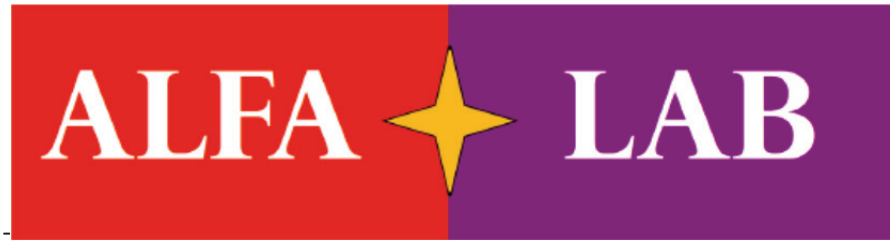


Galaxy

Teacher's Manual

2020 Revision

Program Developer

Teresa Roe

Authors

Ann Maouyo, Crystal Spring, and Genevieve Joyce Hamer

Graphic Design

Maria Garriott and Gregg M. Howell

Everyone Graduates Center
Center for Social Organization of Schools
Johns Hopkins University School of Education
2800 N. Charles Street, Suite 420
Baltimore, Maryland 21218

410-516-8800 telephone

410-516-8890 fax

http://every1graduates.org/

This publication was made possible, in part, by funding from the U.S. Department of Education, Institute of Education Sciences, Grant # R305A180154. This publication reflects the views of its authors. It does not necessarily reflect the opinions of (or have the endorsement of) the U.S. Department of Education.

Table of Contents

Teaching the ALFA Lab

The ALFA Lab is designed to improve reading achievement and increase the independence of struggling adolescents to enable them to successfully meet the literacy requirements of high school courses. It specifically aims to strengthen and build students' skills in the following areas:

- Fluency: the ability to read smoothly and accurately
- Vocabulary: familiarity with high school level content vocabulary
- Comprehension: the ability to make meaning of written texts
- Confidence: self-perception as an effective reader and one who can surmount difficulties
- Autonomy: the ability to take responsibility for one's own learning

The ALFA lab course components were established and various activities developed to target these objectives using multiple approaches to strengthen students' reading skills and confidence. These components, incorporated throughout the activities described on the following pages, include:

Reading Strategies

- explicit instruction with teacher modeling to promote independent, flexible use of strategies

Comprehension

- direct reading instruction emphasizing text-based comprehension skills
- activities that require students to examine vocabulary in the context of reading

Vocabulary

- explicit instruction connecting vocabulary to meanings: pre-teaching vocabulary prior to reading; highlighting vocabulary in context during reading; reflecting on vocabulary after reading
- independent and collaborative activities to reinforce word knowledge and understanding of word structure
- ongoing activities that incorporate vocabulary encountered in core text
- regular practice with high frequency words and high school level content vocabulary

Writing

- construction of written responses to open-ended questions relating to the text
- use of writing prompts that require students to write for a variety of purposes
- use of the computer to compose writing samples

Fluency

- exercises with high frequency words that reinforce word recognition and automaticity
- ongoing practice reading aloud in low-stakes, low-pressure contexts, such as partner reading

Technology

- use of technology for researching information
- use of technology to apply knowledge and reinforce skills previously introduced

ALFA Lab Components

The Accelerating Literacy For Adolescents or ALFA lab builds and strengthens literacy skills necessary to help students become successful, life-long readers and writers. Students work in small groups daily to receive targeted, guided reading instruction and to reinforce and apply word knowledge, fluency, reading and writing skills.

Daily Launch (whole group)

Primary purposes:

- To provide necessary information/directions for activities
- To provide relevant background information (optional)

Activities:

- Students engage in "Do Now" warmup activities.
- Teacher sets a purpose and introduces designated activities.
- Teacher facilitates a brief whole group activity.
- Teacher uses technology to build and/or enhance students' prior knowledge.

Satellite Stations (small group instruction): Main Station, Wordology, Collaboration Station, Media Madness

Main Station (guided reading activity with teacher)

Primary purpose:

- To guide students into, through, and beyond reading selections from the core text

Station Activities:

- Teacher introduces text by activating prior knowledge, introducing key words (Vocabulary Words), and/or building background knowledge.
- Teacher facilitates/guides students through reading the core text.
- Teacher models effective use of reading strategies by pausing at strategic points in the text to facilitate book talk, strategy use, application, and meaningful connections to the text.
- Teacher identifies and encourages student use of strategies included on the Strategy Navigator chart posted near the Main Station instructional area.
- Teacher models use of instructional/learning tools such as graphic organizers.
- Teacher supports and provides opportunities for the students to engage in activities that will reinforce text-based comprehension.

Please note: At each of the satellite stations, students complete a short written assignment or paper-based activity (reproducible activity sheets for each two-day instructional cycle are provided in this manual). Completion of assignments is an important component of individual grades for the lab. After completing their assignment for each station, students should use the remaining time for instruction-

related activities made available to them, such as recommended educational games, related independent reading of materials in the classroom library or preloaded on student tablets, listening to books on tape, or researching information for their final unit projects.

Wordology (small group activity)

Primary purposes:

- To reinforce word knowledge
- To provide meaningful and relevant activities that will increase students' exposure to age- appropriate vocabulary
- To provide hands-on activities to engage and reinforce students' knowledge of the structure of words

Station Activities:

- Students work with peers or individually to complete activities that facilitate the recall and application of word parts, word meaning, and vocabulary in context, particularly the vocabulary words. Students **choose among several activity sheets** provided for each instructional cycle.
- Students write and share Meaningful Sentences for vocabulary words.
- Students play games that exercise their vocabulary knowledge, particularly Scrabble™ and You've Been Sentenced™.

Collaboration Station (small group activity)

Primary purpose:

- To engage students in activities that will require them work collaboratively to construct and apply knowledge

Station Activities:

- Students work in small peer groups or with reading partners to read and respond to text-based questions; organize text information; use graphic organizers; examine vocabulary in the context of reading; construct written responses; and complete specific writing tasks.

Media Madness (small group activity)

Primary purposes:

- To integrate literacy skills (listening, reading, writing, viewing)
- To strengthen fluency

Station Activities:

Students work in small peer groups and individually to:

- Use the Internet to research information to complete specific tasks
- Listen to recorded readings and respond to text-related questions. Students are encouraged to return to the text and reread for details.
- Engage with media and exercise critical thinking skills
- Create products intended for different audiences and purposes

Enrichment Activities

Primary purposes:

- To stimulate student motivation
- To help students connect reading content to real-world experiences

Possible options:

Teachers can enhance students' experiences immeasurably by scheduling an out-of-sequence enrichment opportunity, such as a field trip, guest speaker, or virtual museum tour at some point during the unit. Here are some possible options; feel free to identify others, depending on your local resources.

- A field trip or virtual tour of a planetarium or space museum
- A guest speaker with expertise in a related field (e.g., a space scientist, engineer, or science fiction writer)

Final Project

Primary purposes:

- To offer students an opportunity to develop research and communication skills
- To engage students in higher-order thinking and problem-solving
- To help students take responsibility for learning

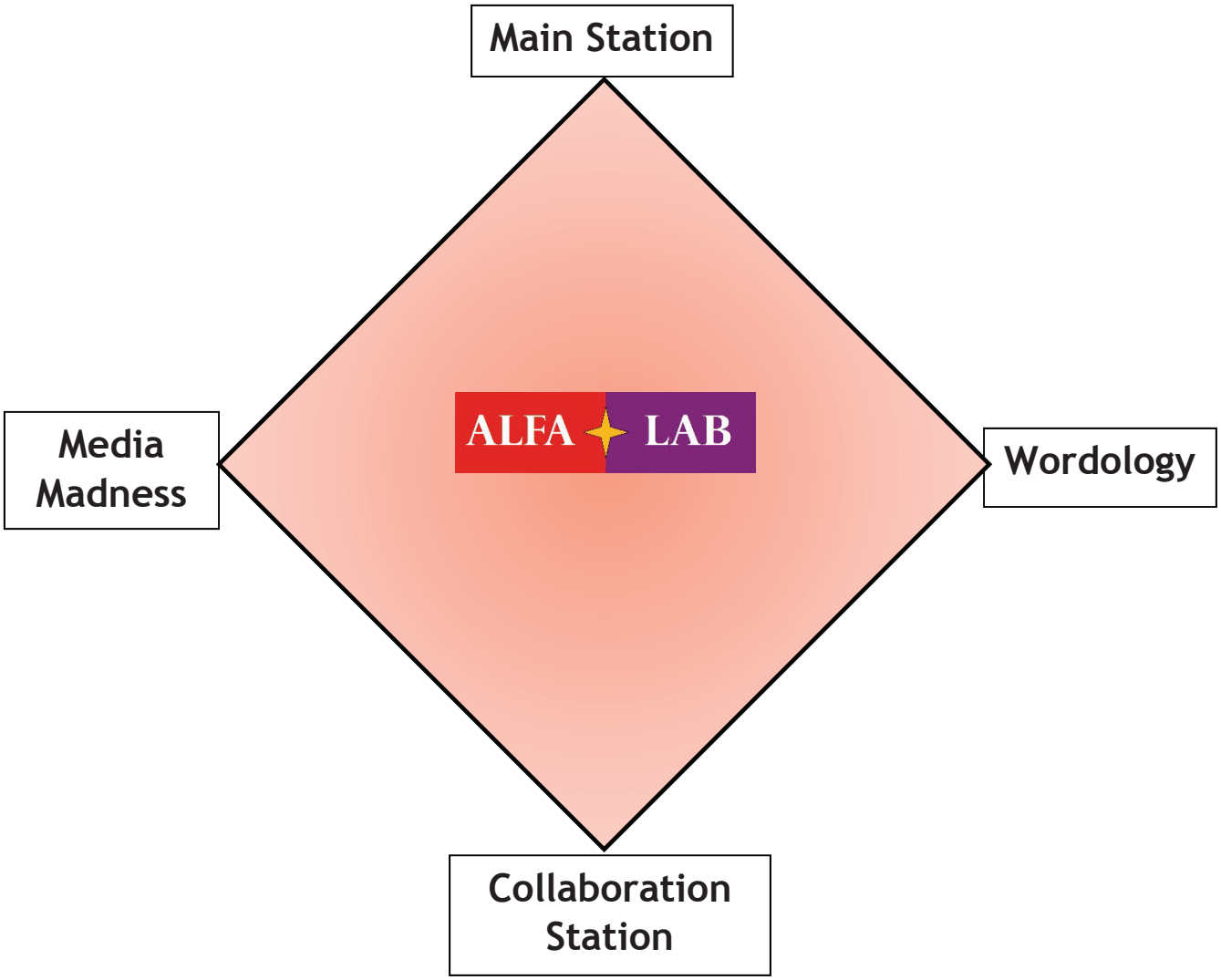
Organizing the final project:

Teachers should monitor students' progress on final projects closely. When students begin exploring possible topics and formats for their projects, note their selections in a log. Be attentive to the possibility that most students may gravitate to one presentation format (e.g., a digital presentation) and encourage them to consider other options.

- You may want to show pictures of various types of past presentations.
- Help overcome possible obstacles—for example, provide materials and/or suggestions for students who want to create diorama or museum displays; or poster board for students to create posters.

You should feel free to propose other types of projects and/or topics. If you choose to do so, determine the steps needed and create a "Guide Sheet" and a rubric for each additional project type added. (Please note: All projects should include some writing practice.)

ALFA Rotations



Scheduling the Rotations

Class periods in most high schools today range from 50 to 70 minutes in length. Where this is the case, students will rotate to two stations each day that they are scheduled for ALFA lab, completing the four stations in a two-day "instructional cycle." A new Daily Launch is provided for each of the two days, but the activities in the Main Station and satellite stations will repeat over two days to allow all students to participate in the same activities. Ten minutes are allotted for each Daily Launch; station rotations are allotted 20-30 minutes depending on the total amount of time in the class period. View a sample rotation schedule below.

Please note that suggestions for additional activities are included for schools with longer (e.g., 25-30 minute) station rotations, particularly for the Main Station. It is important to ensure that students do not have extra time on their hands or become bored at the stations. If you notice that most students are finishing the activities too quickly, augment the assignment at each station so that this does not occur. For example, enough Wordology vocabulary exercises are provided for each student to complete two activities in a rotation should this be needed. You can also create additional Collaboration Station and Media Madness activities if necessary.

Another way to ensure that students do not become bored at stations is providing sufficient extra materials at each station for them to use when they complete activities. Several games should be available at the Wordology station and a well-stocked classroom library at the Collaboration Station; if students are using individual electronic devices (e.g. tablets), these should be pre-loaded with appropriate supplemental readings for them to browse. The instructional assistant will play a key role in making sure that students are productively engaged in fun learning experiences at the Wordology, Collaboration, and Media Madness stations.

Time Slot	Team A	Team B	Team C	Team D
Day 1				
10 minutes	**++ All students participate in whole class Daily Launch ++**			
25 minutes (1st rotation)	**Main Station**	**Wordology**	**Collaboration Station**	**Media Madness**
25 minutes (2nd rotation)	**Wordology**	**Collaboration Station**	**Media Madness**	**Main Station**
Day 2				
10 minutes	**++ All students participate in whole class Daily Launch ++**			
25 minutes (3rd rotation)	**Collaboration Station**	**Media Madness**	**Main Station**	**Wordology**
25 minutes (4th rotation)	**Media Madness**	**Main Station**	**Wordology**	**Collaboration Station**

Please note that in subsequent two-day instruction cycles, the starting point for different teams should also be rotated. If Team A starts at the Main Station for the first rotation on Day 1, a different team (for example Team B) should start at the Main Station for the first rotation on Day 3.

If class periods are longer than 70 minutes (e.g., 90-minute periods), students may rotate to all four stations each day, with 20 minutes per rotation (4 x 20 = 80 minutes, plus ten minutes for the Daily Launch = 90 minutes). Station rotations should not be longer than 30 minutes so that students remain engaged in the activities offered.

Roles in the ALFA Lab

The ALFA Lab Teacher

The ALFA Lab teacher plans and facilitates the ALFA Lab. The teacher's role is tutorial in nature and aims to engage students through daily interactions and ongoing collaboration. The ALFA Lab teacher facilitates interactive reading promoting use of reading comprehension strategies.

Whole Class Support

The ALFA Lab teacher creates and follows an instructional framework with lesson plans and activities for each station in the lab. Lessons include activities for multiple groupings of students based on needs, targeted skills, strategies, and assessments. Each instructional cycle includes specific activities for Main Station, Wordology, Collaboration Station, and Media Madness; the teacher also plans and facilitates the introductory Daily Launch, and the Main Station. Suggested activities for each two-day instructional cycle are included in this manual. However, the teacher should review these activities ahead of time and may modify or replace proposed activities based on students' needs and interests.

Lessons and activities should include a wide variety of learning strategies with a high level of student engagement which targets students' use of before-, during-, and after-reading strategies; fluency and text-based comprehension strategies; and oral and written responses. ALFA Lab lessons should provide opportunities for immediate feedback to students.

The teacher groups students into small learning teams based on reading skill levels, areas of need, vocabulary and comprehension levels, classroom teacher input, and objective and subjective assessments. The teacher can regroup student teams throughout the unit to accomplish instructional goals as necessary. The teacher may want to assign individual roles or responsibilities to team members, or lead students in choosing roles (e.g. time keeper, participation leader, cleanup, desk organizer…)

The ALFA Lab teacher communicates with the lab assistant about lesson planning, student grouping, and lesson plan facilitation. The ALFA Lab teacher regularly discusses students' needs and progress with the ALFA Lab assistant and students' classroom teachers.

Individual Support

The ALFA Lab Teacher may want to maintain assessment folders for each student if ongoing classroom-based student assessments are being conducted. If necessary, the ALFA Lab teacher directs the ALFA Lab assistant to work with individual students for additional instructional support as needed, based on observations and assessment data.

The ALFA Lab teacher collaborates with the regular classroom teacher on an ongoing basis regarding individual students' instructional needs and targets. During the planning stages, it is highly encouraged that the lab teacher's daily schedule allow for ongoing opportunities to provide additional support in ninth grade English classes.

The ALFA Lab Assistant

The ALFA Lab assistant's role is supportive; he or she works with students as they engage in the lab satellite stations by monitoring progress, helping students understand their tasks and modeling as necessary. The assistant rotates among learning teams and provides ongoing technology assistance. The assistant may support the teacher with organizing assessment records and student work folders; he or she may conduct informal assessments as directed by the lab teacher. The assistant plans with the ALFA Lab teacher and plays an active role in accomplishing instructional goals.

Whole Class Support

The ALFA Lab assistant supports classroom instruction by facilitating guided and independent practice, silent reading, partner reading and oral reading. The assistant uses instructional tools and techniques as indicated by the ALFA teacher and provides immediate feedback to encourage student engagement. He or she increases students' use of before-, during-, and after-reading strategies, fluency and comprehension strategies, and oral and written responses.

The lab assistant establishes and reinforces with students operating procedures for satellite center activities. He or she serves as the official timekeeper for lab rotations by setting the timer for each rotation and signaling students with three-minute and five-minute warnings. The assistant should provide assistance as needed to students at the Wordology, Collaboration, and Media Madness Stations, since the lab teacher will be fully engaged in providing instruction at the Main Station. For example, if students complete their chosen Wordology activity early, the lab assistant should remind them to use the time to compose Meaningful Sentences or play vocabulary games.

The assistant organizes lab materials and equipment and distributes, collects, and reviews student work folders. He or she monitors a "work in progress" folder for each student. These folders remain in the lab; students pick them up at the beginning of class and return them to the designated location at the end of class. The lab assistant should ensure that students place completed activity sheets in their folders at the end of rotations for the Wordology, Collaboration, and Media Madness stations. Student folders contain both completed and incomplete work. Students' independent project resources should also be placed in the folders as they are acquired.

Targeted Intervention Support

The ALFA Lab assistant helps individual students who may require additional support and collaborates with the ALFA Lab teacher regarding individual student needs to meet instructional targets. The lab assistant should monitor students on a regular basis and note any significant observations to share with the teacher.

Vocabulary Instruction

Research suggests that vocabulary knowledge is one of the most important forms of background knowledge, since vocabulary can serve as the connection between new and prior information.[1] As part of Main Station activities, teachers introduce vocabulary words selected from the reading texts. The vocabulary words for each instruction cycle may be posted on a Word Wall, and teachers should prepare a display that includes a student-friendly definition for each word (definitions are provided in each cycle's lesson plan). Words and definitions remain posted throughout the instruction cycle.

Before reading

During the Main Station, introduce students to the vocabulary by reading the vocabulary words aloud in order. On a second reading, have students repeat each word after you.

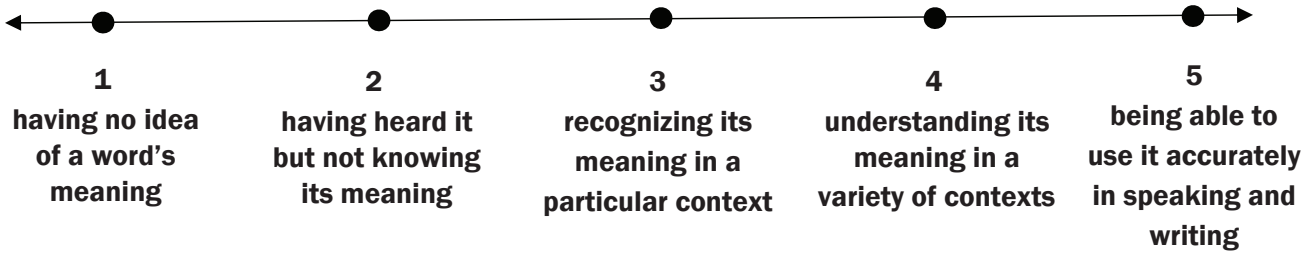
- Ask students if they know the definitions of any words, and confirm correct definitions. For multiple-meaning words, point out definitions matching the way the words are used in the text.
- For words that are entirely unfamiliar, ask students if they recognize parts of the words. Focus on the meanings of prefixes, suffixes, or root words found in unfamiliar words, and help students formulate definitions based upon the meanings of these parts.
- Finally, provide definitions for any words still undefined.

After all words have been introduced:

- Reread them in random order and have students repeat after you.
- Then, pointing to the words in random order, have the students pronounce them without your help. Return to any words students have trouble pronouncing until they can pronounce them correctly.

Students' awareness of each word may fall anywhere along the spectrum shown below.[2]

Vocabulary Awareness Spectrum



[1] See, for example, Robert Marzano's *Building Background Knowledge for Academic Achievement*, Association for Supervision & Professional Development, 2004.

[2] Based on E. Ford-Connors and J. R. Paratore, "Vocabulary Instruction in Fifth Grade and Beyond: Sources of Word Learning and Productive Contexts for Development," *Review of Educational Research*, March 2015, 85:1, p. 52.

Your goal is to move students from their current understanding to level 5: *being able to use the words accurately in speaking and writing*. ***Optional activity:*** If time permits, show students a Vocabulary Awareness Chart with the Vocabulary Words filled in (see example on page 19), copied on chart paper or the white board. For each word, invite students to indicate their current awareness by a show of hands. Note on the chart the number of students who raise their hands for each level.

Research indicates that students learn vocabulary best through being exposed to words in many different contexts.[3] After you introduce the Vocabulary Words (and, if applicable, perform the Vocabulary Awareness Survey), display the Vocabulary Words, along with kid-friendly definitions, that you have prepared in advance. Review prefixes, suffixes, or roots that provide clues to their meaning. Invite students to rephrase definitions in their own words, providing feedback as necessary. If possible, show an appropriate image or demonstrate an action. Demonstrate each word's correct use in a meaningful sentence (examples are provided). Ask students to find clues to its meaning in a sentence. If time permits, work with the class to generate a *different* meaningful sentence for each word, or invite students to proposed meaningful sentences of their own.

In addition to the vocabulary introduction provided at the Main Station, students will develop familiarity with the Vocabulary Words through the Wordology activities, and through reading the selected texts for each instruction cycle.

During reading

To reinforce students' awareness of the words, use them---and encourage students to use them---as much as possible during read aloud/ think aloud demonstrations and classroom discussions. Examine sentences that use the words in the text, and ask students why they think the writer chose that particular word.

After reading

In subsequent sessions, and particularly for texts studied over two full instruction cycles (four days), you can revisit the Vocabulary Awareness Chart with students. Invite them once again to indicate their level of awareness and understanding of each word. If students indicate that they "understand the word every time they hear it" or that they "know the meaning and use it correctly," challenge them to provide a definition or to use the word correctly in a sentence.

Galaxy

Teacher Preparation

This unit focuses on real-life and fictional exploration of the galaxy! Students will continue to build the vocabulary, writing, and speaking skills that they learned in the prior two units.

Prepare the classroom for lab activities. Post helpful reminders near each station (e.g., "Monitoring for Meaning," "Skills Menu," "Menu of Strategies"). Prepare the four stations (Main Station, Wordology, Collaboration Station, and Media Madness) and label them prominently. Each station should have five chairs grouped together, but these should be oriented toward the front of the room for the daily launch. Make sure students have enough room to move around to investigate the four stations. Place Do Now sheets at the classroom entrance with student folders and student activity sheets at each station.

Pre-load the National Geographic video "Solar System 101" at the Media Madness station, as well as the additional optional video for students who finish early.

https://www.youtube.com/watch?v=libKVRa01L8
https://www.youtube.com/watch?v=zR3Igc3Rhfg

Group students into four teams for station activities. Create a card for each team that lists the members assigned to that team; post these four team cards on the board under headings that indicate station areas, so that students can find their places easily. (Shift team starting points on Day 2 so that each team visits all four stations over the course of the two days.)

Prepare a Word Wall with the vocabulary words for Days 1 and 2, as well as a Vocabulary Awareness Chart if you plan to use one (see page 19). You will introduce the words during Main Station instruction, but they should be posted for students to see throughout the unit. You can prepare the definitions ahead of time, but cover them until students have had a chance to propose definitions in their own words.

mass	gravity	surface
axis	alien	habitable
microorganisms	atmosphere	climate
	solar	

Write the Essential Question on a sentence strip and post it prominently in the classroom, near the Main Station:

> What are the benefits and possible drawbacks of humans exploring the galaxy?

Days 1 and 2

Daily Launch Day 1

Whole Group Opening Activity: Accessing Prior Knowledge

Welcome students to the third unit of the ALFA Lab. Make sure all students have picked up their folder and "Do Now" assignments, and have found their places in assigned teams.

After giving students some time to work on the Do Now sheets, ask them to share their responses to the questions: What do you already know about outer space? What do you want to learn in this unit?

If necessary, re-familiarize students with the format of the ALFA lab:

- Each lab class will begin with a brief "Daily Launch" in which the entire class participates in an opening "Do Now" activity and works together on some introductory skill or knowledge building.
- Then the teams will work at the different stations for approximately 20-30 minutes per station. Each team will visit two stations a day, and will go to the other two stations the following day. (In schools with 90-minute class periods, teams will rotate to all four stations each day.)
    - The Main Station is like a train station, with the teacher as conductor to get each team "on board" and assist students in exploring texts and developing good reading strategies.
    - "Wordology": Students will work individually or with a partner to solve word puzzles and play word games while building their confidence in using the vocabulary words.
    - Collaboration Station: Students will work in teams to dig deeper into the texts, then flex their writing muscles in response to assignments or prompts.
    - Media Madness: Students will interact with electronic media, which may take the form of a video, an audio recording, or an online (e.g., electronic tablet) reading. They will then engage in an activity in response to the media selection. Towards the end of the unit, the Media Madness station will be used primarily for working on students' unit projects (more information on that topic later!).

After you have answered any questions, have students place Do Now sheets in their work folders, and advise them to begin working in their stations.

Daily Launch Day 1

Do Now: Background Knowledge

Instructions: In the chart below, list three things you know about outer space. Then list three things you want to learn during the *Galaxy* ALFA lab unit.

Three things I know about outer space	Three things I want to learn about space
1. _____	1. _____
2. _____	2. _____
3. _____	3. _____

Daily Launch Day 2

Whole Group Opening Activity: Popular Media

Welcome students back to the ALFA Lab. Point out good practices from the day before and make suggestions for ensuring time is used productively. Remind students of the plan for the day.

Ask students to share responses from the Do Now sheet, which asked them to reflect on movies, games, or shows that have futuristic settings in outer space (e.g. *Star Wars, Battlestar Galactica, Star Trek, Gravity, Black Mirror, The Martian, Interstellar*).

- Follow-up questions might include: Do you think these fictional plots could happen in real life? Do those settings seem like better places to live than current-day Earth? Why or why not?

With additional time, review key concepts that may have been covered yesterday:

- What's the difference between a solar system and a galaxy? Which is bigger?
- What is the name of the galaxy to which Earth belongs?
- What is a planet?
- What is an asteroid?
- Are other planets habitable?

Daily Launch Day 2

Do Now: Popular Media

Instructions: Reflect on the question below about popular media and answer the question in the space provided. Try to remember what you've seen or heard about outer space!

Think about movies, games, or shows that you have seen with settings in outer space (such as *Star Wars, The Avengers, The Orville, Guardians of the Galaxy,* or *The Martian*). List some ways those settings were different from Earth.

_____

_____

_____

_____

_____

_____

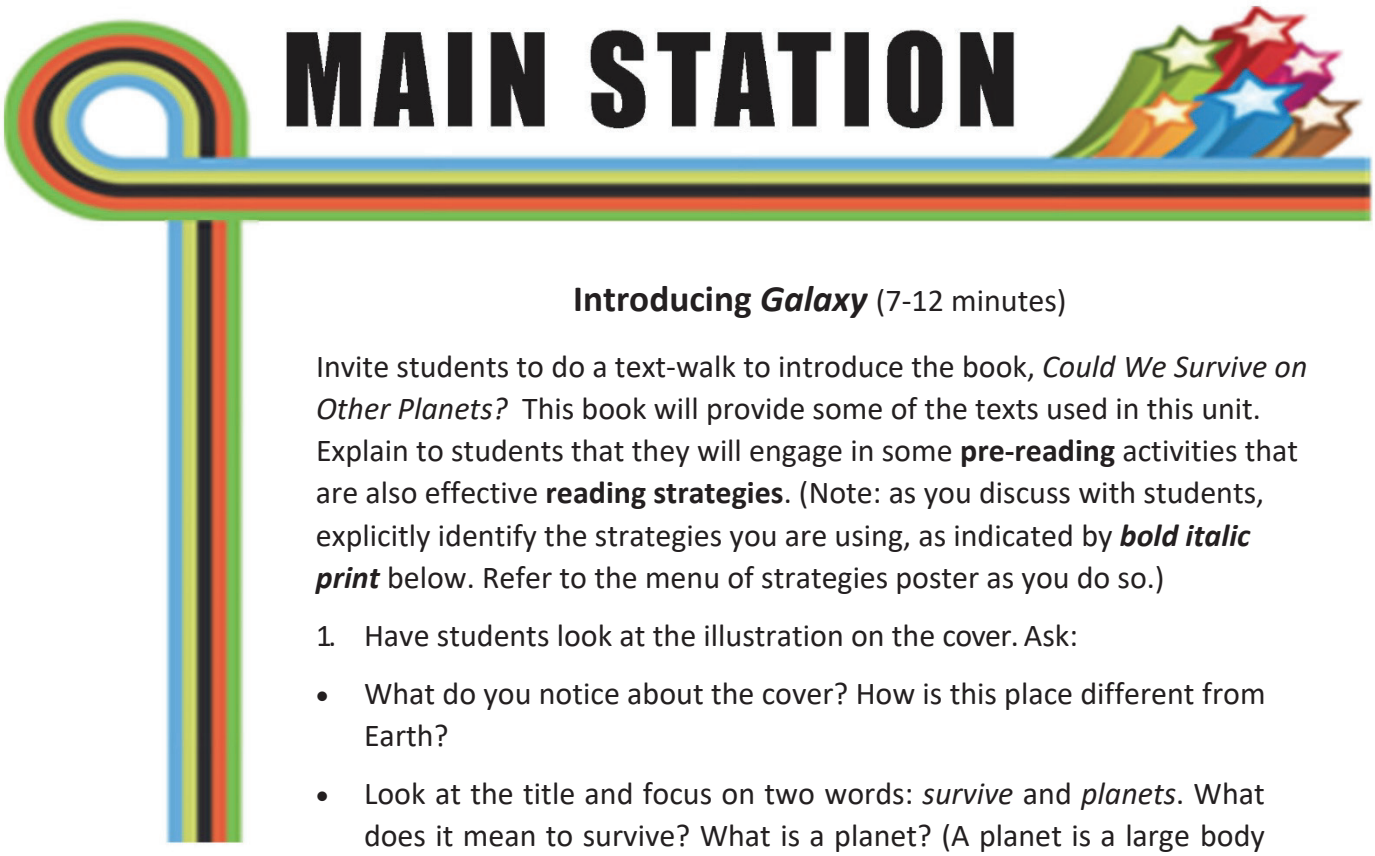
_____

_____

_____

_____

_____



Introducing *Galaxy* (7-12 minutes)

Invite students to do a text-walk to introduce the book, *Could We Survive on Other Planets?* This book will provide some of the texts used in this unit. Explain to students that they will engage in some **pre-reading** activities that are also effective **reading strategies**. (Note: as you discuss with students, explicitly identify the strategies you are using, as indicated by ***bold italic print*** below. Refer to the menu of strategies poster as you do so.)

1. Have students look at the illustration on the cover. Ask:

- What do you notice about the cover? How is this place different from Earth?
- Look at the title and focus on two words: *survive* and *planets*. What does it mean to survive? What is a planet? (A planet is a large body orbiting around a star. For example, Earth orbits the Sun.)

2. Ask students to read the selection titles on the Contents page. Ask them:

- Which titles sound interesting to you?
- What words in these titles are unfamiliar to you?
- Do you know the answers to any of these questions? (All of the "chapter" names are questions.)

3. If time permits, invite students to leaf through the book. Ask them to comment on what they notice.

- How is this book similar to or different from other books you have read?
- What kinds of pictures are included? (Photographs? Artists' drawings? Some of each?)
- Do you think this book includes factual, real-life information, or fiction (made-up information)? Why?

Introduce the Essential Question (3-5 minutes)

Explain to students that as they read the texts included in the *Galaxy* unit, they will be thinking about bigger questions that are important for society to consider. The main or Essential Question for the unit is, **"What are the benefits and possible drawbacks of humans exploring the galaxy?"** Call students' attention to the sentence strip on which you have posted the

Essential Question. Ask students whether they know the meaning of the words "benefit" and "drawback," and explain these if necessary. Invite students to rephrase the question in their own words. Tell students that you will explore this question—as well as possible answers—over the course of the unit.

Introduce the Vocabulary (10-15 minutes)

Introduce students to the vocabulary words, following the guidance provided under "Vocabulary Instruction" (pages 9-10). Read the list aloud from the Word Wall posted, pointing to each word as you pronounce it.

mass	gravity	surface
axis	alien	habitable
microorganism	atmosphere	climate
	solar	

On a second reading, have students repeat each word after you. Ask students whether they know the definitions of any words, and confirm correct definitions. If the words are unfamiliar, ask students whether they recognize parts of the words. Then, display the kid-friendly definitions you have prepared. Point out words that have multiple meanings (alien, atmosphere, surface).

GLOSSARY OF VOCABULARY WORDS

mass – the amount of material in an object; the weight

axis – an imaginary center line that an object spins around (similar to an axle in a wheel)

microorganism – a living thing too small to be seen without a microscope

gravity – the attractive force that draws objects together (for example, making things fall)

alien – someone belonging to a foreign country; also, something unfamiliar or strange

atmosphere – the mix of gases around a planet; also, the general mood or feel of a place

solar – having to do with the sun

surface – the outside part of something; also, the outward appearance

habitable – safe to live in

climate – general weather conditions

Discuss each word with students; use words in sentences that show their meaning ("Meaningful Sentences"; see examples below). Invite students to propose sentences as well. Remind

students that they are to compose their own Meaningful Sentences as time allows at the Wordology Station.

(**Note**: The vocabulary words listed above will recur throughout the unit. Students are not expected to master them in the first two days. Rather, you are introducing them to words and concepts that will be reinforced over many lessons.)**Sample Meaningful Sentences**

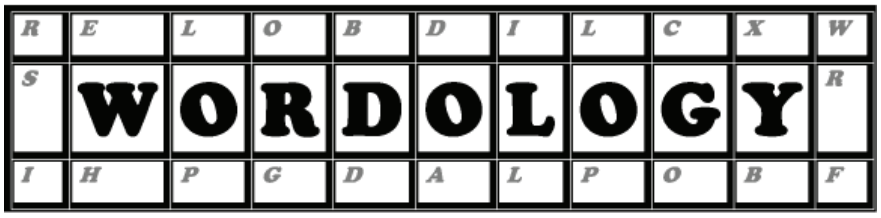
1. A large rock has a lot more **mass** than a pillow that is the same size.
2. A chicken in a rotisserie oven turns slowly on an **axis** so that it cooks evenly on all sides.
3. Scientists use microscopes to identify **microorganisms** that could make people sick.
4. The **solar** panels on our school's roof capture the sun's energy and change it to electricity.
5. After the balloon loses enough helium, the force of **gravity** will make it fall to the ground**.**
6. Some scientists believe we are not alone in the universe—there might be **alien** life out there somewhere.
7. The Earth's **atmosphere** includes many different gases, some of them good for humans and others harmful.
8. This solution only gets at the **surface** of the problem; it doesn't deal with the real issues deeper down.
9. Not many people live in Antarctica because it is too cold to be **habitable**.
10. During the winter, people like to vacation in places with a warm **climate** so they can enjoy the sun.

Additional Activities for Schools with 30-minute Stations

- Extend your discussion of the Essential Question.
- When students repeat Vocabulary Words after you, show them the Vocabulary Awareness Chart (next page), copied on chart paper or the white board. For each word, invite students to indicate their familiarity with the word by a show of hands. Note on the chart how many students raise their hands for each level. You can revise the number cumulatively to reflect the class total as the different teams move through the Main Station. You can revisit this chart from time to time as the unit progresses to evaluate students' growing understanding of the word, and their accuracy and skill in using them.
- After presenting each Meaningful Sentence, ask students to help you think of other possible Meaningful Sentences that showcase the meaning of the word in question.

Vocabulary Awareness Chart

	Never heard it; no idea what it means	I've heard it, but I don't understand it	I understand it some of the time when I hear it.	I understand it every time I hear it.	I know the meaning and I use it correctly.
mass					
axis					
microorganism					
gravity					
alien					
atmosphere					
solar					
surface					
habitable					
climate					



Wordology Activity #1: Vocabulary Scramble

Instructions: Unscramble the letters to find words that fit in the boxes. All the words come from the Word Bank at the bottom of the page.

1. **The gases that surround a planet are called its _____.**

   eeratspomh

2. **With a roar the rocket escaped the pull of _____ and headed into space.**

   vigaryt

3. **The ice skater spun faster and faster around an imaginary _____.**

   isxa

4. **To scratch the _____ means to barely touch a big issue.**

   cefsrua

5. **Mom wiped the table with bleach to kill the _____.**

   scongamorimisr

6. **The _____ of that region is dry and scorching.**

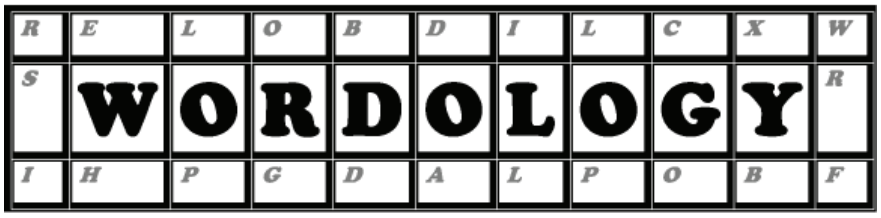
   mteaicl

7. **Scientists hope to make Mars _____ one day.**

   atelhaibb

Word Bank

axis	solar	habitable	atmosphere	microorganisms
gravity	climate	surface	alien	



Wordology Activity #1: Vocabulary Scramble (Teacher Key)

Instructions: Unscramble the letters to find words that fit in the boxes. All the words come from the Word Bank at the bottom of the page.

1. The gases that surround a planet are called its _____.

eeratspomh | A | T | M | O | S | P | H | E | R | E |

2. With a roar the rocket escaped the pull of _____ and headed into space.

vigaryt | G | R | A | V | I | T | Y |

3. The ice skater spun faster and faster around an imaginary _____.

isxa | A | X | I | S |

4. To scratch the _____ means to barely touch a big issue.

cefsrua | S | U | R | F | A | C | E |

5. Mom wiped the table with bleach to kill the _____.

scogamorimicsr | M | I | C | R | O | O | R | G | A | N | I | S | M | S |

5. The _____ of that region is dry and scorching.

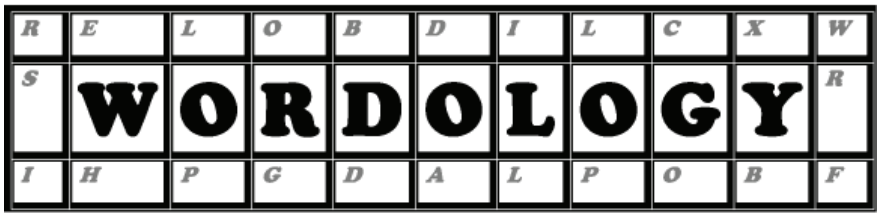
mteaicl | C | L | I | M | A | T | E |

6. Scientists hope to make Mars _____ one day.

atelhaibb | H | A | B | I | T | A | B | L | E |

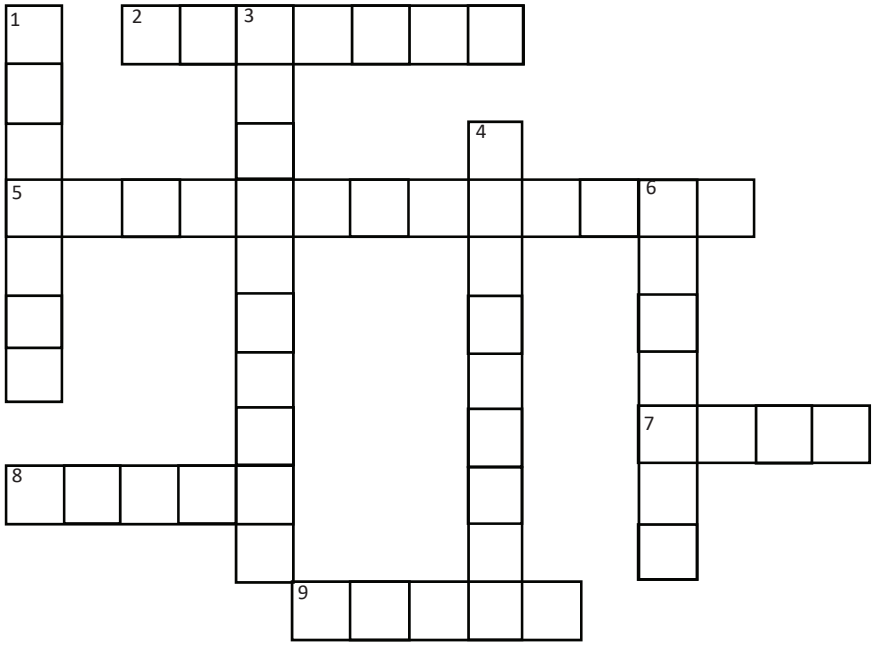
Word Bank

axis	solar	habitable	atmosphere	microorganisms
gravity	climate	surface	alien	



Wordology Activity #2: Galaxy Crossword

Instructions: Choose words from the Word Bank to complete this puzzle. The clues will help you decide which words fit in which spaces.



Clues

Across

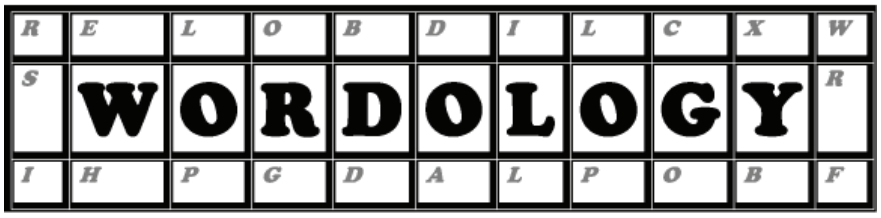
2. the reason why things fall down
5. it's alive but too tiny to see
7. imaginary center line of a spinning object
8. about the sun
9. from a different place

Down

1. weather conditions
3. gases surrounding a planet
4. you can live there
6. only skin-deep

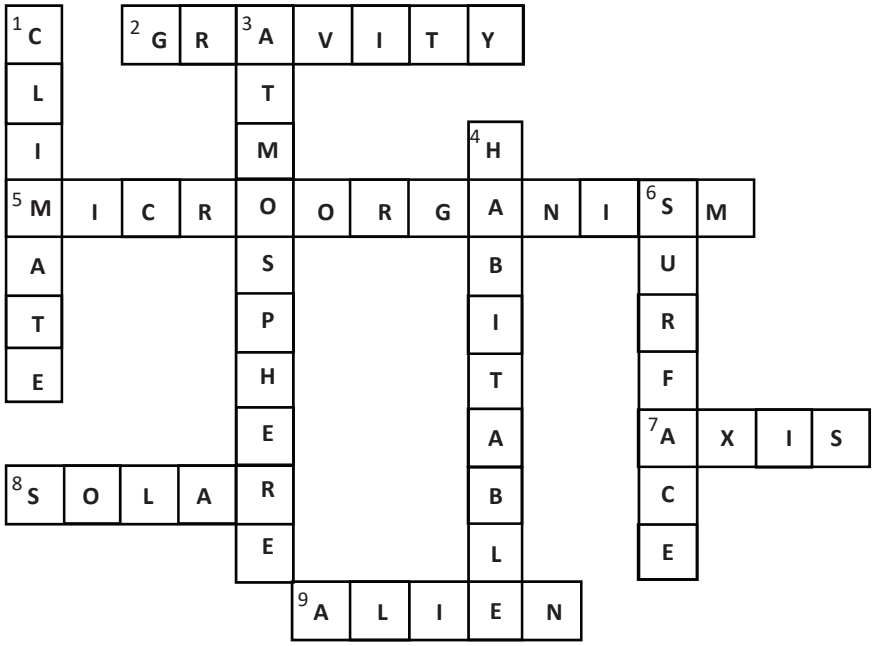
Word Bank

axis	solar
habitable	gravity
atmosphere	climate
surface	alien
microorganism	



Wordology Activity #2: Galaxy Crossword (Teacher Key)

Instructions: Choose words from the Word Bank to complete this puzzle. The clues will help you decide which words fit in which spaces.



Clues

Across

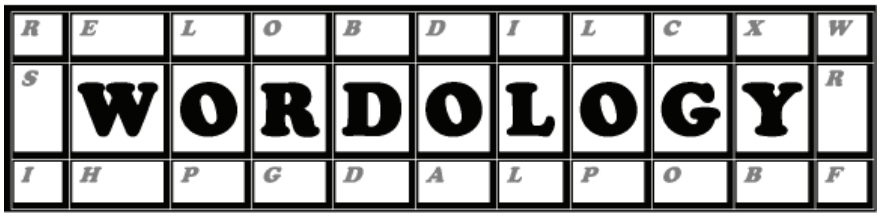
2. the reason why things fall down
5. it's alive but too tiny to see
7. imaginary center line of a spinning object
8. about the sun
9. from a different place

Down

1. weather conditions
3. gases surrounding a planet
4. you can live there
6. only skin-deep

Word Bank

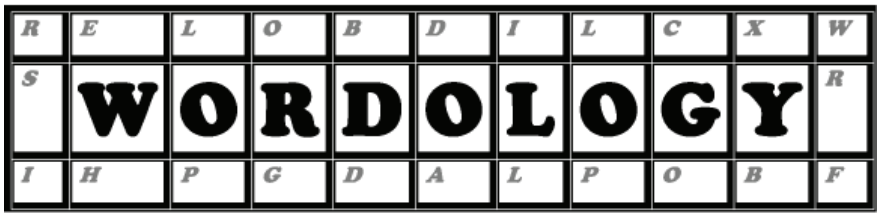
axis	solar
habitable	gravity
atmosphere	climate
surface	alien
microorganism	



Wordology Activity #3: Using Vocabulary Words

Answer the guide questions in complete sentences. Be sure to include the vocabulary word in your answer.

Vocabulary Word	Guide Question	Complete Sentence
1. **gravity**	How does **gravity** affect us in daily life?	
2. **atmosphere**	Why is it important for the **atmosphere** to be free of smoke and pollution?	
3. **solar**	What kind of energy do **solar** panels use?	
4. **habitable**	Describe some features that make our Earth **habitable**.	
5. **climate**	Describe the **climate** where you live right now.	



Composing Meaningful Sentences

If you complete your chosen Wordology activity, take the remaining time at this station to write Meaningful Sentences using the vocabulary words listed below. (Remember, a Meaningful Sentence is a sentence that shows that you know what the word means!) Read and discuss your sentences with your teammates.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

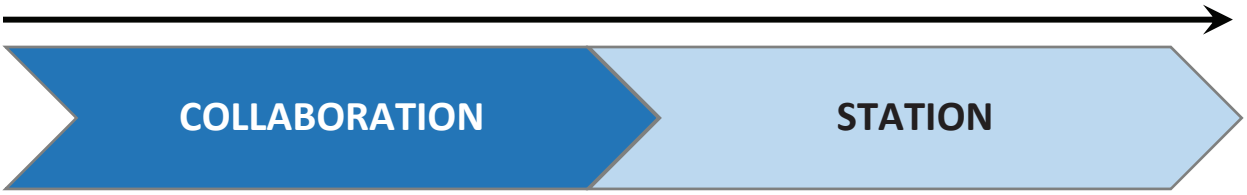
_____

_____

_____

Word Bank

axis	solar	habitable	atmosphere	microorganisms
gravity	climate	surface	alien	



Galaxy Text Walk

Instructions: Look at the cover of the book *Could We Survive on Other Planets?* Open it and flip through the pages. Look at the book as you **read and discuss these questions** with your team. After you talk about all the questions, **write your own answer** under each question.

1. Find one thing in the book—a picture or a statement—that you've already seen or heard about. What is it?

_____

_____

_____

_____

2. Find one thing that is new to you and that you want to learn more about. What is it? Why do you want to learn more about it?

_____

_____

_____

_____

3. What do you like or dislike about the way this book is put together?

_____

_____

_____

_____

Media Madness

Media Madness

Instructions: Watch the video at the link below on your device (tablet or laptop, depending on your teacher's instructions). Turn on the subtitles for fluency practice. Take notes in the chart below!

https://www.youtube.com/watch?v=libKVRa01L8

"Solar System 101" by National Geographic:

The Milky Way and our solar system

Three facts I learned:

1. _____
2. _____
3. _____

Planets in our solar system

Six facts I learned:

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____

If you finish the assignment, you may want to view this video as well:

https://www.youtube.com/watch?v=zR3Igc3Rhfg

Days 3 and 4

Teacher Preparation

Post team cards (with member students listed) under headings to show the station where each team is to start. The text used will be *Could We Survive on Other Planets?*

Post the vocabulary words:

orbit	circular	breathable
galaxy	asteroid	reality
evolved		rehydrate

Pre-load the video for the Media Madness station: "How Long Would It Take to Get to the Nearest Habitable Planets?" by The Infographics Show:

https://www.youtube.com/watch?v=YVBjrJX2Y78

Post the guiding question for this section of the unit:

What necessary conditions do humans need to live good lives?

Daily Launch Day 3

"Could People Live on Other Planets?"
Whole Group Opening Activity: Survival vs. Happiness

All students should have picked up their folders and Do Now. Remind students of the plan for the day.

Ask students to share responses from the Do Now sheet, on which they reflected on the difference between what humans need for basic survival (e.g. food, water) and other things that help them live life to the fullest (e.g. friends, entertainment, transportation). A follow-up question might be:

- Would family fall under the category of basic survival or not? Why? If we built a colony on a different planet, what would it need to offer for you to want to move there?

With additional time, review material from the first two days. For example, ask students to share what they learned from the National Geographic video in the Media Madness station using their notes.

Finally, introduce the **Guiding Question** for students to consider as they read selections from *Could We Survive on Other Planets?* over the next few days.

What necessary conditions do humans need to live good lives?

Daily Launch Day 3

Do Now: Survival vs. Happiness

Instructions: On the left side of the chart below, write down things you think humans need for basic survival. On the right side, write other things humans like to have that make their lives enjoyable.

What basic things do humans need to live?	What other things help to make human lives happy?
•	•
•	•
•	•
•	•
•	•

Daily Launch Day 4

Whole Group Opening Activity: Would You Move to Mars?

All students should have picked up their folders and Do Now. Remind students of the plan for the day.

Ask students to share responses from the Do Now sheet, about the benefits and drawbacks of moving to Mars without knowing anyone else who was going. Ask about their final decisions and encourage a conversation between students.

With additional time, return to the Guiding Question:

What necessary conditions do humans need to live good lives?

Have students discuss whether their answers to the question of whether they would move to Mars differ based on their ideas of how to answer this Guiding Question.

Daily Launch Day 4

Do Now: Would You Move to Mars?

Instructions: Read the scenario and then list the benefits and drawbacks of moving to Mars in the chart below.

Scenario: The company SpaceX has announced that it's ready to set up its first colony on Mars for just 200 people. You have been invited to go, but no one else you know has. What would you do? List the benefits and drawbacks of accepting this invitation in the chart below.

Benefits of Moving to Mars	Drawbacks of Moving to Mars

What is your final decision? Why?

_____

_____

_____

MAIN STATION

"Could People Live on Other Planets?" (pages 4-5, 8-9)

Introduce the Vocabulary Words (10-15 minutes)

Introduce students to the Vocabulary Words following the guidance provided under "Vocabulary Instruction" (pages 9-10). Read the list aloud from the Word Wall posted, pointing to each word as you pronounce it.

orbit	circular	breathable
galaxy	asteroid	reality
evolved		rehydrate

On a second reading, have students repeat each word after you. Ask students whether they know the definitions of any words, and confirm correct definitions. If the words are unfamiliar, ask students whether they recognize parts of the words; as necessary, especially for longer words, walk them through the syllables to assist them in decoding. Then, display your kid-friendly definitions.

VOCABULARY WORDS

orbit – a path that goes around something in a circle

galaxy – millions of stars, gas, and dust held together by gravity

evolved – developed and changed gradually over a long time period

circular – in the shape of a circle

asteroid – a rocky clump in space that is small compared to planets

breathable – safe to breathe in

reality – everything that actually exists

rehydrate – to help someone or something absorb water after being dried out

Discuss each word with students; use words in "Meaningful Sentences" (see examples below). Invite students to propose sentences as well. Remind students that they are to compose their own Meaningful Sentences as time allows at the Wordology Station.

Sample Meaningful Sentences

1. The planet Mercury goes around the Sun on its **orbit** once every three months.
2. The Milky Way is just one **galaxy** among many other huge star systems in the universe.
3. At first this was just going to be a school project, but as the plan **evolved** over time we decided to bring the whole community in on it.
4. The dog walked in a **circular** path around the back yard, and then came back to its starting point**.**
5. The **asteroid** belt is a group of giant rocks floating in space between Mars and Jupiter.
6. Fish can only survive underwater because our air is not **breathable** for them.
7. His crazy ideas are not grounded in **reality**; they seem impossible.
8. The old sponge was dry and stiff as a board, so I had to **rehydrate** it before I could use it.

Read-Aloud, Think-Aloud (10-15 minutes)

Text: "Could People Live on Other Planets?"

Turn to pages 4 and 5 and read the text aloud (omitting the "Hands-On Science" section) as students follow along. Ask students the questions:

- Based on these paragraphs, why might it be misleading to refer to our solar system as "the solar system?" – *There are actually hundreds, maybe millions, of solar systems in our galaxy.*
- Why do you think it is difficult to find a place like Earth if there are so many other planets and solar systems?

Text: "Why Do We Need to Live on Other Planets?"

Now turn to pages 8 and 9 and read the text aloud as students follow along. Model effective reading habits as you read. For example, pause to work out what "gradually" means in the second paragraph, what "conserve" means in the third paragraph, and what "approximately" means in the fourth paragraph. As you "think aloud," explicitly identify the strategies you are using (indicated by ***bold italic print***). Refer to the **menu of strategies** poster as you do so. You may want to focus particularly on **visualizing** as a strategy while reading this text. For example:

- What are humans doing to use up Earth's resources? – ***activate prior knowledge***
- How would an asteroid hitting one part of the Earth affect the whole planet? - ***elaborate***
- To review, what reasons does the author give for us to seek a new place to live? - ***summarize***
- What do you think is the most likely way the Earth could become uninhabitable? - ***predict***

Ask students to share "mind movies" (***visualizations***) of possible situations that could destroy Earth.

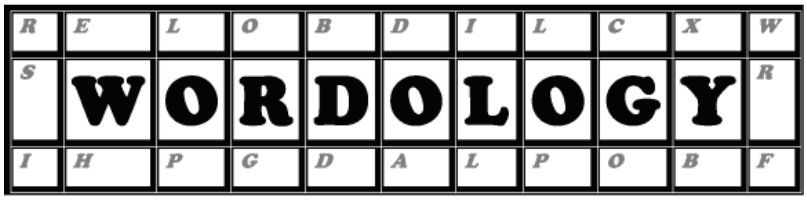
Remind students of the Guiding Question for this section: *What are the necessary conditions for humans to live good lives?* Ask students to suggest possible answers. (It is not necessary to answer this question fully at this time; students will continue to explore this question.)

Additional Activities for Schools with 30-minute Stations

- Extend your discussion of the Essential Question.
- Invite students to evaluate the arguments in the section "Why Do We Need to Live on Other Planets?" by identifying the author's assumptions. For example:
  - *How likely is it that we find another planet offering more/ better food and energy resources than we have on Earth?*
  - *Would identifying other planets we could live on really help us if an asteroid hit Earth? (Asteroids can hit other planets, too!)*
  - *Is preserving our civilization for millions of years a necessary goal?*
- When students repeat Vocabulary Words after you, show them the Vocabulary Awareness Chart, copied on chart paper or the white board. For each word, invite students to indicate their familiarity with the word by a show of hands. Note on the chart how many students raise their hands for each level.
- After presenting each Meaningful Sentence, ask students to help you think of other possible Meaningful Sentences that showcase the meaning of the word in question.
- Revisit the Vocabulary Words from Days 1 and 2, particularly those that students found difficult.

Vocabulary Awareness Chart

	Never heard it; no idea what it means	I've heard it, but I don't understand it	I understand it some of the time when I hear it.	I understand it every time I hear it.	I know the meaning and I use it correctly.
orbit					
galaxy					
evolved					
circular					
asteroid					
breathable					
reality					
rehydrate					



Wordology Activity #1: Vocabulary Scramble

Instructions: Unscramble the letters to find words that fit in the boxes. All the words come from the Word Bank at the bottom of the page.

1. **A circular path around something is called an**

   brito

2. **The ice skater was twirling in a _____ motion.**

   curalcir

3. **Our solar system is one small part of a big _____.**

   xaylga

4. **Video games are a fun way to escape the _____ of everyday life.**

   aytiler

5. **If the air is not _____ you will need a gas mask.**

   tblehaaerb

6. **A giant _____ made of space rock may have hit Earth long ago.**

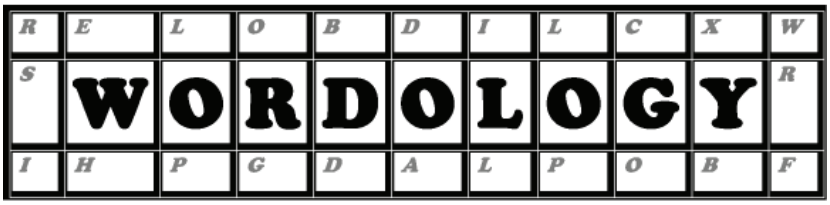
   risadeto

7. **A nurse had to _____ Grandma because she forgot to drink water and became sick.**

   terdyrhae

Word Bank

galaxy	circular	orbit	evolved
asteroid	breathable	reality	rehydrate



Wordology Activity #1: Vocabulary Scramble (Teacher Key)

Instructions: Unscramble the letters to find words that fit in the boxes. All the words come from the Word Bank at the bottom of the page.

1. **A circular path around something is called an**

   brito | O | R | B | I | T |

2. **The ice skater was twirling in a _____ motion.**

   curalcir | C | I | R | C | U | L | A | R |

3. **Our solar system is one small part of a huge _____.**

   xaylga | G | A | L | A | X | Y |

4. **Video games are a fun way to escape the _____ of everyday life.**

   aytiler | R | E | A | L | I | T | Y |

5. **If the air is not _____ you will need a gas mask.**

   tblehaaerb | B | R | E | A | T | H | A | B | L | E |

6. **A giant _____ made of space rock may have hit Earth long ago.**

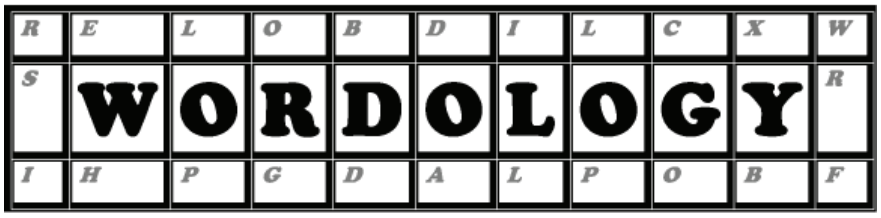
   risadeto | A | S | T | E | R | O | I | D |

7. **A nurse had to _____ Grandma because she forgot to drink water and became sick.**

   terdyrhae | R | E | H | Y | D | R | A | T | E |

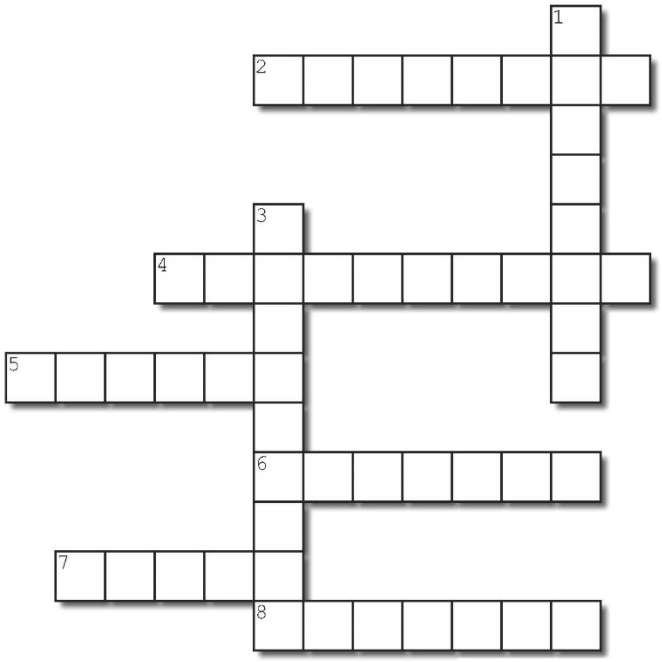
Word Bank

galaxy	circular	orbit	evolved
asteroid	breathable	reality	rehydrate



Wordology Activity #2: Galaxy Crossword

Instructions: Choose words from the Word Bank to complete this puzzle. The Clues box will help you decide which words fit in which spaces.



Word Bank

asteroid	galaxy
breathable	orbit
circular	reality
evolved	rehydrate

Created using the Crossword Maker on TheTeachersCorner.net

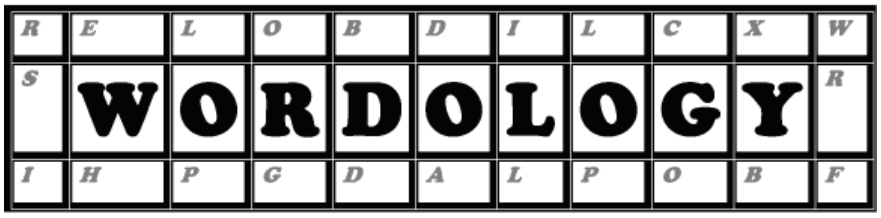
Clues

Across

2. a space rock
4. you can inhale it and live
5. a giant group of millions of stars
6. what actually exists
7. a circular path around something
8. developed and changed over time

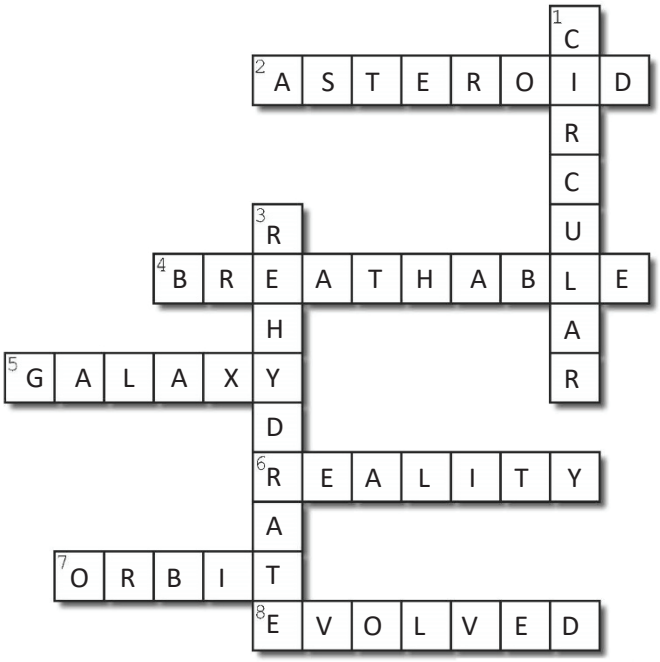
Down

1. round
3. to add water



Wordology Activity #2: Galaxy Crossword (Teacher's Key)

Instructions: Choose words from the Word Bank to complete this puzzle. The Clues box will help you decide which words fit in which spaces.



Word Bank

asteroid	galaxy
breathable	orbit
circular	reality
evolved	rehydrate

Created using the Crossword Maker on TheTeachersCorner.net

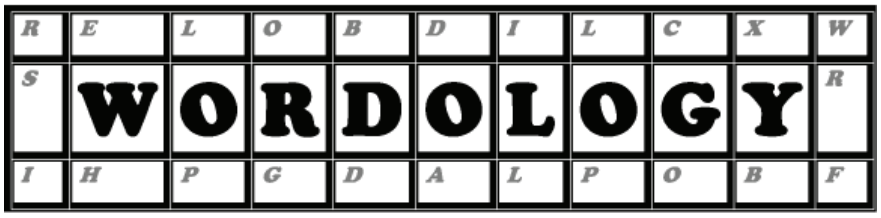
Clues

Across

2. a space rock
4. you can inhale it and live
5. a giant group of millions of stars
6. what actually exists
7. a circular path around something
8. developed and changed over time

Down

1. round
3. to add water



Wordology Activity #3: Find the Planet!

Instructions: Read each definition. Choose a word from the Word Bank that matches it. Write the word and the letter that goes with it in the answer space. When you finish, read down the letter boxes to find another word! One answer has already been filled in for you.

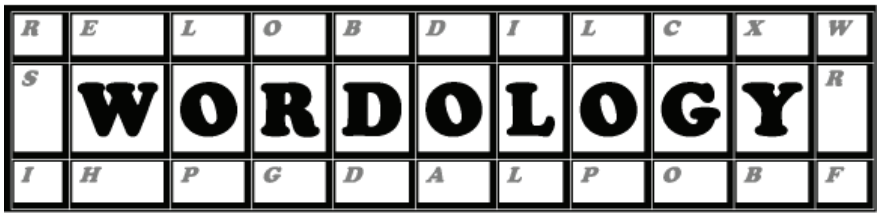
Definitions	**Words and matching letters**	
1. A path around something ……	_____	
2. In the shape of something round……	_____	
3. The world as it actually is ……	_____	
4. Developed over time ……	_____	
5. Something you can breathe in……	____breathable____	T
6. A rocky mass……	_____	
7. Add water ……	_____	

Read down the letters in the boxes on the right side. Which planet name do they spell out? Write it here!

_____

Word Bank

solar - X	orbit - J	galaxy - V	circular - U	evolved - I
asteroid - E	rehydrate - R	breathable - T	reality - P	



Wordology Activity #3: Find the Planet! (Teacher Key)

Instructions: Read each definition. Choose a word from the Word Bank that matches it. Write the word and the letter that goes with it in the answer space. When you finish, read down the letter boxes to find another word! One answer has already been filled in for you.

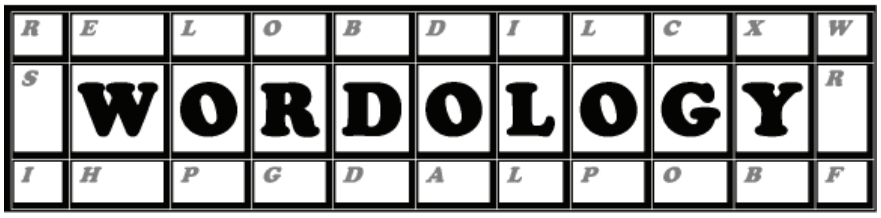
Definitions	**Words and matching letters**	
1. A path around something	orbit	J
2. In the shape of something round.....	circular	U
3. The world as it actually is	reality	P
4. Developed over time	evolved	I
5. Something you can breathe in.....	breathable	T
6. A rocky mass.....	asteroid	E
7. Add water	rehydrate	R

Read down the letters in the boxes on the right side. Which planet name do they spell out? Write it here!

JUPITER

Word Bank

solar - X	orbit - J	galaxy - V	circular - U	evolved - I
asteroid - E	rehydrate - R	breathable - T	reality - P	



Composing Meaningful Sentences

If you complete your chosen Wordology activity, take the remaining time at this station to write Meaningful Sentences using the vocabulary words listed below. (Remember, a Meaningful Sentence is a sentence that shows that you know what the word means!) Read and discuss your sentences with your teammates.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

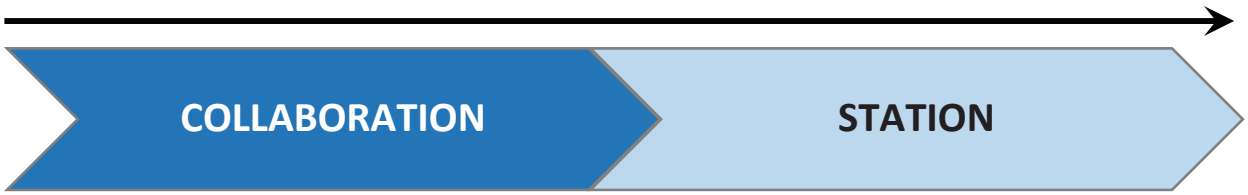
_____

_____

_____

Word Bank

galaxy	circular	orbit	evolved
asteroid	breathable	reality	rehydrate



Survival on Earth: Fact Hunt

Instructions: First, read silently pages 6-7: "How Do Living Things Survive on Earth?" Then, partner read these pages. (Take turns reading the different paragraphs.) Work with your partner to look for answers to the "Survival on Earth: Fact Hunt" below. Then **write your answers in complete sentences** in the spaces provided.

Question	Answer
1. How does the Earth's atmosphere stay in place?	
2. What protects Earth's atmosphere from being destroyed by solar winds?	
3. Why doesn't Earth completely freeze?	
4. What are the different forms of water on Earth?	
5. Why are plants needed to make a planet habitable for humans?	
6. Why can't plants grow on Venus?	
7. Why doesn't the Earth just float away from the Sun?	

COLLABORATION STATION

Survival on Earth: Fact Hunt [TEACHER KEY]

Instructions: First, read silently pages 6-7: "How Do Living Things Survive on Earth?" Then, partner read these pages. (Take turns reading the different paragraphs.) Work with your partner to look for answers to the "Survival on Earth: Fact Hunt" below. Then **write your answers in complete sentences** in the spaces provided.

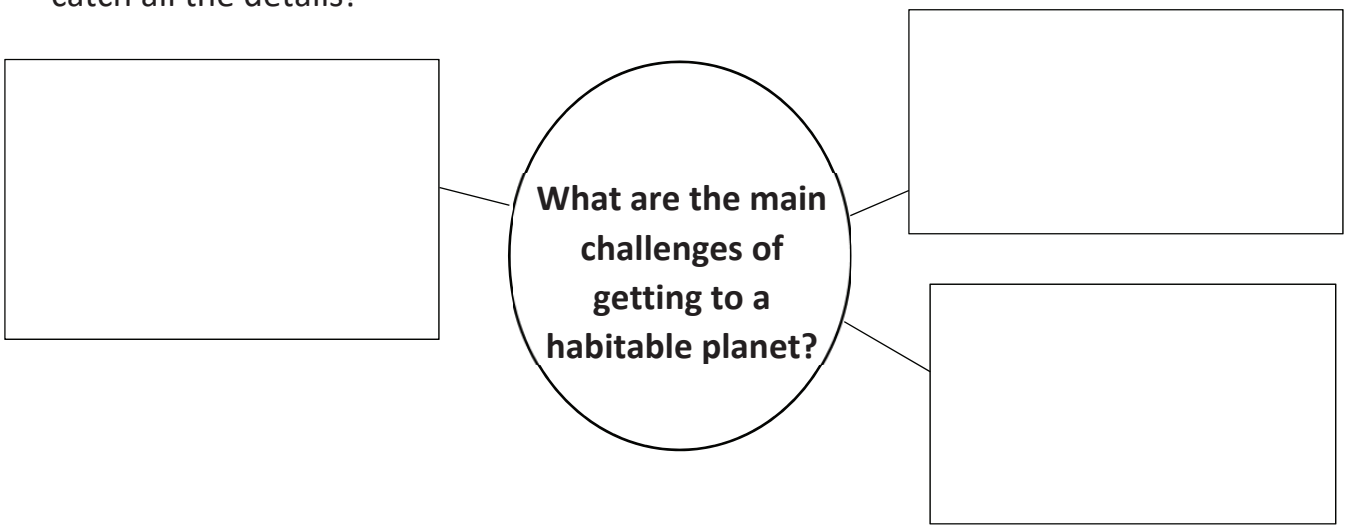
Question	Answer
1. How does the Earth's atmosphere stay in place?	EARTH'S GRAVITY HOLDS THE ATMOSPHERE IN PLACE.
2. What protects Earth's atmosphere from being destroyed by solar winds?	EARTH'S GRAVITY PROTECTS THE ATMOSPHERE FROM BEING DESTROYED BY SOLAR WINDS.
3. Why doesn't Earth completely freeze?	THE CARBON DIOXIDE IN EARTH'S ATMOSPHERE TRAPS HEAT.
4. What are the different forms of water on Earth?	WATER TAKES THE FORMS OF SEAS, OCEANS, LAKES, ICE, AND CLOUDS.
5. Why are plants needed to make a planet habitable for humans?	PLANTS PRODUCE OXYGEN, WHICH HUMANS BREATHE.
6. Why can't plants grow on Venus?	VENUS IS IN DARKNESS FOR LONG PERIODS OF TIME. IT TAKES 243 DAYS TO SPIN ON ITS AXIS.
7. Why doesn't the Earth just float away from the Sun?	THE SUN'S GRAVITY KEEPS EARTH IN ITS ORBIT.

Media Madness

Instructions: Watch the video at the link below on your device (tablet or laptop, depending on your teacher's instructions).

"How Long Would It Take to Get to the Nearest Habitable Planets?" by The Infographics Show: https://www.youtube.com/watch?v=YVBjrJX2Y78

As you watch, takes notes in the organizer. Watch the video two or three times to catch all the details!



What is Trappist-1? _____

_____

Why do scientists think Trappist-1 might be a good place for humans to live?

_____

_____

_____

_____

Days 5 and 6

Teacher Preparation

Post team cards (with member students listed) under headings to show the station where each team is to start. The text used will be *Could We Survive on Other Planets?*

Post the vocabulary words:

examine	route	regular
ancient	quantity	telescope
evidence	automated	canyon
	artificial	

Pre-load the video for the Day 6 Daily Launch: "Legacy of NASA's Kepler Space Telescope: More Planets than Stars" by NASA:

https://www.youtube.com/watch?v=_V7J05fK5e0

Post the guiding question for Days 5 and 6:

What strategies are humans using to see whether other planets are habitable?

Daily Launch Day 5

Whole Group Opening Activity: **Thanks, Earth**

All students should have picked up their folders and Do Now. Remind students of the plan for the day.

Ask students to share responses from the Do Now sheet, which asked students to write a thank you letter to Earth describing its good qualities.

Introduce the **Guiding Question** and discuss what it means. If there is time, brainstorm possible answers to the question. Encourage them to continue to think about it as they proceed to their stations over the next two days.

What strategies are humans using to see whether other planets are habitable?

Daily Launch Day 5

Do Now: A Thank You Letter for the Earth

We've learned over the past few days that the Earth is a special place, and that it might not last forever. Write a thank you letter expressing your gratitude, and include details about what you appreciate!

THANK YOU

Dear Earth,

_____

_____

_____

_____

_____

_____

_____

_____

Sincerely,

_____

Daily Launch Day 6

Whole Group Opening Activity: Video Screening

Show students the NASA video "Legacy of NASA's Kepler Space Telescope: More Planets than Stars" at the following link:

https://www.youtube.com/watch?v=_V7J05fK5e0

The video may be challenging for students to follow; you can stop it and check comprehension if students are struggling. (Some of the interviewees use challenging vocabulary—for example, "ubiquitous"—so be prepared to clarify word meanings as necessary.)

After viewing the video, ask students:

- What exactly was the Kepler project? (*a telescope that was launched into space*)
- What were scientists trying to find out by launching Kepler? (*whether there were other planets in the galaxy*)
- What did they discover? (*that the universe contains very many planets*)
- What unusual features did they find in some planets?
- What kind of planets in particular were the scientists looking for? (*planets around the same size as earth, with temperatures that allow the existence of liquid water—that is, planets that could support life as we know it*)

If time permits, you could also ask students:

- How do the scientists interviewed feel about their jobs?
- Why do you think they are excited about their research?
- Would you like to be a space scientist? Why or why not?

Finally, remind students of the **Guiding Question**, and encourage them to continue to think about it as they proceed to their stations.

What strategies are humans using to see whether other planets are habitable?

Daily Launch Day 6

Do Now: Your "Goldilocks Planet"

Do you know the story of Goldilocks? In this folk tale, the little girl Goldilocks was looking for a home that was just right: a chair that was not too big or too small, but "just right," and food that was not too hot or too cold, but "just right."

If you had to live on another planet, what would you want it to be like? What would make it "just right" for you—your dream planet?

Write your ideas in the space below. What would the climate, scenery, animal and plant life, etc., be like? Remember—anything is possible!

My dream planet would _____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

MAIN STATION

"Where Else Could We Live?"

(pages 14-17 in *Could We Survive…)*

Introduce the Vocabulary Words (10-15 minutes)

Introduce students to the Vocabulary Words following the guidance provided under "Vocabulary Instruction" (pages 9-10). Read the list aloud from the Word Wall posted, pointing to each word as you pronounce it.

examine	route	regular
ancient	quantity	telescope
automated	canyon	evidence
	artificial	

On a second reading, have students repeat each word after you. Ask students whether they know the definitions of any words, and confirm correct definitions. If the words are unfamiliar, ask students whether they recognize parts of the words; as necessary, especially for longer words, walk them through the syllables to assist them in decoding. Then, display your kid-friendly definitions.

GLOSSARY OF VOCABULARY WORDS

examine – to study or inspect carefully

ancient – very old

automated – programmed to work without direct, hands-on human control; robotic

route – a path from one place to another

quantity – the number or count; how much

canyon – a sharp, deep valley or gorge in the surface of a planet

regular – done in a pattern

telescope – a device that makes distant objects appear closer

evidence – facts or information that points to a conclusion

artificial – made by people; not natural

Discuss each word with students; use words in "Meaningful Sentences" (see examples below). Point out that "regular" can mean both "done in a pattern" and "ordinary" (as in, "Do you want the regular or the super-size?). Invite students to propose sentences as well. Remind students that they are to compose their own Meaningful Sentences as time allows at the Wordology Station.

Sample Meaningful Sentences

1. The jury had to **examine** the facts carefully before making a decision.
2. At the museum, we saw objects from **ancient** civilizations thousands of years old.
3. The **automated** front porch light is set to turn on at 6 PM every day, even if we are not home.
4. I just realized that the **route** I usually take is not the fastest way to get there!
5. A large **quantity** of snow fell overnight, so everyone is staying home today.
6. The hiker fell into a deep, rocky **canyon** where rescue workers could not easily climb down to help him.
7. He is a **regular** customer; he orders the same thing every Thursday.
8. Our seats are so far up that we need a **telescope** to see the action!
9. Even though you're saying one thing, the **evidence** points the other way.
10. Mom likes her **artificial** flowers made of silk and wire, because they never fade or wilt.

Call students' attention to different transformations that some of these words can undergo (examine → examination, examiner; automate → automation; regular → regularity, etc.).

Read-Aloud, Think-Aloud (10-15 minutes)

Texts: "Could People Live on Mars?" and "Could We Live in Another Solar System?" in the book *Could We Survive on Other Planets?*

Turn to pages 14-15 and read the text aloud, including the "Fact File" but excluding "Hands-On Science". As you read aloud, pause to demonstrate your thinking, explicitly identifying the strategies you are using (indicated by ***bold italic print***—for example, ***ask questions*** or ***check for understanding***. Refer to the **menu of strategies** poster as you do so.

- (*After paragraph 1, "Scientists are studying Mars to see if it has ever had life on it"*): I wonder how they would be able to tell? Maybe we'll find out if we read on. – ***ask questions; read on***
- (*In "Fact File," after "… in a sunny place over the winter, too"*): Oh cool, like a giant remote control car. – ***visualize***
- (*After "evidence of ancient life, and evidence of water"*): I guess maybe that's how they would know if it had life on it. What kind of evidence—fossils, maybe? – ***ask questions; connect to prior knowledge***

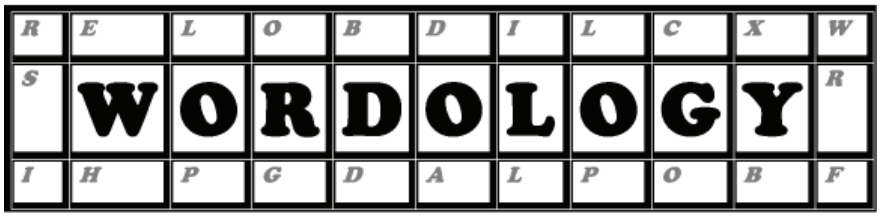
- (*After first paragraph on page 15, "… and then program the rover"*): Oh wait, this is different from a remote control car. What could be difficult about planning the route that the Mars rover would take? – ***check for understanding***
- (*After final paragraph on page 15, "… so maybe there could be still"*): Hmmm… that's a lot of maybe's. I wonder how they could find out for sure? – ***make inferences; reflect on use of language***

Turn to pages 16-17 and read the text aloud, pausing to explain your thinking and highlighting good reading strategies. The concept of how Kepler works to identify planets is complex, so make sure to check for students' understanding. Questions might include:

- (*After the end of paragraph 2, "… the perfect temperature"*): Wait, so why do scientists call certain planets "Goldilocks planets"? What qualities would a "Goldilocks planet" have? (*allow students to offer suggestions*)– ***check for understanding; elaborate***
- (*After the Fact File on page 16, "… for four years"*): Oh, so Kepler is a giant flying telescope. That's weird. I wonder why it just points at the same place for four years? I'll read on to find out. – ***ask questions; read on***
- (*In the paragraph on page 17, after "… just like the Earth orbits the Sun every year"*): So… how exactly does Kepler spot possible planets? "Tiny changes in a star's brightness": I guess if the light from the star flickers a little, it might mean a planet is passing in front. Still, it could be something else, too, right? But if it happens regularly… like once a year, or every three months, it probably means there's a planet, because planets go around stars in regular orbits. – ***check for understanding; elaborate***

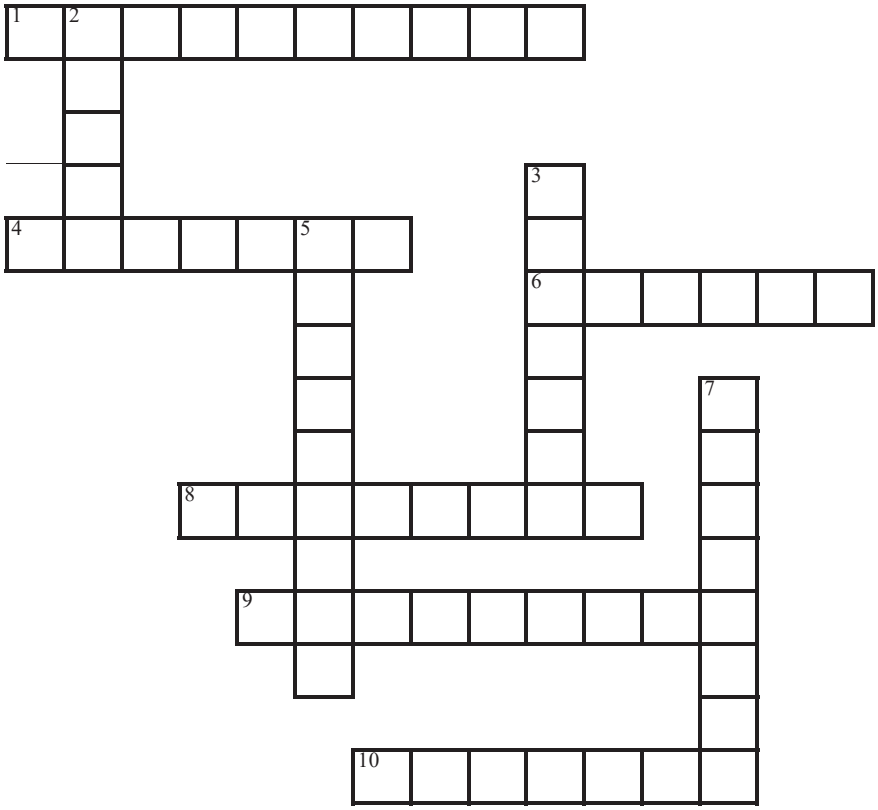
Additional Activities for Schools with 30-minute Stations

- Revisit the Vocabulary Awareness Chart showing the Vocabulary Words for this section. Ask students to indicate their current familiarity with the word by a show of hands. As students indicate that they "understand the word every time they hear it" or that they "know the meaning and use it correctly," challenge them to provide a definition or to use the word correctly in a sentence.
- Discuss the guiding question for this section, "What strategies are humans using to see whether other planets are habitable?" Ask students how the information they have learned in the readings helps them answer this question.



Wordology Activity #1: Galaxy Crossword

Instructions: Choose words from the Word Bank to complete this puzzle. The Clues box will help you decide which words fit in which spaces.



Created using the Crossword Maker on TheTeachersCorner.net

Word Bank	
examine	route
ancient	quantity
telescope	evidence
automated	canyon
regular	artificial

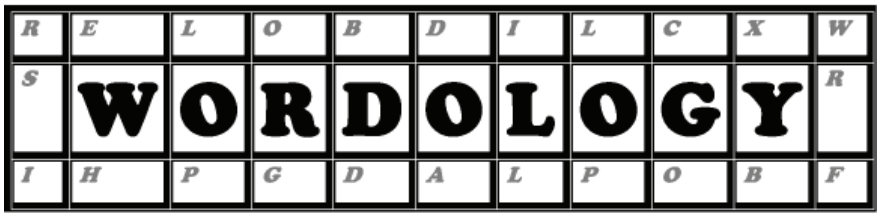
Clues

Across

1. human-made
4. happening at a steady rate
6. a deep, sharp valley
8. amount
9. used to see things that are far away
10. to observe closely

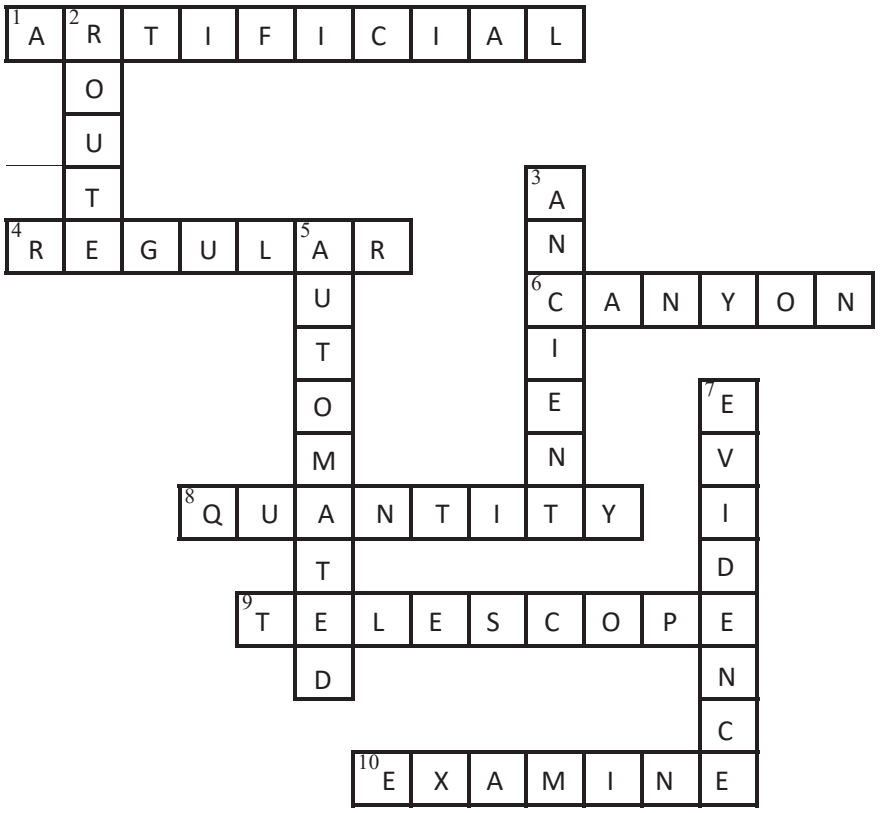
Down

2. a path from here to there
3. extremely old
5. set to work on its own
7. facts that point to a conclusion



Wordology Activity #1: Galaxy Crossword (Teacher Key)

Instructions: Choose words from the Word Bank to complete this puzzle. The Clues box will help you decide which words fit in which spaces.



Created using the Crossword Maker on TheTeachersCorner.net

Word Bank

examine	route
ancient	quantity
telescope	evidence
automated	canyon
regular	artificial

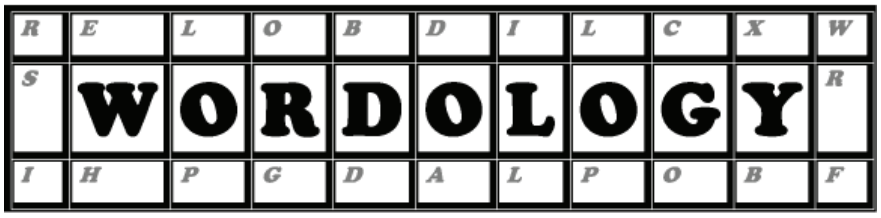
Clues

Across

1. human-made
4. happening at a steady rate
6. a deep, sharp valley
8. amount
9. used to see things that are far away
10. to observe closely

Down

2. a path from here to there
3. extremely old
5. set to work on its own
7. facts that point to a conclusion



Wordology Activity #2: Mars Adventure Journal

Instructions: Try to use at least six of the words from the Word Bank to describe a journey to Mars in a fictional journal entry. The first sentence has been written for you already.

examine	route	automated
ancient	quantity	regular
evidence	canyon	artificial

Last week, I got to see in person something I thought I would only ever see through a **telescope**: Mars. I snuck onto a spaceship in astronaut gear…

_____

_____

_____

_____

_____

_____

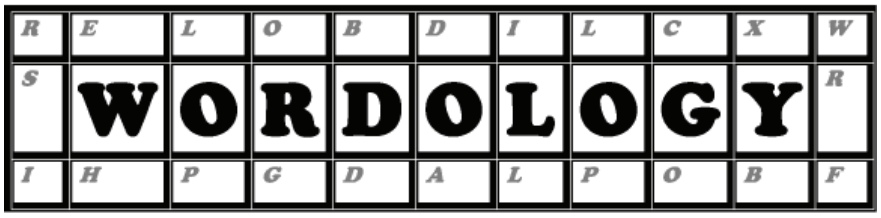
_____

_____

_____

_____

_____



Composing Meaningful Sentences

If you complete your chosen Wordology activity, take the remaining time at this station to write Meaningful Sentences using the vocabulary words listed below. (Remember, a Meaningful Sentence is a sentence that shows that you know what the word means!) Read and discuss your sentences with your teammates.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

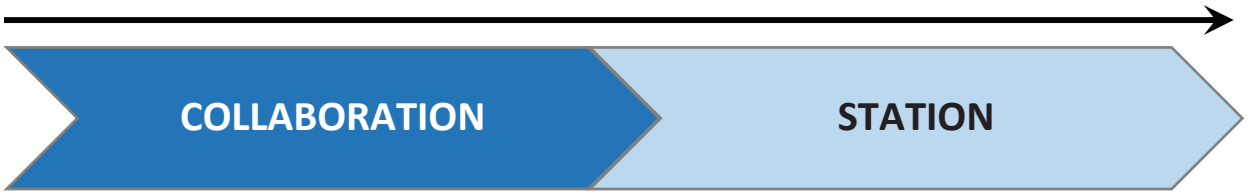
_____

_____

_____

Word Bank

examine	route	automated	ancient
evidence	quantity	regular	canyon



Collaboration Station: Fact Hunt

Partner read "Can Anything Live without Water?" and "Could We Make Our Own Planet to Live On?" on pages 18-21 (take turns reading the paragraphs). **You do not need to read the text boxes on page 19 and page 21** ("Do Other Planets Have Anything Like Water?" and "Hands-On Science").

Then, complete the Fact Hunt below using complete sentences:

Question	Answer
1. What is one interesting fact about tardigrades?	
2. Why might life on another planet not require water to survive?	
3. What is the name of the spacecraft where people have been living since 2000?	
4. Why would an artificial spacecraft for humans need to spin?	

Media Madness

Instructions: Watch the video at the link below on your device and **fill out** the graphic organizer. Watch the video more than once if you need to. Then **answer the question** at the bottom of the page.

"Planets Bursting with Alien Life Might Exist," by Newsweek:

https://www.newsweek.com/planets-alien-life-solar-system-scientists-1455729

Planets Bursting with Alien Life?

Reasons why scientists think alien life might exist on other planets

What scientists are doing to discover alien life on other planets

Different kinds of life scientists think they might discover

Possible reasons why scientists haven't found alien life so far

Your opinion: Do you think people should spend time and money looking for alien life on other planets? Why or why not? _____

_____

_____

Days 7 and 8

Teacher Preparation

Post team cards (with member students listed) under headings to show the station where each team is to start. Place copies of the Newsela article "First Private Passenger Headed toward Moon Is Eager for Company" (pages 68-69 in this manual) at the entrance for students to pick up with their Do Now sheets.

Post the Vocabulary Words:

journey	reusable	launch
architect	outpost	overshadowed
scheduled	beyond	lunar

Preload the Media Madness video, "SpaceX CEO Elon Musk on the Next Giant Leap for Mankind" by CBS:

https://www.youtube.com/watch?v=OPrb50ZDphc

and the optional video "Could We Really Travel to Mars in the Next Four Years?":

https://www.youtube.com/watch?v=tz7We3KNPi0

The guiding question for this section is:

What are some different motives for space exploration?

Daily Launch Day 7

Whole Group Opening Activity: Interpret the Photo

All students should have picked up their folders and Do Now. Remind students of the plan for the day.

Ask students to share responses from the Do Now sheet, which asked students to make up a brief story or scenario behind the photo of two astronauts in space.

Ask students

- What does the photo shows us about traveling in space?
- Why do you think governments send people to space?
- Do you think space exploration is a good use of government money? What other groups or organizations could support space travel?

Introduce the **Guiding Question** and discuss what it means.

What are some different motives for space exploration?

If there is time, brainstorm possible answers to the question. Encourage students to continue to think about it as they proceed to their stations over the next two days.

Daily Launch Day 7

Do Now: Interpret the Photo

Instructions: Look at the photo below and make up a backstory (a story about what's happening in it). Be creative; there are no wrong answers!

(Source: Air & Space Smithsonian: https://www.airspacemag.com/ask-astronaut/ask-astronaut-what-free-fall-180958580/)

_____

_____

_____

_____

_____

_____

Daily Launch Day 8

Whole Group Opening Activity: Agree, Disagree, Not Sure?

All students should have picked up their folders and Do Now. Remind students of the plan for the day.

Ask students to share responses from the Do Now sheet, which had students agree or disagree with several statements related to space travel. Ask students to share their responses and defend their answers.

Choose one of the statements on the Do Now sheet, such as statement #5 or 7. Ask student to show whether they agree or disagree by a show of hands, or by moving to different areas of the room.

Lead students in a brief debate, inviting students from each side to justify their position or respond to other students' views. If necessary, remind them of the effective debate strategies they learned in the *Heroes* unit.

Remind students of the **Guiding Question** and, if there is time, ask them about what they learned the previous day.

What are some different motives for space exploration?

Daily Launch Day 8

Do Now: Agree, Disagree, Not Sure?

Instructions: Read the statements below. Decide whether you agree with the statement, disagree, or are not sure. Beside each statement, check one of the boxes to show what you think about it.

	Agree	Disagree	Not Sure
1. People should not make profits from space travel.			
2. We should just leave aliens alone instead of trying to contact them.			
3. Humans can only be happy on Earth.			
4. It is wrong to send animals to space as experiments.			
5. Going to space just for entertainment is a waste of money.			
6. Elon Musk is a good person.			
7. It is more important to spend money on making Earth better than to spend money on space travel.			

Choose one of the statements above and explain why you agree or disagree:

_____

_____

_____

_____

_____

MAIN STATION

"First Private Passenger Headed toward Moon Is Eager for Company"
(pages 68-69 in this manual)

Introduce the Vocabulary Words (10-15 minutes)

Introduce students to the Vocabulary Words following the guidance provided under "Vocabulary Instruction" (pages 9-10). Read the list aloud from the Word Wall posted, pointing to each word as you pronounce it.

journey	reusable	launch
architect	outpost	overshadowed
scheduled	beyond	lunar

On a second reading, have students repeat each word after you. Ask students whether they know the definitions of any words, and confirm correct definitions. If the words are unfamiliar, ask students whether they recognize parts of the words; as necessary, especially for longer words, walk them through the syllables to assist them in decoding. Then, display the kid-friendly definitions you have prepared.

GLOSSARY OF VOCABULARY WORDS

journey – a trip

architect – someone who designs buildings

scheduled – planned to happen at a certain time

reusable – able to be used again

outpost – a small camp or station far away from the main center

beyond – farther away

launch – a takeoff or liftoff; also, the start of something new

overshadowed – getting less attention because of something else going on

lunar – having to do with the moon

Discuss each word with students. Use words in "Meaningful Sentences" (see examples below). Invite students to propose sentences as well. Remind students that they are to compose their own Meaningful Sentences as time allows at the Wordology Station.

Sample Meaningful Sentences

1. My dad went on a long train **journey** to visit his brother in Chicago.
2. This building was designed by a famous **architect** who really liked funky windows.
3. I **scheduled** a dentist appointment for this afternoon after school.
4. The plastic containers are **reusable,** so we will wash them and save them for next time.
5. The clinic had a small **outpost** up on the mountain to serve people who could not travel to town to see a doctor.
6. If you look **beyond** the city skyline, you can see the storm clouds far away.
7. I was so excited to watch the rocket **launch** and imagine that giant piece of equipment zooming off into space.
8. The A I earned on my science test was **overshadowed** by my brother's championship track meet, so my parents hardly even mentioned it.
9. The first astronauts to walk on the moon brought back some **lunar** rocks as samples.

Read-aloud/ Think-aloud (10-15 minutes)

Text: "First Private Passenger Headed toward Moon is Eager for Company" (pages 68-69 in this manual)

Have students turn to the article and follow along as you read, pausing to think aloud. Note where vocabulary words make an appearance and ask students to comment the ways they are used. As you ask students the following questions, explicitly identify the strategies you are using (indicated by ***bold italic print***). Refer to the **menu of strategies** poster as you do so.

- (*After the first paragraph*): Wait, who is Yusaku Maezawa? I never heard of the guy. But maybe the article will explain if I read on a little further. – ***read on***
- (*After the second paragraph, "… the weeklong journey"*): I wonder who will be invited? That would be pretty cool. – ***ask questions***
- (*At the end of the fifth paragraph, "… create work to reflect on their experience"*): Can you imagine that, looking back at the whole Earth from right next to the Moon? (***visualize***) I wonder what he means by "work to reflect on their experience." Like pictures or sculptures about the moon or space? - ***elaborate***
- (*On the second page, paragraph 3, "… a staffed gateway near the moon during the 2020s"*): Is this still about Mr. Maezawa's space flight? Oh, no, I get it… now they're talking about NASA. But what do they mean by a "staffed gateway near the moon"? Like a space station? – ***check for comprehension; visualize; ask questions***

- (*After the fourth paragraph, "… or say how much they would pay"*): Hmm. But I guess that trip fell through? Because the beginning of the article said that Maezawa's would be the first private flight. – ***make inferences***
- (*After the fifth paragraph, "… several more customers on spaceflights"*): So what exactly is "space tourism"? Is it a new idea, or has it been around for a while? – ***reflect on use of language; check for comprehension***
- (*After the last paragraph, "… a great deal of stress"*): I wonder why the article ends by talking about Musk's struggles. Do you think this might cause problems for the moon flight? – ***ask questions***

Additional Activities for Schools with 30-minute Stations

- When students repeat Vocabulary Words after you, show them the Vocabulary Awareness Chart, filled out with the Vocabulary Words for this section. For each word, invite students to indicate their familiarity with the word by a show of hands. Note on the chart how many students raise their hands for each level. You can revise the number cumulatively to reflect the class total as the different teams move through the Main Station.
- For each Vocabulary Word, after you share a meaningful sentence, ask students to work with their partners to make up meaningful sentences of their own.
- During the Guided Reading, invite students to identify the Vocabulary Words used in each mini-article.

First Private Passenger Headed toward Moon is Eager for Company

By the Associated Press, adapted by Newsela staff 09/24/2018

LOS ANGELES, California — As he prepares for a trip around the moon, Yusaku Maezawa (you-SAH-koo may-ZAH-wah) would like some company on his space journey.

SpaceX founder and CEO Elon Musk (left) shakes hands with Japanese billionaire Yusaku Maezawa after announcing him as the first private passenger on a trip around the moon, Sept. 17, 2018, Hawthorne, California. (Photo: AP/Chris Carlson)

Maezawa announced that he'll take the rocket trip, which will be the first by a private business to go around the moon. Space journeys are usually done by governments. Maezawa said he wants guests for the weeklong journey.

The Japanese billionaire said he plans to invite six to eight people. He wants artists, architects and other creative people to join him on the SpaceX rocket. Maezawa hopes "to inspire the dreamer in all of us."

The Big Falcon Rocket (BFR) is scheduled to make the trip in 2023. SpaceX leader Elon Musk announced the trip September 17.

Maezawa is 42 years old. He said he wants his guests "to see the moon up close, and the Earth in full view, and create work to reflect their experience."

"A Lot of Money"

Musk said Maezawa, who is one of Japan's richest people, will pay "a lot of money" for the trip. Musk did not give the amount. Maezawa came to SpaceX with the idea for the group flight, Musk said.

"I did not want to have such a fantastic experience by myself," said Maezawa. He was wearing a white T-shirt printed with a work by the painter Jean-Michel Basquiat (zhah-mee-SHELL bah-skee-AH). He said he often wondered about what artists like Basquiat or Andy Warhol might have come up with if they had traveled into space.

"I wish to create amazing works of art for humankind," Maezawa said.

Maezawa didn't immediately say who will be on his guest list for the spaceflight. However, in response to a question from a reporter, he said he'd consider inviting Musk.

"Maybe we'll both be on it," Musk said with a smile.

Musk said the BFR will make several test launches before it takes on passengers. The 387-foot rocket is reusable. It will have its own passenger ship.

They Won't Land on the Moon

The mission will not involve a moon landing.

The distance from Earth to the moon is about 237,685 miles. Astronauts last visited the moon during NASA's Apollo program. NASA is the U.S. space agency. Twenty-four men flew to the moon from 1968 through 1972, and half of them landed on the surface.

NASA is planning its own moon flyby around 2023. A crew will be on board. The space agency also aims to build a staffed gateway near the moon during the 2020s. The outpost would serve as a stepping-off point for the moon's surface, Mars, and points beyond.

He Has Paid Big for Artwork

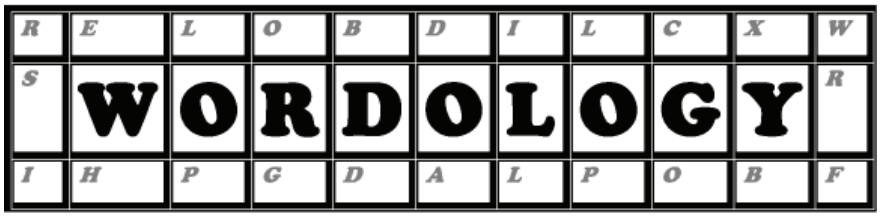
Maezawa started the company Start Today in 1998. He built it into one of Japan's most successful companies. It sells clothing and other items. In 2012, he started a group in Japan to support young artists. He made headlines in 2016 when he paid more than $57 million for artwork by Basquiat. A year later, he paid more than $110 million for another piece by the same artist.

Musk outlined a somewhat different SpaceX lunar mission last year. He said then that two people who know each other approached the company. They asked about a weeklong flight to the moon and back. Musk did not name the clients last year or say how much they would pay.

Space tourism began in 2001. That's when California businessman Dennis Tito paid for a journey on a Russian rocket to the International Space Station. The trip was organized by the Virginia-based company Space Adventures. The company has since sent several more customers on spaceflights.

SpaceX already has a long list of firsts. It became the first private company to launch a spacecraft into orbit and safely return it to Earth in 2010. It also was the first business to fly to the space station in 2012 on a supply mission.

Musk's successes have recently been overshadowed. His Tesla electric car company has struggled. He has talked about having a great deal of stress.



Wordology Activity #1: Vocabulary Scramble

Instructions: Unscramble the letters to find words that fit in the boxes. All the words come from the Word Bank at the bottom of the page.

1. A product _____ is when a new item is released to the public.

huncal

2. A person who designs buildings is called a/an _____.

cictethra

3. The space probe traveled _____ the edge of the solar system and into outer space.

endoby

4. National news is often _____ by urgent local problems.

derhaswedovo

5. Another word for a trip or expedition is _____.

yejorun

6. Twelve men landed on the moon during the Apollo _____ program.

nalru

7. _____ events are shown on the timetable.

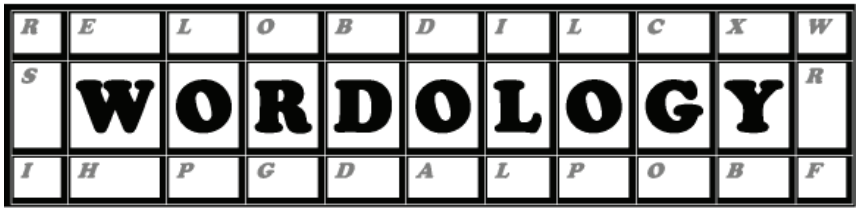
edulhedcs

8. We buy _____ grocery bags to avoid wasting plastic.

baeluesr

Word Bank

architect	launch	beyond	scheduled
lunar	journey	reusable	overshadowed



Wordology Activity #1: Vocabulary Scramble

Instructions: Unscramble the letters to find words that fit in the boxes. All the words come from the Word Bank at the bottom of the page.

1. A product _____ is when a new item is released to the public.

huncal | L | A | U | N | C | H |

2. A person who designs buildings is called a/an _____.

cictethra | A | R | C | H | I | T | E | C | T |

3. The space probe traveled _____ the edge of the solar system and into outer space.

endoby | B | E | Y | O | N | D |

4. National news is often _____ by urgent local problems.

derhaswedovo | O | V | E | R | S | H | A | D | O | W | E | D |

5. Another word for a trip or expedition is _____.

yejorun | J | O | U | R | N | E | Y |

6. Twelve men landed on the moon during the Apollo _____ program.

nalru | L | U | N | A | R |

7. _____ events are shown on the timetable.

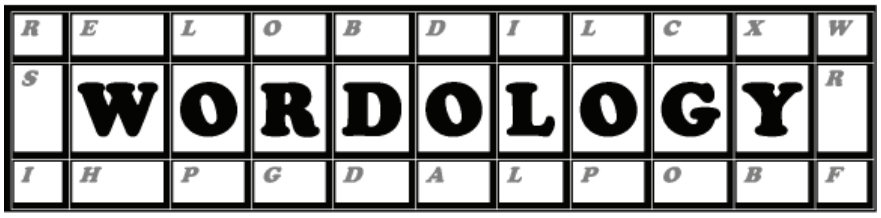
edulhedcs | S | C | H | E | D | U | L | E | D |

8. We buy _____ grocery bags to avoid wasting plastic.

baeluesr | R | E | U | S | A | B | L | E |

Word Bank

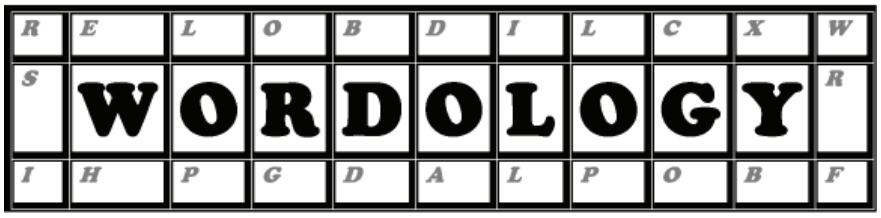
architect	launch	beyond	scheduled
lunar	journey	reusable	overshadowed



Wordology Activity #2: Using Vocabulary Words

Read or re-read the first page of "First Private Passenger…" to answer the guide questions in complete sentences. Include the Vocabulary Word in your answer.

Vocabulary Word(s)	Guide Question	Complete Sentence
1. **launch; scheduled**	When is the Big Falcon Rocket **launch scheduled** to take place?	
2. **journey**	Where will Maezawa's space **journey** take him and his guests?	
3. **architect**	Why does Maesawa want to invite artists and **architects** to join in his space flight?	
4. **reusable**	Why does the Big Falcon Rocket (BFR) need to be **reusable**?	
5. **outpost**	What will the NASA moon **outpost** be used for?	



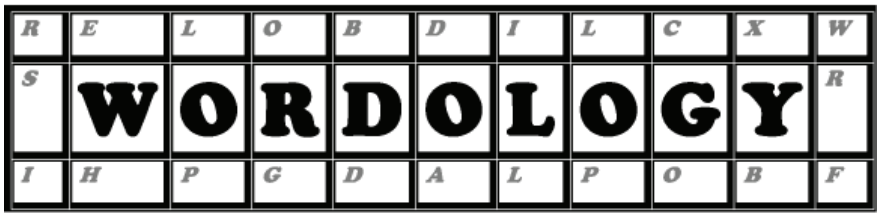
Wordology Activity #3: Word Search

Instructions: Use the clues below to find the nine Vocabulary Words in the puzzle below. The blue circles identify the beginning letters of the words. (Words can go up, down, horizontally, or diagonally in either direction.)

J T G B X M P G Z S W Z D
M F C N P C I U H U G E E
Y C X E M U B H G W L Q L
V N O I T E C E P B L Y U
D K D Y Y I G W A R Y P D
D E W O D A H S R E V O E
C S N O V C U C I P K U H
D D W X U E S P R D L G C
L F D B R T X O D A A K S
R A N U L G P O I I U Z W
X F Q M Z O D O P Y N A C
J O U R N E Y W S Z C S V
P C P V Q X L O C T H H R

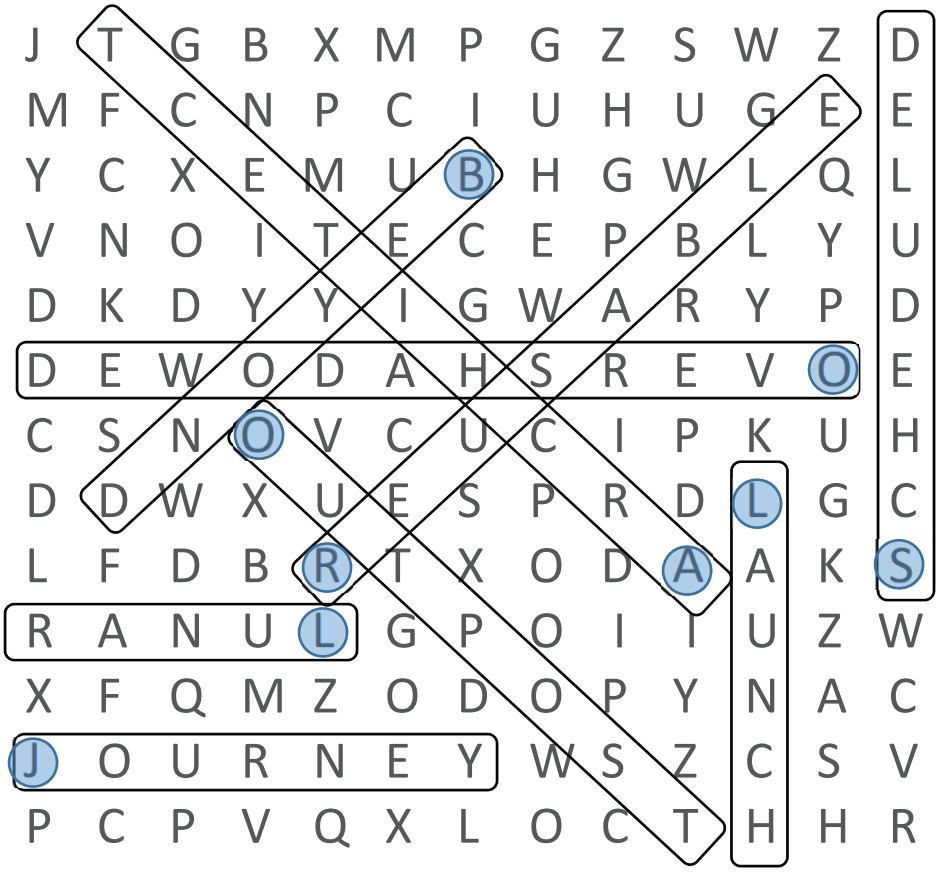
Clues

A person who designs buildings	Lift-off	Further out
Far-off camp or station	About the moon	A trip
Can be used again	Getting less attention	At a set time



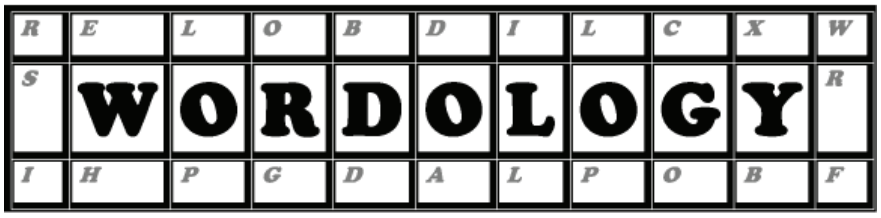
Wordology Activity #3: Word Search – Teacher Key

Instructions: Use the clues below to find the nine Vocabulary Words in the puzzle below. The blue circles identify the beginning letters of the words. (Words can go up, down, horizontally, or diagonally in either direction.)



Clues

A person who designs buildings	Lift-off	Further out
Far-off camp or station	About the moon	A trip
Can be used again	Getting less attention	At a set time



Composing Meaningful Sentences

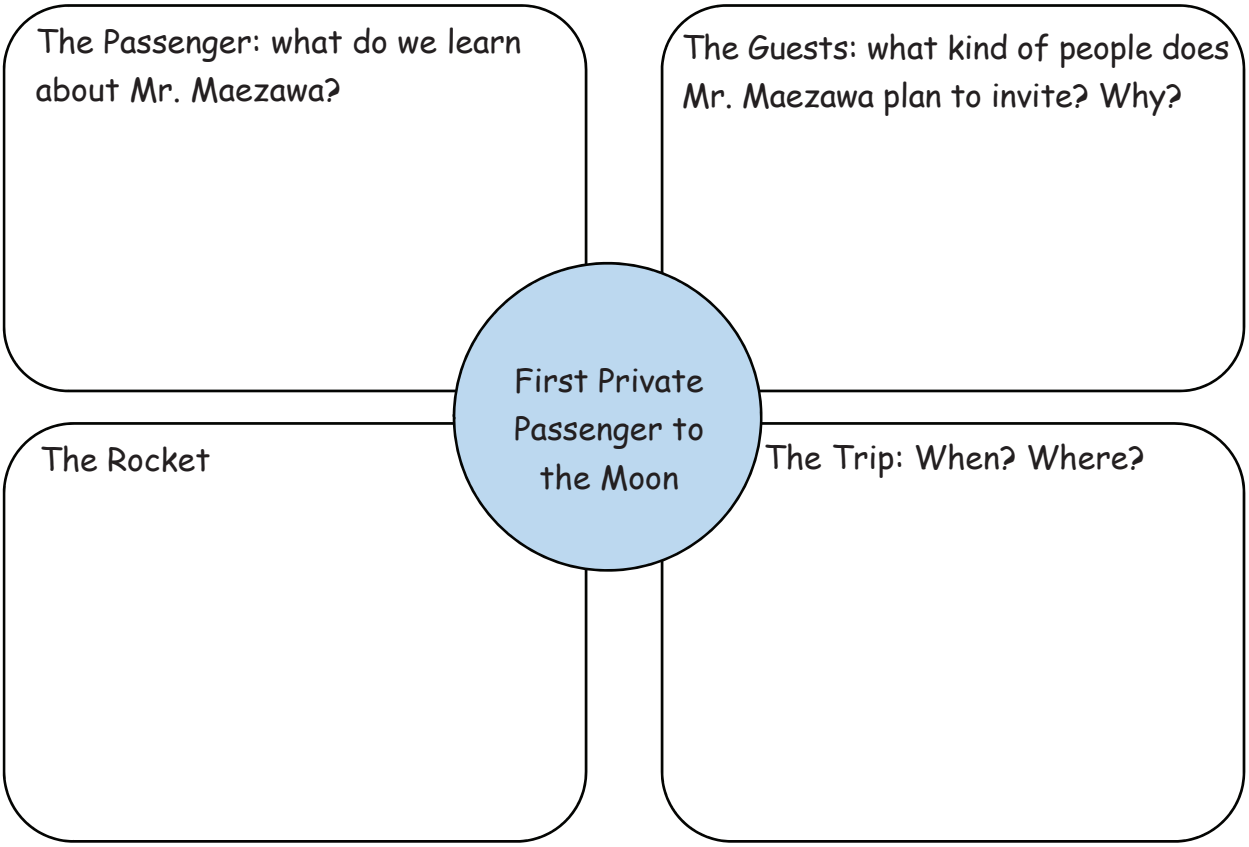
If you complete your chosen Wordology activity, take the remaining time at this station to write Meaningful Sentences using the vocabulary words listed below. (Remember, a Meaningful Sentence is a sentence that shows that you know what the word means!) Read and discuss your sentences with your teammates.

Word Bank			
architect	launch	beyond	scheduled
lunar	journey	reusable	overshadowed

COLLABORATION STATION

Collaboration Station: Graphic Organizer

Instructions. With your team, take turns reading the **first** page of the Newsela article "First Private Passenger Headed toward Moon Is Eager for Company." Then discuss what details you could use to fill out the graphic organizer below. After your discussion, fill out the organizer on your own, and answer the question at the bottom of the page.



Do you agree with Mr. Maezawa's ideas about people to invite? Why or why not?

_____

_____

_____

Media Madness

Media Madness: The Next Giant Leap for Mankind

Instructions: Watch the video at the link below on your device (tablet or laptop, depending on your teacher's instructions). Then answer the questions below. (Note: A CEO is the head of a company.)

"SpaceX CEO Elon Musk on the Next Giant Leap" by CBS:
https://www.youtube.com/watch?v=OPrb50ZDphc

1. Who is Elon Musk?

_____

_____

2. How did Elon Musk get excited about space?

_____

_____

3. What role has SpaceX played in the space shuttle program?

_____

_____

_____

4. What is Elon Musk's long-term goal? Why is this important to him?

_____

_____

_____

_____

If you finish the assignment, you may want to view this video as well:
https://www.youtube.com/watch?v=tz7We3KNPi0

Days 9 and 10

Teacher Preparation

Post team cards (with member students listed) under headings to show the station where each team is to start. Place copies of the Newsela article "A Forgotten Story: Black Women Helped Land a Man on the Moon" (pages 86-87 in this manual) at the entrance for students to pick up with their Do Now sheets.

Prepare and post a chart with the idioms listed for the Daily Launch on Day 7, leaving space to enter correct definitions as you review them with students:

Idioms	What They Really Mean
"stumble on"	
"get to the bottom of"	
"a step ahead"	
"the face of science"	
"poking around"	
"linked up with"	

Make available to students copies of the Independent Project Guide Sheets (pages 235-239 in this manual) for their examination as they consider which project to do. (You should have about ten copies of the guide sheet for **each** type of project, so that students can take a copy of the appropriate guide sheet for their folders after they commit to a project on Day 17.)

Post the Vocabulary Words:

historic	calculation	remarkable
preserve	compute	alternative
unexpected		trailblazer

Preload the video trailer of the movie *Hidden Figures* at the Media Madness station:

https://www.youtube.com/watch?v=RK8xHq6dfAo

The guiding question for this section is:

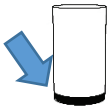
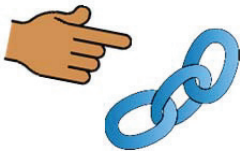
How have different groups of people contributed to space exploration?

Daily Launch Day 9

Whole Group Opening Activity: **Interpreting Idioms**

All students should have picked up their folders and Do Now. Remind students of the plan for the day.

Ask students to share responses from the Do Now sheet, proposing explanations for the idioms found in the text they will be reading. Note correct answers on the chart you have prepared. Also, as you discuss each idiom, provide other sample sentences and invite students to offer their own examples.

Idioms	Idioms Used in Context	What Does It Really Mean?
"**stumble on**"  ?	She **stumbled on** an old photo.	To find or discover by accident
"**get to the bottom of**"  ?	She asked her intern to **get to the bottom of** the mystery.	To figure out the explanation of something
"**a step ahead**"  ?	Ms. Shetterly was **a step ahead** of her in exploring the mystery.	Further along in a process
"**the face of science**"  ?	"The **face of science** was brown like mine."	People you think about when you hear the word "science"
"**poke around**," "**link up with**"  ?	Ms. Shetterly started **poking around** and **linked up with** Ms. Gainer in their search for answers.	* To investigate or look for answers * To get together with someone

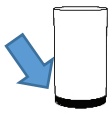
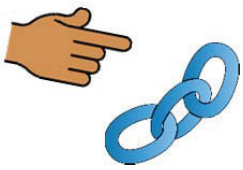
Introduce the **Guiding Question,** *How have different groups of people contributed to space exploration?* and discuss what it means. If there is time, brainstorm possible answers to the question. Encourage students to continue to think about it as they work in their stations over the next two days.

Daily Launch Day 9

Do Now: Interpreting Idioms

An **idiom** is an expression that has a different meaning from what you might think based on the words used.

The chart below lists some idioms you will find in today's reading. The pictures show what you might **think** the idioms mean. But then read the phrase in the center column. Try to guess what the words mean in this phrase. Write down your **best guess** in the right hand column! The first one has been filled in for you.

Idioms	Idioms Used in Context	What Does It Really Mean?
"**stumble on**"  ?	She **stumbled on** an old photo.	She found it by accident.
"**get to the bottom of**"  ?	She asked her intern to **get to the bottom of** the mystery.	_____ _____ _____
"**a step ahead**"  ?	Ms. Shetterly was **a step ahead** of her in exploring the mystery.	_____ _____ _____
"**the face of science**"  ?	"The **face of science** was brown like mine."	_____ _____ _____
"**poke around**," "**link up with**"  ?	Ms. Shetterly started **poking around** and **linked up with** Ms. Gainer in their search for answers.	_____ _____ _____ _____ _____

Daily Launch Day 10

Whole Group Opening Activity: **Final Project Brainstorm**

After students have completed the Do Now, review the final project options. Remind them that this is a chance not only to showcase the content they've learned in this unit, but also to demonstrate and refine their writing skills.

Ask students to share tentative ideas for their projects. As appropriate, ask questions to help students begin thinking about what they will need to have and do to complete the different types of projects. When no more students are volunteering information, check with the quieter ones to find out about their plans. Encourage students to keep thinking about this project going forward. You may want to take notes on student projects in the chart below.

My Students	Project Idea(s); Notes

Daily Launch Day 10

Do Now: Final Project Brainstorm

It is time to start thinking about your final projects for the *Galaxy* unit. Rank your top three choices among the options listed below. Then write your thoughts about them in the space at the bottom of the page.

_____ Make a publicity brochure for a space tourism company

_____ Create a 3-D model space station or spaceship

_____ Write an original short story that takes place in space

_____ Adapt an existing story to take place in space

_____ Write a magazine or encyclopedia article about a space mission or astronaut

_____ Write several poems (at least three) about space or space travel

_____ Create a space exploration board game or quiz game

_____ Create a digital presentation (such as a PowerPoint) or a podcast about an important figure or mission in space exploration

_____ Other: _____

I am interested in these projects because_____

_____

_____

Jot down any other ideas you have about your number one and two choices:

_____

_____

_____

_____

MAIN STATION

"A Forgotten Story: Black Women Helped Land a Man on the Moon" (pages 86-87 in this manual)

Review the Vocabulary Words (5-10 minutes)

Introduce students to the Vocabulary Words following the guidance provided under "Vocabulary Instruction" (pages 9-10). Read the list aloud from the Word Wall posted, pointing to each word as you pronounce it.

historic	compute	remarkable
preserve	calculation	alternative
unexpected		trailblazer

On a second reading, have students repeat each word after you. Ask students whether they know the definitions of any words, and confirm correct definitions. If the words are unfamiliar, ask students whether they recognize parts of the words; as necessary, especially for longer words, walk them through the syllables to assist them in decoding. Then, display your kid-friendly definitions.

GLOSSARY OF VOCABULARY WORDS

historic – having to do with the study of the past

preserve – to keep something in its original state

unexpected – surprising

calculation – working things out with math

compute – to figure something out using math

remarkable – special, unusual

alternative – a different possibility

trailblazer – an explorer; someone who does or invents something new

Discuss each word with students; point out connections with other forms of words (e.g., historic/ history, preserve/ preservation, unexpected/ expect, calculation/ calculate, compute/ computer). Use words in "Meaningful Sentences" (see examples below). Invite students to

propose sentences as well. Remind students that they are to compose their own Meaningful Sentences as time allows at the Wordology Station.

Sample Meaningful Sentences

1. The teacher told us about the **historic** background of the events happening at the time of the story.
2. My family tries to **preserve** memories by taking pictures for our photo album.
3. Washington High School's win was **unexpected**; everyone thought that the other team would win for sure.
4. I made a quick mental **calculation** of the tax by multiplying the price in my head.
5. Please **compute** the total cost of these groceries by adding all of the prices together.
6. Those cookies are **remarkable**—I never tasted such delicious gingersnaps before!
7. Carbonated water is a healthy **alternative** that you can drink instead of sugary soda.
8. Elon Musk was a **trailblazer** in the auto industry when he invented a completely new kind of electric car.

Finally, review the list of NASA astronauts mentioned in the text:

SPECIAL GLOSSARY OF NASA ASTRONAUTS

Alan Shepard – the first American astronaut to travel into space (1961); he also later walked on the moon (1971)

Neil Armstrong – the first man to walk on the moon (1969)

John Glenn – the first American astronaut to orbit the Earth in 1962

Read-aloud, think-aloud (10-15 minutes)

Text: "A Forgotten Story: Black Women Helped Land a Man on the Moon" (pages 86-87)

Have students turn to the article and follow along as you read and pause occasionally to explain your thinking. As you "think aloud," explicitly identify the strategies you are using (indicated by ***bold italic print***). Refer to the **menu of strategies** poster as you do so. You may want to highlight the strategies ***focus on vocabulary*** and ***make connections*** while reading this text.

- (*After the first sentence of the second paragraph, "… a thousand people standing in a huge building"*): So what is this word "preservationist"? I see the word "preserve"—that means to save. Then they added a suffix to make "preservation"; that probably means "saving." And then *another* suffix to make "preservationist." If an artist is a person who does art, then maybe a preservationist is someone who saves stuff. And then it says "historic preservationist," so I guess she was a person who helped save stuff from history. – ***focus on vocabulary in context***

- (*After the second sentence of the third paragraph, "… in knee-length skirts"*): Hmm… why was that unexpected? Oh, I guess in those days there weren't that many women in large workplaces, and probably especially not so many black women. – ***ask questions; make inferences***
- (*At the end of the fourth paragraph, "… that would launch men into space"*): Wow, that was unusual. I mean, this was still in the time of Jim Crow laws. – ***elaborate; make connections***
- (*At the end of the fifth paragraph, "… and Janelle Monáe"*): Oh yeah, I heard about that movie. I heard that it was really good. – ***make connections***
- (*After reading the subtitle "Computers Used Pencil and Paper"*): What? That doesn't seem to make sense. I guess I'll read on to understand what that means. – ***read on***
- (*After the sentence, "Women who used pencils and paper for research calculations were called computers."*): Oh, I get it. They *computed*, so they were called *computers.* That seems weird today—human beings called computers. – ***focus on vocabulary in context***
- (*Second page, at the end of the third paragraph "… even though they required advanced math skills."*): Wait, how could it be easy work if they had to do all that hard math? Hmmm… it says the alternatives for women to work in those days were mostly being nurses or teachers. Nursing is hard physical work, and teaching can have its challenges too. I guess working in a lab or office could be better, especially if you were a math whiz who likes that kind of stuff. – ***ask questions; check comprehension***
- (*After "… trailblazer during a time of discrimination," beginning of sixth paragraph*): Oh, there's that word—trailblazer. Let's see, what was she doing that was new? (***focus on vocabulary in context***; *then read the rest of the paragraph*). They were doing all that sensitive work and they couldn't even eat with the other staff? I wonder how they reacted to that! – ***ask questions***

Additional Activities for Schools with 30-minute Stations

- Focus on the guiding question and discuss with students the information they find in the text to answer this question.
- Revisit the Vocabulary Awareness Chart for this section. Again invite students to indicate their familiarity with each word by a show of hands.
- Revisit the Vocabulary Words from previous days, particularly those that students found difficult.

A Forgotten Story: Black Women Helped Land a Man on the Moon

By the Washington Post, adapted by Newsela and ALFA staff *First published 09/19/2016*

It all started with a photograph.

Mary Gainer was a historic preservationist for NASA in 2011, when she stumbled on a mysterious 1943 photo that showed a thousand people standing in a huge building. Gainer figured that the black men posing in the front were probably machinists, and the rest of the group was mostly white men in suits and ties.

But scattered here and there was something unexpected. The picture showed women, some white and some black, in knee-length skirts. Gainer asked her new intern, Sarah McLennan, to get to the bottom of it. There were too many to be the few secretaries employed then, so who were they, she wanted to know?

Who Were These Women?

Little did Gainer know that another person was on a similar hunt. Margot Lee Shetterly was already a step ahead. Shetterly's father was a scientist who worked at Langley Research Center in Hampton, Virginia, so growing up in the 1970s and '80s, she knew about black women at NASA. "There are these women and I knew them, and my dad worked with them and they went to our church and their kids were in my school," she said recently over the phone from her home in Charlottesville.

Shetterly and her neighbors all knew the stories of these women. "Growing up in Hampton, the face of science was brown like mine," Shetterly writes in her book. But one day she realized this was a special story. In segregation-era Virginia, NASA had hired black women to do math and research that would launch men into space.

NASA Needed Math Whizzes

Shetterly started poking around and linked up with Gainer. Gainer's intern had already begun collecting stories from former employees and their families. Shetterly wrote a book about those math whizzes called "Hidden Figures." In January 2017, a movie based on the book was released. The cast included Taraji P. Henson, Octavia Spencer, and Janelle Monáe.

With that movie, a piece of history that was nearly lost became common knowledge.

Author Margot Lee Shetterly reads from her book to Washington DC school students. NASA photo #NHQ201612140018.

"Computers" Used Pencil and Paper

Poster for the 2017 movie Hidden Figures

One reason the story of these smart women was almost lost is that space travel in the 1950s and 60s was different from what it is today.

Everyone knows what a computer looks like. It has a hard drive, a monitor, a keyboard and a mouse. But in the middle of the last century at Langley, it looked different. Langley was, until 1958, part of the National Advisory Committee for Aeronautics (NACA), before it became NASA. Women who used pencils and paper to do research calculations were called computers. The first of their kind were hired in 1935. During World War II, many male workers left their jobs to join the war effort, and more women were hired to find ways to build better military planes. After the war, at most companies, men returned to their jobs and women returned to the home. But not at Langley. The need for better aircraft gave way to a different kind of battle: the country wanted to beat Russia to the moon. Female computers were more essential than ever.

The women who held these jobs did not feel remarkable. They were just happy to have work that paid better than the alternatives, like teaching and nursing. The jobs were considered easy, even though they required advanced math skills.

Medal of Freedom winner dies at 101

One such woman was Katherine G. Johnson. She was one of the most famous of the computers. In 2016, she won the Presidential Medal of Freedom, saw a building named after her, and had a bench dedicated in her honor. Katherine Johnson died on February 24, 2020, at the age of 101.

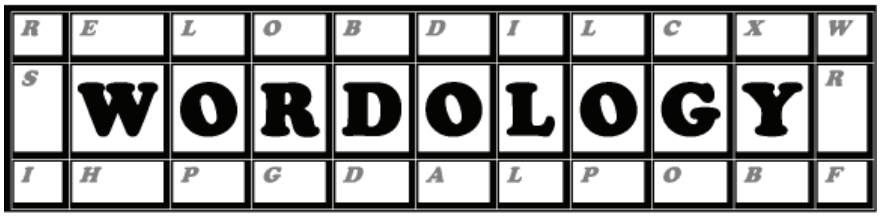
Like many of the other computers, Johnson studied math in college. At NASA, she worked on the life-or-death task of determining launch timing. Her calculations helped send Alan Shepard into space and guided him successfully back to Earth. They landed Neil Armstrong on the moon and brought him home.

Women on Team Were Segregated

Johnson was a trailblazer during a time of discrimination. The first black women who worked at NASA were segregated from the computing pool of white women. They had to use different bathrooms. At lunch in the cafeteria, they had to sit at a table with a white cardboard sign that read "colored computers."

One woman, Miriam Mann, removed the sign from the table and hid it in her purse, throwing it out it at home. At first, it was regularly replaced, but Mann kept taking the signs, and finally they stopped appearing. It was the first of many victories.

Shetterly is happy that people will know not just about the John Glenns of the world, she said, but the whole team that helped them get where they were going.

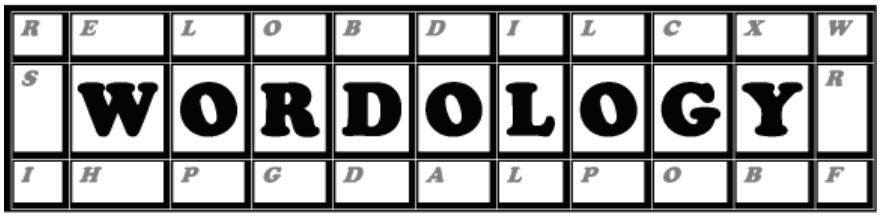


Wordology Activity #1: Matching Root Words

***Instructions**:* The words in Column 1 are your Vocabulary Words. Draw an arrow to match each word to the one in Column 2 that is related to it. Then, write a sentence using the word in Column 2. An example is given.

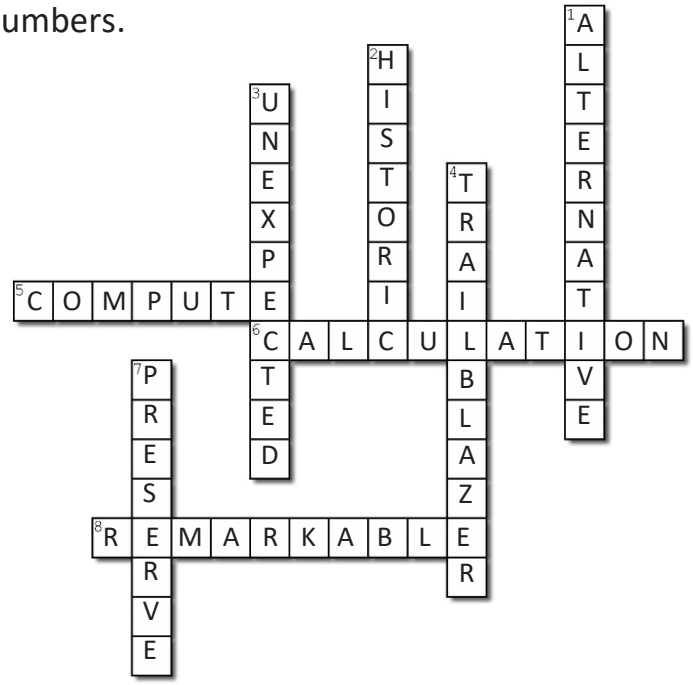
1: Vocabulary Words	2: Related Words	3: Sentences
Historic	Calculate	
Calculations	Preservation	
Remarkable	Computer	
Preserve	Alternate	
Compute	Expect	
Alternative	History	**Example**: We need to know **history** so we don't repeat its mistakes.
Unexpected	Remark	

Name_____ Date _____ *Galaxy* Days 9 and 10



Wordology Activity #2: Reverse Crossword

Instructions: From the filled-out crossword, write down clues next to the appropriate numbers.



Created using the Crossword Maker on TheTeachersCorner.net

Across:

5: _____

_____

6: _____

_____

8: _____

_____

Down:

1: _____

_____

2: _____

_____

3: _____

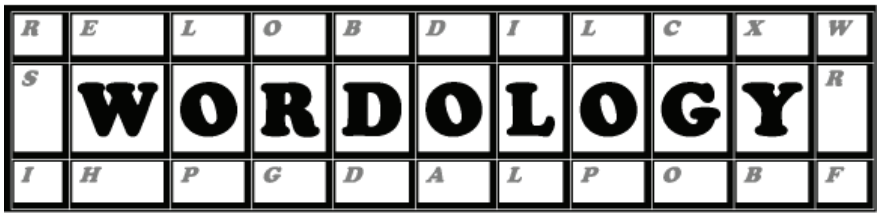
_____

4: _____

_____

7: _____

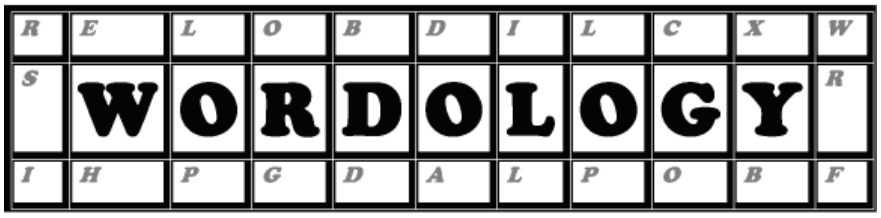
_____



Wordology Activity #3: Using Vocabulary

Choose this activity **after** you have read "A Forgotten Story: Black Women Help Land a Man on the Moon." Answer the questions below in complete sentences. Include the vocabulary words in your answer.

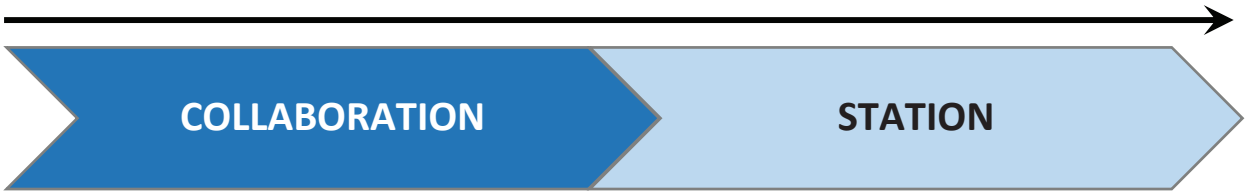
Vocabulary Words	Guide Question	Complete Sentence
1. **unexpected; historic**	What was **unexpected** in the **historic** NASA photo that Mary Gainer found?	
2. **calculations**	What was the purpose of the **calculations** that the women were hired to do at NASA?	
3. **remarkable**	Why was it **remarkable** that NASA hired Katherine Johnson, Miriam Mann, and their coworkers for this work?	
4. **trailblazer**	In what ways were Katherine Johnson and the other black female computers **trailblazers**?	
5. **preserve**	What has been done to **preserve** the story of the black female computers at NASA?	



Composing Meaningful Sentences

If you complete your chosen Wordology activity, take the remaining time at this station to write Meaningful Sentences using the vocabulary words listed below. (Remember, a Meaningful Sentence is a sentence that shows that you know what the word means!) Read and discuss your sentences with your teammates.

Word Bank			
historic	compute	remarkable	trailblazer
preserve	calculation	alternative	unexpected



Collaboration Station: Partner Reading

Instructions: With a partner, read aloud the **first page** of "A Forgotten Story: Black Women Helped Land a Man on the Moon." Discuss answers to the questions below with your partner, then write down your answers on your own.

1. Why do you think Mary Gainer was so interested in learning more about the 1943 photo that she found at NASA?
2. How did Margot Lee Shetterly's background help her write a book about the story of the black women who worked at NASA?
3. If you were making a movie about black female math whizzes at NASA, what types of events would you include to make the movie interesting?

Media Madness

Hidden Figures Trailer

Instructions: Watch the trailer of the 2017 movie *Hidden Figures* at this link:

https://www.youtube.com/watch?v=RK8xHq6dfAo

This movie tells the true story of black women engineers and mathematicians who worked at NASA in the 1950s and 60s to help send astronauts into space. After watching the video once or twice, answer the questions below.

1. What does the video suggest about the challenges that these women faced while working at NASA?

_____

_____

_____

_____

2. What important national goals did the women help NASA accomplish?

_____

_____

_____

_____

3. What can you guess from the video about the attitudes that helped these women succeed?

_____

_____

_____

_____

Days 11 and 12

Teacher Preparation

Post team cards (with member students listed) under headings to show the station where each team is to start. Place copies of the text (excerpts from "Night Wonders," by Jane Ann Peddicord, found on pages 103-104 of this manual) at the entrance for students to pick up with their Do Now sheets.

Post the Vocabulary Words:

canopy	stow	steed
ascend	revolve	swerve
soar	nebula	oasis

On Day 12, place black construction paper at the entrance along with the Do Now sheets. Instruct students to each take one piece of construction paper along with the Do Now. Provide colored chalks, pastels, and/or metallic markers for students to use for the Do Now.

Preload the video "What Is a Nebula?" for the Daily Launch on Day 12:

https://www.youtube.com/watch?v=yJVy9P3XSVE

Also, create a blank T-chart to use for the Day 12 Daily Launch to compare the genres of scientific writing and poetry:

Scientific Prose	Poetry

Preload the Media Madness read-aloud of the poem "Night Wonders."

At Media Madness, students will also be recording themselves, using Vocaroo or any other app of choice.

The guiding question for this section is:

How can poetry describe space travel in ways that regular writing cannot?

Daily Launch Day 11

Whole Group Opening Activity: **Poem Discussion**

(***Note****:* As students work on their "Do Now" sheets, be attentive to the fact that some of them may not realize that the definition and pronunciation of the word "oblivion" are provided. If necessary, as the class gets underway, briefly pronounce and define the word, so that students are not stuck on it.)

Ask students to share their feelings about the poem "Stars," which they read for their Do Now activity.

If you have not already done so, go over the pronunciation of the word "oblivion" with students and have them pronounce it after you.

Read the poem aloud to students (page 96 in this manual). Then, ask the class to read the poem along with you. Ask students some of the following questions:

- What do you notice about the way this poem is written? (*length of lines, rhythm, whether or not it rhymes…*)
- What word pictures did the poem create in your mind? (How did you *visualize* it?)
- Why do you think the poet says that night in the city is "a little breath of oblivion"? Why might this be a good thing?
- What did you think the sentence "Reach up, dark boy, and take a star" might mean? (Remember, Hughes was writing as an African American poet in the 1920s!)
- How are stars discussed differently in this poem, compared to the other readings we've been doing the last few days?

If necessary, review some of the ideas about poetry that the class explored during the *Heroes* unit. Introduce the **Guiding Question** and discuss what it means. If there is time, brainstorm possible answers to the question.

How can poetry describe space travel in ways that regular writing cannot?

Point out that Hughes' poem is an example of **free verse** (poetry without a set pattern of rhyme and rhythm). Tell students that during this instructional cycle, they will be exploring a longer poem that does have a traditional pattern of rhythm and rhyme. Encourage them to continue to think about the guiding question as they work at their stations over the next two days.

Daily Launch Day 11

Do Now: Poem Preview

The poem below, "Stars," is by Langston Hughes, a famous African American poet of the early 20th century. This poem was published in 1921.[1] Read the poem several times. Then read it to yourself aloud softly. Finally, answer the questions below.

"Stars" by Langston Hughes

O, sweep of stars over Harlem streets,
O, little breath of oblivion* that is night.
A city building
To a mother's song.
A city dreaming
To a lullaby.
Reach up your hand, dark boy, and take a star.
Out of the little breath of oblivion
That is night,
Take just
One star.

**Oblivion* (oh-BLIV-ee-un) means forgetfulness.

1. What is the **setting** of this poem (when and where it takes place)? How do we know?

_____

_____

2. Use several words to describe the **mood** or feeling the poem gives you.

_____

_____

3. Why do you think the poet says, "Reach up your hand, dark boy, and take a star"? What might he mean by this?

_____

_____

[1]Scott Horton, in "Browsings: The Harper's Blog," 1/21/2008 https://harpers.org/blog/2008/01/hughes-stars/

Daily Launch Day 12

Whole Group Opening Activity: **Compare Poetry and Prose**

Invite students to hold up the pictures they created for the Do Now, so their classmates can see them. Ask students which features of the poem they chose to include in their drawings.

Then show the video "What is a Nebula?" (Note: Plan to stop the video at minute 4:16 or 5:22 if the time available is limited.)

https://www.youtube.com/watch?v=yJVy9P3XSVE

Ask students to comment on the video and list some of the things they learned about nebulae.

Remind students of the Guiding Question: *How can poetry describe sky or space travel in ways that regular writing cannot?* Ask students whether they would prefer to write a poem or a scientific article about nebulae, and why. (Both answers are acceptable, as this is a matter of personal preference!) Ask them list ways their writing would be different in these two different forms or genres. Use the T-chart you have prepared to note answers comparing the two; for example:

Scientific Prose	Poetry
Numbers and calculations	Figurative language (metaphors, similes)
Provides accurate information	Communicates feelings
Paragraphs and sentences	Stanzas and short lines
Uses charts and tables	Creates mental pictures

Dismiss students to work in their stations.

Daily Launch Day 12

Do Now: Picture the Night Sky

Instructions. Take out your copy of "Night Wonders." Re-read a few stanzas (sections) and make a mental picture based on what you read. Then, use the drawing supplies provided by your teacher and the black construction paper to create a picture that represents one or more stanzas from the poem—a picture of what you might see if you traveled through space!

MAIN STATION

Excerpts from "Night Wonders" by Jane Ann Peddicord

(pages 103-104 in this manual)

Introduce the Vocabulary Words (10-15 minutes)

Introduce students to the Vocabulary Words following the guidance provided under "Vocabulary Instruction" (pages 9-10). Read the list aloud from the Word Wall posted, pointing to each word as you pronounce it.

canopy	stow	steed
ascend	revolve	swerve
soar	nebula	oasis

On a second reading, have students repeat each word after you. Ask students whether they know the definitions of any words, and confirm correct definitions. If the words are unfamiliar, ask students whether they recognize parts of the words; as necessary, especially for longer words, walk them through the syllables to assist them in decoding. Then, display your kid-friendly definitions; for example:

GLOSSARY OF VOCABULARY WORDS

canopy – an awning or covering

ascend – to rise or go up

soar – to fly

stow – to put away (objects); also, to catch a ride by hiding aboard a vehicle, train, plane, etc.

revolve – to go around in a circle or to spin

nebula – a cloud of dust or gas in space (plural **nebulae**, pronounced neb-you-LIE)

steed – an animal that you ride, usually a horse

swerve – to turn aside or change direction

oasis – a place in the desert where there is water; here, a place of safety and refreshment

Discuss each word with students; use words in "Meaningful Sentences" (see examples below). Invite students to propose sentences as well. Remind students that they are to compose their

own Meaningful Sentences as time allows at the Wordology Station. Remind students that in poetry, words are often used **figuratively**, to create a word picture rather than according to their strict dictionary meaning. Encourage students to watch for figurative uses of the vocabulary words in the poem that you will be reading with them. (***Note*:** the word "nebulae" can be pronounced either neb-you-LEE or neb-you-LIE, but in this poem, use neb-you-LIE for the sake of the rhyme.)

Sample Meaningful Sentences

1. My cousin was married on the beach, under a cloth **canopy** they set up to provide shade.
2. We had to **ascend** the escalator to reach the top floor of the department store.
3. I love to watch the birds **soar** high overhead, dipping and turning as they look for food.
4. My little brother tried to **stow** away in the van so he could go to the beach with us, but we found him and made him stay home with Mom.
5. We watched the basketball **revolve** around on the hoop before it finally fell in.
6. Through the telescope, the **nebula** of dust looked like a brightly colored space cloud.
7. The rodeo rider gripped the reins tightly to stay on as his wild **steed** tried to throw him off.
8. My dad had to **swerve** the car sharply to the side so he wouldn't hit the dog in the road.
9. My grandmother's house is an **oasis** of peace and quiet in the craziness of my life.

Guided Reading/ Think-aloud (10-15 minutes)

Text: Excerpts from "Night Wonders" by Jane Ann Peddicord (pages 103-104 in this manual)

Read the poem aloud to students, pausing after each stanza to "think aloud" and model reading strategies, explicitly identifying the strategies you are using (indicated by ***bold italic print***). Refer to the **menu of strategies** poster as you do so. You may want to highlight the strategies ***focus on vocabulary in context***, ***reflect on author's use of language***, and ***visualize*** while reading this text.

- (*After the first stanza*): Okay, there's a vocabulary word: *canopy*. Does that mean she was in a tent or something? Oh, no, I bet this is figurative, just making a word picture—like the whole sky was a canopy over her head. – ***focus on vocabulary in context***
- (*After the second stanza*): This is a little bit confusing. Someone is inviting her to fly? Let me find the subject of this sentence. There it is: "the *light* escaped the Earth's embrace." So the light is ascending (that's a vocabulary word too), it seems like it's inviting her, it escapes the Earth and soars away. Okay, I get that. The light flies away and wants her to come too. – ***check for comprehension; visualize***
- (*After the third stanza*): Hmm, it sounds like she does want to travel in space. What does she mean by "the wings of light"? I guess that's another word picture, right—an example of figurative language? – ***reflect on author's use of language and literary techniques***

- (*After the fourth stanza*): Well, this is easier to understand. Sounds like she traveled past all the planets and way out in outer space. I guess it's like an imaginary journey. – ***visualize; make inferences***
- (*After the fifth stanza*): Wait, where did the grains of sand come from? Hmm, I see the work "like," so this might be a **simile**—another example of figurative language. There's a word picture of grains of sand on a velvet ribbon. I can picture that, but what is she talking about? Maybe we need to look back at the previous stanza: "our Sun looked like a distant star…"—and then there are three dots, so the sentence isn't really finished. Got it. So it's the Sun that looks like one grain of sand, and the rest of the stars are like other grains of sand, and the black night sky is like a velvet ribbon. – ***visualize; reflect on author's use of language and literary techniques***
- (*After the sixth stanza*): Hmm, what does she mean by "stars are born, and live, and die"? I'll have to think about that. But what an amazing word picture: "diamond veils called nebulae." That's really cool. – ***ask questions; reflect on author's use of language and literary techniques***
- (*After the first stanza on the second page*): Here's another vocabulary word: "steed." But she's not riding a horse, right? She's riding a beam of light. Oh, I see: she says "my light steed"—that must mean the light is what she's riding on—another example of figurative language. And here's another simile: "like a bubble in a bath, I found myself drawn round a path." I think she's talking about when you let the water out of the bathtub and the bubbles go round and round in a circle before they go down the drain. So she's going round in a circle, too. But why? Oh yeah, because "outer space itself is curved." Hmm. – ***visualize; reflect on author's use of language and literary techniques; ask questions***
- (*After the second stanza on the second page*): So what is she talking about here? I think there might be some clues if I read this closely. "Beyond a glowing sun and very near where I'd begun": that sounds like she was back to near her starting place. So what is this silver face that she recognizes, "that overlooks a special place"? (*allow students to offer suggestions or guesses*) – ***check comprehension; make inferences***
- (*After the third stanza on the second page*): Okay, here is a big clue: "graced by water, wind, and air"—where do we find all those things? (*allow students to offer suggestions or guesses*) Yes, she must be back near Earth! And I guess the "silver face" was the Moon. So why does she say a "bright oasis in the night"? I guess just like an oasis in the desert is the only place where travelers can find water that they need, Earth is the only place in space that provides us the things we need to survive. – ***make inferences; elaborate***
- (*After the final stanza*): So she's back to Earth… but here's a funny thing. In the last line, she says "I knew I'd wonder back one night." Doesn't she mean "I'd *wander* back one night"? Or maybe this is just a play on words. Since the trip was in her imagination, I guess that's why she says "wonder back" instead of "wander back." I like that! – ***reflect on author's use of language and literary techniques***

Additional Activities for Schools with 30-minute Stations

- When students repeat Vocabulary Words after you, show them the Vocabulary Awareness Chart, filled out with the Vocabulary Words for this section, and have them indicate their familiarity with each one; proceed as usual with the Awareness Chart.
- Revisit the Vocabulary Words from previous days.

From *Night Wonders*

by Jane Ann Peddicord*

Photo: Sindre Strøm

Beside a dark and quiet sea
beneath a starlit canopy
I shone my light upon a star
and wondered, *What is out that far?* […]

Ascending high across the sky
as if inviting me to fly,
the light escaped the Earth's embrace
and soared away through open space.

I wished that night with all my might
that I might stow aboard that flight
and sail upon the wings of light
across the sparkling winds of night. […]

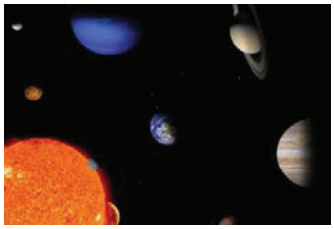


Photo: nvmixArt

I passed the planets one by one
revolving round the glowing Sun,
then sped through empty space so far
our Sun looked like a distant star…

Photo: NASA

Like one of many grains of sand
sprinkled on a velvet band,
each turning nighttime into day
and lighting up the Milky Way.

I flew upon my steady beam
to lands more distant than a dream,
where stars are born, and live, and die,
in diamond veils called nebulae. […]

Photo: NASA

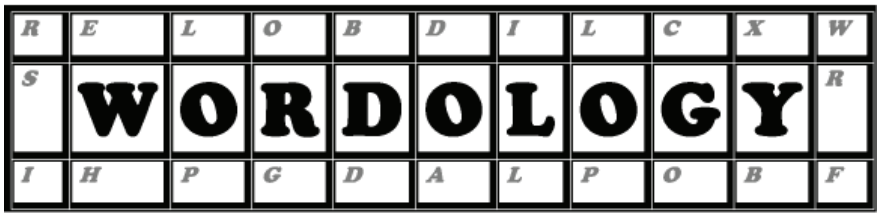
My light steed never ever swerved,
but outer space itself is curved.
So like a bubble in a bath,
I found myself drawn round a path… […]

Not far beyond a glowing sun
and very near where I'd begun,
I recognized a silver face
That overlooks a special place…

Photo: NIST

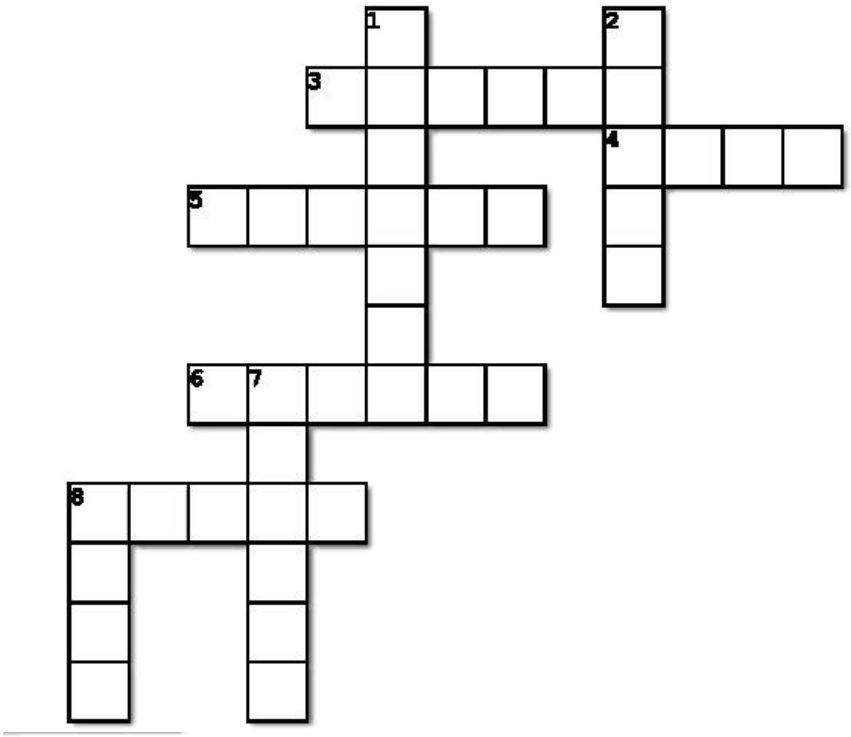
One graced by water, wind, and air,
to me it never looked so fair—
a bright oasis in the night
inviting me to end my flight.

Sailing back to Earth once more
and landing on my sandy shore,
I searched the sky for sparks of light
and knew I'd wonder back one night.



Wordology Activity #1: Crossword Puzzle

Instructions: Choose words from the Word Bank to complete this puzzle. The Clues box will help you decide which words fit in which spaces.



Created using the Crossword Maker on TheTeachersCorner.net

Word Bank

canopy
ascend
soar
stow
revolve
nebula
steed
swerve
oasis

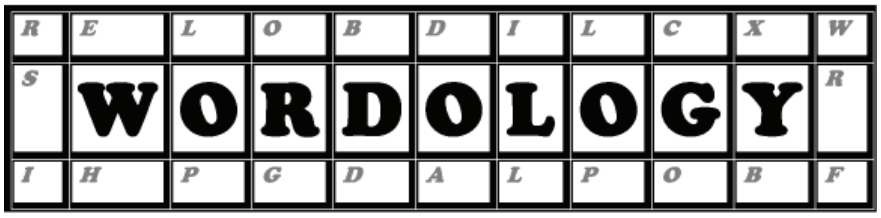
Clues

Across

3. a cloud of space dust
4. to fly
5. an awning or covering
6. to rise up
8. an animal that you ride on

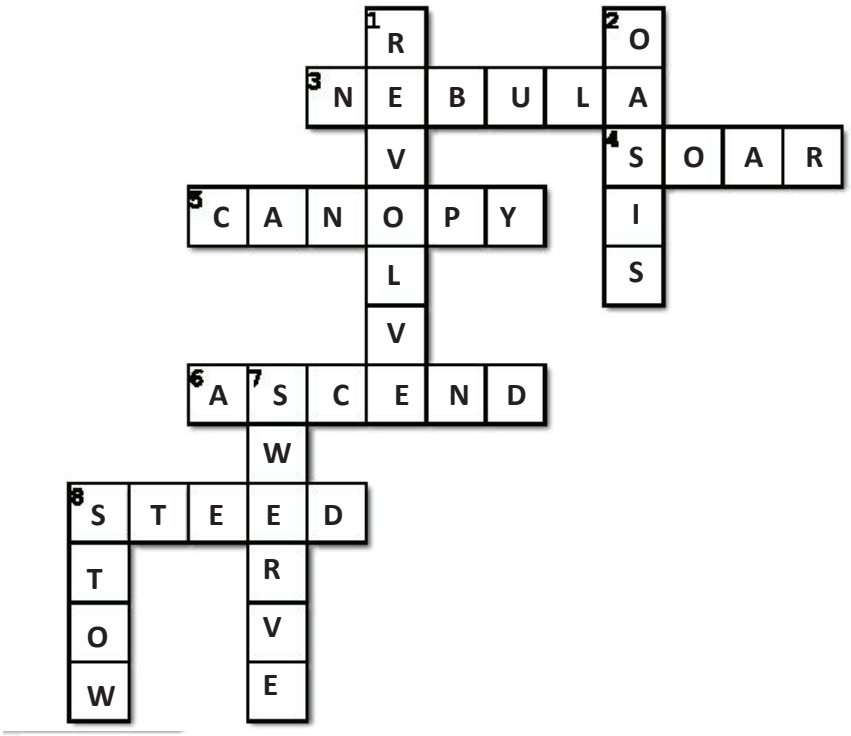
Down

1. to circle around
2. a place of refreshment
7. to turn aside
8. to put away or hide



Wordology Activity #1: Crossword Puzzle (Teacher Key)

Instructions: Choose words from the Word Bank to complete this puzzle. The Clues box will help you decide which words fit in which spaces.



Created using the Crossword Maker on TheTeachersCorner.net

Word Bank

canopy
ascend
soar
stow
revolve
nebula
steed
swerve
oasis

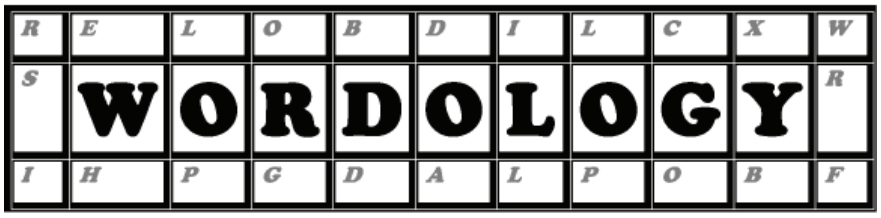
Clues

Across

3. a cloud of space dust
4. to fly
5. an awning or covering
6. to rise up
8. an animal that you ride on

Down

1. to circle around
2. a place of refreshment
7. to turn aside
8. to put away or hide



Wordology Activity #2: Poetry Writing

Instructions: Using at least four of the words in the Word Bank, write a poem about an imaginary trip into space. (Your poem does not have to rhyme.) Refer back to "Night Wonders" if you need inspiration.

Title of your poem: _____

_____

_____

_____

_____

_____

_____

_____

_____

_____

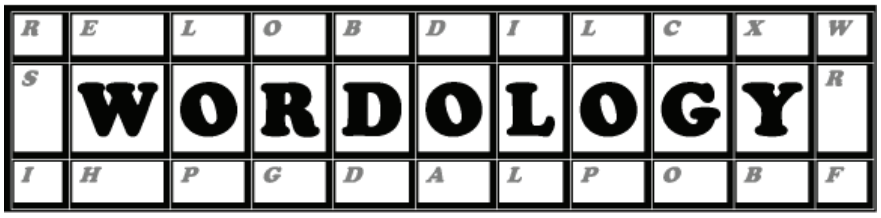
_____

_____

_____

Word Bank

canopy	ascend	soar	stow	revolve
nebula	steed	swerve	oasis	



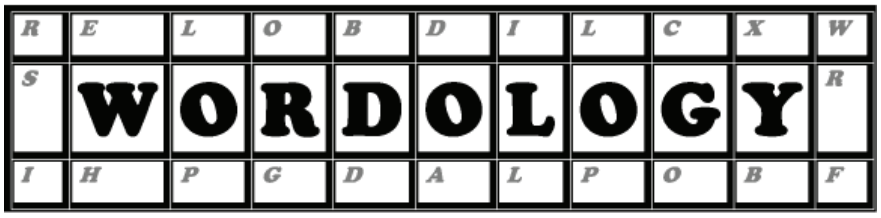
Wordology Activity #3: Synonym Hunt

Instructions: A **synonym** is a word that means the same or almost the same as another word. **Rewrite** each sentence without changing its meaning. Choose a synonym from the Word Bank to replace the underlined word or phrase in each sentence.

1. What a great vacation plan—I wish I could <u>hide</u> myself in your suitcase and come along!
2. Jet fuel gives rockets the power to <u>go up</u> high into space.
3. All of the planets <u>circle</u> around the Sun at different rates.
4. Desert travelers found a <u>safe place</u> beside a well where they could rest and refresh themselves.
5. The <u>dust cloud</u> showed up as a bright spot far away in space.
6. You will need a fast <u>horse</u> to win that race.
7. Marta had to <u>sharply turn</u> her bike to avoid hitting the potholes in the street.
8. The party was outdoors so we put up a <u>tent covering</u> in case of rain.
9. I can't wait to see my kite <u>fly</u> way up in the sky!

<u>Word Bank</u>

canopy	ascend	soar	stow	revolve
nebula	steed	swerve	oasis	



Composing Meaningful Sentences

If you complete your chosen Wordology activity, take the remaining time at this station to write Meaningful Sentences using the vocabulary words listed below. (Remember, a Meaningful Sentence is a sentence that shows that you know what the word means!) Read and discuss your sentences with your teammates.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

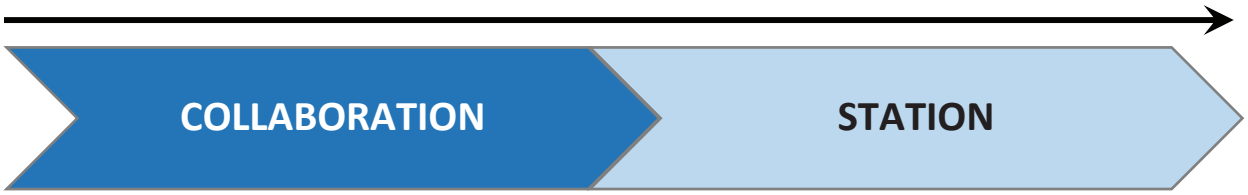
_____

_____

_____

Word Bank

canopy	ascend	soar	stow	revolve
nebula	steed	swerve	oasis	



Collaborations Station: Prose Summary

***Instructions*:** Partner read the **first** page of "Night Wonders," taking turns reading the stanzas. Then work with your partner to summarize in one prose (= regular language) sentence what is happening in each stanza. Write your answers in the chart below. (The first stanza has been done for you as an example.)

Stanza 1: The writer is standing on the beach looking up at the stars and wondering about space.
Stanza 2: _____ _____
Stanza 3: _____ _____
Stanza 4: _____ _____
Stanza 5: _____ _____
Stanza 6: _____ _____

Media Madness

Poetry Read-Aloud and Recording

Instructions: Listen to the audio recording from the poem "Night Wonders" by Jane Ann Peddicord on your device (tablet or laptop). As you listen, read along on your own copy. (Notice the pictures too.)

Then, record yourself reading several stanzas (sections) of the poem. You can take a few tries to get it sounding right.

Listen to your recording, and comment on your reading using the following prompts:

1. How is your speed as you read the poem?

   ○ Too fast ○ Too slow ○ About right

2. Is your reading choppy or smooth?

   ○ Very choppy ○ A little choppy ○ Mostly smooth

3. Can you hear a rhythm in the lines from your recording?

   ○ Yes, I hear the rhythm ○ No, not really

4. Does your version communicate the feeling that the poem tries to express?

   ○ Yes ○ A little bit ○ Not really

If you want, make another recording and see if it sounds better to you!

Days 13 and 14

Teacher Preparation

Post team cards (with member students listed) under headings to show the station where each team is to start. Place copies of the address by President Ronald Reagan to the nation after the 1986 explosion of the *Challenger* (pages 120-121 in this manual) at the entrance for students to pick up with their Do Now sheets.

For the Day 13 Daily Launch, preload the video "The Space Shuttle *Challenger* Disaster Explained": https://www.youtube.com/watch?v=TJIXIhypGL0. Preview the video and decide whether you want to stop it at minute 4:00 or minute 4:45 (the entire video, at almost seven minutes long, will take up too much time).

Make sure students have access to colored pencils or markers for the Daily Launch on Day 14.

Post the Vocabulary Words:

mourn	tragedy	dazzle
expand	diminish	quest
anguish	fainthearted	coincidence
	shuttle	

Preload the Media Madness read-aloud—the actual Reagan address from C-SPAN:

https://www.youtube.com/watch?v=66mGwws7EEw.

The guiding question for this instructional cycle is:

How can we respond when scientific exploration leads to human tragedy?

Daily Launch Day 13

Whole Group Opening Activity: The Challenger *Tragedy*

Ask students to share their ideas from the Do Now sheets. Encourage them to use their imagination to think about ways teaching from space would be different from teaching on Earth. (For example, would it be easier or harder to write on the board if you were weightless?)

Tell students that the first and most famous teacher to join the space program was Christa McAuliffe, a New Hampshire history teacher. Tell them that the video they are going to watch tells the story of the mission in which McAuliffe participated. Show the video "The Space Shuttle *Challenger* Disaster Explained" at the following link:

https://www.youtube.com/watch?v=TJIXIhypGL0

Stop the video at minute 4:00 or 4:45 (whichever you decided on). Ask students how kids and teachers across the country might have responded to these events. (Remember, millions of classrooms were viewing them live on television when they occurred.) Tell students that over the next two days, they will learn more about how the nation faced this tragic situation.

Introduce the **Guiding Question** and discuss what it means. If there is time, brainstorm possible answers to the question. Encourage them to continue to think about it as they proceed to their stations over the next two days.

How can we respond when scientific exploration leads to human tragedy?

Daily Launch Day 13

Do Now: Teachers in Space!

Teachers in space? What a weird idea! Actually, several U.S. astronauts have been teachers. Barbara Morgan, an elementary school teacher from Idaho, was an astronaut from 1998 to 2008 and helped to build the International Space Station. She now teaches math, science, and engineering at Boise State University. Other teacher astronauts who helped with the International Space Station were middle and high school science teachers. These include Joseph Acaba, the first astronaut of Puerto Rican heritage; Ricky Arnold; and Dorothy Metcalf-Lindenburger.

Question: *Imagine one of your teachers going to space! What kind of online lesson do you think he or she would teach from a space station?*

_____

_____

_____

_____

_____

_____

How might teaching from a spaceship be different from teaching a lesson on Earth?

_____

_____

_____

_____

_____

Daily Launch Day 14

Whole Group Opening Activity:

Space Patch and Discussion

Give students enough time to sketch out their space patches for the Do Now. Then, invite them to share their ideas: where they would go on a space journey and how they represented their ideas visually.

Remind students of the guiding question, *How can we respond when scientific exploration leads to human tragedy?* Ask students to respond to the information they learned the previous day about the *Challenger* tragedy. Invite them to connect this to things they discussed in the *Heroes* unit (for example, the poem about the fall of the twin towers on September 11, 2001), and to current events in your city or state. Use questions such as the following to spark discussion:

- How can communities come together to heal in the face of tragedy?
- How can they support those most affected (for example, bereaved families)?
- Was the suspension of space missions following the *Challenger* tragedy appropriate?
- Is it right for governments and private companies to spend billions of dollars to send people into space, considering the risks involved? Why or why not?

Daily Launch Day 14

Do Now: Create a Space Patch

Each time NASA puts together a team for a space mission, the team's first job is to create a space patch that represents the team and the mission! Look at the space patch for the Challenger mission below. Do you see the tiny red apple beside Christa McAuliffe's name? The apple is a **symbol** of her work as a teacher.

The official NASA space patch for the 1986 *Challenger* mission (NASA, Photo ID: S85-46260, Wikimedia Commons)

What about you? Where would you like to go on a space journey? A different planet? Or maybe a different galaxy? Who would you want to have on your mission team?

Use the space below (or the back of the page) to design a space patch for your mission. Use words and pictures to represent the mission goal and the people you would like on the team.

MAIN STATION

Explosion of the Space Shuttle *Challenger*: Address to the Nation, 1/28/1986 (pages 120-121 in this manual)

Review the Vocabulary Words (5-10 minutes)

Introduce students to the Vocabulary Words following the guidance provided under "Vocabulary Instruction" (pages 9-10). Read the list aloud from the Word Wall posted, pointing to each word as you pronounce it.

mourn	tragedy	dazzle
expand	diminish	quest
anguish	fainthearted	coincidence
	shuttle	

On a second reading, have students repeat each word after you. Ask students whether they know the definitions of any words, and confirm correct definitions. If the words are unfamiliar, ask students whether they recognize parts of the words; as necessary, especially for longer words, walk them through the syllables to assist them in decoding.

GLOSSARY OF VOCABULARY WORDS

shuttle – a vehicle that carries people or things back and forth

mourn – to feel or show deep sadness; to grieve

tragedy – an event causing great suffering

dazzle – to amaze; to astonish

expand – to make larger; to increase

diminish – to make smaller; to decrease

quest – a long adventurous search

anguish – mental or physical pain; extreme suffering

fainthearted – fearful; cowardly

coincidence – something that happens by accident; a chance event

Discuss each word with students; use words in "Meaningful Sentences" (see examples below). Invite students to propose sentences as well. Remind students that they are to compose their own Meaningful Sentences as time allows at the Wordology Station.

Sample Meaningful Sentences

1. **Shuttle** buses carry people back and forth between the parking lots and the airport.
2. When people **mourn** the loss of a loved one, they show their sadness in different ways.
3. The teenagers' death in the accident was a **tragedy** that deeply affected their whole community.
4. The magician used amazing tricks and dramatic lighting to **dazzle** the audience, leaving them speechless.
5. The breakfast program was successful in a few schools, so leaders decided to **expand** it to every school in the district.
6. Susan loved running on the track team so much that even the long hours of practice and training did not **diminish** her excitement.
7. Stephan's **quest** to find the best pizza in town took him to restaurants all over the city.
8. Mrs. Henson's **anguish** over her son's death was so great that she could not eat or sleep.
9. Joining the military is not for the **fainthearted**; being a soldier is tough, hard work.
10. I didn't plan to meet Juan in the coffee shop; it was just a **coincidence** that we were there at the same time that day.

Read-Aloud, Think-Aloud (10-15 minutes)

Text: Explosion of the Space Shuttle Challenger: Address to the Nation, 1/28/1986 (pages 120-121 in this manual)

Have students turn to the Newsela article and follow along as you read and pause occasionally to "think aloud," explicitly identifying the strategies you are using (indicated by ***bold italic print***). Refer to the **menu of strategies** poster as you do so. You may want to highlight the strategies ***check for comprehension*** and ***make connections*** while reading this text. Note where vocabulary words appear and how the words are used in context. Possible questions include:

- *In paragraph 1, after "… have led me to change those plans"*): Wait, what does he mean by "the state of the Union"? Oh yes, that's the speech the president gives on TV every year in January. – ***ask questions; build background knowledge***
- (*In paragraph 3, after "… terrible accident on the ground"*): Hmm, looks like there's a little tiny symbol at the end of that sentence. I wonder what that is. Oh, look, there's the same symbol at the bottom—and there's a note to explain what he was referring to. (*Read the*

footnote.) Oh, wow, so this was not the first time that people died in the space program. – ***elaborate***

- (*After the first paragraph on the second page, "… the members of the Challenger crew were pioneers*"): Why does he say they were pioneers? Oh, I guess because they were doing things that no one had ever done before. – ***check for comprehension***
- (*After the next paragraph, "… and we'll continue to follow them"*): How does he explain to schoolchildren what had happened? How do you think this explanation might have helped them process the tragedy? (*allow students to respond*) – ***summarize; make inferences***
- (*After the third paragraph, "… we wouldn't change it for a minute"*): I wonder why he says, "We don't keep secrets and cover things up"? Oh, I guess it's because other countries like the Soviet Union might have tried to hide a great disaster like what happened to the *Challenger.* That is one of the great things about our country… sometimes we mess up, big time, but people are still allowed to know about it and talk about it. – ***check for comprehension; make connections***
- (*After the fourth paragraph, "… our hopes and our journeys continue"*): Well, they did stop sending people to space for a couple of years after that happened. But then they started up again, so I guess he was right to say, "Nothing ends here." – ***make connections***

Remind students of the guiding question, *How can we respond when scientific exploration leads to human tragedy?* Ask them to think about a recent national or local tragedy that had an impact on them. Ask them what helped them to cope with that situation, and how people can help each other when a tragedy affects a whole community or even an entire nation.

Additional Activities for Schools with 30-minute Stations

- Revisit the Vocabulary Awareness Chart for this section. Again invite students to indicate their familiarity with each word by a show of hands.
- Revisit the Vocabulary Words from previous days that students found difficult.

National Aeronautics and Space Administration: NASA History Office

The Explosion of the Space Shuttle *Challenger*

Address to the Nation, January 28, 1986 by President Ronald W. Reagan

[Note: The President spoke at 5 p.m. from the Oval Office at the White House. His address was broadcast live on nationwide radio and television.]

Ladies and gentlemen, I'd planned to speak to you tonight to report on the state of the Union, but the events of earlier today have led me to change those plans. Today is a day for mourning and remembering.

Nancy* and I are pained to the core by the tragedy of the shuttle *Challenger*. We know we share this pain with all of the people of our country. This is truly a national loss.

The crew of the Challenger space shuttle. (Photo: NASA, Johnson Space Center)

Nineteen years ago, almost to the day, we lost three astronauts in a terrible accident on the ground.† But we've never lost an astronaut in flight; we've never had a tragedy like this. And perhaps we've forgotten the courage it took for the crew of the shuttle; but they, the *Challenger* Seven, were aware of the dangers, but overcame them and did their jobs brilliantly. We mourn seven heroes: Michael Smith, Dick Scobee, Judith Resnik, Ronald McNair, Ellison Onizuka, Gregory Jarvis, and Christa McAuliffe. We mourn their loss as a nation together.

Launch of the Challenger space shuttle, Jan. 28, 1986 (Wikimedia Commons)

For the families of the seven, we cannot bear, as you do, the full impact of this tragedy. But we feel the loss, and we're thinking about you so very much. Your loved ones were daring and brave, and they had that special grace, that special spirit that says, "Give me a challenge and I'll meet it with joy." They had a hunger to explore the universe and discover its truths. They wished to serve, and they did. They served all of us.

* Nancy was President Reagan's wife.

† President Reagan was referring to the death of three Apollo 1 astronauts in a fire during a training exercise on January 27, 1967.

We've grown used to wonders in this century. It's hard to dazzle us. But for 25 years the United States space program has been doing just that. We've grown used to the idea of space, and perhaps we forget that we've only just begun. We're still pioneers. They, the members of the *Challenger* crew, were pioneers.

And I want to say something to the schoolchildren of America who were watching the live coverage of the shuttle's takeoff. I know it is hard to understand, but sometimes painful things like this happen. It's all part of the process of exploration and discovery. It's all part of taking a chance and expanding man's horizons. The future doesn't belong to the fainthearted; it belongs to the brave. The *Challenger* crew was pulling us into the future, and we'll continue to follow them.

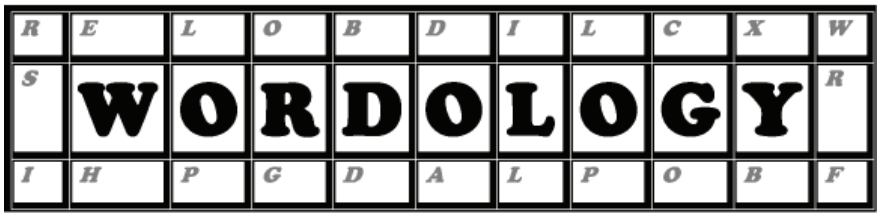
I've always had great faith in and respect for our space program, and what happened today does nothing to diminish it. We don't hide our space program. We don't keep secrets and cover things up. We do it all up front and in public. That's the way freedom is, and we wouldn't change it for a minute.

We'll continue our quest in space. There will be more shuttle flights and more shuttle crews and, yes, more volunteers, more civilians, more teachers in space. Nothing ends here; our hopes and our journeys continue.

I want to add that I wish I could talk to every man and woman who works for NASA or who worked on this mission and tell them: "Your dedication and professionalism have moved and impressed us for decades. And we know of your anguish. We share it."

There's a coincidence today. On this day 390 years ago, the great explorer Sir Francis Drake died aboard ship off the coast of Panama. In his lifetime, the great frontiers were the oceans, and an historian later said, "He lived by the sea, died on it, and was buried in it." Well, today we can say of the *Challenger* crew: Their dedication was, like Drake's, complete.

The crew of the space shuttle *Challenger* honored us by the manner in which they lived their lives. We will never forget them, nor the last time we saw them, this morning, as they prepared for their journey and waved goodbye and "slipped the surly bonds of earth" to "touch the face of God."

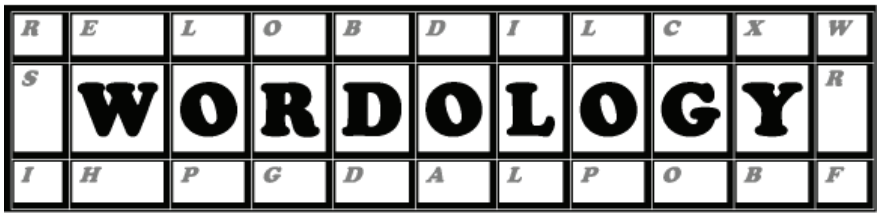


Wordology Activity #1: Speech-Writing

***Instructions**:* Think of a recent public disaster or tragedy that you know something about. Using at least four words from the Word Bank, write a brief speech as if you were the president, mayor, or another public official. Explain what happened and tell your audience how people should remember the victims and heroes.

Word Bank

mourn	tragedy	dazzle	expand	diminish
quest	anguish	fainthearted	coincidence	shuttle



Wordology Activity #2: Vocabulary Scramble

Instructions: Unscramble the letters to find words that fit in the boxes. All the words come from the Word Bank at the bottom of the page.

1. Be brave; stop being so _____!

hfedanitrate

2. People at a funeral come to _____ and pay their respects.

noumr

3. Instead of shrinking our business, we should be trying to _____ it.

xaepdn

4. I am on a _____ to make this community better.

tuseq

5. Whenever Ramón gets the ball, he tries to _____ us with his fancy footwork.

lezadz

6. It's such a _____ that we're wearing the same shirt.

dincecenioc

7. His screwed-up face told a story of much pain and _____.

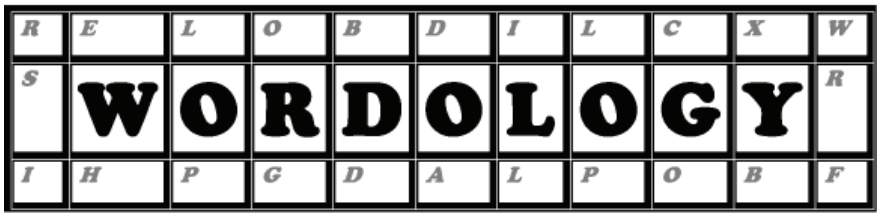
hgsiuna

8. Mom usually takes the _____ to get to her job at the hospital.

lesthut

Word Bank

mourn	tragedy	dazzle	expand	diminish
quest	anguish	fainthearted	coincidence	shuttle



Wordology Activity #2: Vocabulary Scramble

Instructions: Unscramble the letters to find words that fit in the boxes. All the words come from the Word Bank at the bottom of the page.

1. Be brave; stop being so _____!

hfedanitrate

F	A	I	N	T	H	E	A	R	T	E	D

2. People at a funeral come to _____ and pay their respects.

noumr

M	O	U	R	N

3. Instead of shrinking our business, we should be trying to _____ it.

xaepdn

E	X	P	A	N	D

4. I am on a _____ to make this community better.

tuseq

Q	U	E	S	T

5. Whenever Ramón gets the ball, he tries to _____ us with his fancy footwork.

lezadz

D	A	Z	Z	L	E

6. It's such a _____ that we're wearing the same shirt.

dincecenioc

C	O	I	N	C	I	D	E	N	C	E

7. His screwed-up face told a story of much pain and _____.

hgsiuna

A	N	G	U	I	S	H

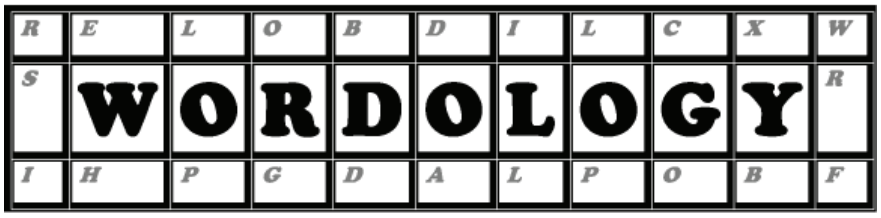
8. Mom usually takes the _____ to get to her job at the hospital.

lesthut

S	H	U	T	T	L	E

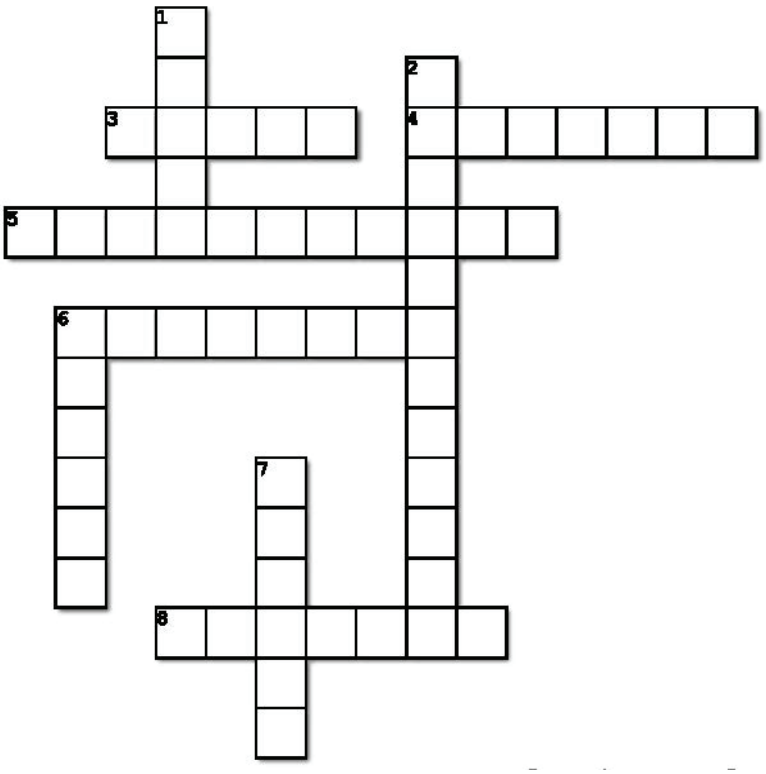
Word Bank

mourn	tragedy	dazzle	expand	diminish
quest	anguish	fainthearted	coincidence	shuttle



Wordology Activity #3: Crossword Puzzle

Instructions: Choose words from the Word Bank to complete this puzzle. The Clues box will help you decide which words fit in which spaces.



Created using the Crossword Maker on TheTeachersCorner.net

Word Bank

mourn
tragedy
dazzle
expand
diminish
quest
anguish
fainthearted
coincidence
shuttle

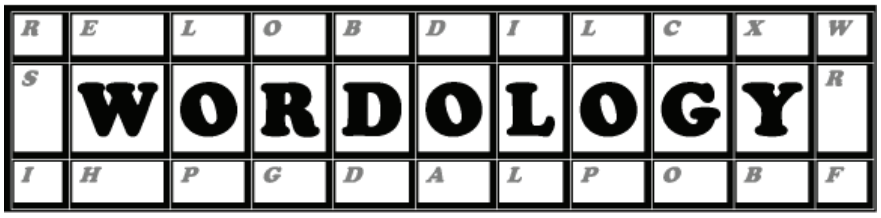
Clues

Across

3. an adventurous search
4. extreme mental or physical pain
5. a chance event
6. to make smaller; to decrease
8. an event that causes great suffering

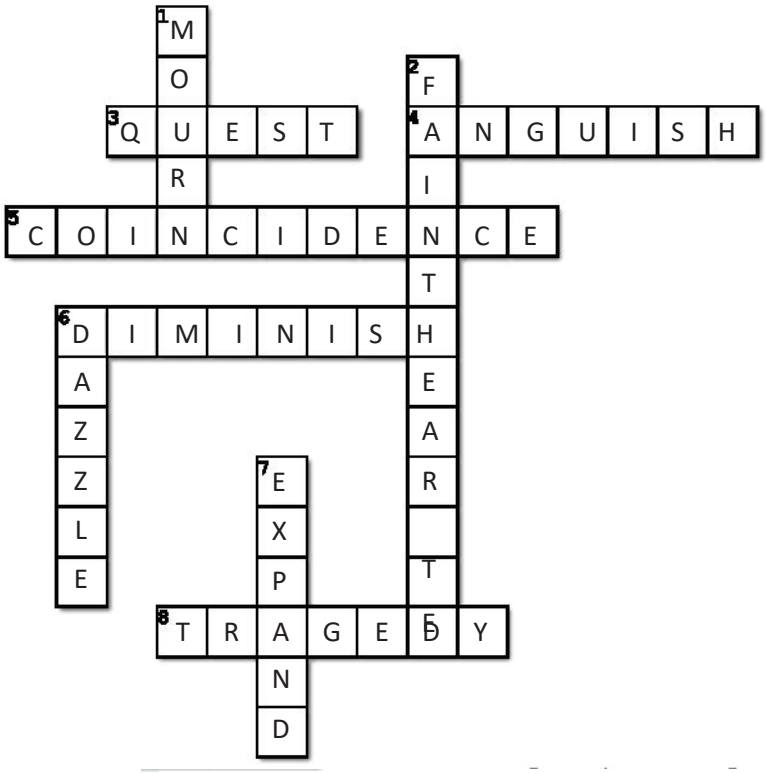
Down

1. to show sorrow; to grieve
2. nervous; scared
6. to amaze or astonish
7. to make larger; to increase



Wordology Activity #3: Crossword Puzzle (Teacher's Key)

Instructions: Choose words from the Word Bank to complete this puzzle. The Clues box will help you decide which words fit in which spaces.



Word Bank

mourn
tragedy
dazzle
expand
diminish
quest
anguish
fainthearted
coincidence
shuttle

Created using the Crossword Maker on TheTeachersCorner.net

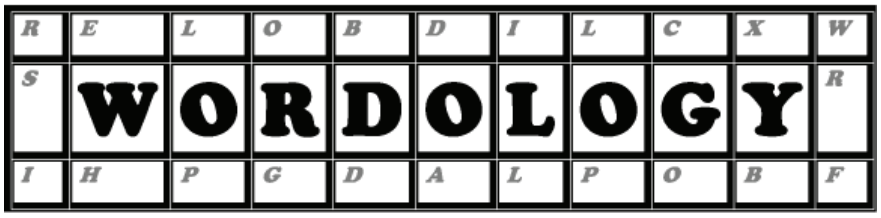
Clues

Across

3. an adventurous search
4. extreme mental or physical pain
5. a chance event
6. to make smaller; to decrease
8. an event that causes great suffering

Down

1. to show sorrow; to grieve
2. nervous; scared
6. to amaze or astonish
7. to make larger; to increase



Composing Meaningful Sentences

If you complete your chosen Wordology activity, take the remaining time at this station to write Meaningful Sentences using the vocabulary words listed below. (Remember, a Meaningful Sentence is a sentence that shows that you know what the word means!) Read and discuss your sentences with your teammates.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Word Bank

mourn	tragedy	dazzle	expand	diminish
quest	anguish	fainthearted	coincidence	shuttle

COLLABORATION STATION

Collaboration Station: Persuasive Speech Organizer

With your team, take turns reading aloud the four paragraphs on the first page of "The Explosion of the Space Shuttle *Challenger*: Address to the Nation." Discuss together the graphic organizer below. Then fill in the organizer on your own.

Speaker:

_____

Occasion:

_____

_____

Audience:

_____

_____

Purpose:

_____

_____

Main Points:

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Conclusion:

_____

Media Madness

Media Madness: A Speech to the Nation

Instructions: Go to the link https://www.youtube.com/watch?v=66mGwws7EEw. This is the actual footage of the speech that Reagan gave in 1986. Follow along with the text as you listen to him speak.

After watching it once or twice, find a partner and practice giving the speech (softly!) as if you were the President giving an address to the entire country. You can take turns reading by paragraph if you like.

Ronald Reagan, President of the United States 1981-1989 (Wikimedia Commons)

Days 15 and 16

Teacher Preparation

Post team cards (with member students listed) under headings to show the station where each team is to start. The text used will be *Star Wars: the Story of Darth Vader.* Place markers on pages 5, 8, and 16 of your copy of the book so that you can turn to these pages easily during the Main Station Read-Aloud/Think-Aloud.

Post the vocabulary words:

ruthless	apprentice	droid
impulsive	governed	liberated
potential	emperor	invasion

Pre-load the video "What Is Science Fiction?" for the Day 15 Daily Launch:

https://youtu.be/nrusqQ5JftA

Provide colored pencils or fine-tip markers for students to use for the Day 16 Do Now.

Pre-load the "You've Been Sentenced" video for the Day 16 Daily Launch:

https://youtu.be/ssRnaNuTTJo

Make sure to add the special NASA word deck to the "You've Been Sentenced" resources at the Wordology station.

Preload the site https://www.archives.gov/space at the Media Madness station. Provide markers and enough shelf paper or poster board at the station for each of the four teams to create a timeline when its turn comes.

Post the guiding question for Days 15 through 20:

What moral values do people need to exercise to explore space wisely?

Daily Launch Day 15

Whole Group Opening Activity: **What is Science Fiction?**

Ask students to share some of their responses from the Do Now sheet, which asked them to report on an imaginary Mars landing. Students may either read their "reports" or share orally what they think they might experience on a trip to Mars.

Ask students to indicate by a show of hands whether they are familiar with the term "science fiction." Ask several volunteers to offer definitions of science fiction and note their ideas on the board. Then tell students they are going to watch a video that will give them a more complete and accurate understanding of the genre science fiction. Show the video at the following link:

https://youtu.be/nrusqQ5JftA

Ask students

- According to this video, what is a *genre*? What are some examples of genre in literature?
- List some of the typical features we find in the genre of science fiction.
- The video explains that science fiction is imagined stories that *could* happen in our world, usually sometime in the future. Science fiction occurs both in print—such as short stories and novels—and in films. What sci-fi movies can you name?
- The video also says that science fiction helps us think about choices that we make now, and how they can affect the future. Can you think of any examples?

Direct students to look again at their Do Now sheets. Ask them

- Do you think you could use your Do Now as a starting point for a science fiction story? What would you need to add?

Then, introduce the **Guiding Question**: *What moral values do people need to exercise to explore space wisely*? Ask students to define the term "moral values" (= beliefs about what is right and wrong) and to give some examples (e.g., compassion, honesty, humility, courage). If necessary, introduce the terms **humility** (= being humble) and **grit** (stick-to-it-iveness), which students will encounter in the Day 16 Do Now. If there is time, brainstorm ways and reasons that moral values might be important as people explore outer space.

Tell students that they will be reading a modern science fiction story over the next three instructional cycles. Encourage them to think about ways the writer of this story explores the question of moral values through the genre of science fiction.

Daily Launch Day 15

Do Now: A Visit to Mars

Imagine that you are a young astronaut on your first visit to the planet Mars. How would you get there? What would you see when you arrive? How would you communicate with your home base on Earth? What concerns might you have?

Use the space below to describe your trip to Mars, your landing experience, and things you might expect to happen. Use your imagination and provide as many details as possible!

Mission Report: Mars Landing Date: October 16, 2030

Astronaut ID: _____

Spaceship travel report: _____

_____

_____

_____

Mars landing report: _____

_____

_____

_____

_____

Possible risks/concerns: _____

_____

_____

_____

_____

Daily Launch Day 16

Whole Group Opening Activity: "You've Been Sentenced" NASA Deck

Ask student to share their Space Avatars from the Do Now, and to tell the class which moral values they chose to represent.

Students learned to play the game "You've Been Sentenced" in the Feisty Felines unit, and have had the opportunity to play it at the Wordology station after completing their activity sheets. However, at this time you will introduce them to the special NASA word deck that they can use during the rest of the Galaxy unit.

Tell students that every field—from sports to music, from education to business—has its own special vocabulary or **terminology**. Over the course of this unit, they have become familiar with many of the terms used in science and science fiction to talk about space exploration. Now, they will have an opportunity to use those words and others like them in the "You've Been Sentenced" game, because NASA has created a special card deck featuring those terms.

As a review, show the video at the following link:

https://youtu.be/ssRnaNuTTJo

Then briefly go over the following directions with students:

1. Open the special NASA pack, shuffle the cards, and deal each player 10 cards. (Feel free to mix in cards from the traditional deck if necessary.)
2. Look at your cards and try to make the longest grammatically correct sentence you can. The sentence must make sense, but it does not have to be true.
3. Each card can only be used once in a sentence. Under the word you used, there is a number. This number shows how many points you get for using that word.
4. Show your sentence to your team. They must agree that the sentence makes sense; if they question it, you must be prepared to defend it. Your teammates will vote on whether to accept the sentence.
5. If your sentence is approved, add up your score and add it to the score sheet.
6. Shuffle and deal a new hand of 10 cards to each player.
7. To keep the game moving quickly, use the hourglass in the original pack to limit the time you can spend on each sentence.

The game is over when the time is up, the cards run out, or someone reaches 200 points.

Finally, remind students of the **Guiding Question**, *What moral values do people need to exercise to explore space wisely*? Encourage them to continue to think about it as they proceed to their stations.

Daily Launch Day 16

Do Now: Intergalactic Space Avatar

Turn to pages 14-15 in *The Story of Darth Vader*, "Meet Queen Amidala." Read the short paragraph at the top of page 14 and look carefully at the two pictures.

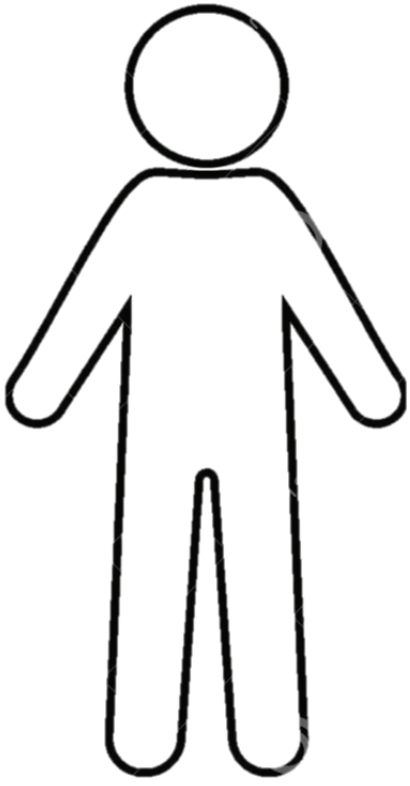
These two photos show Queen Amidala both as a courageous space warrior and a brave and loyal political leader. **Brave**, **loyal**, and **courageous** are words that describe **moral values**! Queen Amidala's costumes represent these values.

An **avatar** is a character you create to play online games—like a cartoon of yourself, or of a person you'd like to be. Imagine yourself as an intergalactic leader sometime in the future. Choose three of the moral values in the box at left that you most want to stand for, and circle them. Then, using the silhouette on the right, create an **avatar** of yourself as a space hero that represents these values. Use colored pencils or markers to add your features and a futuristic space leader outfit!

Moral Values:

Circle three that you most want to stand for.

Courage	Compassion
Honesty	Creativity
Loyalty	Friendship
Grit	Thoughtfulness
Humility	Responsibility
Patience	Kindness
Self-control	Generosity
Justice	Freedom



MAIN STATION

Darth Vader's Origins

(pages 5, 8-13, 16 in *The Story of Darth Vader*)

Introduce the Vocabulary Words (10-15 minutes)

Introduce students to the Vocabulary Words following the guidance provided under "Vocabulary Instruction" (pages 9-10). Read the list aloud from the Word Wall posted, pointing to each word as you pronounce it.

ruthless	apprentice (n.)	droid
impulsive	governed	liberated
potential (n.)	emperor	invasion

On a second reading, have students repeat each word after you. Ask students whether they know the definitions of any words, and confirm correct definitions. If the words are unfamiliar, ask students whether they recognize parts of the words; as necessary, especially for longer words, walk them through the syllables to assist them in decoding. Then, display your kid-friendly definitions:

GLOSSARY OF VOCABULARY WORDS

ruthless – heartless; willing to do anything to reach one's goals

impulsive – hasty; reckless; doing things without thinking them through

potential – the ability to become something

apprentice – a person who is learning to do a job by working at it with supervision

governed – ruled; managed; controlled

emperor – a super-king over an empire that includes several countries (or planets)

droid – a robot

liberated – set free

invasion – when an enemy army comes into a place and takes over

Discuss each word with students; use words in "Meaningful Sentences" (see examples below). Invite students to propose sentences as well. Remind students that they are to compose their own Meaningful Sentences as time allows at the Wordology Station.

Sample Meaningful Sentences

1. The leadership made a **ruthless** decision to fire half the workers and replace them with machines.
2. Brandon was a young, **impulsive** guy who often didn't think carefully before acting.
3. Sarah is still a young athlete, but with her natural talent she has the **potential** to become really good some day.
4. Damien wants to become a welder, so he has become an **apprentice** doing on-the-job training in a small local company.
5. Many of my parents' decisions are **governed** by their belief that giving us a good education is the best way to help us succeed in life.
6. Napoleon was an **emperor** who ruled over most of Western Europe in the early 1800s.
7. Engineers have developed a mechanical **droid** that helps doctors do complicated surgeries.
8. Trainers taught the dolphins how to survive in the wild before they **liberated** them to return to the ocean.
9. After the **invasion**, enemy soldiers filled the streets and people were afraid to leave their houses.

Read-Aloud, Think-Aloud (10-15 minutes)

Text: *The Story of Darth Vader*, pages 5; 8-13; 16.

Ask students how many of them have seen one or more *Star Wars* movies. Ask them to list some of the main characters in the movies and briefly mention some story lines. Tell students that the book they will be reading brings together one of the story lines from the *Star Wars* tale. Take a few minutes to introduce the following Star Wars terminology below if some of your students are unfamiliar with the films.

SPECIAL GLOSSARY OF STAR WARS TERMINOLOGY

The Force – an energy throughout the universe, which can be good or bad (dark or light)

Sith Lord – a powerful evil person on the dark side of the Force

Jedi Knights – highly skilled warriors for good, governed by the **Jedi Council**

Podrace – a race of high-speed space vehicles

Trade Federation – "cover" organization for the evil dark side

Turn to page 5 and read the text aloud; then skip to page 8 and read through page 13; finally, read page 16. As you read, explicitly identify the strategies you are using, such as ***inferring***, ***visualizing***, and ***summarizing***, referring to the **menu of strategies** poster as you do so. (**Note**: The *Darth Vader* text is not particularly complicated; you may want to focus less on reading strategies and spend more station time discussing the moral issues raised.)

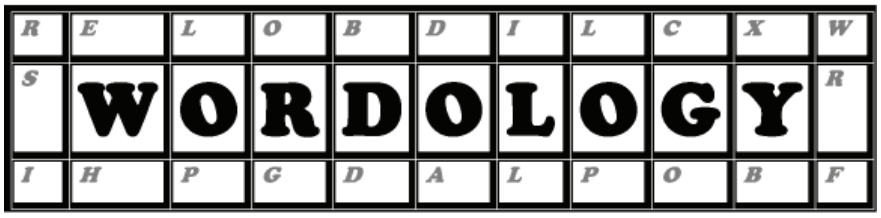
- (*Page 5, after the second sentence, "… the evil emperor Palpatine"*): Hmm, "Sith Lord"? "Emperor Palpatine"? I wonder who that is… I guess I'll read on and find out. – ***ask questions; read on***
- (*Page 8, after the fourth sentence, "… named C-3PO to help his mother"*): Wow, he must have been pretty smart. – ***make inferences***
- (*Page 8, after the fifth sentence, "… impulsive and liked to take risks"*): Uh-oh. A lot of young people are impulsive, but that might make trouble for him later on. – ***make predictions***
- (*Page 11, after the first sentence, "… his ship and Anakin's freedom"*): Okay, that sounds like a good plan: the Jedi needed parts to fix his spaceship, and Anakin was a slave who would need to be freed so he could learn to be a Jedi Knight and fulfill his potential. I guess that would be a win-win. – ***elaborate***
- (*Page 16, after the fifth sentence, "… only to defend, never to attack"*): Hmmm… that might be challenging for Anakin, since he was impulsive by nature. But it might be good for him too. – ***make inferences; make predictions***

Remind students of the guiding question, *What moral values do people need to exercise to explore space wisely*? Ask students

- What moral values does the author suggest are important in this section of the story? (Ideally, this should be an open-ended question for students to discuss. But if necessary, you can call their attention to the next-to-last sentence on page 16 to help answer it.)
- What kinds of situations do you think could arise in space that would require people to make moral decisions? (For example, think about life that might exist on other planets, different groups of humans settling on different planets or worlds, conflict over resources…)

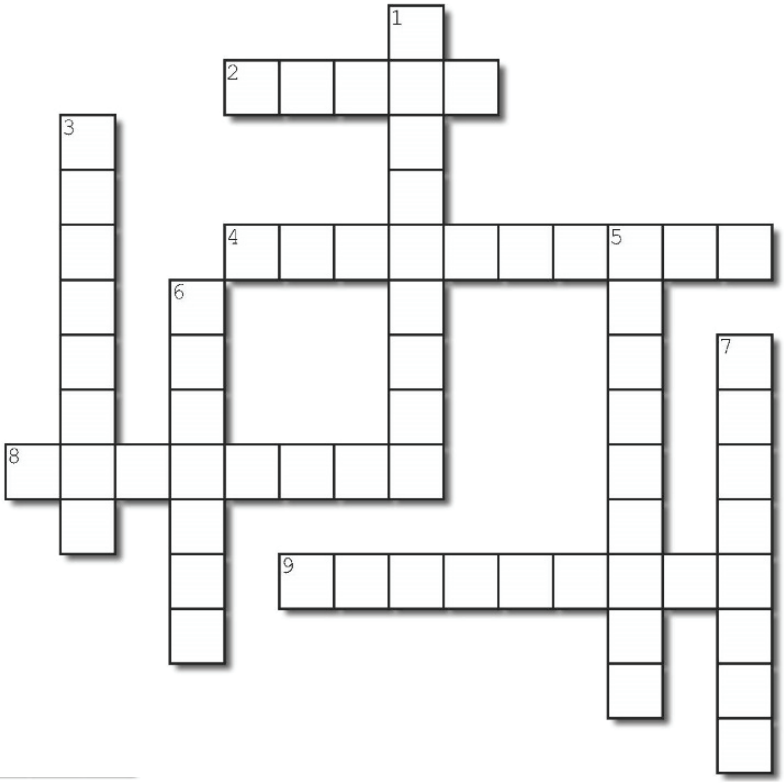
Additional Activities for Schools with 30-minute Stations

- Revisit the Vocabulary Awareness Chart showing the Vocabulary Words for this section. Ask students to indicate their current familiarity with the word by a show of hands. As students indicate that they "understand the word every time they hear it" or that they "know the meaning and use it correctly," challenge them to provide a definition or to use the word correctly in a sentence.
- The creator of the *Star Wars* movies, George Lucas, introduced "the Force" as a non-religious basis for moral values in his story. Ask students whether they agree or disagree with the idea of an impersonal "Force" that can be either good or bad. Ask them to suggest other frameworks they know of that provide a basis for moral values and decision-making.



Wordology Activity #1: *Star Wars* Crossword

Instructions: Choose words from the Word Bank to complete this puzzle. The Clues box will help you decide which words fit in which spaces.



Created using the Crossword Maker on TheTeachersCorner.net

Word Bank

ruthless	apprentice
impulsive	governed
potential	emperor
droid	invasion
liberated	

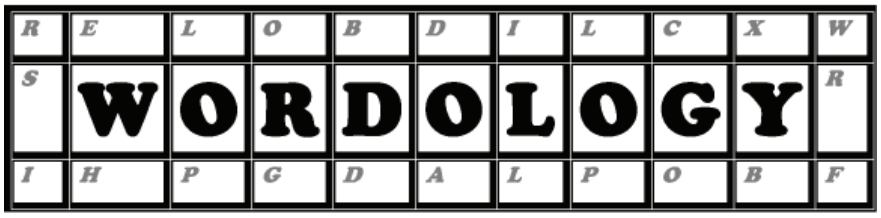
Clues

Across

2. a robot
4. someone who is learning on the job
8. controlled
9. the ability to become something

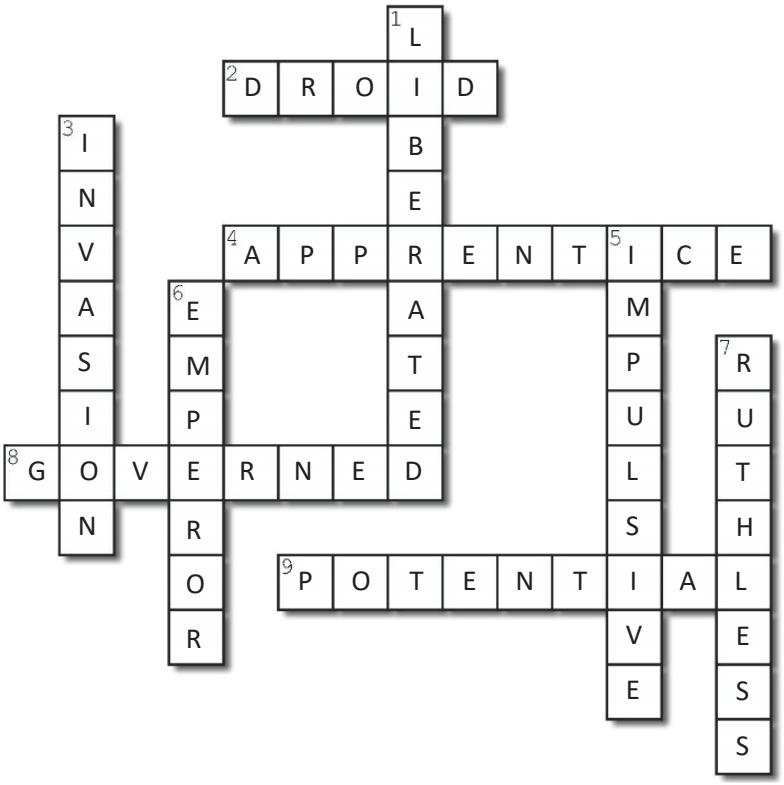
Down

1. set free
3. being taken over by an enemy army
5. hasty; acting without thinking
6. ruler of an empire
7. heartless



Wordology Activity #1: *Star Wars* Crossword (Teacher Key)

Instructions: Choose words from the Word Bank to complete this puzzle. The Clues box will help you decide which words fit in which spaces.



Created using the Crossword Maker on TheTeachersCorner.net

Word Bank

ruthless	apprentice
impulsive	governed
potential	emperor
droid	invasion
liberated	

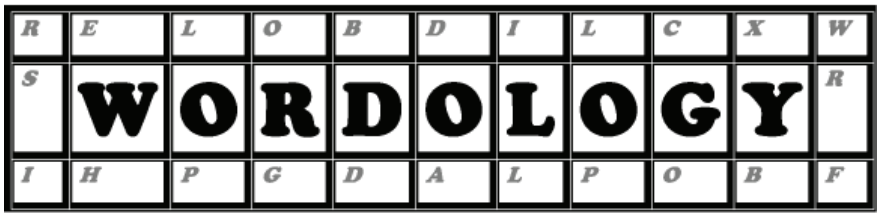
Clues

Across

2. a robot
4. someone who is learning on the job
8. controlled
9. the ability to become something

Down

1. set free
3. being taken over by an enemy army
5. hasty; acting without thinking
6. ruler of an empire
7. heartless



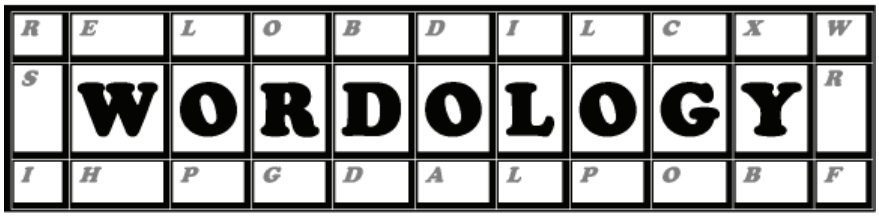
Wordology Activity #2: Synonym Hunt

Instructions: **Rewrite** each sentence without changing its meaning. Choose a synonym from the Word Bank to replace the underlined word or phrase in each sentence.

1. I wish I had a <u>robot</u> to clean my room for me!
2. When we get out of school for summer vacation, I feel like I've been <u>set free</u>.
3. My math teacher says I have the <u>ability</u> to do very well in math and science if I work hard at it.
4. Antwan is a <u>heartless</u> opponent in chess: he showed no mercy as he took me down.
5. The electrician who came to our house brought his <u>trainee</u> along to help him make the repair.
6. Sundiata Keita was the <u>ruler</u> of the huge Mali Empire in West Africa in the 13th century.
7. A board of directors <u>controlled</u> the company and made important policy decisions.
8. I made a sudden, <u>unplanned</u> decision to post my story online and see what would happen.
9. We put traps out all over the house to stop the mouse <u>attack</u> before it got any worse.

<u>Word Bank</u>

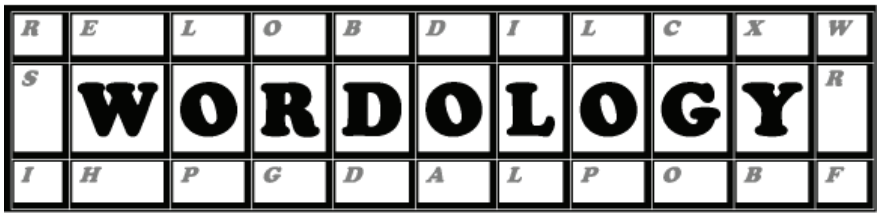
ruthless	apprentice	droid	impulsive	governed
potential	emperor	liberated	invasion	



Wordology Activity #3: Using Vocabulary

Choose this activity **after** you have read the first part of "The story of Darth Vader." Answer the questions below in complete sentences. Include the vocabulary words in your answer.

Vocabulary Words	Guide Question	Complete Sentence
1. **droid**	Why did Anakin Skywalker create a **droid** when he was just nine years old?	
2. **impulsive**	Who was the **impulsive** young slave that the Jedi Knights met on the planet Tatooine?	
3. **potential**	What **potential** did the Jedi Knight Qui-Gon see in Anakin Skywalker?	
4. **apprentice**	Why did the Jedi Council at first refuse to let Anakin Skywalker become Qui-Gon's **apprentice**?	
5. **liberated; invasion**	What did the Council decide after the Jedi **liberated** the planet Naboo from a dark force **invasion**?	



Composing Meaningful Sentences

If you complete your chosen Wordology activity, take the remaining time at this station to write Meaningful Sentences using the vocabulary words listed below. (Remember, a Meaningful Sentence is a sentence that shows that you know what the word means!) Read and discuss your sentences with your teammates.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

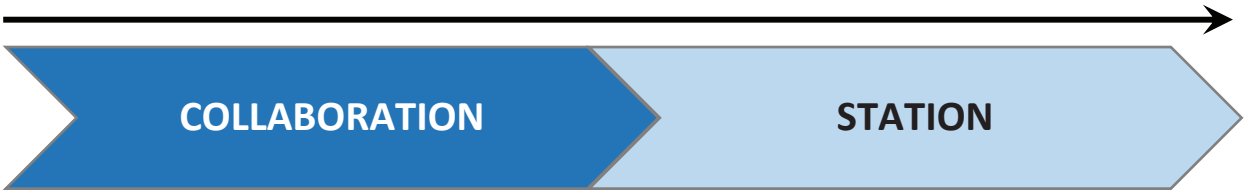
_____

_____

_____

Word Bank

ruthless	apprentice	droid	impulsive	governed
potential	emperor	liberated	invasion	



Two Sides of the Force

With your team, read "Two Sides of the Force" on pages 6-7, and discuss the following questions. Then, write answers to the questions on your own in the spaces provided. (Note: There are definitions for some difficult words at the bottom of this page.)

Question	Answer
1. Do you agree with the author about the "dark" and "light" qualities? (For example, do you think ambition and passion are always bad? Why or why not?)	
2. Do you think most people are either completely on the Dark Side or completely on the Light Side? Why or why not?	
3. Why is it hard to make "Light Side" (good) choices in real life?	
4. What gives you guidance about right and wrong in the decisions you make?	

DEFINITIONS OF IMPORTANT WORDS

traits – qualities or features

dominance – being stronger and more powerful than others

ambition – the desire to become great

passion – very strong feeling

compassion – kindness and concern for others

Media Madness

Creating a Timeline of Space Exploration

Instructions: NASA has provided a timeline on U.S. space exploration at the following link:

https://www.archives.gov/space

1. View the information provided on the website with your team (you have to click on the arrows on the right side of the screen to get to the next event).
2. As you view the site, in the space below, make a note of the events you think are the most important. (Choose a FEW important events—don't write down everything.)
3. Talk with your team to agree on the most important events to include.
4. Work with your team to create a space timeline using the paper and markers your teacher has provided. (Plan ahead and make sure you have enough room for all the events you want to include!)

Some Important Events in US Space Exploration (list below)

-
-
-
-
-
-
-
-
-

Days 17 and 18

Teacher Preparation

Post team cards (with member students listed) under headings to show the station where each team is to start. The text used will be *Star Wars: the Story of Darth Vader.* Place markers on pages 20, 26, and 30 of your copy of the book so that you can turn to these pages easily during the Main Station Read-Aloud, Think-Aloud. Have **Independent Project Guide Sheets** (pages 235-239) available to distribute to students after they select their final projects during the Day 17 Daily Launch. These should remain in their folders as a resource while they are working on the projects.

Place **four** copies (one for each team) of the 11x17" map "Are You on a Path to the Dark Side?" (adapted from pages 28-29 in the book) at the Collaboration station, so each team can work with a clean map, along with several different colored pencils for students to use to trace their own choices as they move through the map.

Post the vocabulary words:

frustration	plotting	intense
transition	horrific	ambitious
comrades	facility	crave

Pre-load the trailer "The Rise of Skywalker" for the Day 18 Daily Launch:

https://youtu.be/Pu4-pBVtKco

At the Media Madness station, students will begin work on their independent projects. Advise the ALFA lab assistant to give students a five-minute warning before the end of the rotation so that they can reach a good stopping point and log their progress.

Post the guiding question for Days 15 through 20:

What moral values do people need to exercise to explore space wisely?

Daily Launch Day 17

Whole Group Opening Activity: **Independent Project Check-In**

In the Daily Launch, students selected a project for this unit and began the planning process. Invite students to share their plans! You may want to take notes in the table below. (If two students plan to work together, list their names jointly beside the project they plan to do.)

Create an atmosphere of enthusiasm about the projects, inviting students to share their plans spontaneously. Ask questions to help them think about what they will need to have and do to complete the different types of projects.

My Students	Project Planned	Notes

Note: Advise students that they may use all of their Wordology time to play "You've Been Sentenced" with the NASA card deck, but should write approved sentences on the activity sheet provided (page 153). Distribute **Independent Project Guide Sheets** based on the projects students have selected.

Daily Launch Day 17

Do Now: Project Planning Steps 1-3

INDEPENDENT PROJECT LONG-TERM PLANNING SHEET

It is time to begin work on your independent project! Of course, you will need to break up the project into smaller steps. Use this checklist of steps to complete your project by the time it is due.

Today, please think through **Steps 1-3** and take notes on your ideas.

Step 1: **Pick** a project. (See your Do Now from Day 10!) Write what kind of project you will do here:

_____

Are you working with a partner? ❑ Yes ❑ No (If Yes, who? _____)

Step 2: **Think** about what you need to read/research/plan to complete your project. Jot notes here:

- _____
- _____

Step 3: Think about any materials or resources you will need for your project. List them here.

- _____
- _____

Step 4: **Plan** your project. Think through the activities required to create this project. List them below. (*Example: Make a mind map of my story.*) You may have more activities or fewer than these.)

- ◇ Activity:_____
- ◇ Activity: _____
- ◇ Activity: _____
- ◇ Activity:_____
- ◇ Activity: _____

Step 5: **Carry out** the activities you planned. Check each one off as you finish!

Step 6: **Rehearse** your presentation

Step 7: **Present** your work to the class.

Daily Launch Day 18

Whole Group Opening Activity: Star Wars Trailer

Review students' Do Now sheets, inviting them to share the things they already know about Darth Vader, things they still want to find out, and things they are learning.

Then show the *Rise of Skywalker* trailer found at the following link. Tell students to be watching and listening for words representing moral values as they view the trailer.

https://youtu.be/Pu4-pBVtKco

Ask students

- How does this trailer relate to the story of Darth Vader that we've been discovering in our station work?
- What **moral and social values** were mentioned in this clip? – *freedom, justice, order*
- What one phrase did several different characters repeat, in different contexts? (*The phrase—"I promise you"—occurs early in the trailer, from minute 1:10 to 1:37. If necessary, you could replay the beginning of the clip or just this short segment.*)
- Think about the words "I promise you." What **moral values** are involved in making and keeping promises?
- Are there **moral values** that might lead someone to break a promise? Explain.

Advise students that during this instructional cycle, they may use **all** of their Wordology station time to play "You've Been Sentenced" using the NASA add-on deck that they learned about in the Day 16 Daily Launch (rather than playing the game only after completing an activity sheet). However, they will need to write down their approved sentences as they play the game.

Dismiss students to their stations.

Daily Launch Day 18

Do Now: What I Know about Darth Vader

How many *Star Wars* movies have you seen? Nine movies came out over more than forty years, from 1977 to 2019! There have also been several spin-off movies from the series. Whether you've seen all, some, or maybe none of these movies might affect how familiar you are with Darth Vader and his world! Take a few minutes to fill in the following chart by listing what you already know about Darth Vader and what you still want to learn.

K **Things I know about Darth Vader**	**W** **Things I want to know about Darth Vader**	**L** **Things I am learning about Darth Vader**

MAIN STATION

Anakin Skywalker Becomes Darth Vader

(pages 20-21, 26-27, 30-34 in *The Story of Darth Vader*)

Introduce the Vocabulary Words (10-15 minutes)

Introduce students to the Vocabulary Words following the guidance provided under "Vocabulary Instruction" (pages 9-10). Read the list aloud from the Word Wall posted, pointing to each word as you pronounce it.

frustration	plotting	intense
transition	horrific	ambitious
comrades	facility	crave

On a second reading, have students repeat each word after you. Ask students whether they know the definitions of any words, and confirm correct definitions. If the words are unfamiliar, ask students whether they recognize parts of the words; as necessary, especially for longer words, walk them through the syllables to assist them in decoding. Then, display your kid-friendly definitions:

GLOSSARY OF VOCABULARY WORDS

frustration – feeling annoyed when something keep you from reaching your goals

transition – a change from one thing to another

comrades – team members or buddies

plotting – making secret plans with someone

horrific – horrible; dreadful

facility – a building where an organization conducts certain activities

intense – powerful; focused; concentrated

ambitious – eager to become great, important, or powerful

crave – to desire something very strongly

Discuss each word with students; use words in "Meaningful Sentences" (see examples below). Invite students to propose sentences as well. Remind students that they are to compose their own Meaningful Sentences as time allows at the Wordology Station.

Sample Meaningful Sentences

1. Darren's **frustration** grew since he couldn't understand why he kept on missing the basket.
2. The **transition** from middle to high school often leads to other changes, including new schedules, activities, and responsibilities.
3. Luis couldn't wait for summer vacation to start so he could hang out with his **comrades** at the rec center.
4. My mom and my aunt are **plotting** to have a surprise party for Grandma's sixtieth birthday.
5. We were shocked and disturbed by the **horrific** conditions that the refugees lived in.
6. Grandpa went to a special medical **facility** downtown for his eye surgery procedure.
7. The memories that came back were so powerful that they stirred **intense** emotions in me.
8. Antwan is both **ambitious** and smart, so he works hard to reach the high goals he has set for himself.
9. Sometimes I **crave** pizza so much that I just have to have it, even in the middle of the night.

Read-Aloud, Think-Aloud (10-15 minutes)

Text: *The Story of Darth Vader*, pages 20-21, 26-27, 30-34.

Tell students that you will pick up the story of Anakin Skywalker, Obi-Wan's Jedi apprentice, that you began in the previous instructional cycle. Read pages 20-21; then skip to pages 26-27; finally, read pages 30-34. As you read, explicitly identify the strategies you are using, such as ***inferring***, ***visualizing***, and ***summarizing***, referring to the **menu of strategies** poster as you do so. (As noted previously, the *Darth Vader* text is not particularly complicated; you may want to focus less on reading strategies and spend more time discussing the moral issues raised.)

- (*Page 20, after the second sentence, "… leader of the Republic"*): I wonder why Anakin was frustrated? Maybe he was tired of being just an apprentice. – ***ask questions; make inferences***
- (*Page 21, after the third sentence, "… unlike Obi-Wan"*): Well, it always feels good to find someone who will listen to you—especially if other people don't seem to understand you. But somehow this makes me wonder whether Palpatine was really such a good friend. – ***make connections; make inferences***
- (*Page 21, after the fourth sentence, "… seize power for himself"*): Ah-ha! I knew it. Palpatine is just trying to get Anakin on his side so he can use him. – ***elaborate***

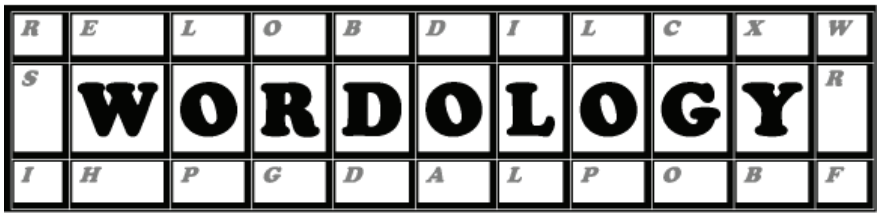
- (*Page 26, in the first sentence: stop at the word "increasingly")*: Wait, that's a long word. But I can probably figure it out if I break it down. If I take off the suffixes "-ing" and "-ly," I know what "increase" means: to become more. So increasing, increasingly, means becoming more and more. (*Reread the sentence from beginning to end.*) – ***focus on words in context***
- (*Page 27, after the second sentence, "… only Palpatine was encouraging his talents"*): Yes, there it is—that's why he's frustrated. Even after all these years, he doesn't realize that Palpatine is not his true friend. – ***summarize***
- (*Page 31, after the first sentence, "… Anakin gave in"*): Wait, why did Palpatine want Anakin to kill Dooku, if both of them were on the dark side? Is it because people on the dark side don't trust or care for each other? Maybe Palpatine thought Dooku was a threat to his power. – ***ask questions; make inferences; elaborate***
- (*Page 34, after the final sentence, "… completely to the ways of the dark side"*): Wow, he's just like a robot now. It's like he has a bionic body for evil, not for good. – ***elaborate***

Remind students of the guiding question, *What moral values do people need to exercise to explore space wisely*? Ask students:

- Why do you think Anakin Skywalker turned to the dark side? Where did he go wrong? *This should be an open-ended question. Encourage students' contributions. You may want to prompt their thinking with sub-questions, such as,* What was most important to him? *(Power and the opportunity to use his gifts)* Do you think he showed good judgment in deciding whom to trust? What do you think governed his decisions? *(His judgment was poor; governed by his emotions, he was flattered by the attention that Palpatine gave him and turned against his mentor, who was a true friend.)*
- How do you think this will turn out? Could Darth Vader ever come back to the light side at this point? Why or why not?
- Do you think young people today face similar decisions about whom they should trust and with whom they should associate? Give examples. What moral values can help guide them to make good choices?

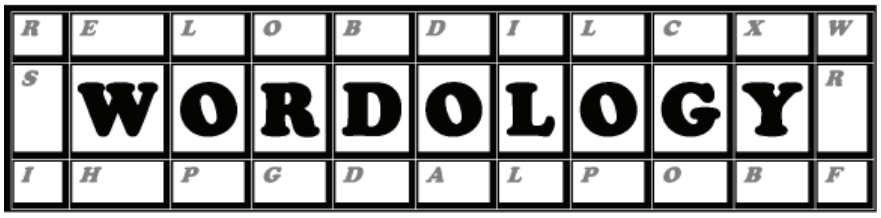
Additional Activities for Schools with 30-minute Stations

- Revisit the Vocabulary Awareness Chart showing the Vocabulary Words for this section. Ask students to indicate their current familiarity with the word by a show of hands. As students indicate that they "understand the word every time they hear it" or that they "know the meaning and use it correctly," challenge them to provide a definition or to use the word correctly in a sentence.



Wordology Activity: "You've Been Sentenced," NASA Deck

Instructions: You may spend the full time at the Wordology station playing "You've Been Sentenced" with your team, using the NASA space terminology card deck. Write the approved sentences (the ones you get points for!) in the space below. (If you need more room, please use the back of the page.)



Wordology Activity #2: Vocabulary Scramble

Instructions: Unscramble the letters to find words that fit in the boxes. All the words come from the Word Bank at the bottom of the page.

1. **Moving from the city to the suburbs was a big _____ for me.**

   narstitoni

2. **Some children act out because they _____ attention from adults.**

   arvec

3. **Jinae's _____ is to become a famous fashion designer.**

   mibtonia

4. **My dad works at a research _____ north of the city.**

   clafitiy

5. **Those guys were _____ how to cheat on the test, but they got caught.**

   gintoplt

6. **Climbing to the mountaintop was a very _____experience for us.**

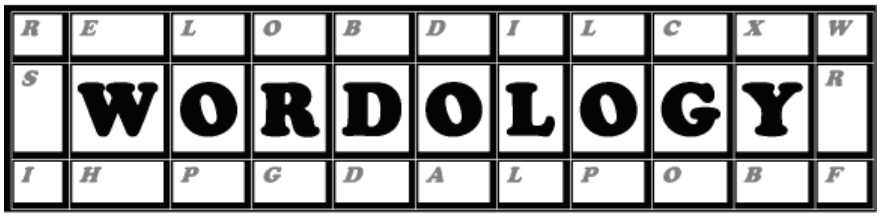
   senetin

7. **I have so much _____ with my math homework that sometimes I want to give up.**

   tarfustroni

Word Bank

frustration	transition	comrades	plotting	horrific
facility	intense	ambition	crave	



Wordology Activity #2: Vocabulary Scramble (Teacher Key)

Instructions: Unscramble the letters to find words that fit in the boxes. All the words come from the Word Bank at the bottom of the page.

1. Moving from the city to the suburbs was a big _____ for me.

narstitoni | T | R | A | N | S | I | T | I | O | N |

2. Some children act out because they _____ attention from adults.

arvec | C | R | A | V | E |

3. Jinae's _____ is to become a famous fashion designer.

mibtonia | A | M | B | I | T | I | O | N |

4. My dad works at a research _____ north of the city.

clafitiy | F | A | C | I | L | I | T | Y |

5. Those guys were _____ how to cheat on the test, but they got caught.

gintoplt | P | L | O | T | T | I | N | G |

6. Climbing to the mountaintop was a very _____experience for us.

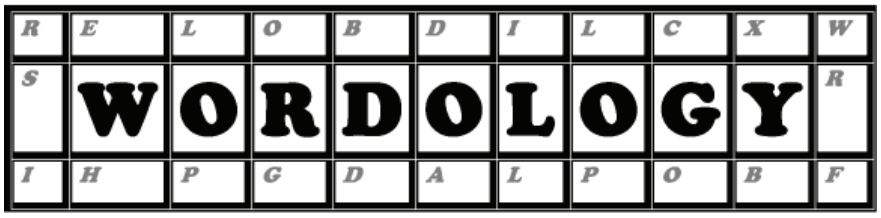
senetin | I | N | T | E | N | S | E |

7. I have so much _____ with my math homework that sometimes I want to give up.

tarfustroni | F | R | U | S | T | R | A | T | I | O | N |

Word Bank

frustration	transition	comrades	plotting	horrific
facility	intense	ambition	crave	



Composing Meaningful Sentences

If you complete your chosen Wordology activity, you may take the remaining time at this station to write Meaningful Sentences using the vocabulary words listed below. (Remember, a Meaningful Sentence is a sentence that shows that you know what the word means!) Read and discuss sentences with your teammates.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

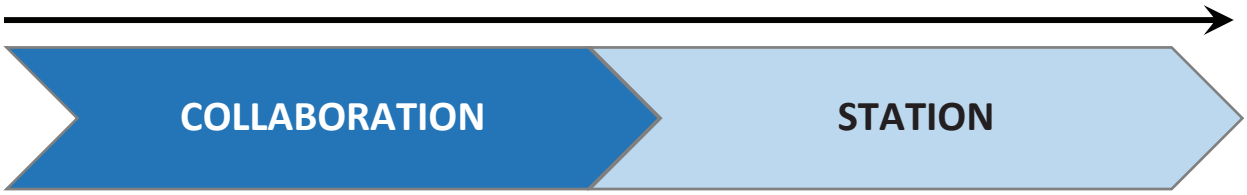
_____

_____

_____

Word Bank

frustration	transition	comrades	plotting	horrific
facility	intense	ambition	crave	



Two Sides of the Force

***Instructions*.** With your team, examine the "Are You on a Path to the Dark Side?" map (based on pages 28-29 of *The Story of Darth Vader*). Each person should choose a different colored pencil. Read each question in turn. After you read the question, each person should decide whether his or her answer to that question is "yes" or "no." Based on your answer, follow the arrows to draw a line with your colored pencil to the next question. Take turns reading the questions you reach and deciding what your answers will be. When all team members have finished the map, discuss the following questions. Then, write your answers below.

1. Were you happy with where your choices led you? Why or why not?

_____

_____

_____

2. Do you think the outcome gave a true picture of who you are? Why or why not?

_____

_____

_____

_____

3. If you did this activity over again, would you change any of your choices? Which ones?

_____

_____

_____

_____

Media Madness

Media Madness: Independent Project Time: Planning Step 4

Instructions: Use this time to work on your independent project!

Take out your Day 17 Do Now planning sheet. Under "Step 4," list things that you need to do to complete your project. Then begin working on them!

At the end of your time, write down what you accomplished.

What I accomplished today:

_____

_____

Notes on my project:

Days 19 and 20

Teacher Preparation

Post team cards (with member students listed) under headings to show the station where each team is to start. The text used will be *Star Wars: the Story of Darth Vader.* Place markers on pages 38, 44, 52, and 56 of your copy of the book, so that you can turn to these pages easily during the Main Station Read-Aloud/ Think-Aloud.

Post the vocabulary words:

obtain	shaft	enraged
fatal	torpedoes	vital
flaw	surrender	overcome

Choose ONE of the following videos for the Day 19 Daily Launch and preload it:

"Anakin Skywalker Becomes Darth Vader": https://www.youtube.com/watch?v=0KYxYOo2RnA OR

"Ten Interesting Facts about Darth Vader's Suit": https://www.youtube.com/watch?v=tujTxf5Sjwc

Place several sheets of poster-size paper at the Collaboration Station along with a selection of colored pencils or markers.

Provide colored pencils for the Day 20 Do Now, and preload the video "Luke Confronts Darth Vader" for the Day 20 Daily Launch:

https://www.youtube.com/watch?v=en8bh60K7m8

Preload the video "First All-Woman Spacewalk" at the Media Madness station:

https://www.youtube.com/watch?v=cNnvYACgwrE

After watching the video and responding to the prompts, students will use any remaining Media Madness time to work on their projects. Ask the ALFA lab assistant to give a five-minute warning before the end of the rotation so they can reach a good stopping point and log their progress.

Post the guiding question for Days 15 through 20:

What moral values do people need to exercise to explore space wisely?

Daily Launch Day 19

Whole Group Opening Activity: **Darth Vader's Suit**

Preview the following videos; select ONE for the Daily Launch and preload it:

"Anakin Skywalker Becomes Darth Vader":

https://www.youtube.com/watch?v=0KYxYOo2RnA

OR "Ten Interesting Facts about Darth Vader's Suit":

https://www.youtube.com/watch?v=tujTxf5Sjwc

(**Note:** "Anakin Skywalker Becomes Darth Vader" is a clip from *Revenge of the Siths* and includes some rather gruesome scenes of Anakin's injuries; however, it is also the more exciting video. If you choose to use "Ten Interesting Facts about Darth Vader's Suit," which is slightly longer, you may wish to stop it around minute 5:38 for the sake of time.)

After showing the selected video, ask students:

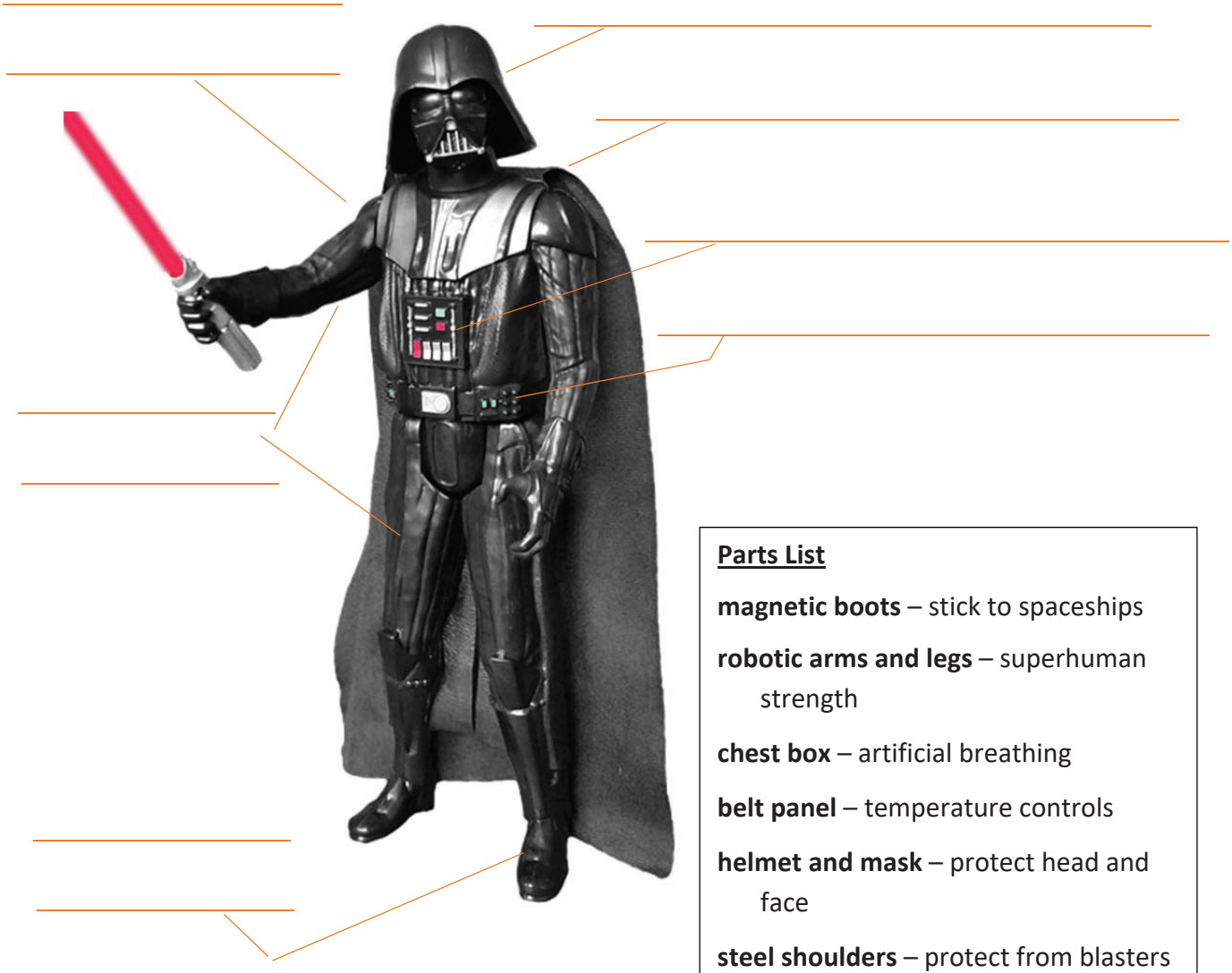
- What new information did you learn about Darth Vader in this video?
- Did you learn anything that gave you some compassion for Darth Vader? If so, what?
- Would you want to wear a suit of armor like Darth Vader's? All the time? Why or why not?
- How do you think wearing this suit might affect Darth Vader's relationships with others? How would it influence the choices he makes in the future?

Tell students that in this instructional cycle they will learn more about Darth Vader's family, his career as a Sith Lord, and the conclusion of his story.

Daily Launch Day 19

Do Now: Darth Vader's Suit

After Anakin Skywalker almost dies in a battle with Ob-Wan Kenobi, the Sith Lords use technology to rebuild his body with robotic parts. This process is described on pages 36-37 of *The Story of Darth Vader.* Label the illustration below with names of body parts and armor from the "Parts List." Notice what each part does!



Parts List

magnetic boots – stick to spaceships

robotic arms and legs – superhuman strength

chest box – artificial breathing

belt panel – temperature controls

helmet and mask – protect head and face

steel shoulders – protect from blasters

armored suit – covers artificial skin

Daily Launch Day 20

Whole Group Opening Activity: "Luke Confronts Darth Vader"

Invite student volunteers to share with the class the spaceships they designed for their Do Now activity, showing the pictures they drew and describing the spaceships' special features.

Then show the "Luke Confronts Darth Vader" clip found at the following link. Tell students to be watching and listening for moral values that Luke expresses in the confrontation.

https://www.youtube.com/watch?v=en8bh60K7m8

Ask students the following questions, encouraging open-ended conversation on each one:

- What signs of Luke's **moral values** are on display in this clip? – *Luke shows courage, hope, and persistence in his refusal to believe that his father has fully gone over to the dark side.*
- How does Luke try to influence his father? – *He tells Darth Vader that there is still good in him, and urges him to return to the light side.*
- What reasons does Darth Vader give for refusing Luke's appeal? – *He says that it is too late for him. He also says that Luke does not realize how powerful the dark side is.*
- Do you think that part of Darth Vader wants to go with Luke? Why or why not? Explain. – *Different answers are possible here. On one hand, his decision to turn Luke over to the Emperor suggests a firm commitment to the Emperor and the dark side. However, his comments "It is too late for me, my son" and "You don't know the power of the dark side; I must obey my master" may suggest that he feel he has no choice in the matter. These remarks suggest some level of moral conflict within Darth Vader.*

Dismiss students to their stations.

Daily Launch Day 20

Do Now: Create an Inter-Galactic Spaceship

Would you like to be a screenwriter or producer of science fiction movies? Or maybe a special effects director?

Science fiction creators use their imagination to think about what could be. One example is the Star Destroyer pictured on pages 48-49 of *The Story of Darth Vader.*

If you were producing a tenth Star Wars movie, what kind of spaceship would you create? What shape would it be? What features would it include?

Use this space to draw whatever kind of spaceship you like. Be sure to label some of its unusual features!

MAIN STATION

Darth Vader and the Dark Side

(pages 38-39, 44-45, 52-53, and 56-59 in *The Story of Darth Vader*)

Introduce the Vocabulary Words (10-15 minutes)

Introduce students to the Vocabulary Words following the guidance provided under "Vocabulary Instruction" (pages 9-10). Read the list aloud from the Word Wall posted, pointing to each word as you pronounce it.

obtain	shaft	enraged
fatal	torpedoes	vital
flaw	surrender	overcome

On a second reading, have students repeat each word after you. Ask students whether they know the definitions of any words, and confirm correct definitions. If the words are unfamiliar, ask students whether they recognize parts of the words; as necessary, especially for longer words, walk them through the syllables to assist them in decoding. Then, display your kid-friendly definitions:

GLOSSARY OF VOCABULARY WORDS

obtain – to get hold of; to acquire

fatal – leading to ruin, destruction, or death

flaw – a mistake or weak spot

shaft – a straight, narrow channel or tube; also, a straight rod or handle

torpedoes – large, bullet-shaped explosive missiles (usually for underwater use)

surrender – to give up; to admit defeat

enraged – extremely angry; furious

vital – very important; crucial

overcome – to conquer or defeat

Discuss each word with students; point out that while in real life, **torpedoes** are used exclusively underwater, the Star Wars movies use the term for space weapons. Also, in the *Heroes* unit, students learned about **vital signs**. Advise them that the word **vital** here has a

different, though related, meaning. Use words in "Meaningful Sentences" (see examples below). Invite students to propose sentences as well. Remind students that they are to compose their own Meaningful Sentences as time allows at the Wordology Station.

Sample Meaningful Sentences

1. To open that closet, I need to **obtain** the key from someone.
2. One **fatal** mistake ruined Juan Carlos' chances of winning the chess tournament.
3. The coach used videotapes of earlier games to show me the **flaw** in my pitching that was giving me trouble.
4. I dropped my key in the elevator **shaft** and had to go all the way to the basement to get it.
5. The submarines used **torpedoes** to attack the enemy warships.
6. The soldiers had to **surrender** when they realized they had no hope of winning the battle.
7. The **enraged** mother bear lashed out furiously to protect her cubs from danger.
8. The company president needs this **vital** information immediately to make the right decision.
9. I just need to **overcome** my fears and be brave enough to meet the challenge.

Read-Aloud, Think-Aloud (10-15 minutes)

Text: *The Story of Darth Vader*, pages 38-39, 44-45, 52-53, and 56-59.

Tell students that you discover what happened after Anakin turned to the dark side and became Darth Vader. As you read, explicitly identify the strategies you are using, such as **inferring**, **visualizing**, and **summarizing**, referring to the **menu of strategies** poster as you do so.

- (*At the end of page 38, after, "… Owen Lars, and his wife, Beru"*): Wow, this is getting confusing. Let me make a graphic organizer so I can keep all these names and relationships straight. – ***check for understanding*** (*Draw a graphic organizer like the one in Figure 1 on the next page—or create your own—adding the Leia information after reading page 39.*)
- (*Page 45, after the second sentence, "… would destroy the whole Death Star"*): Okay, let me draw a picture so I can be sure I understand what this is saying. – ***visualize*** (*Make a sketch like the one in Figure 2 on the next page, adding Luke Skywalker, the torpedo path, and the explosion after reading the next sentence.*)
- (*Page 52, after the second sentence, "… he was searching for his son"*): Okay, but what is his goal? Is he searching for Luke for a good purpose or an evil one? – ***ask questions***
- (*Page 56, after the last sentence, "… close to the dark side")*: Hmmm. So even though he was fighting for the light side, his anger and hatred could bring him into the dark side. That's interesting. – ***elaborate***
- (*Page 57, after the second sentence, "… from the dark side to save his son"*): Wow. So I guess it was his family feeling that kept some little bit of good alive in him. – ***make inferences***

Figure 1: Darth Vader's Family

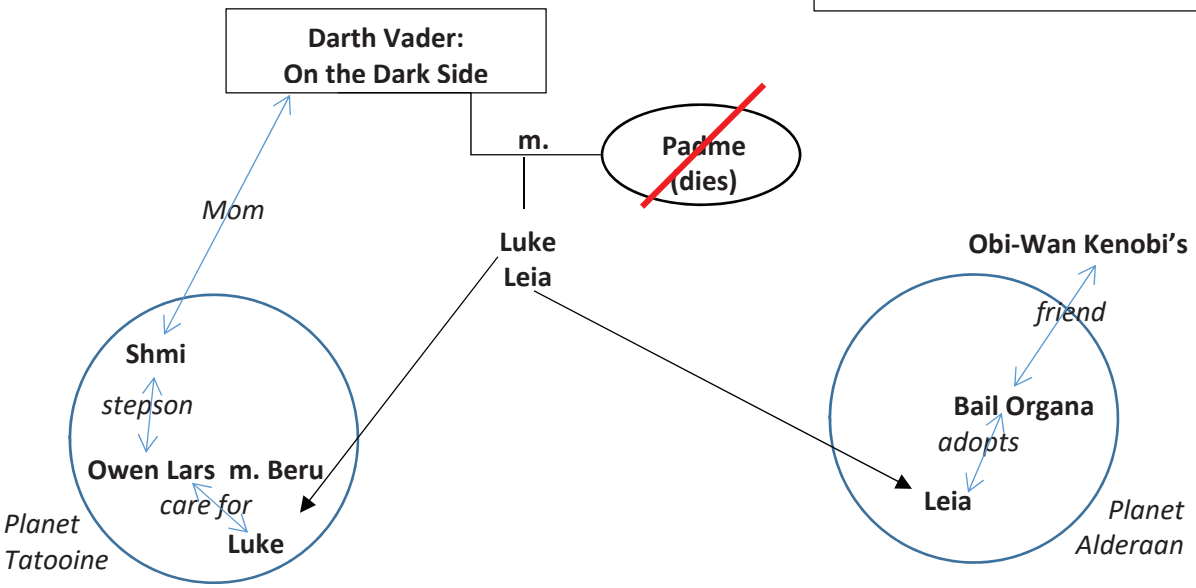
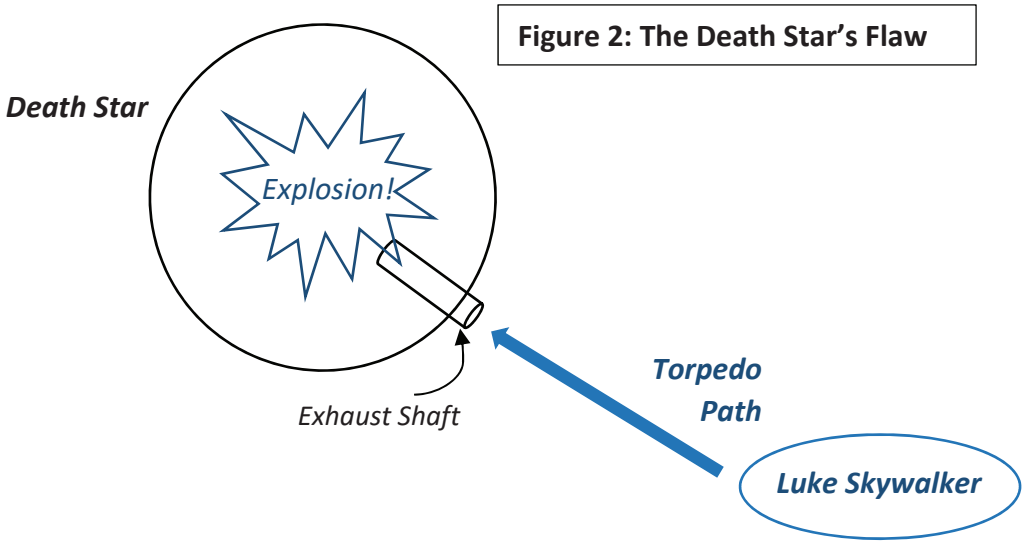
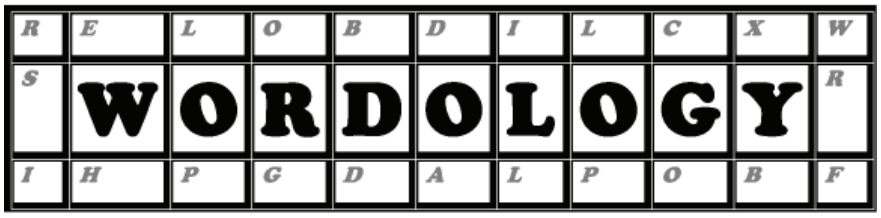


Figure 2: The Death Star's Flaw



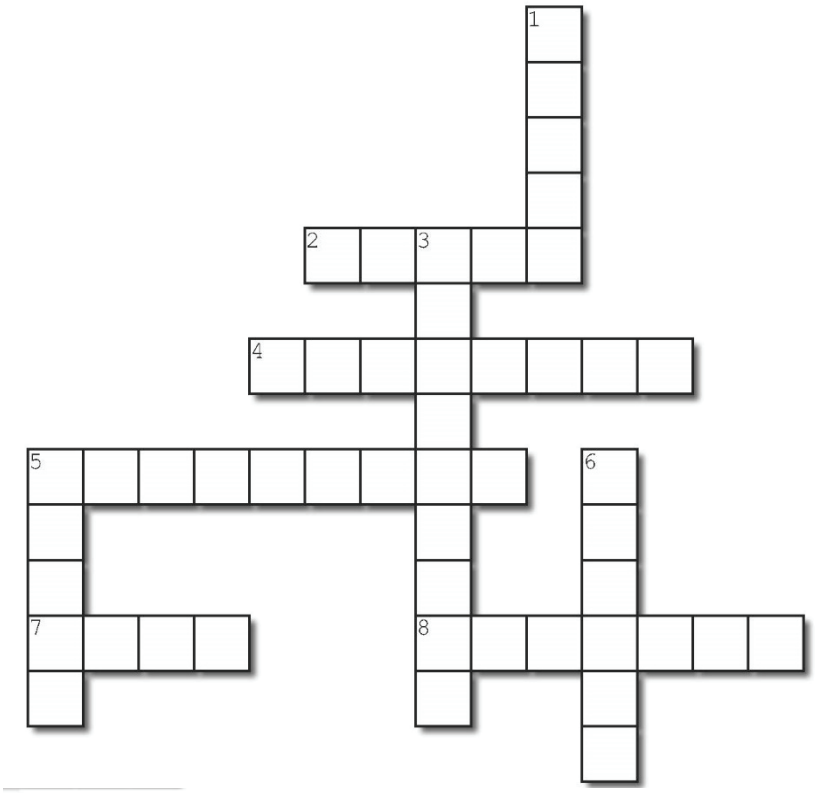
Additional Activities for Schools with 30-minute Stations

- Revisit the Vocabulary Awareness Chart showing the Vocabulary Words for this section. Ask students to indicate their current familiarity with the word by a show of hands. As students indicate that they "understand the word every time they hear it" or that they "know the meaning and use it correctly," challenge them to provide a definition or to use the word correctly in a sentence.



Wordology Activity #1: Crossword Puzzle

Instructions: Choose words from the Word Bank to complete this puzzle. The Clues box will help you decide which words fit in which spaces.



Created using the Crossword Maker on TheTeachersCorner.net

Word Bank

obtain
fatal
flaw
shaft
torpedoes
surrender
enraged
vital
overcome

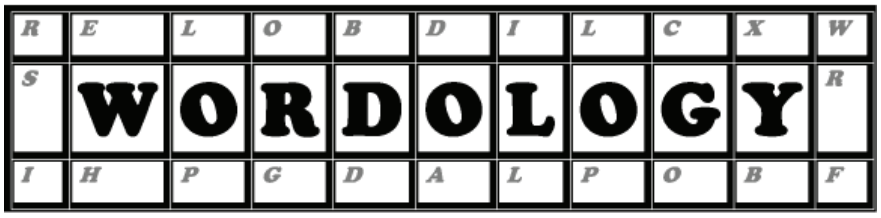
Clues

Across

2. leading to death or disaster
4. to master or conquer
5. to admit defeat
7. a weak spot or error
8. furious

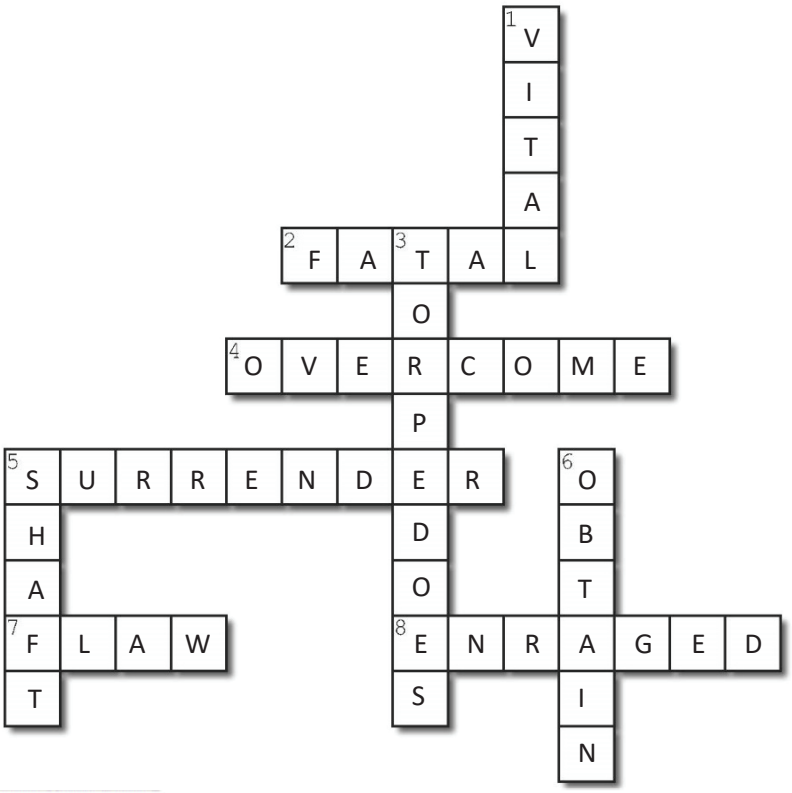
Down

1. very important; necessary
3. exploding missiles
5. a tube or chute
6. to get



Wordology Activity #1: Crossword Puzzle (Teacher's Key)

Instructions: Choose words from the Word Bank to complete this puzzle. The Clues box will help you decide which words fit in which spaces.



Word Bank

obtain
fatal
flaw
shaft
torpedoes
surrender
enraged
vital
overcome

Created using the Crossword Maker on TheTeachersCorner.net

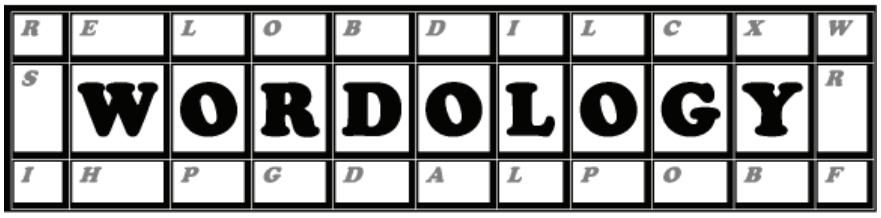
Clues

Across

2. leading to death or disaster
4. to master or conquer
5. to admit defeat
7. a weak spot or error
8. furious

Down

1. very important; necessary
3. exploding missiles
5. a tube or chute
6. to get



Wordology Activity #2: Intergalactic Battle Report

Instructions: Pretend you are a reporter for the *Intergalactic Times.* Write a newspaper account of **either** the explosion of the Death Star (pages 44-45) **or** Luke Skywalker's final battle with Darth Vader (pages 56-57). Use at least **five** of the vocabulary words below in your article.

Intergalactic Battle! by _____

A crucial intergalactic battle occurred recently. Here's what happened:

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

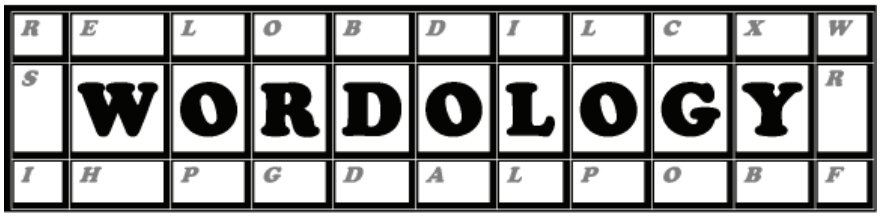
_____

_____

_____

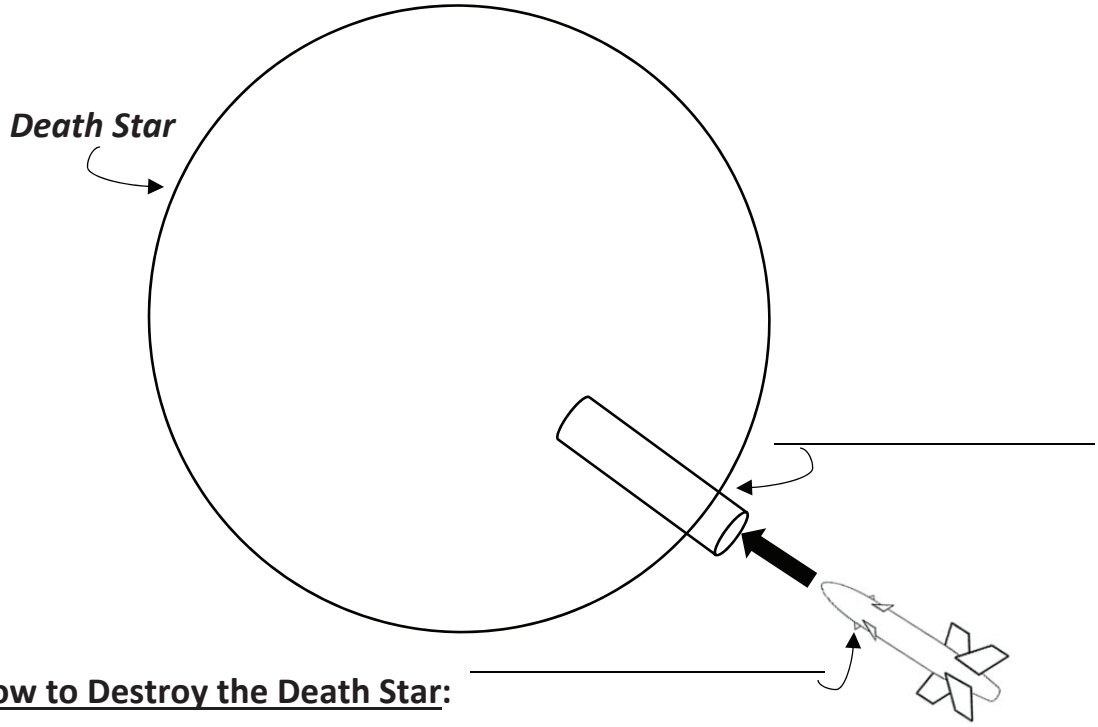
Vocabulary Words

fatal	flaw	surrender	vital	overcome
torpedoes	shaft	enraged	obtain	



Wordology Activity #3: Instructions for Destroying the Death Star

Instructions: You are a commander of the rebel forces working against the evil Empire. You need to provide instructions for your star fighters to destroy the Emperor's new superweapon, the Death Star. Label the diagram below and write instructions for your fighters. Use at least four vocabulary words.



How to Destroy the Death Star:

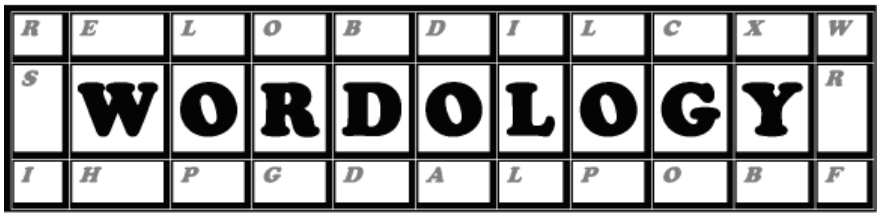
_____

_____

_____

_____

Vocabulary Words				
fatal	flaw	surrender	vital	overcome
torpedo	shaft	enraged	obtain	



Composing Meaningful Sentences

If you complete your chosen Wordology activity, take the remaining time at this station to write Meaningful Sentences using the vocabulary words listed below. (Remember, a Meaningful Sentence is a sentence that shows that you know what the word means!) Read and discuss your sentences with your teammates.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Vocabulary Words

fatal	flaw	surrender	vital	overcome
torpedo	shaft	enraged	obtain	

COLLABORATION STATION

Spaceship Draw-Around

***Instructions*.** With your team, examine the drawing of the "Star Destroyer" on pages 48-49 of *The Story of Darth Vader*. Now it is your turn as a team to create your own spaceship designs. Work together to create your designs!

1. Write your name on the "Spaceship Design Draw-Around" paper provided, and draw **just the outline** or shape of a spaceship. Then, pass your drawing to the person on your left. (Since all four team members are doing this, you should have four drawings going around the circle.)

2. Person #2: Add some details to your teammate's spaceship design. Label them to explain what they are for. Then, pass the drawing on to the person on your left.

3. Person #3: Add more features to the spaceship design. Label them. Then, pass the drawing on to the person on your left.

4. Person #4: Add the final touches to the spaceship design. Label them. Then, pass the drawing back to the person who started it.

When you finish all the drawings, look at them together. Discuss the following questions:

What is similar about them? What is different?

How did your team members' contributions change the idea you started with?

How do you think each spaceship could help to make life in the galaxy better? (Use your imagination to think about this!)

Give your spaceship design a name and save it in your folder!

Spaceship Design Draw-Around

Media Madness

Media Madness: First All-Woman Spacewalk

Instructions: Watch the video at the following link and answer the questions listed below.

https://www.youtube.com/watch?v=cNnvYACgwrE

1. What made this spacewalk a historic event?

_____

_____

2. How did the two astronauts feel about their achievement?

_____

_____

3. Would you want to go out in space to repair a space ship? Why or why not?

_____

_____

After you finish, use the rest of the time to work on your independent project.

At the end of your time, write down what you accomplished.

What I accomplished today:

_____

_____

Notes on my project:

Days 21 and 22

Teacher Preparation

Post team cards (with member students listed) under headings to show the station where each team is to start. The text used will be "The International Space Station" (pages 184-185 in this manual). Place copies of this text at the entrance for students to pick up along with their Do Now sheets on Day 21. Place activity sheets at the different stations.

Post the vocabulary words:

satellite	pressurized	portal
altitude	module	tether
component	functional	conduct (v.)
	maintenance	

Preload the two short videos for the Day 21 Daily Launch:

"Pizza in Space": https://www.youtube.com/watch?v=z74OwRy8o9I

"Peanut Butter and Jelly": https://www.youtube.com/watch?v=Z2szk-NuKWg

For the Day 22 Daily Launch, there is a choice between two videos. Be sure to preview the options and select and upload the video you consider most appropriate for your class. (See Notes on the videos, page 178.)

"Everything about Living in Space (Q&A)" (5:26 min.)
https://www.youtube.com/watch?v=ouDKD9G9jOE&feature=emb_rel_pause

"Space Shuttle Launch and Landing Highlights" (4:54 min.)
https://www.youtube.com/watch?v=uCVt0kpefHM

At the Media Madness station, preload the AskNASA video "What is the International Space Station": https://www.youtube.com/watch?v=6MR-qaDaG6w, as well as the three optional videos listed at the bottom of page 192.

Post the guiding question for Days 21-28:

What is happening today to advance space exploration?

Daily Launch Day 21

Whole Group Opening Activity:

Brainstorm: Living in Zero Gravity

Review with students their responses to the Do Now activity, on ways that daily activities would be different in zero gravity (some possible answers are shown below). As they identify the challenges that zero gravity would create, also invite them to think about ways to solve these problems. (For example, if drinking from a glass is impossible because the water would float away, what about drinking from a squeeze pouch?)

Daily Activity	How Would It Be Different in Zero Gravity?
Taking a shower	Water would float around instead of spraying over your body. It would even float out of the shower stall!
Eating breakfast	Food would float off your plate. No way to keep milk and cereal in a bowl. Even the plate, fork, and spoon would float away from the table.
Getting a drink of water	Water would not stay in a cup or glass but float away. You couldn't even turn on a tap and expect the water to flow down into the cup.
Working out	You couldn't keep your feet on the ground to run. Even heavy weights would float around, so you couldn't "lift" them. But you could work out using elastic bands.
Playing ball	The ball would not follow a predictable path the way it does with gravity. Also, it would move a lot more slowly!
Bedtime	Your body would float off the bed… and your pillow and blankets would float away too. It wouldn't be very restful.

After the discussion, show students these two short videos:

"Pizza in Space": https://www.youtube.com/watch?v=z74OwRy8o9I

"Peanut Butter and Jelly": https://www.youtube.com/watch?v=Z2szk-NuKWg

Ask students to comment on how they would like to live in a zero gravity environment, based on what they have seen.

Then, tell them that in the next few instructional cycles, they will explore the Guiding Question, *What is happening today to advance space exploration?* On Days 21 and 22, they will begin by learning more about the International Space Station featured in the videos. Dismiss students to their stations.

Daily Launch Day 21

Do Now: How Would It Be Different?

As you know, there is no gravity in space! This means that people and objects float around freely if there is nothing to hold them still… as you can see in the pictures at the bottom of the page.

Imagine yourself in a spaceship with no gravity. How would that change the following daily activities? Write your best guesses in the chart!

Daily Activity	How Would It Be Different in Zero Gravity?
Taking a shower	
Eating breakfast	
Getting a drink of water	
Working out	
Playing ball	
Bedtime	

Astronaut Winston Scott on a spacewalk in 1997
https://www.flickr.com/photos/nasacommons/9449355483

Astronauts and fruit on the International Space Station
https://www.needpix.com/photo/306854/astronauts-floating-fruit-space-weightless-spacecraft-mission-exploration-gravity

Daily Launch Day 22

Whole Group Opening Activity:
The International Space Station

Invite students to share some of their responses to the Do Now. Ask students

- What would you still like to learn about the International Space Station?
- Would you like to live on the space station for a longer time, maybe several months or even more than a year? Why or why not?

After discussion, show ONE of the following videos.

"Everything about Living in Space (Q&A)" (5:26 min.)
https://www.youtube.com/watch?v=ouDKD9G9jOE&feature=emb_rel_pause

OR

"Space Shuttle Launch and Landing Highlights" (4:54 min.)

https://www.youtube.com/watch?v=uCVt0kpefHM

(Please note: Both of these videos are relatively long. "Everything about Living in Space" is quite engaging, though, and if you anticipate it being too long for the time available, you can plan to cut it off at a certain point. The "Space Shuttle Launch and Landing Highlights" video is visually appealing but moves slowly; if you choose to show this one, you may want to set the speed setting at 1.25x to run it a bit more quickly.)

After viewing, dismiss students to their stations.

Daily Launch Day 22

Do Now: Planning for a Space Mission

Suppose you were invited to visit the International Space Station for a week to help with some science experiments. A local reporter comes to interview you about your upcoming trip! Write your answers to the interview questions below. (Use your imagination… there are no wrong answers!)

1. What are you most excited about as you prepare for this adventure?

_____

_____

2. What are you nervous about?

_____

_____

3. What will you take to remind you of home?

_____

_____

4. How do you expect living on the space station to be different from home?

_____

_____

5. What science experiments will you conduct on the space station?

_____

_____

6. What will you bring back from the space station to remember your trip?

_____

_____

MAIN STATION

"The International Space Station"

(pages 184-185 in this manual)

Introduce the Vocabulary Words (5-10 minutes)

Introduce students to the Vocabulary Words following the guidance provided under "Vocabulary Instruction" (pages 9-10). Read the list aloud from the Word Wall posted, pointing to each word as you pronounce it.

satellite	pressurized	portal
altitude	module	tether
component	functional	conduct (v.)
	maintenance	

On a second reading, have students repeat each word after you. Ask students whether they know the definitions of any words, and confirm correct definitions. If the words are unfamiliar, ask students whether they recognize parts of the words; as necessary, especially for longer words, walk them through the syllables to assist them in decoding. Then, display your kid-friendly definitions; for example:

GLOSSARY OF VOCABULARY WORDS

satellite – an object that orbits the earth or some other planet or heavenly body

altitude – distance away from the surface of the ground

component – one part of a complex system

pressurized – having air pumped in to create a comfortable pressure level for humans

module – a section or unit of a larger whole

functional – able to do or support specific tasks or processes

maintenance – upkeep; taking care of something so that it stays in good shape

portal – a special type of entrance or doorway

tether – a cord, rope, or chain to keep one object attached to another

conduct (v.) – to carry out or do

Discuss each word with students; point out that the word **conduct**, used here as a verb, is also a noun meaning "behavior"; as a verb, it can also mean "transfer," as in "to **conduct** electricity." Use words in "Meaningful Sentences" (see examples below). Invite students to propose sentences as well. Remind students that they are to compose their own Meaningful Sentences as time allows at the Wordology Station.

Sample Meaningful Sentences

1. The moon is the earth's natural **satellite**, but in the past fifty years, many man-made objects have been sent into orbit as well.
2. The pilot increased the plane's **altitude** so that it would fly over the mountain range.
3. The homework hotline is just one **component** of my school's system of supports to help students keep their grades up.
4. Airplane cabins must be **pressurized** because way up high, the air is too thin for people to breathe.
5. Each **module** of our math program explores a different topic that we need to learn about.
6. We need to set up a **functional** system that allows students, teachers, and parents to communicate with each other.
7. Dad does the everyday **maintenance** on his car, like changing the oil and making sure the tires have enough air.
8. You enter the submarine through a special **portal** on its top surface.
9. The acrobat had a long **tether** attached to her waist to keep her safe when she practiced new skills on the high wire.
10. The school board is going to **conduct** a review of grading practices at all the city schools.

Read-Aloud, Think-Aloud (10-15 minutes)

Invite students to take out their copies of "The International Space Station" (pages 184-185 in this manual). Give them a few seconds to skim the subtitles and look at the pictures. Then begin to read the selection. As you read, explicitly identify the strategies you are using, such as ***focusing on words in context*** and ***making connections,*** referring to the **menu of strategies** poster as you do so. (Note: the section shaded blue, which students will be reading at the Collaboration Station, is less challenging than the first three paragraphs, so you may want to plan on inviting student volunteers to read these paragraphs.)

- (*First page, paragraph 1, after the first sentence "… around the Earth"*): Whoa… there are a lot of vocabulary words in this sentence! Let's break it down. Who knows what "habitable" means? How about "artificial"? (*Give students time to respond.*) So basically, that means it's something created by human beings that people can actually live in, that's going around the earth. Right? – ***examine vocabulary in context***

- (*First page, paragraph 1, after the second sentence, "… and Japan"*): Hmmm… I wonder what "joint project" means. What do you think? (*Allow students to make suggestions.*) Yes, there are five different countries listed here. I'm pretty sure a "joint project" means a project they all worked on together. – ***use context clues***
- (*After the first paragraph*): Wow, look at that picture. It doesn't look much like a spaceship, does it? What do you think those things are that look like wings? (*Allow students to make suggestions.*) Oh, you might be right. Those must be the solar panels they talked about. – ***examine illustrations***
- (*First page, paragraph 2, in the middle of the first sentence, "… into orbit in 1998"*): Wait, what does "component" mean again? Oh, right, one part of a larger system. So I guess that means they sent it up into space one section at a time. – ***focus on vocabulary in context***
- (*First page, paragraph 2, after the sentence that ends, "… (330 to 435 km) above the Earth"*): Wow, that's about as far as from here to_____ (*name a city about 250 miles from where you are*). That's really far! – ***make connections***
- (*First page, paragraph 3, after the first sentence, "… a truly international space station"*): Okay, who remembers what "negotiating" means? (*This was a vocabulary word in the* Heroes *unit; elicit an answer from a student volunteer*.) – ***focus on vocabulary in context***

[**Reminder**: The section shaded in blue that follows is at a fairly accessible reading level. You may wish to recruit one or more student volunteers to read the shaded paragraphs. Use your judgment as to how much to interject "think-aloud" comments when students are reading.]

- (*First page, paragraph 4, after the third sentence, "… to decide when you should go to bed"*): So why is it hard to decide? (*Elicit student responses.*) Oh, I guess it's because it keeps switching from night to day and back again over such short time periods. – ***check for comprehension***
- (*Second page, paragraph 1, after the first sentence, "… to keep from becoming too weak"*): Wait, why is that? (*Elicit student responses.*) Oh, right, if you don't use your muscles you lose strength. That's why athletes have to keep training to stay in shape during the off season. – ***make connections***
- (*Second page, paragraph 4, after the second sentence, "… so they can breathe"*): I think we had the word "protective" as a vocabulary word during the *Heroes* unit. Who remembers what it means? (*Elicit student responses.*) So why do astronauts need to be protected from when they go outside the spaceship? I guess since the space outside the ship is not pressurized, there's no air. It must be very cold. Maybe their bodies would even blow apart with no air pressure. I bet all kinds of terrible things would happen if you had a human being in space with no protection! – ***focus on vocabulary in context; elaborate***

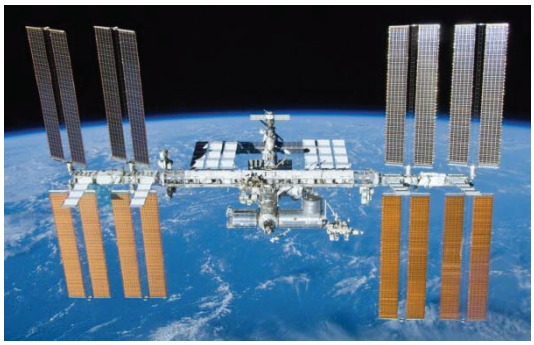
After completing the selection, remind students of the guiding question, *What is happening today to advance space exploration?* Ask students:

- How do you think the International Space Station has helped prepare people for exploring further into space? *This should be an open-ended question. Encourage students' contributions. You may want to prompt their thinking with sub-questions, such as,* What have scientists learned from twenty years of keeping people alive in the space station? Do you think it's important that the space station has required the collaboration of so many different countries? What do you think the next step in space exploration might be?

Additional Activities for Schools with 30-minute Stations

- Revisit the Vocabulary Awareness Chart showing the Vocabulary Words for this section. Ask students to indicate their current familiarity with the word by a show of hands. As students indicate that they "understand the word every time they hear it" or that they "know the meaning and use it correctly," challenge them to provide a definition or to use the word correctly in a sentence.

The International Space Station



The International Space Station (ISS) as viewed from a departing space shuttle mission

The **International Space Station** (**ISS**) is a space station, or a habitable artificial satellite, orbiting around the Earth. It is a joint project of five different space agencies in the United States, Russia, Canada, Europe, and Japan. The ISS includes pressurized modules where people can live and work, a strong outer frame, solar panels to generate energy, and other components. Both American space shuttles and Russian rockets have been used to launch new components for the space station.

The first component of the ISS launched into orbit in 1998, and its first long-term crew arrived in November 2000. The station has had people living in it for almost twenty years! New components are added to the station every few years, and more are scheduled for launch in 2020. The ISS' orbit is between 205 and 270 miles (330 to 435 km) above the Earth. It maintains that altitude by reboosting, using the engines of one of its modules or of visiting spacecraft. It orbits the Earth 15.54 times per day. The ISS is the largest human-made object in orbit; it can sometimes be spotted by people on Earth.

In the early 1990s, U.S. government officials began negotiating with Europe, Russia, Japan and Canada to build a truly international space station. The first three sections, launched in 1998-2000, were the Zarya Functional Cargo Block, Unity Module, and Zvezda service module. On November 2, 2000, the first crew, Expedition 1, docked onto the ISS. It included U.S. astronaut William Shepherd and two Russian cosmonauts, Yuri Gidzenko and Sergei Krikalev.

Life in space: zero gravity!

Scientists living in the space station have to get used to all kinds of changes from life on Earth. It takes them only 90 minutes to orbit the Earth, so the sun looks as if it is rising and setting every 45 minutes. This makes it hard to decide when you should go to bed! The astronauts try to keep a 24-hour-schedule anyway. When bedtime comes, they strap themselves into sleeping bags that are stuck to the wall, so they will not float away in the middle of a dream.

In space there is no gravity (this is called *zero gravity*). One place where you can get an idea of what zero gravity feels like is in a swimming pool, because the water makes you float. However, in a pool you still push against the water as you move around. In zero gravity, there is nothing to push against, so you just float in the air. Another way that NASA astronauts experience zero gravity for a very short time is going in a plane that drops to earth very quickly. This training can make people quite sick at first!

Crew member Tracy Caldwell Dyson looks out a window on the ISS

Since the astronauts do not use their legs very much in zero gravity, they need exercise to keep from becoming too weak. Without gravity, astronauts can get big upper bodies and skinny legs, so the crew members get lots of exercise every day to stay healthy.

Flight Engineer John Phillips floats inside the ISS Destiny laboratory (Photo: NASA)

Eating in space is hard, too. Since water and other liquids do not flow down in space, if you spilled some milk in a space station, it would float around everywhere! Liquids ruin high-tech equipment, so astronauts have to be very careful. They drink by sucking water from a bag, or from a tube stuck to the wall. If they put their food on plates, it would just float away, so they have to eat it from pouches. Most of the food is dried, because crumbs floating around could also ruin the equipment. Sometimes fresh fruits and vegetables are sent to the station, but this is expensive and difficult, so they carry most of their food with them when they go.

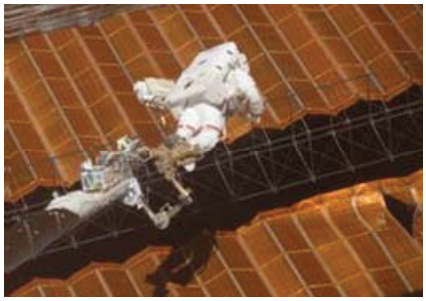
What does a space toilet look like? Now you know!

Using the bathroom in space

Actually, in space, the *bathroom* should probably be called the *restroom*, because you really can't take baths there. Instead, astronauts use squirt guns to take a shower! One person squirts himself with a gun while other people outside use a water vacuum to get rid of all the water that floats out of the shower. This is quite hard, so astronauts usually wash with a wet cloth. Toilets can be another problem. There is no gravity to make the toilet flush work, so the toilet must be attached to the astronauts to gently suck away the waste.

Spacewalks

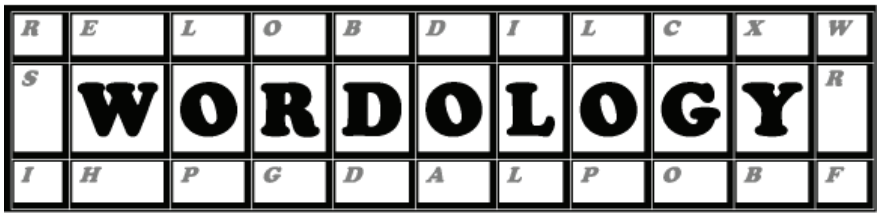
When the outside of the ISS needs repairs or maintenance, crew members do spacewalks. Before leaving the ship, they put on protective spacesuits that cover every part of the body, along with air tanks so they can breathe. They leave through a special portal so the space station doesn't lose air pressure. They are attached to the station by a tether so they don't float away in space.



Astronaut Scott Parazynski repairs a damaged solar panel on the ISS

The ISS serves as a research laboratory where crew members conduct science experiments in a low-gravity space environment. They can also test spacecraft systems and equipment required for missions to the Moon and Mars. The space station is expected to be used until 2030.

This article was developed by ALFA Lab staff. Unless otherwise noted, images and content are adapted from Kiddle Encyclopedia.



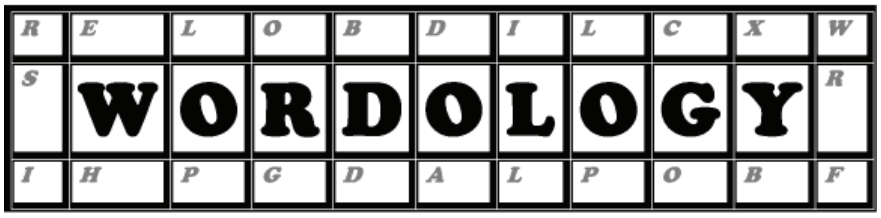
Wordology Activity #1: Synonym Hunt

Instructions: A **synonym** is a word that means the same or almost the same as another word. **Rewrite** each sentence without changing its meaning. Choose a synonym from the Word Bank to replace the underlined word or phrase in each sentence.

1. Each <u>working part</u> of the engine must be tested before it is used.
2. The plane flew at a <u>height</u> of 5000 feet above ground.
3. If we don't keep our dog tied on a <u>lead</u>, he might jump over the fence.
4. This week, engineers launched another <u>orbiting object</u> to go around the Earth.
5. My sister likes to <u>do</u> cooking experiments when we are home alone.
6. Please use the special <u>doorway</u> to enter the garden from the side.
7. I'm not sure whether this is a <u>working</u> camera or just a toy.
8. If you don't do regular <u>upkeep</u> on your car, it may need expensive repairs later.

<u>Word Bank</u>

satellite	pressurized	portal	altitude	module
tether	component	functional	conduct (v.)	maintenance

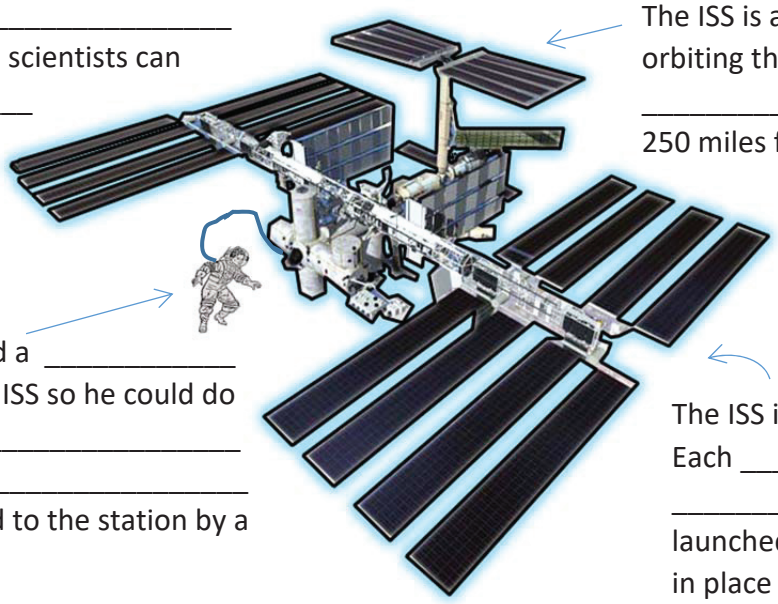


Wordology Activity #2: Fill in the Blanks

Instructions: This picture represents the International Space Station. Use the definitions given below to help you choose words to label the illustration. Write each word in the correct blank.

The ISS includes _____ labs where space scientists can _____ experiments.

The ISS is a _____ orbiting the Earth at an _____ of about 250 miles from the ground.



This astronaut used a _____ to come out of the ISS so he could do repairs and _____ on it. He wears a _____ suit and is attached to the station by a _____.

The ISS is made of many sections. Each _____ or _____ was launched from Earth and then put in place as a part of the station.

Definitions

satellite – an object that orbits the earth or another planet

altitude – distance from the surface

component – one part of a complex system

pressurized – with air pumped in to create a comfortable pressure level

module – a section of a larger whole

functional – able to do or support specific tasks or processes

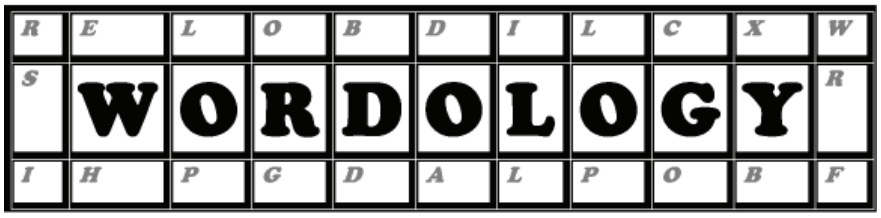
maintenance – upkeep

portal – a special entrance or doorway

tether – a cord, rope, or chain to keep something attached

conduct (v.) – to carry out or do

Images: https://www.hiclipart.com/free-transparent-background-png-clipart-ypnci; https://www.needpix.com/photo/854584/astronaut-rocket-space-spaceman-space-stuff

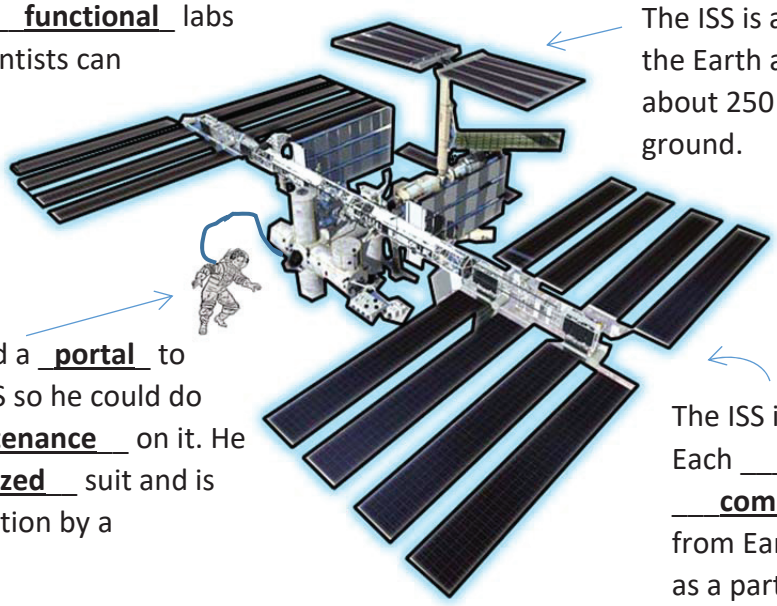


Wordology Activity #2: Fill in the Blanks (Teacher Key)

Instructions: This picture represents the International Space Station. Use the definitions given below to help you choose words to label the illustration. Write each word in the correct blank.

The ISS includes __**functional**__ labs where space scientists can __**conduct**__ experiments.

The ISS is a __**satellite**__ orbiting the Earth at an __**altitude**__ of about 250 miles from the ground.



This astronaut used a __**portal**__ to come out of the ISS so he could do repairs and __**maintenance**__ on it. He wears a __**pressurized**__ suit and is attached to the station by a __**tether**__.

The ISS is made of many sections. Each __**module**__ or __**component**__ was launched from Earth and then put in place as a part of the station.

Definitions

satellite – an object that orbits the earth or another planet

altitude – distance from the surface

component – one part of a complex system

pressurized – with air pumped in to create a comfortable pressure level

module – a section of a larger whole

functional – able to do or support specific tasks or processes

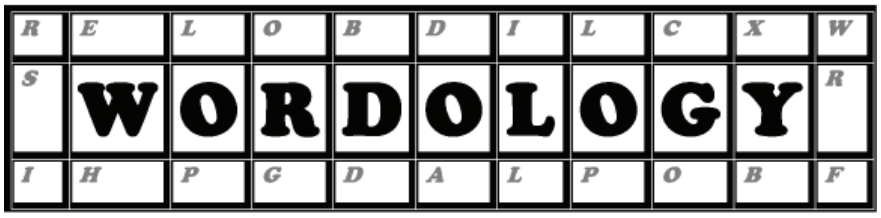
maintenance – upkeep

portal – a special entrance or doorway

tether – a cord, rope, or chain to keep something attached

conduct (v.) – to carry out or do

Images: https://www.hiclipart.com/free-transparent-background-png-clipart-ypnci; https://www.needpix.com/photo/854584/astronaut-rocket-space-spaceman-space-stuff



Wordology Activity #3: Space Station Mission Report

Instructions: You are an astronaut! Imagine that you visited the International Space Station for a special mission. Write your mission report in the space provided, using at least five of the vocabulary words listed below.

ISS Mission Report Name: _____

Mission Goals: _____Date of Mission: _____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

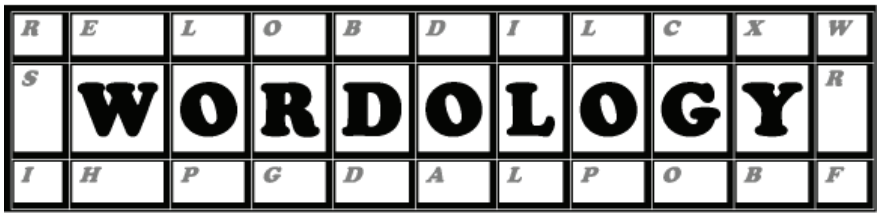
_____

_____

_____

Word Bank

satellite	pressurized	portal	altitude	module
tether	component	functional	conduct (v.)	maintenance



Composing Meaningful Sentences

If you complete your chosen Wordology activity, take the remaining time at this station to write Meaningful Sentences using the vocabulary words listed below. (Remember, a Meaningful Sentence is a sentence that shows that you know what the word means!) Read and discuss your sentences with your teammates.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

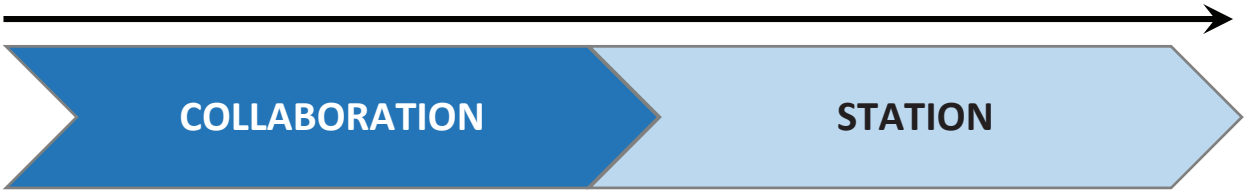
_____

_____

_____

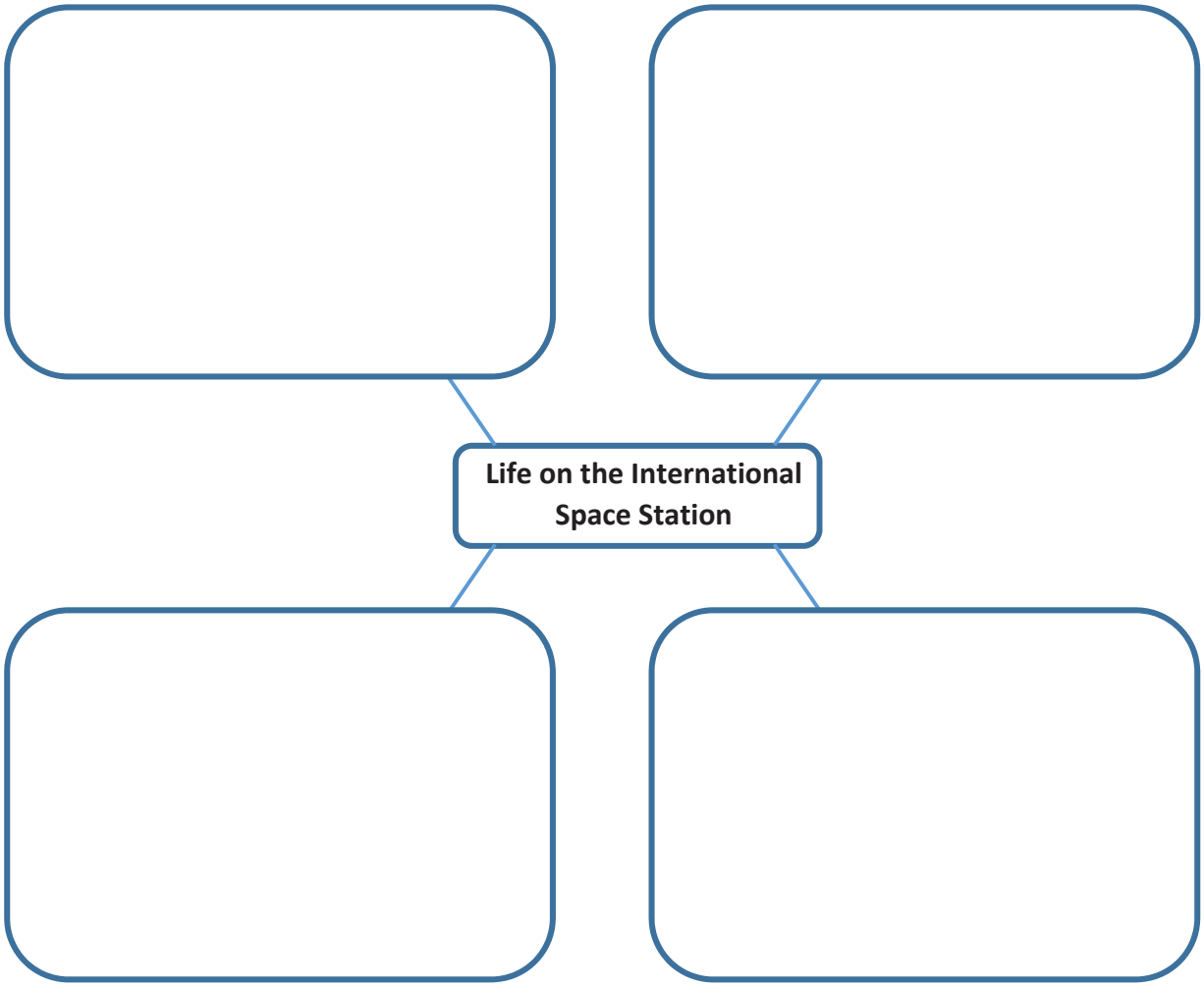
Word Bank

satellite	pressurized	portal	altitude	module
tether	component	functional	conduct (v.)	maintenance



Collaboration Station: Create a Graphic Organizer

***Instructions*.** With a partner, take turns reading the paragraphs of "The International Space Station" inside the shaded blue boxes. These paragraphs tell about life on the International Space Station. When you finish reading, discuss ways you could use a graphic organizer to remember the information. Then, create a graphic organizer using the format below. (It does not have to be the same as your partner's!)



Media Madness

Media Madness: Ask NASA—What Is the International Space Station?

Instructions: Watch the video at the following link. As you watch, take notes in the space below. Then, answer the question at the bottom of the page.

https://www.youtube.com/watch?v=6MR-qaDaG6w

My Notes on the International Space Station

What are some ways that you think the International Space Station has helped people prepare to go further into space?

_____

_____

_____

If you finish early, you may want to watch one or more of the following videos:

Tennis in Space: https://www.youtube.com/watch?v=uE4k4P1nKuk

How to Wash Your Hair in Space: https://www.youtube.com/watch?v=kOIj7AgonHM

Running in Space: https://www.youtube.com/watch?v=_ikouWcXhd0

Days 23 and 24

Teacher Preparation

Post team cards (with member students listed) under headings to show the station where each team is to start. The text used will be the first two chapters of *Space, Incorporated: The Future of Commercial Space Travel.* Make sure that copies of the book are available to students to pick up with their Day 23 Do Now sheets. Provide colored pencils for students to draw with for the Day 23 Daily Launch.

Upload the video Tech Insider video "How SpaceX, Blue Origin, and Virgin Galactic Plan on Taking You to Space" for the Day 23 Daily Launch:

https://www.youtube.com/watch?v=llh8rfwWqqY

Post the vocabulary words:

incorporated	catastrophe	minerals
commercial	resources	drastically
humanity	currently	platinum

For the Day 24 Daily Launch, prepare in advance the five cardstock posters for the "corners" activity, and affix them before class in the five spaces you have identified for students to move to. Also, preview the Seeker video "The Race to Mine the Moon"

https://www.youtube.com/watch?v=5vbiiI2Y7_Q

and decide where you want to stop it. The whole video is 9:11 minutes long; we recommend you plan to show no more than 5:30 minutes. (If you are short on time, you can also increase the speed to 1.25x using the Settings icon.)

Preload the optional SpaceX videoon intercontinental rocket travel at the Media Madness Station:

https://www.youtube.com/watch?v=xDEKjfnRhqQ

Post the guiding question for Days 21-28:

What is happening today to advance space exploration?

Daily Launch Day 23

Whole Group Opening Activity: Space Vacation

Invite students to share some of their responses for the Do Now activity on a space vacation anywhere in the solar system. Where would they like to visit? Why? What would they expect to see and experience on Jupiter, Saturn, Mars, or wherever?

Ask students,

- What do you think would be the most interesting or exciting aspect of traveling in space?

After students have had an opportunity to respond and discuss, tell them that two experiences that stand out for astronauts are (1) weightlessness, and (2) seeing the Earth from far away. Tell them that during the next few days, you will be exploring ways that private companies hope to make these exciting experiences available even to people who are not professional astronauts.

Then show students the TechInsider video, "How SpaceX, Blue Origin, and Virgin Galactic Plan on Taking You to Space":

https://www.youtube.com/watch?v=llh8rfwWqqY

Dismiss students to their stations.

Daily Launch Day 23

Do Now: Space Vacation?

If you could take a space vacation anywhere in the solar system, where would you go? Why? Who would you take with you? And how long would you stay?

Answer these questions by filling in the blanks below. Then, use the space at the bottom of the page to draw a picture of what you would expect to see on your space vacation!

If I could take a space vacation anywhere in the solar system, I would travel to _____, because _____.

The people I would invite to join me on my vacation are _____ _____ . We would stay there for _____ days.

What I would expect to see on my space vacation:

Daily Launch Day 24

Whole Group Opening Activity: Why Explore Space?

Begin this session with a "corners" activity. Have each of the four corners of the room, plus a fifth space (perhaps in the center, or in the middle of the front), labeled with one of five cardstock posters, as follows:

# 1 – Tourist Destinations	**# 2 – Mining for Resources**	**# 3 – Permanent Human Colonies**

# 4 – Scientific Discoveries	**# 5 – Protection from Asteroids**

After students complete their Do Nows, call their attention to the five "corners" you have prepared, which correspond to the five reasons for space exploration listed on the Do Now sheet. Invite students to move to the space matching the reason they selected as most important. (***Note****: if you do not want to take time for students to move around in the classroom, you can have them indicate their choices by a show of hands as you read the options aloud, holding up the five associated posters*.) Give students a few minutes to share with others in their "corner" the reasons they gave for their choices. Then, ask a spokesperson for each option to summarize the reasons their group came up with.

Then, show students the portion you have pre-determined of the Seeker video "The Race to Mine the Moon":

https://www.youtube.com/watch?v=5vbiiI2Y7_Q

If you have time, ask a few follow-up questions to check for comprehension (for example, *Why does Dr. Abbud-Madrid think it is important to develop a fueling station on the Moon? What do the interviewees believe is the most valuable resource the Moon has to offer?*).

Finally, dismiss students to their stations.

Daily Launch Day 24

Do Now: What Do You Think?

The author of *Space, Incorporated* points out several reasons for people to continue exploring space. Several reasons are listed below. Which one do you think is the **most important** reason to explore space? Put a check in the box beside that reason. Then, use the large space to the right to explain the reasons for your choice.

I think the MOST important reason for people to explore space is (check ONE):

☐ To find exciting new places for tourists and explorers to visit

☐ To discover new places to get important resources from

☐ To create a new permanent home for humans

☐ To learn more about science and space

☐ To protect Earth from asteroids

I think this because:

MAIN STATION

Space, Incorporated

(pages 4-5, 8-9 in *Space, Incorporated*)

Introduce the Vocabulary Words (10-15 minutes)

Introduce students to the Vocabulary Words following the guidance provided under "Vocabulary Instruction" (pages 9-10). Read the list aloud from the Word Wall posted, pointing to each word as you pronounce it.

incorporated	catastrophe	minerals
commercial	resources	drastically
humanity	currently	platinum

On a second reading, have students repeat each word after you. Ask students whether they know the definitions of any words, and confirm correct definitions. If the words are unfamiliar, ask students whether they recognize parts of the words; as necessary, especially for longer words, walk them through the syllables to assist them in decoding. Then, display your kid-friendly definitions; for example:

GLOSSARY OF VOCABULARY WORDS

incorporated – formed into a legally recognized company

commercial – related to the business of buying and selling

humanity – human beings viewed as a group

catastrophe – a disaster or tragic event

resource – something useful that people need to do something

currently – right now; at the present time

minerals – non-living solids that are found in nature, such as rocks or metal

drastically – significantly; severely; in extreme ways

platinum – a very valuable silver-white metal, used in many modern technologies

Discuss each word with students, identifying multiple-meaning words. For example, the word **incorporated**, used here in the legal sense, can also mean "included," as in the sentence, "I *incorporated* your suggestions in the final draft of my essay." Students may be familiar with

the word **commercial** used as a noun: "My favorite part of the Super Bowl is watching the *commercials*", but here it is used as an adjective in the broader sense, "related to commerce" (that is, buying and selling). Finally, while students may be familiar with the word **resources** in the context of information (Internet *resources*), in this context we are considering natural resources. Use words in "Meaningful Sentences" (see examples below). Invite students to propose sentences as well. Remind students that they are to compose their own Meaningful Sentences as time allows at the Wordology Station.

Sample Meaningful Sentences

1. Last year mom **incorporated** her catering service, because making it a legally recognized business is better for tax purposes.
2. My uncle used to work for the government, but now he has joined the **commercial** side of things as a sales rep for a big company.
3. When people first invented the wheel, it brought a huge benefit for **humanity**.
4. That earthquake was a terrible **catastrophe** that killed more than 100 people.
5. Water from the river is an important **resource** to help the farmers grow their crops.
6. **Currently**, our school only has one gym teacher, but next year we will have two.
7. Miners tunnel into the earth to bring back valuable **minerals** that they dig from the rocks.
8. We are way behind in our math course; we will have to **drastically** speed up our learning to finish by the end of the school year.
9. My sister-in-law has a beautiful silvery white **platinum** wedding ring.

Read-Aloud, Think-Aloud (10-15 minutes)

Text: *Space, Incorporated,* pages 4-9.

Invite students to do a quick text walk of *Space, Incorporated.* As they look at the cover, ask:

- What is surprising or unusual about the title, *Space, Incorporated*? (*If "incorporated" means recognized as a company, how can space be a company?*) – ***examine vocabulary in context***
- What do you think "commercial space travel" might mean?

Invite them to leaf through the book and comment on the illustrations. Then ask them to turn to page 4 as you begin a read-aloud, think-aloud. As you read, explicitly identify the strategies you are using, such as ***making connections,*** referring to the **menu of strategies** poster as you do so.

- (*At the end of page 4, after "… visited the International Space Station"*): Oh right, we just learned about the International Space Station. That picture on page 5 looks pretty familiar! – ***make connections***

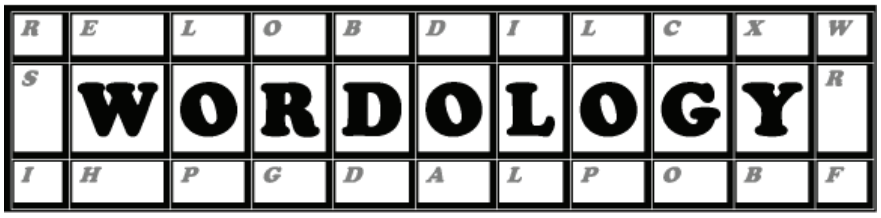
- (*Page 5, after "… sooner than once thought"*): Wait, what does that mean—"space tourism"? You can't just go to space for a vacation, can you? I guess I will keep reading to find out what they're talking about. – ***check comprehension; read on***
- (*Page 6, after "… bombed major cities in Europe"*): Okay, we learned about World War II during the *Heroes* unit, and we just learned about missiles when we talked about Darth Vader. So I guess these real-life missiles were important in helping people learn to make rockets for space. – ***make connections***
- (*Page 6, after "This time period was called the space race"*): Oh, yeah! This is when the black female engineers and computers were helping put people into space, like we saw in *Hidden Figures*. This page is reviewing a lot of history that we've already learned about. – ***make connections***
- (*Page 6, after "… Jupiter, Mars, Venus, Mercury, and Saturn"*): Well, that's fine, but 1980—that's more than 40 years ago. Hasn't anything exciting happened since then, in all that time? – ***ask questions***
- (*Page 8, after "… killing all on board"*): Oh, that was the *Challenger…* remember, the one that President Reagan made the speech about? – ***make connections***
- (*Page 8, after "… maintaining the ISS"*): Well, yeah, they did have the ISS, so I guess that was pretty exciting. First they had to put it together, and then all those people going back and forth, and doing experiments on board—all that must have kept them pretty busy. – ***elaborate***
- (*Page 9, after "Now private companies have joined them"*): Oh, *that's* what they meant by "Space, Incorporated"! Private companies are getting involved. Okay, I get it. – ***examine vocabulary in context***

After you finish reading the main text on page 9, call students' attention to the guiding question, *What is happening today to advance space exploration?* Ask students:

- How do you think getting private companies involved could help advance space exploration? Do you see any dangers or drawbacks to it?
- Do you really think going to Mars could someday be as common as flying across the country for a vacation? Why or why not? What are some of the challenges that would have to be overcome?

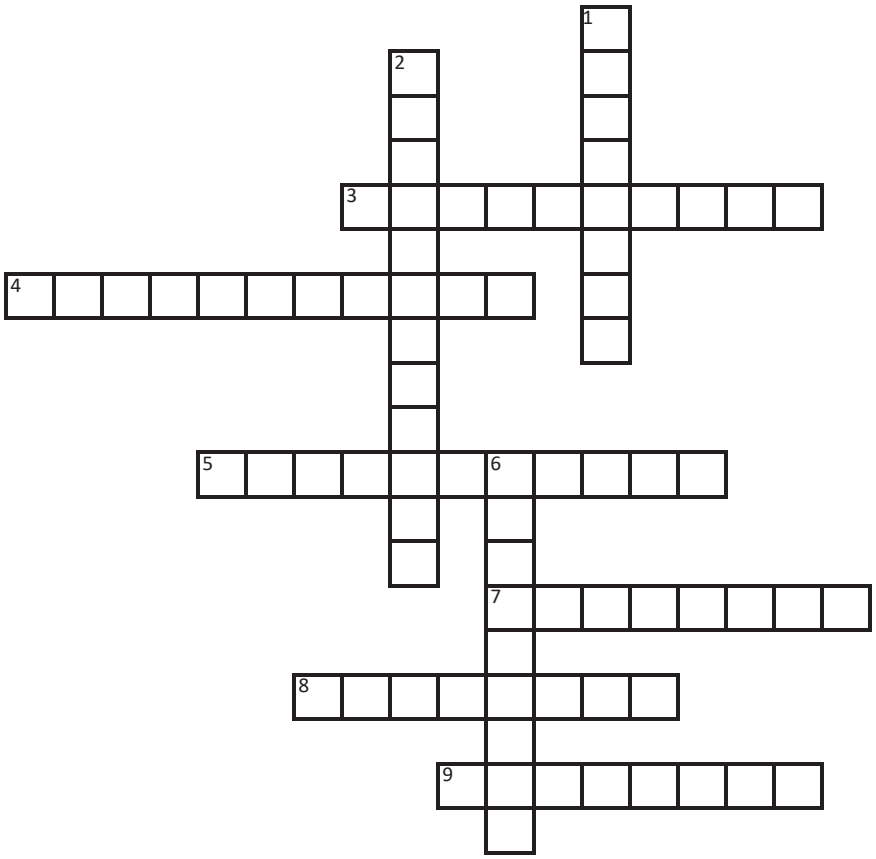
Additional Activities for Schools with 30-minute Stations

- Revisit the Vocabulary Awareness Chart showing the Vocabulary Words for this section. Ask students to indicate their current familiarity with the word by a show of hands. As students indicate that they "understand the word every time they hear it" or that they "know the meaning and use it correctly," challenge them to provide a definition or to use the word correctly in a sentence.



Wordology Activity #1: Crossword Puzzle

Instructions: Choose words from the Word Bank to complete this puzzle. The Clues box will help you decide which words fit in which spaces.



Word Bank

catastrophe
commercial
currently
drastically
humanity
incorporated
minerals
platinum
resource

Adapted from the Crossword Maker on TheTeachersCorner.net

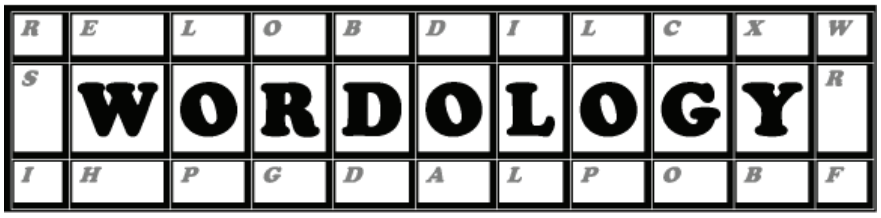
Clues

Across

3. related to sales
4. a disaster
5. severely
7. stuff you need to do something
8. all people everywhere
9. a silvery white metal

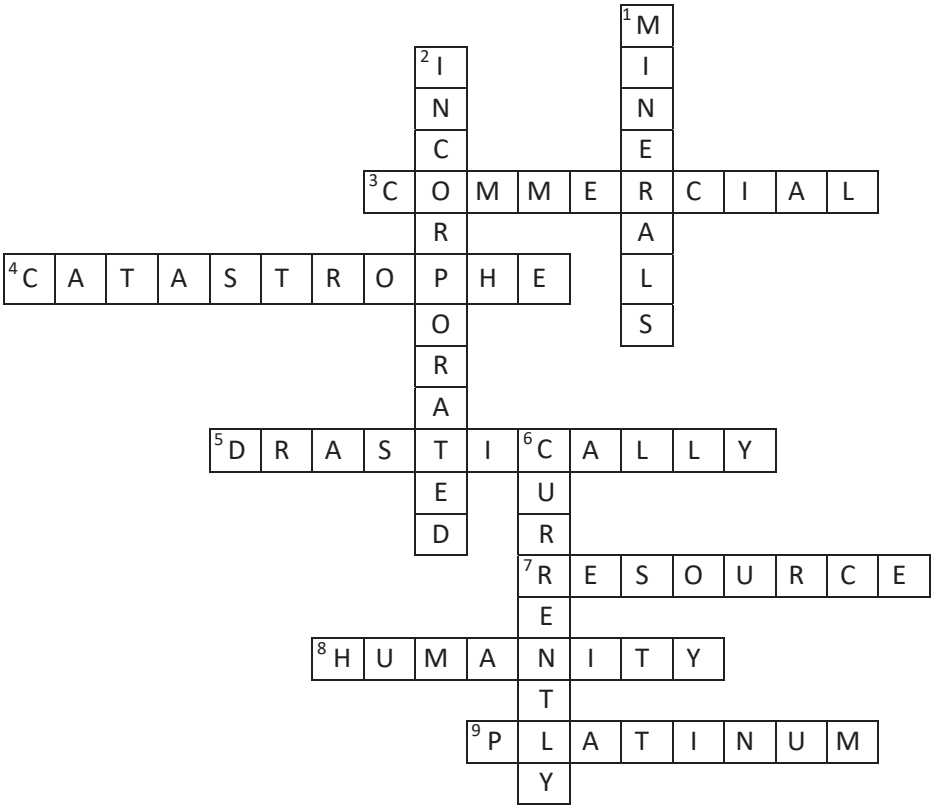
Down

1. rocks and metals
2. made into a legal company
6. right now



Wordology Activity #1: Crossword Puzzle (Teacher Key)

Instructions: Choose words from the Word Bank to complete this puzzle. The Clues box will help you decide which words fit in which spaces.



Word Bank

catastrophe
commercial
currently
drastically
humanity
incorporated
minerals
platinum
resource

Adapted from the Crossword Maker on TheTeachersCorner.net

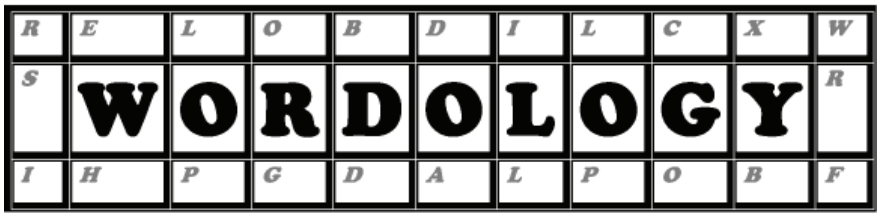
Clues

Across

3. related to sales
4. a disaster
5. severely
7. stuff you need to do something
8. all people everywhere
9. a silvery white metal

Down

1. rocks and metals
2. made into a legal company
6. right now



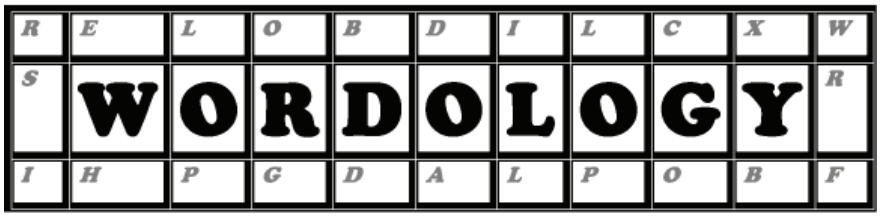
Wordology Activity #2: Synonym Hunt

Instructions: A **synonym** is a word that means the same or almost the same as another word. **Rewrite** each sentence without changing its meaning. Choose a synonym from the Word Bank to replace the underlined word or phrase in each sentence.

1. Each new discovery or invention brings new benefits and challenges to <u>people</u>.
2. If you have a new product to sell, it is a good idea to form a(n) <u>legally recognized</u> company.
3. You need some kind of <u>raw material</u> to make most new inventions.
4. <u>At this time</u>, many electronic devices are made with rare <u>rock crystals</u> from the earth.
5. <u>Business</u> companies have to look for new places where they can get these materials.
6. They need safe ways to mine them from the earth to avoid a <u>tragedy</u>.

<u>Word Bank</u>

catastrophe	commercial	currently	drastically	humanity
incorporated	mineral	platinum	resource	



Wordology Activity #3: "You've Been Sentenced," NASA Deck

Instructions: If team members each complete at least one Wordology activity, you can spend the remaining time at the Wordology station playing "You've Been Sentenced" using the NASA space terminology card deck. Write approved sentences (the ones you get points for!) in the space below. (If you need more room, please use the back of the page.)

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

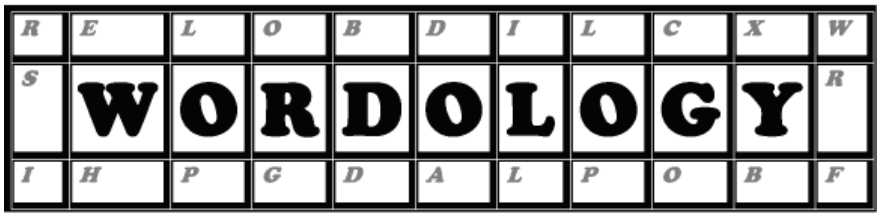
_____

_____

_____

_____

_____



Composing Meaningful Sentences

If you complete your chosen Wordology activity, you may take the remaining time at this station to write Meaningful Sentences using the vocabulary words listed below. (Remember, a Meaningful Sentence is a sentence that shows that you know what the word means!) Read and discuss sentences with your teammates.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Word Bank

catastrophe	commercial	currently	drastically	humanity
incorporated	mineral	platinum	resource	

COLLABORATION STATION

Collaboration Station: *Space, Incorporated,* chapter 2

***Instructions*.** Turn to page 10 in the book *Space, Incorporated.* Chapter 2 is titled, "Why Go to Space?" With your team, take turns reading pages 10-13. (Each person can read one section. If you have trouble with some of the words, ask your ALFA Lab teacher assistant for help.) Then, discuss with your team how you could fill in the graphic organizer below. Finally, each person should fill in the organizer independently.

One Reason to Go to Space Now:

_____

_____

_____

Reasons to Go to Space in the Future (list at least three):

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Media Madness

Media Madness: Independent Project Time

Instructions: Use your Media Madness time today to work on your independent project. Try to finish the project so that you can rehearse it in the next two days.

At the end of your time, write down what you accomplished.

What I accomplished today:

_____

_____

Notes on my project:

****Note:** If you have time, you may enjoy this SpaceX video about using space rockets to travel to faraway places on Earth:

https://www.youtube.com/watch?v=xDEKjfnRhqQ

Days 25 and 26

Teacher Preparation

Post team cards (with member students listed) under headings to show the station where each team is to start. The text used will be *Space, Incorporated* (pages 14-21).

For the Day 25 Daily Launch, preload the Brilliant video "What Will Space Tourism Be Like?":

https://www.youtube.com/watch?v=eH-xm9G9QBk

Post the vocabulary words:

dramatically	recover	propel
donations	reliable	evacuate
boosters		underway

For the Day 26 Daily Launch, preload the Tech Insider video, "How Virgin Galactic Plans to Send You to Space": https://www.youtube.com/watch?v=vS7aidy2bwk

Also preload the optional NASA Spaceplace link at the Media Madness stations:

https://spaceplace.nasa.gov/spacecraft-graveyard/en/

Post the guiding question for Days 21-28:

What is happening today to advance space exploration?

Daily Launch Day 25

Whole Group Opening Activity: Different Ways to Get to Space

Invite students to share their responses to the Do Now activity. What similarities and differences did they notice among the spacecraft pictured? (**Note**: You may wish to explain to students that the SpaceX Dragon module, used to service the International Space Station, is launched via the Falcon, a long vertical rocket not pictured here.) Which spaceship would they be interested in traveling on? Why?

Then show the **first five minutes** of the Brilliant video "What Will Space Tourism Be Like?" (be sure to stop the video at minute 5:00):

https://www.youtube.com/watch?v=eH-xm9G9QBk

If time permits, invite students to discuss their reactions to the video.

Remind students to use any extra time at their stations to work on their projects.

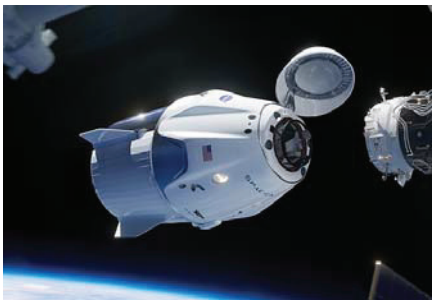
Then, dismiss them to their stations.

Daily Launch Day 25

Do Now: Different Ways to Get to Space

Each of the images below* shows a reusable spacecraft developed by a different commercial company. Examine the photos carefully, than answer the questions at the bottom of the page.

Amazon Blue Origin Spacecraft



SpaceX Dragon shuttle module

Virgin Galactic Unity (VMS Eve + SpaceShip 2)

Boeing Starliner spaceship

What are some ways these spacecraft are similar to one another? _____

_____

What are some differences between them? _____

_____

Which one would you most like to travel in? _____

Why? _____

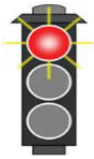
_____

Photos (clockwise from top left): https://commons.wikimedia.org/w/index.php?curid=61440254 by the Penultimate One; https://commons.wikimedia.org/wiki/File:SpaceX_Crew_Dragon_(More_cropped).jpg; https://sk.wikipedia.org/wiki/S%C3%BAbor:Boeing_Orbital_Flight_Test_Prelaunch_(NHQ201912190017).jpg; https://commons.wikimedia.org/wiki/File:SS2_and_VMS_Eve.jpg

Daily Launch Day 26

Whole Group Opening Activity: Independent Project Checks

As students work on the Do Now, which asks them to reflect and report on their progress on the independent projects, circulate around the class and fill out the tracker chart to make sure students are on track and have enough time to complete their projects.

	My students	Next Steps
 Students on track		
 Students who may need extra help		
 Students who are behind		

Then, remind students of the Guiding Question, *What is happening today to advance space exploration?* Ask students to summarize some of the things they've been learning that help to answer this question.

Show the Tech Insider video "How Virgin Galactic Plans to Send You to Space":

https://www.youtube.com/watch?v=vS7aidy2bwk

After the video, ask students:

- Which "space experience" sounds more interesting to you: the capsule launched from the Blue Origins spacecraft (a fall to Earth of about 45 seconds) or the SpaceShip 2 airplane-like rocket launched from Virgin Galactic's VMS Eve. (You could have them vote for one or the other.)
- With a price tag of more than $200,000, these space experiences are still a luxury that is only available to the very rich. How do you think the technologies that these companies are developing could help advance space exploration for everyone's benefit?
- How do you think the money these rich passengers are paying could help to support advances in space exploration for everyone's benefit?

Finally, dismiss students to their stations.

Daily Launch Day 26

Do Now: Independent Project Check

Please fill this out and refer to it as you plan how you will use your independent project time in these last few days of the *Galaxy* unit.

What my project is:

_____

What have you changed about your project since you began planning it?

_____

_____

What do you still need to do to complete your project?

_____

_____

Rate the following by coloring in or circling the face that represents how you feel about each statement.

	Great!	Just okay	Not so good
I have enough time in class to work on my project.			
I like my Galaxy project so far.			
This Galaxy project is fun.			
I think I can finish my project on time.			
My Galaxy project is interesting.			
I feel good about presenting my project to the class.			

MAIN STATION

Space, Incorporated

(pages 14-16, 20-21 in *Space, Incorporated*)

Introduce the Vocabulary Words (10-15 minutes)

Introduce students to the Vocabulary Words following the guidance provided under "Vocabulary Instruction" (pages 9-10). Read the list aloud from the Word Wall posted, pointing to each word as you pronounce it.

dramatically	recover	propel
donations	reliable	evacuate
boosters		underway

On a second reading, have students repeat each word after you. Ask students whether they know the definitions of any words, and confirm correct definitions. If the words are unfamiliar, ask students whether they recognize parts of the words; as necessary, especially for longer words, walk them through the syllables to assist them in decoding. Then, display your kid-friendly definitions:

GLOSSARY OF VOCABULARY WORDS

dramatically – in a noticeable, striking, or extreme way

donations – gifts that people give to support an organization or a cause

booster – something that gives extra thrust or "oomph" to something

recover – to get back again; to retrieve or rescue

reliable – dependable; something you can count on

propel – to send forward; to push

evacuate – to get people out of a dangerous place or situation

underway – happening now; going on

Discuss each word with students. Point out that the word **booster** has the general meaning of something that adds extra usefulness and is found in various contexts, such a "booster seat" (giving small children extra height in a car or at a table) or a "booster shot" (adding extra time after a first vaccination). Here, "booster rockets" give an extra thrust of power at a critical stage in a spaceship's journey. Students may remember that the word **recover** was used with the

sense "to heal or get well" in the *Heroes* unit; in the present context, however, it means "to get something back" (in this case, a used spacecraft or module). Use words in "Meaningful Sentences" (see examples below). Invite students to propose sentences as well. Remind students that they are to compose their own Meaningful Sentences as time allows at the Wordology Station.

Sample Meaningful Sentences

1. After Jon started working with his math tutor, his grades improved so **dramatically** that everyone was amazed.
2. We set up a stand outside the grocery store to ask for **donations** of food and supplies for the people at the homeless shelter.
3. I was feeling really down this morning, so your encouraging words were a big **booster** for my mood.
4. I went back to homeroom to **recover** my lunch bag that I left there this morning.
5. Dad loves his new car because it's much more **reliable** than the old one; it hardly ever breaks down.
6. The kids in the robotics club created tiny motors to **propel** their little machines across the gym floor.
7. The city has a plan to **evacuate** people from areas where it might flood so they will be safe.
8. Testing of the new drug is **underway**, so if it works well, it should be available to the public in a few more months.

Briefly review the Special Glossary words (below). They are not high-frequency words and students are not expected to master them; however, introducing them will help them to understand the text where they occur.

SPECIAL GLOSSARY

suborbital – reaching space, but not completing an orbit around the Earth

unmanned – not carrying people

Read-Aloud, Think-Aloud (10-15 minutes)

Invite students to turn to page 14 in *Space, Incorporated*. Invite a volunteer to read the chapter title. Ask students:

- What do you think this title "Going Private" means? What do they mean by "A new kind of space race? – ***note the title***

Then, begin reading the text. As you read, explicitly identify the strategies you are using, such as ***making connections,*** referring to the **menu of strategies** poster as you do so.

- (*At the end of page 14, after "… Zero 2 Infinity in Spain"*): Wow, that is a lot of companies! I wonder whether they're all working on the same kind of projects? – ***ask questions***
- (*At the end of page 15, after "… donations from their followers"*): Really? People give money to a space program, just like you could give money to the United Way or something? That's pretty amazing – ***make connections***
- (*Page 16, end of paragraph 1, after "… sitting on the bottom of the ocean"*): Rocket parts on the bottom of the ocean? That's a different kind of shipwreck, for sure! I wonder whether that's good for the ocean creatures? I guess it's good that they've developed reusable ones so there isn't so much waste and space trash. – ***ask questions; elaborate***

Invite students to skip ahead to page 20 (unless you decided to include page 19 in the Read-Aloud/ Think-Aloud; see below). Continue reading and "thinking aloud":

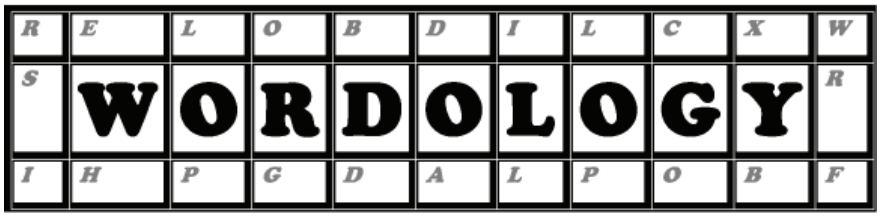
- (*Page 20, paragraph 1, after "… to and from the ISS"*): Oh yeah, I remember we read about how they have all these different people working on the ISS for a certain time period, doing experiments and maintenance and everything. I guess these commercial spacecraft help them get there and come back again. – ***make connections***
- (*Page 21, paragraph 2, after "… send up manned flights"*): Oh wait, I guess I was wrong… it sounds like the commercial spacecraft haven't taken any people up yet… just deliveries of equipment and supplies. This says "plans are underway for manned flights," so I guess that's still in the future. – ***check comprehension***

Remind students of the guiding question, *What is happening today to advance space exploration?* Ask them:

- How do you think the private companies' involvement will help advance space exploration? – *Make sure students realize that the more people and organizations are working in a field, the more quickly it is likely to advance. The development of reusable rockets is one example that will bring down the cost of space exploration in the future.*

Additional Activities for Schools with 30-minute Stations

- If time permits, include page 19 in your Read-Aloud/ Think-Aloud (this is the text that students are reading at the Collaboration Station).
- Revisit the Vocabulary Awareness Chart showing the Vocabulary Words for this section. Ask students to indicate their current familiarity with the word by a show of hands. As students indicate that they "understand the word every time they hear it" or that they "know the meaning and use it correctly," challenge them to provide a definition or to use the word correctly in a sentence.



Wordology Activity #1: My Space Adventure

Instructions: What if you won a trip that would take you to the edge of the Earth's atmosphere and back to the ground? Pretend you are a reporter for the school paper. Write a short article about your adventure in the space below. Be sure to use at least four vocabulary words in your article (see definitions below).

To Outer Space and Back by _____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Definitions

dramatically – in an exciting way

donations – gifts to support something

booster – something that gives extra power

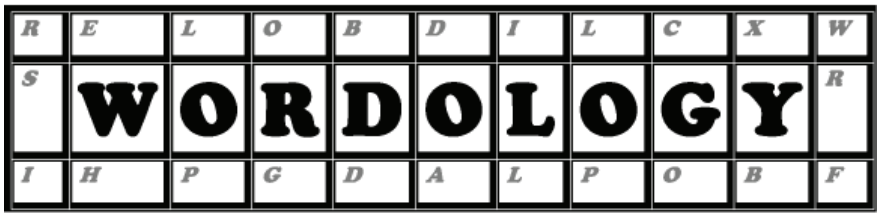
reliable – trustworthy

recover – to get something back again

propel – to send forward or push

evacuate – to get people away from danger

underway – going on now



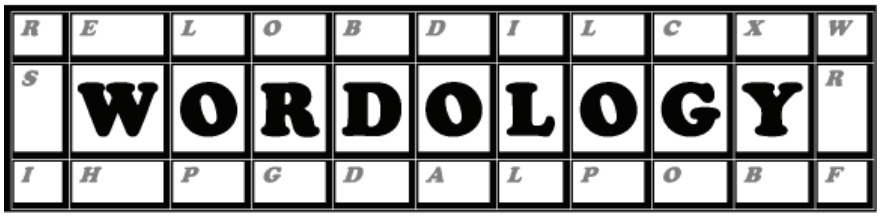
Wordology Activity #2: Synonym Hunt

Instructions: A **synonym** is a word that means the same or almost the same as another word. **Rewrite** each sentence without changing its meaning. Choose a synonym from the Word Bank to replace the underlined word or phrase in each sentence.

1. I am glad that the Internet service at my house is very <u>dependable</u>.
2. Mom went over my history notes with me as a <u>special help</u> so I could do well on the exam.
3. That swimmer has a powerful kick to <u>push</u> him forward through the water.
4. The staff rushed to <u>remove</u> the residents when the fire alarm sounded.
5. My video was <u>going on</u> when Mom made me pause it to take out the trash.
6. I like to give to this organization because my <u>contributions</u> will help people.
7. The sky darkened <u>suddenly</u>, the wind began to howl, and the rain fell in sheets.
8. My phone fell over the side of the boat and I couldn't <u>retrieve</u> it.

<u>Word Bank</u>

evacuate	donations	booster	underway
recover	propel	dramatically	reliable



Wordology Activity #3: Cryptogram Puzzle

Instructions: This puzzle is called a **Cryptogram**. At the bottom, there is a message in code. Every number stands for a letter. A few of the letters have been filled in. To solve the puzzle, you need to figure out which letters go with the other numbers. Once you figure out a letter, you can add it to the Key, and everywhere in the message that you see that number (for example, 17 always stands for "R," so everywhere that 17 appears, "R" is filled in). Look for short, familiar words to get you started, and use logic to figure it out. This cryptogram puzzle includes several vocabulary words from this section!

Key:

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
13							11										17	7							

Message:

__ __ S __ __ __ __ __ S __ __ __ __ R __ A __ __ __

22 5 7 22 2 14 15 2 7 16 14 8 5 17 18 13 23 12 14

R __ __ __ A __ __ __, R __ __ S A __ __ __ R __ __ __ __ __ S

17 5 10 2 13 4 10 5 17 5 16 7 13 4 10 5 17 12 20 21 5 22 7

__ H A __ __ __ __ __ R A __ A __ __ __ A __ __ __

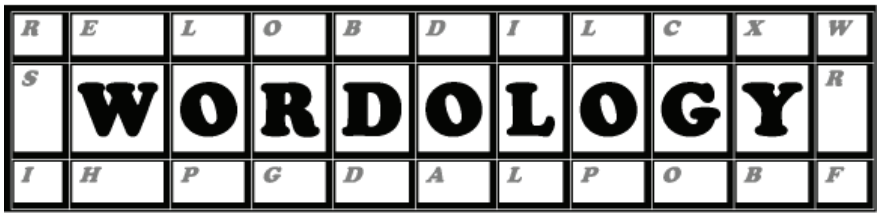
22 11 13 22 18 2 10 10 8 17 13 6 13 22 2 20 13 10 10 23

__ H A __ __ __ __ H __ F __ __ __ R __ __ F S __ A __ __

20 11 13 14 15 5 22 11 5 19 16 22 16 17 5 12 19 7 24 13 20 5

__ __ __ __ __ R A __ __ __ __.

5 9 24 10 12 17 13 22 2 12 14



Wordology Activity #3: Cryptogram Puzzle (Teacher's Key)

Instructions: This puzzle is called a **Cryptogram**. At the bottom, there is a message in code. Every number stands for a letter. A few of the letters have been filled in. To solve the puzzle, you need to figure out which letters go with the other numbers. Once you figure out a letter, you can add it to the Key, and everywhere in the message that you see that number (for example, 17 always stands for "R," so everywhere that 17 appears, "R" is filled in). Look for short, familiar words to get you started, and use logic to figure it out. This cryptogram puzzle includes several vocabulary words from this section!

Key:

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
13	4	20	8	5	19	15	11	2	26	21	10	6	14	12	24	1	17	7	22	16	3	18	9	23	25

Message:

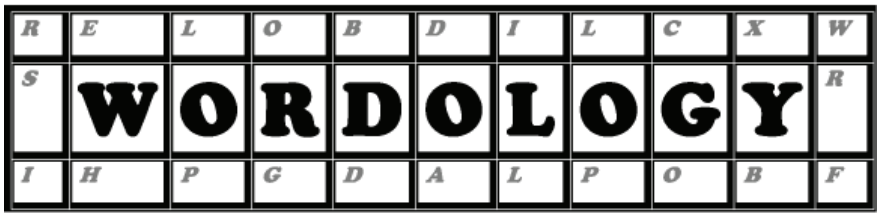
T E S T I N G I S U N D E R W A Y O N
22 5 7 22 2 14 15 2 7 16 14 8 5 17 18 13 23 12 14

R E L I A B L E, R E U S A B L E R O C K E T S
17 5 10 2 13 4 10 5 17 5 16 7 13 4 10 5 17 12 20 21 5 22 7

T H A T W I L L D R A M A T I C A L L Y
22 11 13 22 18 2 10 10 8 17 13 6 13 22 2 20 13 10 10 23

C H A N G E T H E F U T U R E O F S P A C E
20 11 13 14 15 5 22 11 5 19 16 22 16 17 5 12 19 7 24 13 20 5

E X P L O R A T I O N.
5 9 24 10 12 17 13 22 2 12 14



Composing Meaningful Sentences

If you complete your chosen Wordology activity, take the remaining time at this station to write Meaningful Sentences using the vocabulary words listed below. (Remember, a Meaningful Sentence is a sentence that shows that you know what the word means!) Read and discuss your sentences with your teammates.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

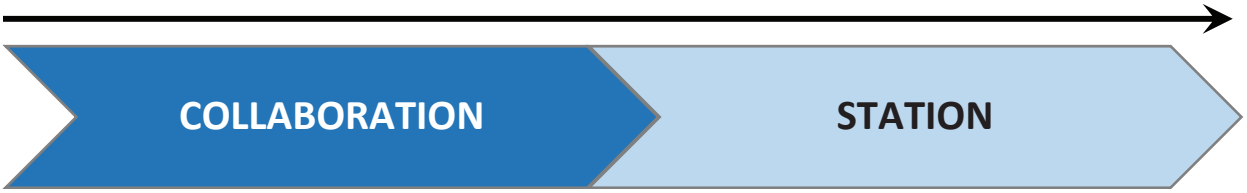
_____

_____

_____

Word Bank

evacuate	affordable	donations	booster	underway
recover	propel	dramatically	reliable	



Collaboration Station: Reflection Questions

***Instructions*.** Turn to **page 19** of *Space, Incorporated*. In groups of two or three, **partner read** this page. Discuss together how to fill out the graphic organizer below. Then, write your answers on your own.

Older rocket features:

compared to

Newer rockets (example: the SpaceX Falcon 9)—how its features make it reusable:

First stage

Extra fuel

Fins

Media Madness

Media Madness: Independent Project Time

Instructions: Use your Media Madness time today to work on your independent project. If you have finished creating your project, practice presenting it today. Make sure you have printed any texts or labels that you need!

At the end of your time, write down what you accomplished.

What I accomplished today:

_____

_____

Notes on my project:

****Note:** If you finish your work and have time, you may want to explore NASA's Spaceplace website at https://spaceplace.nasa.gov . An interesting place to start is this article, "Where do old satellites go when they die?":

https://spaceplace.nasa.gov/spacecraft-graveyard/en/

Days 27 and 28

Teacher Preparation

Post team cards (with member students listed) under headings to show the station where each team is to start. During this instructional cycle you will finish *Space, Incorporated* (pages 22-23 and 26-29).

In other stations, students' priority will be on getting their independent projects ready for presentation in the next instructional cycle. Guidelines for presentation practice are provided at both the Collaboration and Media Madness stations, so that students can finish their projects at the first station they come to and practice their presentations subsequently. Students who engaged in presentation practice during the *Heroes* unit and should be familiar with the process. (You should also provide each student a copy of the rubric that will be used to evaluate the type of presentation he or she has chosen, found on pages 241-246). However, some flexibility will be needed in the timing, so make sure that the ALFA lab assistant is prepared to offer guidance in the process. Students who finish early at the stations should use the extra time for independent reading and/or instructional games.

Make sure that students have access to colored pencils or markers for the Day 27 Do Now. Preview the following two videos and select the one you want to preload for use during the Daily Launch:

"We Are Going" (3:47): https://www.youtube.com/watch?v=vl6jn-DdafM OR

"How We're Going" (5:31): https://www.youtube.com/watch?v=_T8cn2J13-4

Preload the Artemis announcement "NASA Selects Human Landing Systems" video for use in the Day 28 Daily Launch:

https://www.youtube.com/watch?v=dlHJAKIaALg

There is no new vocabulary list for Days 27 and 28.

At the Media Station, preload the "Eyes on the Stars" video for students who have time to watch it:

https://storycorps.org/animation/eyes-on-the-stars/

Post the guiding question for Days 21-28:

What is happening today to advance space exploration?

Daily Launch Day 27

Whole Group Opening Activity: Check-In

Ask students to share their responses to the Do Now activity on the status of their independent projects. Remind students that they need to complete and rehearse their projects during this instruction cycle. In contrast to the *Heroes* unit, they will rehearse their projects either during the Collaboration Station or Media Madness station times. However, they must complete the project so that it is ready for rehearsal. Take the time to troubleshoot any issues or obstacles that students may be encountering as they complete their projects.

Tell students that in the Main Station, you will finish the book *Space, Incorporated*. Advise students that their priority during the rotations when they are **not** at the Main Station (Wordology, Collaboration Station, and Media Madness) should be on completing their independent projects and then rehearsing their presentations with a teammate.

Choose one of the following two NASA videos to show to complete this Daily Launch.

"We Are Going" (3:47): https://www.youtube.com/watch?v=vl6jn-DdafM

OR

"How We're Going" (5:31): https://www.youtube.com/watch?v=_T8cn2J13-4

Dismiss students to their stations.

Daily Launch Day 27

Do Now: Final Steps on My Independent Project

Instructions: This is the last instructional cycle during which you can work on your independent projects. Let's make sure everyone finishes on time! Use this Do Now to identify any remaining steps you have to do to complete your project. You will finish it and rehearse it over the course of this instructional cycle.

Do you still need to finish some steps on your project? If so, list them here:

- Step:_____
- Step: _____
- Step: _____

Bonus: If you have finished work on your project, use the space below to design a space hotel!

Daily Launch Day 28

Whole Group Opening Activity: Thoughts on the Essential Question

Ask students to share some of their responses to the Do Now, which asks them to reflect and report on things they've learned during this unit that change how they think about the Essential Question, *What are the benefits and possible drawbacks of humans exploring the galaxy?*

Encourage students to discuss and respond to one another's ideas. You may also want to encourage them to consider how the Essential Question related to current NASA and private initiatives to extend space exploration on the Moon and as far as Mars.

Show students the Seeker video "How NASA's Rover Team Reimagined Mars 2020":

https://www.youtube.com/watch?v=O9YBPRF3o5w

Dismiss students to their stations.

Daily Launch Day 28

Do Now: Personal Reflection

Think about the Essential Question for this unit:

> *What are the benefits and possible drawbacks of humans exploring the galaxy?*

What have you learned in this unit that would make your answer to this question different from what it would have been before?

Write a personal reflection in the space below, describing one thing you've learned during this unit that changes the way you look at this Essential Question.

Essential Question: What are the benefits and possible drawbacks of humans exploring the galaxy?

One thing I've learned that changes the way I think about this question is: _____

MAIN STATION

Space, Incorporated Conclusion (pages 22-23, 26-29)

Introduce New Words (5 minutes)

There are no new vocabulary words for this section. However, you may want to introduce ahead of time three new words found on pages 26-27 (the text provides definitions for two of them):

GLOSSARY

colonize – to send a group of people to live in a new place

propellant – fuel burned to give power to a rocket

depot – a place where large quantities of something are stored

Point out to students that the word "propellant" is related to "propel," which they have already had as a vocabulary word. Students may already be familiar with the word "depot" from the names of big box supply stores; point out that it is used because these stores carry large quantities of supplies that people need for particular settings (office, home, etc.).

Read-Aloud/ Think-Aloud (20-25 minutes)

Direct students to turn to page 22 in *Space, Incorporated*. Explain that you will be reading this additional section of chapter 3 and then concluding with chapter 4. Ask students:

- Does the photo on pages 22-23 look familiar? Where have we seen it before? (*This is the Virgin Galactic spaceship and launch plane seen previously.*) – ***note illustrations***

Begin reading page 22. As you read, explicitly identify the strategies you are using, referring to the **menu of strategies** poster as you do so.

- (*Page 22, after "… hitches a ride on an airplane"*): What does that mean? How can a rocket hitch a ride on an airplane? Oh, wait, that's it in the picture. Right. – ***ask questions; clarify meaning***
- (*At the end of page 23, after "… our toughest challenge"*): Okay, this is what we saw in those videos in the last instructional cycle. Pretty cool. – ***make connections***

Direct students to skip ahead to the beginning of chapter 4, "The Future of Space Tourism," on page 26 (unless you decided to include page 24 in the Read-Aloud/ Think-Aloud; see below). Continue reading and identifying the strategies you use.

- (*Page 26, second sentence, after "… called Gateway in the 2020s"*): Oh there's that vocabulary word, "outpost." We learned that a couple of weeks ago. I guess this Gateway is what they were talking about in the NASA video we saw in the Daily Launch. – ***examine vocabulary in context; make connections***
- (*End of page 26, after "… during his lifetime"*): Do you think that's possible? It seems to me like there have been a lot of setbacks and a lot of challenges to overcome. I really don't know whether people could actually live in cities on Mars in the next thirty years. I mean, there isn't even air there for humans to breathe. – ***ask questions; elaborate***
- (*End of page 27, after "… fill up a spacecraft when it gets low"*): So how would that work? Can you just set a depot out there in empty space? How would you keep it from floating away? – ***ask questions; visualize***
- (*Page 29, end of paragraph 1, after "… in case people want to stay more than a few days"*): Can you imagine that? People just wanting to live like that for weeks or months on end, floating around and eating freeze-dried food and everything? It would be a cool experience for a few days, but I don't know if I could live that way for very long. – ***visualize; elaborate***

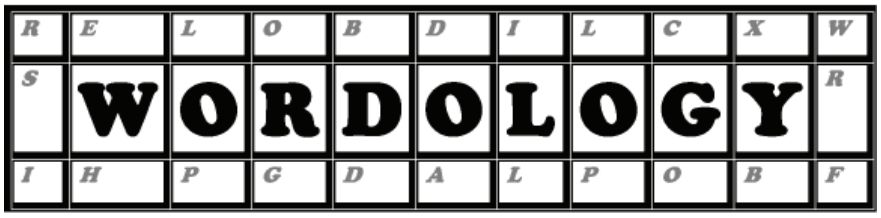
Remind students of the guiding question, *What is happening today to advance space exploration?* Ask them:

- Let's **summarize**: what have we learned about the latest plans and developments in space travel? – *Some of the developments that students should mention include space tourism, a gateway refueling outpost on the Moon, and plans to send humans to Mars in the next few years.*

Finally, ask students how this discussion relates to the Essential Question for the unit, *What are the benefits and possible drawbacks of humans exploring the galaxy?*

Additional Activities for Schools with 30-minute Stations

- If time permits, choose some of the call-outs and sidebars to include in your Read-Aloud/ Think-Aloud.
- Include page 24, "Chasing Asteroids," in your Read-Aloud/ Think-Aloud. If you decide to include this page, be aware that you may need to introduce some additional vocabulary words (such as *destinations, obtain, formation,* and *origins*) and will probably have to take time to check comprehension, since this section is slightly more technical than some others.



Wordology Activity: "You've Been Sentenced," NASA Deck

Instructions: If team members have completed work on their independent projects, they should spend their time at the Wordology station playing "You've Been Sentenced" using the NASA space terminology card deck. Write the approved sentences (the ones you get points for!) in the space below. (If you need more room, please use the back of the page.)

COLLABORATION STATION

Collaboration Station: Independent Projects/ Presentation Practice

Instructions: If you have NOT completed work on your independent project, use this time to finish it. If you and a teammate HAVE finished work, use this time to practice your presentation following the guidelines below. **Also**—if you work on your projects during the Collaboration Station, be sure to practice your presentations at the Media Madness Station.

Presentation Practice Guidelines

Think about the independent projects you presented for the *Feisty Felines* and *Heroes* units. Share with your partner answers to the following questions:

- What did you like about your previous presentations? What would you like to improve on?
- What did you like about your partner's previous projects? Do you have any suggestions for how he/she could do even better this time?

Now, set up your poster or project. If you wrote a story, poems, or a brochure, let your partner read through the printed version. Then designate one partner to "present" first. Follow this schedule. (Be sure to lower your voices while practicing!)

1. First person delivers presentation (3-5 minutes)
2. Partner gives feedback on first person's presentation (1-2 minutes)
3. Second person delivers presentation (3-5 minutes)
4. Partner provides feedback on second person's presentation (1-2 minutes)

If you have time:

5. First person practices one part of their presentation that they got feedback on (1 minute)
6. Second student practices one part of their presentation that they got feedback on (1 minute)

(**Note**: If only one person in the team has finished and the others are still working on their projects, the person who has finished can use this time for independent reading from the classroom library.)

Media Madness

Media Madness: Independent Projects/ Presentation Practice

Instructions: If you have NOT completed work on your independent project, use this time to finish it. If you and a teammate HAVE finished work, use this time to practice your presentation following the guidelines below. **Also**—if you work on your projects at the Media Madness Station, be sure to practice your presentations when you get to the Collaboration Station.

Presentation Practice Guidelines

Think about the independent projects you presented for the *Feisty Felines* and *Heroes* units. Share with your partner answers to the following questions:

- What did you like about your previous presentations? What would you like to improve on?
- What did you like about your partner's projects? Do you have any suggestions for how he/she could do even better this time?

Now, set up your poster or project. If you wrote a story, poems, or a brochure, let your partner read through the printed version. Then designate one partner to "present" first. Follow this schedule. (Be sure to lower your voices while practicing!)

1. First person delivers presentation (3-5 minutes)
2. Partner gives feedback on first person's presentation (1-2 minutes)
3. Second person delivers presentation (3-5 minutes)
4. Partner provides feedback on second person's presentation (1-2 minutes)
5. First person practices one part of their presentation that they got feedback on (1 minute)
6. Second student practices one part of their presentation that they got feedback on (1 minute)

If you have time, you may want to watch one of the following videos:

- Elon Musk's plan to colonize Mars: https://www.youtube.com/watch?v=zSv0Y7qrzQM
- Astronaut Ronald McNair's childhood: https://storycorps.org/animation/eyes-on-the-stars/

Days 29 and 30

Teacher Preparation

You will use Days 29 and 30 for students to present their independent projects. As each classroom is different, you should make a careful classroom management plan for the presentations. Different types of projects will call for different types of presentations. Determine ahead of time how you will order the presentations; some options are

- Asking for volunteers to present and then calling on other students until everyone has presented
- Doing the presentations in clusters by teams (all of the students in Team 1 do their presentations, then all the students in Team 2, etc.)
- Having all of the presentations of a certain type (for example, museum displays) presented successively in a cluster
- Deliberately rotating among presentation types to vary the rhythm

Each approach has its advantages and disadvantages; decide what will work best for your particular classroom.

Students should have an opportunity to ask questions of each presenter after each presentation.

Students who prepared podcasts or digital presentations should present these.

Students who created models should show these to their classmates, explaining each component and responding to questions. You may wish to designate an area of the classroom for models. Either have students move to the model display area, or have presenters bring their models where students are, so that students can view them up close.

Students who created text publications (articles, stories, or poems) should distribute hard copies. (The Guide Sheet requires five hard copies, but you can increase the number if you prefer that each student receive a copy.) Students should have time to peruse the text; if time permits, you could read an excerpt, or invite the presenter to read the text before responding to questions.

Students who created space travel brochures should describe the features and then pass hard copies around for classmates to examine as the presenter responds to questions.

Students who created games should have an opportunity to explain their games. If time permits, several students could play an exhibition round of each game as others watch, or if there are several games, different teams could play different games.

Continued…

The amount of time required for all students to present their projects will vary. It is important to have a plan for what the class will do if the presentation of all projects finishes early. If there are several games, students can play them for a longer time, and try different games successively; this option will only work if there are enough games for all students to be engaged in either playing or actively watching.

Alternatively, you can plan to lead a discussion with students on the project-making process: what they enjoyed, what they learned, and how they resolved any problems they encountered.

Since this is the final unit for the ALFA project, plan to have some time to debrief and celebrate with students at the end of Day 30.

Galaxy Independent Project Guide Sheet: Space Travel Brochure

For this project, you will create an imaginary space travel brochure that includes visual design elements, such as graphics. To complete this project successfully, you must:

- Research and take notes about space travel using online and/or print sources
- Create an attractive brochure at least **two pages** long (front and back of a sheet of paper), including pictures or other graphics

Researching space travel

You can begin with the books used for the *Galaxy* unit, and those in the classroom library. What have you learned about things that humans need to survive in space? You should also use a search engine to learn more online, or use print articles or books from your school or local library. Take notes on a separate page.

When you have enough notes, you may want to create a graphic organizer to connect the information in a logical way.

Your brochure

Your brochure should cover at least two pages. It should tell your readers:

- What kind of space travel you are offering
- Where they would go and how they would get there
- How long the trip would be
- Reasons why they should be interested in this opportunity
- How they can find out more or sign up

You can also include other information if you want to. You can do your creative work by hand or use the computer; your teacher will tell you where to save your project while you are working on it. (If you create your brochure by hand, ask your teacher about how to make photocopies for your classmates.) Think about ways to make the brochure exciting to look at and fun to read.

Be creative, and have fun!

Galaxy Independent Project Guide Sheet: Model Space Station or Spaceship

For this project, you will create a model space station or spaceship. It can be based on a real-life space station or spaceship, or it can be completely imaginary. To complete this project successfully, you must:

- Read and take notes about space stations or space ships
- Do more research using online and/or print sources, so that you get more ideas
- Create a model spaceship or space station
- Include a display card for your model and label specific features

You will need to find or create the materials for the model. Depending on the type of model you choose, these might include things such as:

- A sturdy plywood or heavy cardboard base for your model
- Different shaped cardboard boxes to make the 3-D model
- Markers or paints
- Foil or plastic
- Small action figures (not required, but you can include them if you like!)
- Glue, tape, or other ways to hold it together

Learning about space transport

You can begin with the books used for the *Galaxy* unit, and those in the classroom library. What have you learned about things that humans need to survive in space? You should also use a search engine to learn more online, or use print articles or books from your school or local library. Take notes on a separate page.

Your model

The display card and labels for your model should provide information on

- The name of your space station or spaceship
- What it would be used for or where it would travel
- Different features and why they are important

Think about ways to make your display interesting and informative. Label any artifacts or pictures. Have fun—but remember, neatness counts!

Galaxy Independent Project Guide Sheet: Story or Poetry about Space

For this project, you will create a short story or a collection of poems about space. To complete this project successfully, you must:

- Use real facts about space creatively to develop a fictional story or several poems
- Create an attractive text using a word processing program. Stories must be at least **three** pages long (double-spaced). If you are writing poems, you must write at least **three** poems for your project (you can write more if you want to).
- Your teacher will tell you where to save your text while you are working on it, and how to print it when you have finished. You must provide at least five printed copies for your classmates to read.

Thinking about a story

Every story begins with a **setting** (time and place where it occurs), **characters**, and a **problem** to be solved. You could start by brainstorming what your setting, characters, and problem will be. Then, begin writing what happens next! Be sure to include enough details to make the story intersting. And remember: the story must be about space. But it's a fictional story, so you can make up the details.

Another possiblity is to take a story you already know (for example, a fairy tale), and change it around so that it take place in space.

Be sure to give the story a title!

Thinking about poems

If you write poems about space, you can use any form of poetry you want. The poems can rhyme or not rhyme, but you should try to use words that will sound good together when you read the poems aloud. Your poems should reflect something about what you think or feel about space or space travel. Each poem should have a title.

Be creative!

Galaxy Independent Project Guide Sheet: Magazine or Encyclopedia Article

For this project, you will create a magazine or encyclopedia article about **one** person or mission that was important in the history of space exploration. To complete this project successfully, you must:

- Research this person or mission using online and/or print sources, so that you become an expert
- Create an attractive text at least **one page** long in one of the formats listed above, using a word processing program

Research for your article

Use a search engine to learn about the person or mission online, and use print articles or books from your school or local library. Take notes on a separate page, and keep a list of the articles, books, web pages, and other sources you use. (**Hint**: you may be able to find newspaper articles about space missions at the local library. Ask the librarian to help you find things in the old newspaper archives.)

When you have enough notes, you may want to create a graphic organizer to connect the information in a logical way. (Note: *You must write the article yourself.* Do **not** just "cut and paste" from a web page.)

Your text

Your text should be at least a page long and include **at least** all of the following:

- A title
- The name of the mission or person
- When and where this space exploration occurred
- Interesting facts about the mission or person
- How this person or mission helped move space exploration forward

You can include other information if you want to! If you choose to include graphics (such as a picture, map, or timeline), choose ones that illustrate your text.

Your teacher will tell you where to save your text while you are working on it, and how to print it when you have finished. You must provide at least five printed copies for your classmates to read.

Be creative!

Galaxy Independent Project Guide Sheet: Game

(Board game, card game, quiz game, etc.)

For this project, you will create a game using information about space. To complete this project successfully, you must:

- Decide what kind of game you want to create: a board game, quiz game, or card game
- Read and take notes about space using classroom resources
- Do more research using online and/or print sources, so that you collect enough facts to create an interesting game
- Decide how the game will be played, what the rules are, and how to win
- Create the materials for your game, such as
  - Question and answer cards
  - A board and playing pieces (for a board game)
  - A list of rules

Researching space facts

You will begin with the *Galaxy* unit books and others in the classroom library. You should also use a search engine to learn more online, and use print articles or books from your school or local library. Take notes listing facts that you could include in a game. You can write question-and-answer cards about the facts, or include the facts in the game in a different way.

Your game

Your game should include **at least**:

- 15 different facts about space (for example, on question-and-answer cards)
- A list of rules that make sense

It might also include

- A game board and playing pieces
- A scorecard

Neatness counts!

Galaxy Independent Project Guide Sheet: Digital Presentation or Podcast

For this project, you will create a presentation about **one** important person or mission in the history of space exploration. To complete this project successfully, you must:

- Do research about this person or mission using online and print sources, so that you become an expert
- Create a podcast or digital presentation to inform your class about this person or mission

Researching your topic

You should use a search engine to learn about the person or mission online. You can also use print articles or books from your school or local library. Take notes on a separate page, and keep a list of the articles, books, web pages, and other sources you use. (**Hint**: you may be able to find newspaper articles about space missions at the local library. Ask the librarian to help you find things in the old newspaper archives.)

When you have enough notes, you may want to create a graphic organizer to connect the information in a logical way.

Your podcast or presentation

Your podcast or presentation should be about 3-5 minutes long. It should tell your audience **at least** the following:

- What mission or space hero you are presenting
- When and where the space exploration took place
- Interesting facts about this person or mission
- How this person or mission helped space exploration move forward
- What sources of information you used to learn about this person or mission

You can also include other information if you want to!

Think about ways to make your presentation interesting, such as sound effects for a podcast or graphics in a digital presentation.

Have fun!

Rubric for *Galaxy* Design Publication Project (space tourism brochure, etc.)

Criteria	Awesome!	Good Job	Needs Work
Content ○ Brochure provides a broad range of accurate or plausible information about space travel. ○ Brochure effectively engages readers' interest in space travel.			
Format ○ Brochure is appropriately titled. ○ Information is creatively presented. ○ Brochure includes graphics (original or drawn from other sources) that are attractive and illustrate text. ○ Spelling and grammar are relatively error-free.			
Presentation ○ Project shows evidence of careful thought and execution. ○ Presenter provides five hard copies of brochure for classmates to examine.** ○ Presenter is enthusiastic and excited about project.			
Research ○ Brochure makes effective use of information found in *Galaxy* unit. ○ Brochure draws on additional sources of information (print and/or online).			

**** If brochure is hand-drawn, presenter should make photocopies.

Rubric for *Galaxy* 3-D Model Project (space station, spaceship, etc.)

Criteria	Awesome!	Good Job	Needs Work
Model ○ Model reflects ideas learned in *Galaxy* unit. ○ Model shows creative use of materials. ○ Model holds together well.			
Display ○ Project includes a display card and labels for specific features. ○ Display card indicates what the model represents and what it could do. ○ Display is neat and attractive.			
Presentation ○ Presenter is enthusiastic and excited about material. ○ Presenter is organized and able to explain features of display.			
Research ○ Model makes effective use of information from *Galaxy* unit. ○ Model draws on additional sources of information (print and/or online).			

Rubric for *Galaxy* Creative Writing Project (science fiction story or poetry)

Criteria	Awesome!	Good Job	Needs Work
Content ○ Text draws on accurate information about space and/or space travel. ○ Text shows creative thinking and extension beyond merely factual information.			
Format ○ Text(s) is/are appropriately titled. ○ Text is of appropriate length (stories: at least 3 pages double-spaced; poems: at least 3 poems). ○ Spelling and grammar are relatively error-free.			
Presentation ○ Text is neat and attractive. ○ Presenter provides five printed hard copies of text for classmates' appreciation.			

Rubric for *Galaxy* Non-fiction Text Publication Project (magazine or encyclopedia article)

Criteria	Awesome!	Good Job	Needs Work
Content ○ Text provides a broad range of accurate information about the topic. ○ Text shows the role of this person or mission in the history of space exploration.			
Format ○ Text is appropriately titled. ○ Information is logically organized and creatively presented. ○ Any graphics included are appropriate to illustrate text. ○ Spelling and grammar are relatively error-free.			
Presentation ○ Text is neat and attractive. ○ Presenter provides five printed hard copies of text for classmates' appreciation.			
Research ○ Presentation makes effective use of information found in *Galaxy* unit. ○ Presentation draws on additional sources of information (print and/or online).			

Rubric for *Galaxy* Game Project (board game, card game, quiz game, etc.)

Criteria	Awesome!	Good Job	Needs Work
Content ○ Game presents a broad range of accurate information about space. ○ Game includes a set of rules that make sense.			
Format ○ Game includes all necessary equipment for play (Q&A cards, game board and playing pieces if needed, etc.). ○ Information about space is built into game format. ○ Game is neat and attractive.			
Presentation ○ Presenter is enthusiastic and excited about game. ○ Presenter is organized and able to explain how the game is played.			
Research ○ Presentation makes effective use of information found in *Galaxy* unit. ○ Presentation draws on additional sources of information (print and/or online).			

Rubric for *Galaxy* Digital Presentation or Podcast Project

Criteria	Awesome!	Good Job	Needs Work
Content ○ Facts presented are accurate and interesting. ○ Presentation shows the role of this person or mission in the history of space exploration.			
Presentation ○ Presenter is enthusiastic and excited. ○ Presentation is creative and engaging. ○ Presenter is well-prepared.			
Format ○ Presenter makes good use of format selected (slideshow or podcast). ○ Presenter(s) use technology effectively (audio recording or software).			
Research ○ Presentation draws on several sources of information, both print and online. ○ Presenter lists sources of information (on last slide for digital presentations; orally for podcasts).			