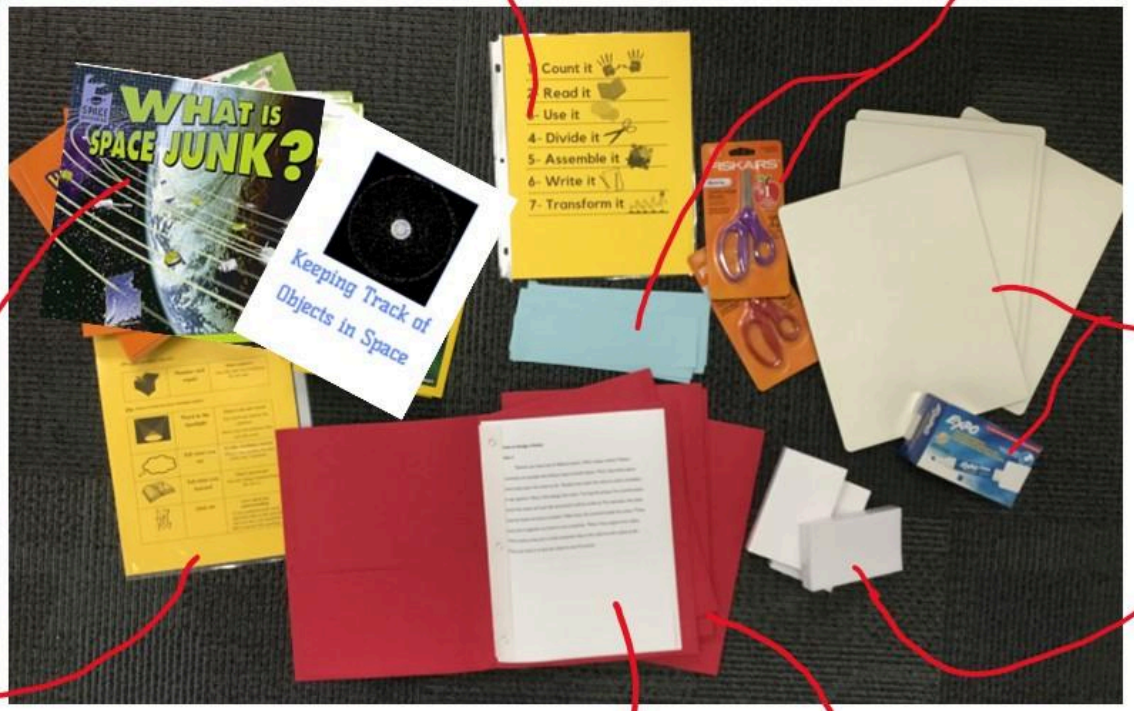
Teacher Lesson Plans & Student Materials

Module Title: Space Pollution

The materials for this module of K.L.I. include:

Topic-related books for *Discovery Reading:*

1. *What is Space Junk?* by T. Swatling (Gareth Stevens Publishers: ISBN: 1538219670)
2. *Keeping Track of Objects in Space* (by the K.L.I. team; full text provided in module materials)



Breaking Words prompt card

Scissors and strips of paper for *Breaking Words*

Small dry erase boards and markers for *Breaking Words*

Note cards for *Sentence Workshop*

Discovery Reading prompt card and *Sentence Workshop* prompt card

Stacked texts for *Confident Reading*

Graphic organizers for *Uncover the Structure*

Module Inquiry Focus: Space Pollution **Overarching Inquiry Questions:** -What is space pollution? -Is it harmful to people? Why or why not? -What can be done about space pollution?			
Segment 0	**Intro/Preview**		
Segments 1-3	**1-DR Lesson A**	**2-CR Lesson A**	**3-BW Lesson A**
	Book Title: *Keeping Track of Objects in Space*	Passage Title: Space Force Text 1	Word Choices: orbit (orbiter, deorbit, orbited); accelerate (accelerated, accelerator, deaccelerate)
	Text Chunks (page #s): p. 1-2		
	Guiding Question: What are space rocks and how do they affect Earth?		
	Word in the spotlight: orbit		BW Affixes: de-, -ed, -ly, -er/-or, -ness
Segments 4-6	**4-DR Lesson B**	**5-CR Lesson B**	**6-SW Lesson A**
	Book Title: *Keeping Track of Objects in Space*	Passage Title: Space Force Text 2	Mystery sentence: Rocks from space fall quickly toward Earth every day, but they almost never crash because they usually burn up in the atmosphere.
	Text Chunks (page #s): p. 3-4		
	Guiding Question: What is space pollution and where does it come from?		
	Word in the spotlight: debris		
Segments 7-9	**7-DR Lesson C**	**8-CR Lesson C**	**9-BW Lesson B**
	Book Title: *Keeping Track of Objects in Space*	Passage Title: Space Force Text 3 (MAZE)	Word Choices: malfunction (malfunctioned), activate (deactivate, activator, activated)
	Text Chunks (page #s): p. 5-6		
	Guiding Question: What are some of the dangers of space debris?		
	Word in the spotlight: malfunction		BW Affixes: de-, -ed, -ly, -er/-or, -ness
Segments 10-12	**10-DR Lesson D**	**11-UtS Lesson A**	**12-SW Lesson B**
	Book Title: *Keeping Track of Objects in Space*	Passage Title: Space Force Text 3 (complete)	Mystery sentence: While orbiting the Earth, satellites sometimes malfunction, and some eventually burn up in the atmosphere or fall into the ocean.
	Text Chunks (page #s): p. 7-8	Text structure: Descriptive	
	Guiding Question: How do scientists keep track of the debris in space?		
	Word in the spotlight: estimate		
Segment 13	**13-Inquiry Wall Maintenance Day**		
Segments 14-16	**14-DR Lesson E**	**15-CR Lesson D**	**16-BW Lesson C**
	Book Title: *What is Space Junk?*	Passage Title: The Space Cemetery at the Bottom of the Sea Text 1	Word Choices: estimate (estimated, estimator); useless (uselessness, uselessly)
	Text Chunks (page #s): pp. 4-7		
	Guiding Question: What can happen if tiny pieces of space debris hit a spacecraft?		
	Word in the spotlight: satellite		BW Affixes: de-, -ed, -ly, -er/-or, -ness
Segments 17-19	**17-DR Lesson F**	**18-CR Lesson E**	**19-SW Lesson C**
	Book Title: *What is Space Junk?*	Passage Title: The Space Cemetery at the Bottom of the Sea Text 2	Mystery sentence: Space debris is dangerous because it can crash into satellites and spacecraft and cause harm to astronauts and important pieces of technology.
	Text Chunks (page #s): pp. 8-9		
	Guidng Question: Why is it easier to track space debris in low orbit than in high orbit?		
	Word in the spotlight: radar		
Segments 20-22	**20-DR Lesson G**	**21-CR Lesson F**	**22-BW Lesson D**

	Book Title: *What is Space Junk?*	Passage Title: The Space Cemetery at the Bottom of the Sea Text 3 (MAZE)	Word Choices: satellite; wasteful (wastefully, wastefulness)
	Text Chunks (page #s): pp. 10-13		
	Guiding Question: Why did scientists once think it was okay to leave objects floating around in space?		
	Word in the spotlight: theory		BW Affixes: de-, -ed, -ly, -er/-or, -ness
Segments 23-25	**23-DR Lesson H**	**24-UtS Lesson B**	**25-SW Lesson D**
	Book Title: *What is Space Junk?*	Passage Title: The Space Cemetery at the Bottom of the Sea Text 3 (complete)	Mystery sentence: Scientists carefully track space debris orbiting the Earth so that they can predict when an object might crash into the atmosphere.
	Text Chunks (page #s): pp. 14-15	Text Structure: Cause & Effect	
	Guiding Question: What are two strategies that scientists use to get rid of old satellites in orbit around Earth?		
	Word in the spotlight: surrounds		
Segment 26	**26-Inquiry Wall Maintenance Day**		
Segments 27-29	**27-DR Lesson I**	**28-CR Lesson G**	**29-BW Lesson E**
	Book Title: *What is Space Junk?*	Passage Title: Robot Round Up...In Space! Text 1	Word Choices: surrounds (surrounded); collide (collided, collider)
	Text Chunks (page #s): pp. 16-17		
	Guiding Question: Why don't old satellites harm people when they fall back to Earth?		
	Word in the spotlight: atmosphere		BW Affixes: de-, -ed, -ly, -er/-or, -ness
Segments 30-32	**30-DR Lesson J**	**31-CR Lesson H**	**32-SW Lesson E**
	Book Title: *What is Space Junk?*	Passage Title: Robot Round Up...In Space! Text 2	Mystery sentence: Today, spacecraft are covered by a layer of protective material called shielding that can keep them from getting damaged by small pieces of debris.
	Text Chunks (page #s): pp. 18-23		
	Guiding Question: What happens when two pieces of space debris crash into each other?		
	Word in the spotlight: avoid		
Segments 33-35	**33-DR Lesson K**	**34-CR Lesson I**	**35-BW Lesson F**
	Book Title: *What is Space Junk?*	Passage Title: Robot Round Up...In Space! Text 3 (MAZE)	Word Choices: avoid (avoider; avoided); destructive (destructiveness, destructively)
	Text Chunks (page #s): pp. 24-25		
	Guiding Question: Why is it dangerous to destroy old satellites by blowing them up?		
	Word in the spotlight: destruction		BW Affixes: de-, -ed, -ly, -er/-or, -ness
Segments 36-38	**36-DR Lesson L**	**37-UtS Lesson C**	**38-SW Lesson F**
	Book Title: *What is Space Junk?*	Passage Title: Robot Round Up...In Space! Text 3 (complete)	Mystery sentence: Astronomers can accurately track large pieces of space debris to prevent collisions, but they cannot keep track of the millions of tiny objects in space.
	Text Chunks (page #s): pp. 26-29	Text structure: Descriptive	
	Guiding Question: What are some strategies that scientists might use to solve the space pollution problem?		
	Word in the spotlight: clutter		
Segment 39	**39-Inquiry Space - prepare for informal showcase**		
Segment 40	**40-Showcase: Share and celebrate new knowledge**		

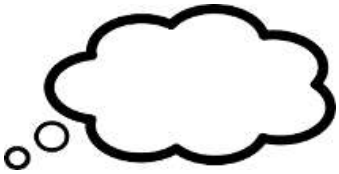
Printable Materials

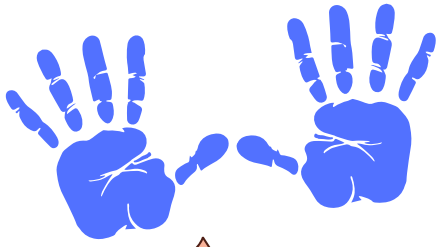
1. Discovery Reading Prompt Card
2. Breaking Words Prompt Card
3. Sentence Workshop Prompt Card
4. Graphic Organizers for Uncover the Structure
5. Confident Reading Stacked Texts

After <u>every</u> text chunk, stop and:

	**Monitor and repair**	**Wait a minute!** One idea that was confusing for me was…

<u>Plus</u>, choose at least one more thought routine:

	**Word in the spotlight**	**There's our new word!** Our word was used in this sentence… Here's my own sentence that uses the word...
	**Tell what you see**	**It's like watching a movie!** When I was reading this part of the text, I pictured…
	**Tell what you learned**	**That's new to me!** One new thing I learned from the text is...
	**Quiz me**	**Let's check for understanding!** If you understood the most important idea in this part of the text, then you should be able to answer this question...

1- Count it 

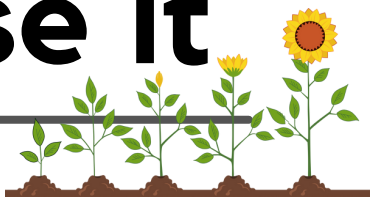
2- Read it 

3- Use it

4- Divide it 

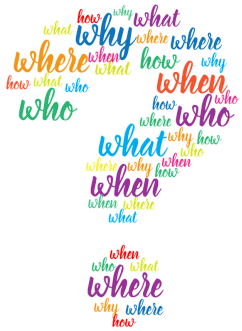
5- Assemble it 

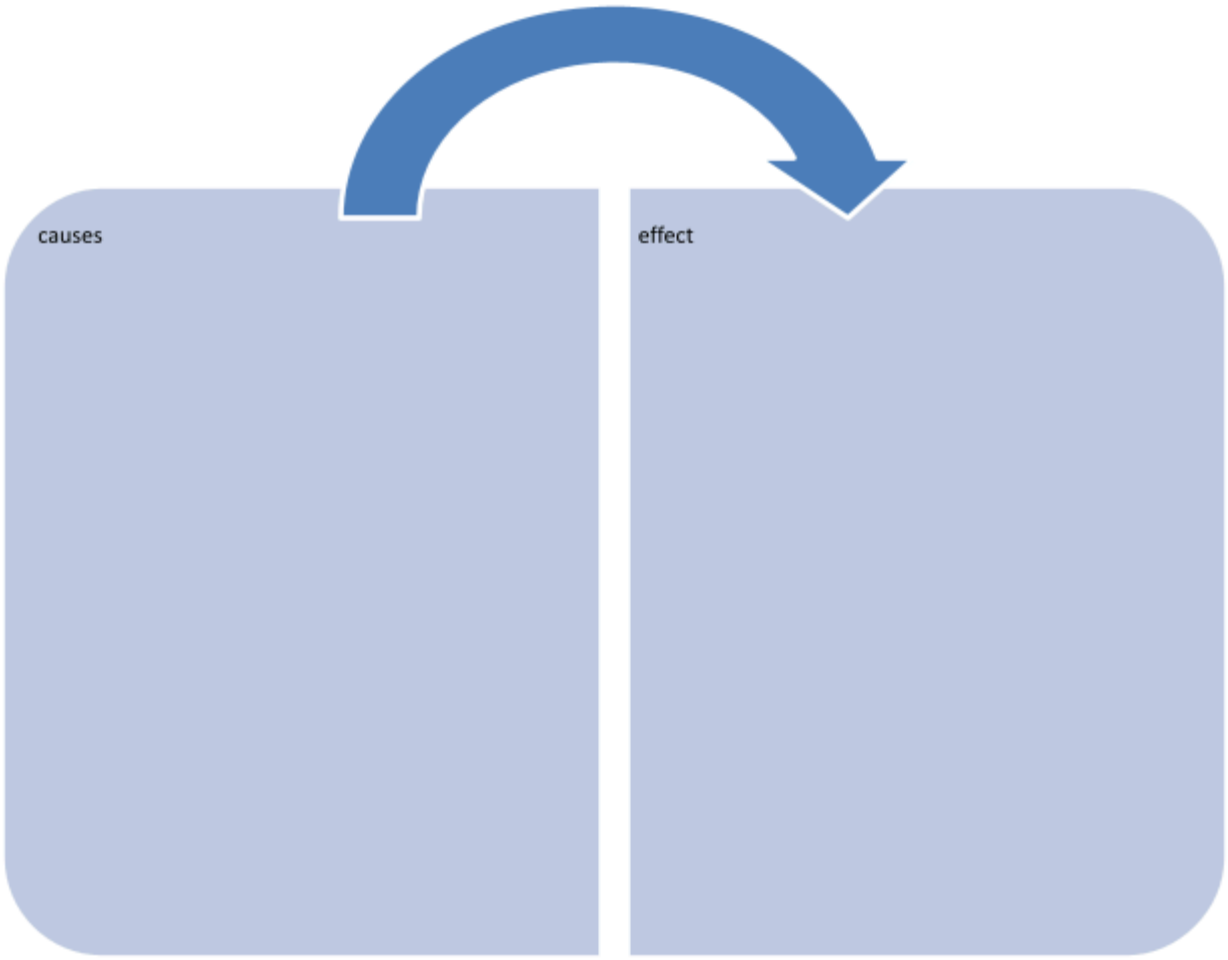
6- Write it 

7- Transform & Use it 

Sentence Workshop

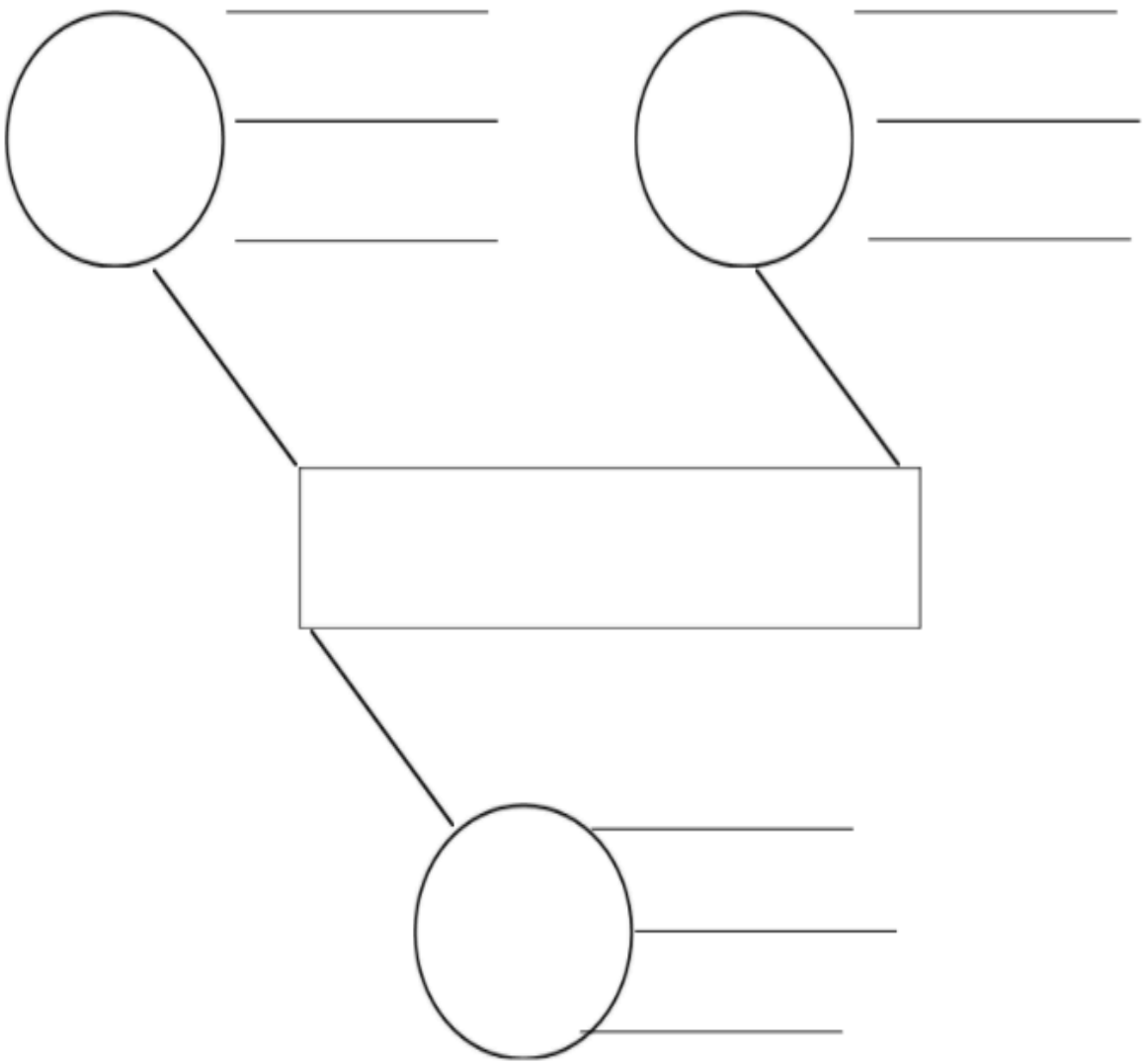
Prompts for Discussing a Sentence

	1. <u>Who</u> or <u>what</u> is the most important part of this sentence?
	2. What does the sentence tell us about the who or what?
	3. What else do we know from the sentence? a. Do we know why? b. Do we know when? c. Do we know where? d. Do we know how?



Signal Words: *Because*, *as a result*, *outcome*, *so*, *thus*, *consequently*, *leads to*, *is caused by*, *if…then*, *produces*, *therefore, in order to*

Descriptive



Describes what something *looks like, sounds like, feels like, tastes like, what something does*
Describes shape, size, color, number, etc.

Signal Words: *for example, for instance, specifically, such as, in particular*

Student Texts for Confident Reading

Space Force

Text 1

[1]Many objects orbit the Earth. [2]They are all different shapes and sizes. [3]Some are small, but big ones can be dangerous. [4]The U.S. Space Force tracks these objects. [5]For example, they use satellites to make maps of where objects are. [6]They watch how the objects move. [7]When they get too close to a spacecraft, then the Space Force tells NASA so they can keep the spacecraft away from it. [8]The Space Force and NASA work together to keep astronauts safe.

Space Force

Text 2

[1]Many objects orbit the Earth. [2]They are all different shapes and sizes. Some are very small, but bigger pieces can be dangerous. [4]To keep spacecraft safe, the U.S. Space Force tracks these objects. [5]This group is similar to the U.S. Air Force. [6]Scientists use satellites to make maps of where all the objects are. [7]They use the maps to track the debris and watch how the objects move. [8]If an object gets too close to a spacecraft, then the Space Force tells NASA scientists to keep spacecraft away from it. [9]The Space Force and NASA work together to keep astronauts and spacecraft safe from space debris.

Space Force

Text 3 (maze version)

[1]Many objects orbit the Earth. [2]They are all different shapes and sizes. [3]While some are very small, bigger pieces can be dangerous. [4]To keep spacecraft and astronauts safe, the U.S. Space Force tracks these objects. [5]This new military branch is similar to the U.S. Air Force. [6]One of [his / them / its] jobs is to protect Earth from space debris. [7] [Once / Finally / For example], Space Force scientists use satellites to create maps of space debris so they can track the debris and watch how the objects move. [8]If any get too close to a spacecraft, then the Space Force tells NASA so [you / they / he] can keep the spacecraft away from them and prevent a [collision / launch / fly]. [9]The Space Force and NASA work together to keep astronauts and spacecraft safe from space debris.

Space Force

Text 3 (complete)

[1]Many objects orbit the Earth. [2]They are all different shapes and sizes. [3]While some are very small, bigger pieces can be dangerous. [4]To keep spacecraft and astronauts safe, the U.S. Space Force tracks these objects. [5]This new military branch is similar to the U.S. Air Force, and it has several important jobs. [6]One of its specific jobs is to protect Earth from space debris. [7]For example, Space Force scientists use satellites to create maps of space debris so they can track the debris and watch how the objects move. [8]If any get too close to a spacecraft, then the Space Force tells NASA so they can keep the spacecraft away from them and prevent a collision. [9]The Space Force and NASA work together to keep astronauts and spacecraft safe from space debris.

The Space Cemetery at the Bottom of the Sea

Text 1

[1]When cars no longer work, they are sent to a junkyard. [2]What do you do when a spacecraft no longer works? [3]You might think they just stay in space, but larger objects could become dangerous to other spacecraft. [4]Sometimes, scientists need to bring these objects down from space. [5]Scientists help the objects crash in a safe place. [6]This place is called Point Nemo. [7]Point Nemo was chosen because it is so far from land. [8]The water here is also very deep. [9]It is safe to put these objects here. [10]Many objects are already in this "Space Cemetery." [11]In a few years, scientists plan to bring down the International Space Station. [12]It is getting old. [13]It will join the other space pollution at the bottom of the sea.

The Space Cemetery at the Bottom of the Sea

Text 2

[1]There is a place in the Pacific Ocean called Point Nemo. It is called the "space cemetery". [2]It is called that because of all the old pieces of space trash that are buried there. [3]Why is there so much space trash in the ocean near Point Nemo?

[4]When cars break down and no longer work, they are sent to a junkyard. [5]The same thing happens when old spacecraft become obsolete. [6]You might think they just stay in orbit forever, but larger objects like satellites could be dangerous. [7]Therefore, scientists have to find a place for these objects to crash to Earth without putting anyone in danger. [8]Scientists help them enter Earth's atmosphere and crash in a safe place. [9]Point Nemo was chosen because it is so far from land. [10]The water here is also very deep. [11]It is safe to put these objects here.

[12]After decades of space exploration, many objects are already in the space cemetery. [13]In a few years, scientists plan to bring down the International Space Station because it is getting old. [14]It will join the other space objects at the bottom of the sea.

The Space Cemetery at the Bottom of the Sea

Text 3 (maze version)

[1]There is a special place in the middle of the Pacific Ocean called Point Nemo

that
for example
then

is sometimes called the "space cemetery". [2]It is called that because of all the old pieces of space debris that are buried there. [3]What caused all this debris to collect in the area around Point Nemo? [4]Believe it or not, scientists put it there on purpose.

[5]When cars break down and become useless, they are sent to a junkyard. [6]The same thing happens when old spacecraft become obsolete. [7]You might think they just stay in orbit forever, but larger objects like satellites could become dangerous to other spacecraft. [8]Therefore, scientists need a place for these objects to crash to Earth without putting anyone in danger. [9]

Them
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help the objects re-enter Earth's atmosphere and crash into the Ocean. [10]Point Nemo was chosen because

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is so far from land. [11]Because the water is very deep, it is safe to put these objects there.

[12]As a result of many decades of space exploration, more than 260 space objects are now resting on the ocean floor in this special location. [13]Some of the objects already in the space cemetery are damaged satellites and a worn-out Russian space station. [14]

Last
Once
Since

it is getting old, scientists plan to bring down the International Space Station in 2031. [15]It will join the other objects at the bottom of the sea, leading to an even larger cemetery at Point Nemo.

The Space Cemetery at the Bottom of the Sea

Text 3 (complete version)

[1]There is a special place in the middle of the Pacific Ocean called Point Nemo that is sometimes called the "space cemetery". [2]It is called that because of all the old pieces of space debris that are buried there. [3]What caused all this debris to collect in the area around Point Nemo? [4]Believe it or not, scientists put it there on purpose.

[5]When cars break down and become useless, they are sent to a junkyard. [6]The same thing happens when old spacecraft become obsolete. [7]You might think they just stay in orbit forever, but larger objects like satellites could become dangerous to other spacecraft. [8]Therefore, scientists need a place for these objects to crash to Earth without putting anyone in danger. [9]They help the objects re-enter Earth's atmosphere and crash into the Ocean. [10]Point Nemo was chosen because it is so far from land. [11]Because the water is very deep, it is safe to put these objects there.

[12]As a result of many decades of space exploration, more than 260 space objects are now resting on the ocean floor in this special location. [13]Some of the objects already in the space cemetery are damaged satellites and a worn-out Russian space station. [14]Since it is getting old, scientists plan to bring down the International Space Station in 2031. [15]It will join the other objects at the bottom of the sea, leading to an even larger cemetery at Point Nemo.

Robot Roundup…In Space!

Text 1

[1]Space pollution is a big problem. [2]It is dangerous. [3]Scientists are trying to think of ways to get rid of space pollution. [4]One idea is to use robots. [5]Robots can go to dangerous places like space. [6]The robots have arms that can grab the pollution. [7]They can push the pollution out of the way. [8]Another idea is a machine with a net to catch space pollution. [9]When it is full, it could return to Earth. [10]These ideas are not easy. [11]Scientists must do a lot of work to make them happen. [12]They need to find a way to clean up space pollution so we can safely explore space in the future.

Robot Roundup…In Space!

Text 2

[1]Space pollution is a big problem. [2]Scientists are trying to think of ways to get rid of the dangerous pollution in Earth's orbit. [3]Some scientists want to design robots to clean up space pollution. [4]Robots can go to dangerous places like space. [5]Scientists are working on robots that can detect space pollution with sensors. [6]They also have special arms that can grab the pollution. [7]These robots could push the pollution out of the way of nearby spacecraft. [8]Another idea is to build a spacecraft with a net to catch space pollution. [9]When the net is full, the spacecraft could return to Earth. [10]Scientists will have to work hard to invent new technology. [11]They must clean up space pollution if we want to explore space safely in the future.

Robot Roundup…In Space!

Text 3 (maze version)

[1]Space pollution is a big problem. [2]Scientists are trying to think of ways to

replace
reduce
reuse

the dangerous pollution in Earth's orbit. [3]

Since
Because
For example

, some scientists want to design robots to clean up space pollution. [4]Robots can go to dangerous places like space, so scientists are working on robots that can detect space pollution with sensors. [5]They will have special arms that can grab debris and push

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out of the way of nearby spacecraft. [6]Another idea is to build a spacecraft with a net to catch pollution. [7]When the net is full, it could return to Earth. [8]Scientists will have to work hard to invent this new technology,

but
when
now

they must clean up space pollution if we want to explore space safely in the future.

Robot Roundup…In Space!

Text 3 (complete)

[1]Space pollution is a big problem. [2]Scientists are trying to think of ways to reduce the dangerous pollution in Earth's orbit. [3]For example, some scientists want to design robots to clean up space pollution. [4]Robots can go to dangerous places like space, so scientists are working on robots that can detect space pollution with sensors. [5]They will have special arms that can grab debris and push it out of the way of nearby spacecraft. [6]Another idea is to build a spacecraft with a net to catch pollution. [7]When the net is full, it could return to Earth. [8]Scientists will have to work hard to invent this new technology, but we must clean up space pollution if we want to explore space safely in the future.

Space Pollution Module Day 0 Lesson
Introduction to the Module

Purpose of the Day Zero Lesson

The first lesson of a KLI module is intended to allow students to preview the inquiry topic of the module and to be introduced to the Discovery Reading thought process routines. We provide some general guidance in this Day Zero lesson plan, but we allow for and encourage flexibility so teachers can use this first day to get themselves and students set up for success in the module. Thus, this lesson should not be used as a script or formula.

Generally, the components of the Day 0 lesson should include:

- acquainting students to the teacher, each other and the classroom environment
- introducing and explaining the DR thought process routines using the DR prompt card
- reading a short text that introduces the topic of the module and allows for students to begin practicing the DR routines
- setting up the inquiry space and discussing what topics or questions students are curious about learning in the module

Introductory activities to establish classroom environment (optional)

Use the first few minutes to introduce students to the classroom environment in ways that fit your teaching style and preferences. This is especially important if the students have not worked together or with the teacher before beginning K.L.I.

Ideas for this time might include:

- Icebreaker activities to help students get to know each other and the teacher. It's a good idea to do something that gets students talking to one another to set the stage for all the discussion they will do during the module.
- Establishing classroom routines or norms, such as expectations for participation or time-saving procedures.

Introductory text to practice the DR thought process routines

-Pass out the DR prompt card to students. Teacher may say, **"Every day we are going to be reading books together during a routine called Discovery Reading. While we read, we are going to use these special cards to help us think about what we are reading. We will use these cards to discuss what we are reading about and what we are learning while we read. Today, we are going to get introduced to what these routines are and practice them a little bit."**

-Introduce the topic of this module: space pollution. Teacher may say, "**During this module we are going to be learning all about pollution, or trash, in outer space. Some of you may**

already be familiar with outer space and with pollution in space, and that's great. During this unit, we are going to be doing a lot of reading, thinking, and talking about space pollution, so it's okay if you don't know much about this topic yet. Just to get a little introduction to this topic before we read any books, today we are going to read this short text about space pollution. We'll use this text to learn and practice these routines on our Discovery Reading prompt card."

-Use this short text (see below) to introduce the typical "format" of a Discovery Reading lesson. For example, you may say, **"Each day, before we read, I will introduce our spotlight word. This is an important new vocabulary word that we will come across in the text we read during each lesson. Our first spotlight word is a very important word: *pollution! Pollution* means harmful materials in a specific place, such as the environment, or in the air. Be on the lookout for this word as we read today."**

- "Another thing we will do before we begin reading each day is look at our Guiding Question. Each day we will have a question that relates to the big idea of what we are learning that day. If we think carefully about what we are reading, we will be able to answer the Guiding Question by the end of the lesson! Today our guiding question is *Why is pollution harmful?* After we read this text, we should be able to answer this question!"

-Lead students through reading the text. You may choose to read it aloud, or choose a reading routine from our Scaffolded Reading Routine in the DR manual.

-You can either take pauses after every few sentences and lead students in practicing the thought routines. Or, you can read the whole text one time through, introduce and practice a few thought routines, then read the text a second time, and practice the routines again.

-When you pause, introduce a routine and model it for students, then invite students to take a turn practicing it as well, just as you would do during Discovery Reading. Here are two examples:

- **"One routine we are always going to do after we read is 'Monitor and Repair.'** (direct them to Prompt Card) **"This is when we say, 'Huh! Wait a minute! Something that confused me in the text was…' We think about what was confusing and then talk through it together so that we can understand what we are reading. I'll go first.**

  On this part it says 'Our trash pollutes Earth's land and can hurt the habitats of plants and animals. I know I have heard this word *habitat* before. I think that means like the home of plants or animals. How can trash hurt an animal's home? Hmm, oh I've heard about this before. My mom tells me not to use too many plastic bottles, because when landfills get full of plastic, chemicals get released into the environment and can kill animals or hurt plants and prevent them from growing. Animals need plants and healthy land to live in for their homes. She also tells me not to throw trash on the ground, because if an animal tries to eat trash, it could kill them!

  See how I used the knowledge I have in my head to help me make sense of a confusing part of the text? That's what 'Monitor and Repair' is all about!

(Student name), do you want to take a turn? What in the text made you say 'Wait a minute!'?"

- **"Let's stop here and practice 'Word in the Spotlight.' This is when we have spotted our new vocabulary word for today in the text we are reading! During this routine, we will find our new word, explain what it means, and practice using the word in a sentence! Today our word is *pollution,* which was all over this text!"**
  - **"(Student name), can you read us the first sentence that we saw the word *pollution*?"**
  - **"Great, can you explain to us what *pollution* means?"**
  - **"And (*student* name), do you think you can use the word *pollution* in your own sentence?"**

-After you have finished reading the text, lead students in a discussion of the guiding question: *Why is pollution harmful?* You do not need to record the answer– just use this time to talk about the answer and to help students practice returning to the text to construct an answer. Try to solicit participation from every student here.

Introduce the Inquiry Space

-After you have finished reading, introduce the Inquiry Space to students. Teacher may say something like, "**During this module we are going to be learning so many exciting things about space pollution. We need a place to keep track of our new knowledge! This is called our Inquiry Space. We are going to pull this up every day, at the end of each lesson, and record important things we learned during the lesson.**

We are doing this not only to keep track of our new knowledge, but because at the end of this module, we are going to share this knowledge with others! When we are finished reading all about space pollution, we are going to invite some other students, teachers, family members, whoever you'd like!-- to come visit our class, and we are going to share everything we learned about space pollution with them! We are going to be experts about space pollution by the end of this module. So that we are totally prepared to share our knowledge with others, we are going to use this inquiry space to keep our learning organized."

-Take some time with students to set up this inquiry space however you'd like, using the template provided. You may solicit input from students on how to organize it, what colors to use, etc. It's also a good idea to add one entry to the inquiry space based on today's lesson: for example, you may record the definition of "pollution" or write one sentence about pollution on Earth and in space.

-Close the lesson by sharing the two overarching questions for this module and inviting students to generate any questions they have about the module, as well. Read the questions together and tell students that this is what we will be learning about in the module. You may choose to place the questions on the inquiry space if you'd like:

1) What is space pollution? Is it harmful? Why or why not?
2) What can be done about space pollution?

Earth's environment is made up of air, land, and water. Every day, humans do things that can harm the environment. For example, we drive cars and work in factories that send harmful gasses into the air. Our trash pollutes Earth's land and can hurt the habitats of animals and plants. Humans also release garbage and other chemical waste into oceans and rivers, causing water pollution.

We have even caused pollution in outer space! You may think of outer space as a place with only stars, planets, and asteroids. There are other objects in space left there by humans, such as old satellites or pieces of broken spacecraft and rockets. Does this space pollution cause harm the way Earth pollution does? Is space pollution dangerous for humans? Let's find out!

DR Lesson A

Discovery Reading Lesson Title: Space Pollution_Lesson A (Elaborative, High Teacher Support)

Book: *Keeping Track of Objects in Space*

Pages: 1-2

Lesson Reminders:

- Students should practice **at least two routines** from the prompt card after **every text chunk**. Lessons are fast-paced: each routine should be practiced with **urgency.**
- For each prompt routine, invite participation from **at least two students**, rotating strategically to hear from as many students as possible. **Every student** should have a chance to share their ideas **at least once** during the lesson.
- The teacher **does not need to take a turn on every prompt routine.** When the teacher takes a turn, they should model using the prompt card language **succinctly**.
- **Encourage students to talk to each other**, not just to the teacher. During each routine, after the first student contributes, a second student should, when appropriate and whenever possible, be invited to add to or respond to the first student.
- **Full linguistic repertoire (FLR)**: Students can discuss and ask each other questions in their home language to support their mental models of the text.
- Remember to give **wait time**: after inviting students to participate, wait 3-4 seconds to allow some thinking time.

SETTING THE PURPOSE - Before Reading

Ideas from Inquiry Space to Review Before Reading:

- **"As we discussed yesterday, over the next few weeks, we are going to be learning all about space pollution. Today during Discovery Reading we are going to read from a book called *Keeping Track of Objects in Space.*"** Show cover of book to students.

Guiding Question Framing:

- "**Let's take a second and look at the big question that we are going to be able to answer by the end of this lesson**. (Show and read the question.) **The question we will answer is: *What are space rocks and how do they affect Earth?* So while we read today, let's make sure we are gathering ideas that help us form and understand an answer to this question."**

Word to Preview Before Reading:

- **"Before we start reading, I want to talk about a word we will encounter in this text today. It's a really important word to help us understand this whole module. This word is <u>orbit</u>. Repeat after me: orbit."** (Students say the word.) **"Good. *Orbit* is the circular path an object takes around a planet or star in outer space. You could say, for example, that the moon orbits around the Earth. And the Earth is in orbit around the Sun. That means the Earth is following a curved path, kind of like a circle, around the sun. In this module we will learn about objects that are in orbit in space."** Add the vocabulary word to the Inquiry Space for later reference.

METACOGNITIVE DISCUSSION - During Reading

<u>Text Chunk #1:</u> page 1, the first paragraph plus the photo/caption.

- **"We are going to read the first paragraph on this page before we stop and discuss using our prompt card. To introduce us to this book, I am going to start by reading aloud. Follow along in your books while I read."** Students follow along while the teacher reads the first paragraph on page 1 aloud.

- Prompt cards should be in front of students, and direct them to look at the prompt card as you say this next part. "**Let's stop here and begin with 'Word in the Spotlight' because I think our vocabulary word appeared on this page! Who spotted our new vocabulary word here? When you share, be sure to say 'Our word was used in this sentence', and then read the sentence to us!"**
    - **"Yes, (student name), thank you for reading the sentence for us. So what does it mean that other smaller objects *orbit* the sun, as it says here?"** Call on a student to respond and briefly discuss.

    - **"Now, who would like to use the word <u>*orbit*</u> in your own sentence? When you share, start by saying, 'Here's my own sentence that uses this word,' and tell us your sentence that shows us you know what *orbit* means!"**

- "**Now let's practice 'Monitor and Repair.' Let's think of something that made you say 'Wait a minute!' Who would like to take a turn monitoring and repairing? What in that paragraph or in the caption made you say 'wait a minute!'"**
    - Call on one student to share and another to help that student work out their confusion.
    - <u>If no one volunteers, you can take a turn</u>, for example: "**Well I wanted to talk about something that was a little tricky for me. In this sentence when it is talking about asteroids, it says that *most of them are found in a special region of space called the asteroid belt, located between Mars and Jupiter.* Hmm. An asteroid belt. Does that mean that outer space wears a big leather belt with a buckle like we wear? That doesn't sound right. Let me re-read. *A special region of space called the asteroid belt.* So maybe the belt isn't really a belt like you and I wear, it's just a region or area in space. And it's between Mars and Jupiter. So maybe there is this area where all**

these asteroids are. Maybe it's a big area, since it does say that some asteroids are huge! And we've been talking a lot about circular or curved paths today. So maybe it's called a "belt" because the region is shaped like a curve or a circle the way a belt is? Does that make sense? I think so! See how I thought carefully about what I was reading, and I re-read as needed, in order to make sense of the text? That's monitoring and repairing! Does anyone else want to take a turn and try working out your confusion? We can work together to help you."

- Allow a student volunteer to take a turn and discuss.

Text Chunk #2: page 1, second paragraph + the first paragraph on page 2; plus the photo/caption on page 2.

- **"For this section, let's choral read together. We'll all start right here on the second paragraph of page 1, and let's read aloud together, all the way until we get to the end of this first paragraph on page 2."** Students and teacher read aloud together.

- **"OK, here let's start with Monitor and Repair. Who would like to share one thing that made you say 'Wait a minute'? What was an idea that was confusing for you?"**
  - **"(Student name), thank you for sharing. (Student name), can you help (student name) figure out their confusion?"**
  - Give students a moment to talk through their confusion, providing guidance as necessary.

- **"Let's do 'Tell what you see' next. As we read this section of text, what did you picture in your mind? Were you picturing dinosaurs or meteorites? What did you see? When you answer, be sure to use the prompt card and say, "When I was reading this part of the text, I pictured…"**
  - Call on at least one student to share.

Text Chunk #3: rest of page 2- the second paragraph.

- **"I'm going to read aloud this last paragraph on page 2. Everyone follow along with me in your books."**

- **"Let's do Monitor and Repair one last time. Who would like to share something on this page that made you say "Huh. Wait a minute!"? Let's talk through it together."**
  - Note: questioning students about why space rocks burn up when they reach Earth's atmosphere might be a good discussion for the Monitor and Repair routine here if no one volunteers a part that confused them. This concept will be discussed more extensively throughout the module.

- "**As our last step, let's practice Tell What You Learned. We sure learned a lot on these pages! Turn to your partner and each of you take turns sharing one new**

thing you learned from the text. It can be from this section or anything we read today."

- Debrief or allow students to share out if time.

SYNTHESIZING KNOWLEDGE - After Reading

"Now that we have finished our reading for today, let's return to our guiding question:

<u>What are space rocks and how do they affect Earth?</u> **Hopefully you noticed that this idea came up a bunch today in our conversation.**

"Let's generate an answer to this together. Who has an idea to get us started?"

Walk the students through a discussion, encouraging students to return to the text, and have them work together with you to construct an answer. The teacher leads the students in writing an answer as a group on the **inquiry space** (you write while students dictate.)
*NOTE: You should always ensure that the vocabulary word is reinforced or reviewed after reading. You can either encourage students to use the vocabulary word in the class answer (as in the model sentence below), or you can briefly review the meaning of the word before answering the question.

Example model answer:
Space rocks are objects that orbit in space. Some space rocks, like asteroids, are farther out in space, near Mars and Jupiter. Other space rocks, such as meteors and meteorites, fly closer toward Earth. Some space rocks have affected Earth. Millions of years ago, a giant meteorite hit Earth and may have led to the extinction of dinosaurs. More recently, a meteorite hit Earth and caused a fireball over Russia.

CR Lesson A

Confident Reading Lesson Plan A: Elaborative

Text: Space Force Text 1

Reminders for Every Lesson:

- Invite participation from **at least two students** each time you pause to discuss, rotating strategically to hear from as many students as possible. **Every student** should have a chance to share their ideas **at least once** during the lesson.
- **Encourage students to talk to each other**, not just to the teacher. During each routine, after the first student contributes, a second student should, when appropriate and whenever possible, be invited to add to or respond to the first student.
- Remember to give **wait time**: after inviting students to participate, wait 3-4 seconds to allow some thinking time.

Text 1

[1]Many objects orbit the Earth. [2]They are all different shapes and sizes. [3]Some are small, but big ones can be dangerous. [4]The U.S. Space Force tracks these objects. [5]For example, they use satellites to make maps of where objects are. [6]They watch how the objects move. [7]When they get too close to a spacecraft, then the Space Force tells NASA so they can keep the spacecraft away from them. [8]The Space Force and NASA work together to keep astronauts safe.

Text: "Space Force Text 1"
Step One. Teacher Intro and Model Read Aloud
"Today we are going to be reading a text called "Space Force." I will read the text aloud first so you can get a sense of what the text is saying and how it sounds. Follow along with me." Teacher reads aloud the text while students follow along.
Step Two. Silent Read
"In a moment you will take turns reading this same text out loud with your partner. To get

ready for that, let's first take a minute and read the text silently in our heads. Go ahead."

Students read the text silently.

Step Three. Partner Read

"Now I want you to take turns reading the text aloud to your partner. Partner A will read the whole text aloud, and then Partner B will read the text aloud." [Offer any brief reminders related to teaching points covered in prior lessons.]

As students take turns reading the text aloud, the teacher observes and listens carefully, identifying common issues that can be discussed during the feedback and teaching portion of the lesson.

Step Four. Discuss

"Wow, we just read a lot of information. Let's take a second and quickly discuss what we just read. Let's use our prompt "Tell me what you learned" from Discovery Reading. I'm going to quickly go around and point to each of you. When I point to you, tell me one thing you learned from this text."

Teacher calls on each student to share. This should be done quickly.

Step Five. Feedback and Teaching Point

Teacher provides feedback in specific areas, such as: (see manual for description)

- pace and expression
- accuracy
- punctuation
- connectives and conjunctions
- words and phrases that signal text structure
- other forms of phrasing

Example: "While you were reading, I heard some really great confident reading. First, I noticed that you all read at just the right speed. I know last week we were reading a little too quickly, which made it hard for us to understand one another, so it's great that I heard you slow down this time. Confident readers make the text sound clear to whoever is listening to them read.

"Let's talk a little bit about the way we should sound when we read phrases that show us how ideas in a sentence are connected. Everyone put your finger here [points to sentence]. I'm going to read that sentence. Listen carefully. [3]*Some are small, but big ones can be dangerous.* Did you hear how I paused after *some are small*? I took a breath there to signal that the rest of the sentence would give more

information about these objects. That pause was a clue that I needed to pay close attention to what came next. It helps me understand why these objects need to be tracked by scientists.

"Let's practice this and hear how it sounds. "Now I'll read the whole sentence, being sure to take that brief pause at the comma, and I want you to repeat after me: [3]*Some are small, but big ones can be dangerous.* (students repeat; do this maybe 1 or 2 more times.)

Step Six. Bridging Language Routine

The teacher offers a teaching point related to an example of bridging language in the text using the systematic routine:

"Let's re-read a couple of sentences. Put your finger on the fourth sentence and listen while I read. [4]*The U.S. Space Force tracks these objects.* [5]*For example, they use satellites to make maps of where objects are.* [6]*They watch how the objects move.*

"Who is *they* referring to in the second sentence? Who uses satellites to make maps of the objects?"
Students: "The U.S. Space Force."
"Robot scientists? OK, let's check it and see. Let's place the words "the U.S. Space Force" in place of "they" in the fifth sentence. Read aloud with me, from the beginning: [4]*The U.S. Space Force tracks these objects.* [5]*For example, the U.S. Space Force use satellites to make maps of where objects are.* [6]*The U.S. Space Force watch(es) how the objects move.*

"Does that sound right? Yes! The first sentence is about the space force so we know that *they* in the next sentence is referring to *the U.S. Space Force*!"

Step Seven. Group Read

"Let's read the text one last time, and this time we will choral read aloud, all together. Let's try to make sure we are incorporating the feedback we learned today."

Students and the teacher read the text together, and the teacher provides some brief last bits of feedback.

BW Lesson A

Breaking Words Lesson Plan A (Elaborative_High Teacher Support)

Space Pollution Module

Word Cards:
- *orbit*
- *accelerate*

Affix Cards:
- *de-*
- *-ed*
- *-ly*
- *-ness*
- *-er/-or**

Note: Not all of these affixes will be used in every Breaking Words lesson during this module, but students should have access to the affix cards to experiment with during this section of the lesson. Cards will be used again in future lessons.
*Two sides of the same notecard.

Note: For each part of the lesson, refer back to the BW Prompt Card

Warm up	There is no warm up today because it is the first day of the module.
	Word 1: *orbit* **Spanish cognate: *órbita***
Count It	"Today we are going to work with a few words related to our learning about space pollution. The first word is *orbit*. For example, we learned that space pollution can *orbit,* or move in a direct path around planets in our atmosphere. Let's start with **Count It** on our prompt card. How many syllables are in the word *orbit* ?" [Do this without showing the written word to students; this prompts them to think about it based on phonology (sound)] Students: *Two* ● *Note: if students struggle with syllabification, remind them of the vowel rule: one vowel sound for each syllable. Also, the teacher can help them clap through the "rhythm" of the word: "Think about how it*

	sounds as we say it and the movement of your chin up and down with each syllable." "You're right! *Orbit* has two syllables. Let's clap it out to make sure."
Read It	Now let's move on **Read It** (place the word card in front of the student). Can you read this word aloud?" Students: *orbit*
Use It	"Next, let's **Use It**. How would you use *orbit* in a sentence about space pollution?" Students: (for example) *The space rocks orbit around our Earth and other planets.* *Note: give two students an opportunity to contribute a sentence; invite students to use their full linguistic repertoire))*
Divide It	"Now it's time for **Divide It**. How would we divide this word?" Students: or/bit Students mark these breaks on the card. If they mark a break in a place that is not logical, the teacher provides support. "Let's check each syllable to make sure it has exactly one vowel sound (*or* has the vowel sound /or/ and *bit* the vowel sound /short i/). Awesome! We are going to cut this word into two pieces."
Assemble It	"Ok, time to **Assemble It.** How do we put this word back together?" Scramble the cards and have students put it back together.
Write It	"Next we're going to **Write It.** Without looking, how do you write *orbit*? Think about the two syllables we found to help you spell it." Students take a moment to write the word on the whiteboards. If students need assistance, prompt them to think about what they noticed/learned in previous parts of the lesson to help them write it correctly.
Transform & Use It	"Last but not least, let's **Transform It**." "While we are learning about space pollution, we are going to pay attention to a set of word parts that can be added to a lot of our words, though not all of them will work. I have already made cards for these parts so that we can add them to our words." *Show the students the affixes for this module: de-, -ed, -ly, -ness, -er/-or**

	"These word parts add meaning to our words. The word *orbit* is a base word or root word that means a path an object takes as it travels around another object. We can add other word parts to this base word to make new words. For example, if I add the word part *de-* to the beginning of this base, I get *deorbit*. *De-* means "to remove", or to do the opposite, so *deorbit* means "to go out of orbit." "Let's try another one of our word parts. Let's remove the prefix de- and add *-ed* to the ending. (*Physically lay the -ed card next to the base word you cut out during Divide It.)* What new word do we have?" Students: *orbited* "If the word part *-ed* means something is being done in the past tense, what do you think *orbited* could mean?" Students: *Space pollution has already traveled around another object* "Does adding *-ed* add a syllable?" Students: *Yes, now it is three syllables.* "How could you use *orbited* in a sentence about space pollution?" Students: *Space rocks have orbited around Earth's atmosphere for thousands of years.* "Awesome. Now, does that word work in that sentence? Does it make sense?" Students: *Yeah, it makes sense because it means that the space rocks move in a path around the Earth in our atmosphere.* "Let's try another of our word parts. What if we added *-er* at the ending of the word? What word do we have now?" Students: *orbiter* "If the word part *-er* means "someone who" or "one (object) who" what does *orbiter* mean?" Students: It could mean a thing like a spacecraft or object that moves around an object. "Does *-er* add another syllable to the base/root word *orbit*?" Students: *Yes, now it is now three syllables.*

	"How could you use *orbiter* in a sentence about space pollution?" Students: *The orbiter continued to move through the atmosphere.* "Awesome. Now, does that word work in that sentence? Does it make sense?" Students: *Yes, it does work.* "Great work! I'm going to start building a word deck of the words we create in Breaking Words lessons during this module. I'm going to write *orbited, deorbit,* and *orbiter* on three word cards for us to practice later. Let's move on to our next word."
	Word #2: *accelerate* **Spanish cognate: acelerar**
Count It	"Our next word is *accelerate*. We have learned that objects like space rocks can *accelerate,* or begin to move more quickly towards another object. Let's start with **Count It** on our prompt card. How many syllables are in the word *accelerate*?" [Do this without showing the written word to students; this prompts them to think about it based on phonology (sound)] Students: *Four* ● *Note: if students struggle with syllabification, remind them of the vowel rule: one vowel sound for each syllable. Also, the teacher can help them clap through the "rhythm" of the word: "Think about how it sounds as we say it and the movement of your chin up and down with each syllable"* "You're right! *Accelerate* is a four syllable word."
Read It	"Now let's move on **Read It** *(place the word card in front of the student*). Can you read this word aloud?" Students: *accelerate*
Use It	"Next, let's **Use It**. How would you use *accelerate* in a sentence about space pollution?" Students: *When objects in space accelerate, they move faster.* (*Note: give two students an opportunity to contribute a sentence; invite*

	students to use their full linguistic repertoire)
Divide It	"Now it's time to **Divide It**. How would we divide this word?" Students: ac/cel/er/ate "Awesome! We are going to cut this word into four pieces."
Assemble It	"Ok, time to **Assemble It.** How do we put this word back together?" Scramble the cards and have students put it back together.
Write It	"Next we're going to **Write It.** Without looking, how do you write *accelerate*?" Students take a moment to write the word on the whiteboards. If students need assistance, prompt them to think about what they noticed/learned in previous parts of the lesson to help them write it correctly.
Transform & Use It	"Last but not least, let's **Transform It**. *Show students the affix cards again: de-, -ed, -ly, -ness, -er/-or** "What if we added *-ed* to this word? What is the word now? (*Physically lay the -ed card next to the base word you cut out during Divide It.)* "What new word do we have?" Students: *accelerated* "We know that the word part *-ed* means something is being done in the past tense, so what do you think *accelerated* could mean?" Students: *an object already moved quickly* "Does adding *-ed* add a syllable?" Students: *It actually added one. There were four and now there are five syllables.* "How could you use *accelerated* in a sentence about space pollution?" Students: *The space rocks accelerated towards Earth.* "Does that word work in that sentence??" Students: *Yes, it makes sense because the space rocks had moved quicker towards our planet, Earth.* "Let's try another of our word parts. Let's take off *-ed* and add *-or*. What word

	do we have now?" Students: *accelerator* "If the word part -*or* means "someone who" or "one (object) who" just like the word part -er, what do you think *accelerator* means?" Students: *an object or person that begins to move quicker; it could also mean a device like the pedal in a car that controls the speed of something* "Does -*or* add another syllable to the word? Students: *Yes, now it is five syllables like the word accelerated.* "How could you use the term *accelerator* in a sentence about space pollution?" Students: *The astronaut pushed the accelerator on the spacecraft to move quicker.* "Let's try this word part. Let's take off -*or* and add -*ly*. What word do we have now?" Students: *acceleratly* "Does this word make sense? Why or why not?" Students: *No, this word does not sound right and would not make sense in a sentence.* "Good observation. Now, what if I put this word part, *de*-, at the beginning? Does that make a real word?" Students: *Deaccelerate.* "Remember *de*- means to undo, or the opposite of, so *deaccelerate* would probably mean–" Students: *To not speed up. So that would be to go slower.* "Great work! I'm going to make word cards for these new words for us to review later: *accelerate, accelerated, accelerator, deaccelerate*. I'm not going to make a word card for *acceleratly*, because that's not a real word." *(Students may add words to the inquiry space to synthesize their knowledge of the module topic.)*

DR Lesson B

Discovery Reading Lesson Title: Space Pollution_Lesson B (Blueprint)

Book: *Keeping Track of Objects in Space*

Pages: 3-4

Reminders for Every Lesson:

- Students should practice **at least two routines** from the prompt card after **every text chunk**. Lessons are fast-paced: each routine should be practiced with **urgency.**
- For each prompt routine, invite participation from **at least two students**, rotating strategically to hear from as many students as possible. **Every student** should have a chance to share their ideas **at least once** during the lesson.
- The teacher **does not need to take a turn on every prompt routine.** When the teacher takes a turn, they should model using the prompt card language **succinctly**.
- **Encourage students to talk to each other**, not just to the teacher. During each routine, after the first student contributes, a second student should, when appropriate and whenever possible, be invited to add to or respond to the first student.
- **Full linguistic repertoire (FLR)**: Students can discuss and ask each other questions in their home language to support their mental models of the text.
- Remember to give **wait time**: after inviting students to participate, wait 3-4 seconds to allow some thinking time.

SETTING THE PURPOSE - Before Reading

Ideas from Inquiry Space to Review Before Reading:

- Review 1-2 new learnings from previous lessons about space pollution, using the inquiry space.

Guiding Question Framing:

- Show question: *What is space pollution and where does it come from?*
- "**As we talk and discuss our reading together, we're going to be thinking about how to answer our guiding question."**

Word to Preview Before Reading:

- debris: loose or scattered pieces of trash or waste
- Add the vocabulary word to the Inquiry Space for later reference

METACOGNITIVE DISCUSSION - During Reading

Text Chunk #1: page 3 (whole page). Teacher reads aloud while students follow along.

Prompt cards should be in front of students and the teacher for all discussions.

- "**Let's stop here and do 'Monitor and Repair.' Let's think of something that made you say 'Wait a minute!' Who would like to take a turn monitoring and repairing? What in that paragraph or in the caption made you say 'wait a minute!'"**
    - Allow students to discuss. **If no one brings these up, perhaps direct students' attention to the words risk, satellites, or probes, which may be unfamiliar to them. Guide them to use textual clues, the picture, and/or background knowledge to infer the meaning of these words.
- **"Now let's try Tell What You See. What did you picture in your mind as you were reading that first paragraph? (Student name), why don't you start us out?"**
    - Allow at least one student to take a turn and discuss.

Text Chunk #2: page 4, top paragraph. Teacher reads aloud while students follow along.

- "**As always, let's begin with 'Monitor and Repair.' Let's think of something that made you say 'Wait a minute!' Who would like to take a turn? Was there something in this section that made you say 'wait a minute!'?"**
    - *Note*: If you invite students to monitor and repair and no one wants to take a turn to share, that is okay. Perhaps students had no confusion, and you can move on. However, when this happens, it's a good idea to try "Tell what you learned" or "Quiz Me" as a way to check that students understood the chunk. If they struggle to answer your "Quiz Me" question or share a new thing they learned, that allows you to help them clarify ideas.
    - This is a smaller chunk, so if there is something to monitor and repair, you may just do that thought routine and then move on, potentially practicing 3 thought routines with the last chunk, as shown below.

Text Chunk #3: rest of page 4. Teacher reads aloud or selects a different scaffolded reading routine.

- **"Let's stop here and begin with 'Word in the Spotlight' because I know some of us spotted our vocabulary word on this part! Who can read us the sentence with the word *debris* in it?"**
    - Call on a student to read the sentence and ask the student to explain the meaning of the word.
    - Call on another student to come up with an original sentence using the word *debris.*
    - **As an additional activity if you want to provide more practice with this word, you could ask students to return to page 3 or the top of page 4 and find words that *debris* could replace and the sentence would still mean the same. For example: page 3- "pieces of old spacecraft"; "something" (in last sentence); page 4- "garbage; "these objects." We want students to see that all of these

items have now become ‘debris’ in space.

- **Let’s do Monitor and Repair one last time. Who would like to share something on this page that made you say “Huh. Wait a minute!”? Let’s talk through it together.”**
    - Give students time to discuss.
    - **It might be worth discussing how the idea of “floating around” on the bottom of page 3, and in the last sentence of the first paragraph on page 4, means that now the objects are in *orbit.* The space debris isn’t just floating around aimlessly; it’s now joined the ‘path’ or circular orbit around Earth.

- “**As our last step, let’s practice Tell What You Learned. We sure learned a lot on this page! Turn to your partner and each of you take turns sharing one thing you learn on this page. When you share, be sure to use your prompt card and say, ‘One thing I learned from the text was…’”**
    - Debrief or allow students to share out if time permits.

SYNTHESIZING KNOWLEDGE - After Reading

Collaboratively guide students through forming and writing an answer to today’s big question. Be sure to review lesson vocabulary before or while answering the question. Add answer to the Inquiry Space.

What is space pollution and where does it come from?

Exemplar answer:
Space pollution is debris that orbits around Earth in outer space. This pollution might be satellites that no longer function that are left up in space, tools that astronauts have dropped, or broken pieces of spacecraft and other objects that are left in orbit.

CR Lesson B

Confident Reading Lesson Plan B: Elaborative

Text: Space Force Text 2

Reminders for Every Lesson:

- Invite participation from **at least two students** each time you pause to discuss, rotating strategically to hear from as many students as possible. **Every student** should have a chance to share their ideas **at least once** during the lesson.
- **Encourage students to talk to each other**, not just to the teacher. During each routine, after the first student contributes, a second student should, when appropriate and whenever possible, be invited to add to or respond to the first student.
- Remember to give **wait time**: after inviting students to participate, wait 3-4 seconds to allow some thinking time.

Text 2

[1]Many objects orbit the Earth. [2]They are all different shapes and sizes. Some are very small, but bigger pieces can be dangerous. [4]To keep spacecraft safe, the U.S. Space Force tracks these objects. [5]This group is similar to the U.S. Air Force. [6]For example, scientists use satellites to make maps of where all the objects are. [7]They use the maps to track the debris and watch how the objects move. [8]If an object gets too close to a spacecraft, then the Space Force tells NASA scientists to keep spacecraft away from them. [9]The Space Force and NASA work together to keep astronauts and spacecraft safe from space debris.

Text: “Space Force Text 2”
Step One. Teacher Intro and Model Read Aloud
“Today we are going to be reading another version of our text called “Space Force.” I will read the text aloud first so you can get a sense of what the text is saying and how it sounds. Follow along with me.” [At this point in the lesson, teachers can also remind students of a teaching point covered previously, such as, “Last time we were working on how to pause after a period at the end of the sentence. As I read, pay attention to where I pause.”] Teacher reads aloud the text while students follow along.
Step Two. Silent Read
“In a moment you will take turns reading this same text out loud with your partner. To get ready for that, let’s first take a minute and read the text silently in our heads. Go ahead.” Students read the text silently.
Step Three. Partner Read
“Now I want you to take turns reading the text aloud to your partner. Partner A will read the whole text aloud, and then Partner B will read the text aloud.” [Offer any brief reminders related to teaching points covered in prior lessons.] As students take turns reading the text aloud, the teacher observes and listens carefully, identifying common issues that can be discussed during the feedback and teaching portion of the lesson.
Step Four. Discuss
“Wow, we just read a lot of information. Let’s take a second and quickly discuss what we just read. Let’s use our prompt “Tell me what you learned” from Discovery Reading. I’m going to quickly go around and point to each of you. When I point to you, tell me one <u>new</u> thing you learned from this text.” *Teacher calls on each student to share*. This should be done quickly.
Step Five. Feedback and Teaching Point
Teacher provides feedback in specific areas, such as: (see manual for description) ● pace and expression ● accuracy ● punctuation ● connectives and conjunctions ● words and phrases that signal text structure ● other forms of phrasing

Example: "While you guys were reading, I heard some really great confident reading. First, I noticed that you all read at just the right speed. I know last week we were reading a little too quickly, which made it hard for us to understand one another, so it's great that I heard you guys slow down this time. Confident readers make the text sound clear to whoever is listening to them read.

"Everyone put your finger on the fourth sentence. I'm going to read that sentence. Listen carefully. [4]*To keep spacecraft safe, the U.S. Space Force tracks these objects.* Did you notice how the comma in the middle divided that sentence into two different ideas? The first part of the sentence gave us information about something that needs to happen: keeping spacecraft safe from these large, dangerous space objects. The second part of the sentence explains *how* the spacecraft are kept safe: the U.S. Space Force tracks the objects. That pause in the middle tells us that the second half of the sentence is going to give us more information.

"Let's practice this and hear how it sounds. "Now I'll read the whole sentence, being sure to take that brief pause at the comma, and I want you to repeat after me: [4]*To keep spacecraft safe, the U.S. Space Force tracks these objects.* (students repeat; do this maybe 1 or 2 more times.)

Step Six. Bridging Language Routine

The teacher offers a teaching point related to an example of bridging language in the text using the systematic routine:

"Let's re-read a few sentences. Put your finger on this sentence and listen while I read. [8]*If an object gets too close to a spacecraft, the Space Force tells NASA scientists to keep spacecraft away from it.*

"Who is *it* referring to at the end of the sentence? What or who is the Space Force and NASA trying to keep away from spacecraft?"

Students: "The object."

"The object? OK, let's check it and see. Let's place the words "the object" in place of "them" in the next two sentences. Read aloud with me, from the beginning: [8]*If an object gets too close to a spacecraft, the Space Force tells NASA scientists to keep spacecraft away from the object.*

“Does that sound right? Yes! The first sentence said *robot scientists*, so we know that *it* in the next sentence is referring to *the object*!”
Step Seven. Group Read
“Let’s read the text one last time, and this time we will choral read aloud, all together. Let’s try to make sure we are incorporating the feedback we learned today.” Students and the teacher read the text together, and the teacher provides some brief last bits of feedback.

SW Lesson A

Sentence Workshop Lesson A (Elaborative)
Space Pollution Module

Mystery Sentence: Rocks from space fall quickly toward Earth every day, but they almost never crash because they usually burn up in the atmosphere. **Sentence #1:** Rocks from space fall quickly toward Earth every day. **Sentence #2:** Space rocks almost never crash because they usually burn up in the atmosphere.
Word Cards for Sentence #1: If you are making the cards beforehand, it might be helpful to group them by chunk, paperclip each chunk, and have them ready to go in the order they'll appear in the lesson. [Note: some cards consist of entire phrases as indicated by the brackets.] *Earth, fall, rocks, toward* *space, from* *quickly, [every day]*
Word Cards for Sentence #2: *[burn up], rocks, space* *usually, atmosphere, the, in* *they, because, [almost never], crash*
Words Cards for the Mystery Sentence: *but, they*

Note: Be sure the SW prompt card is visible to the whole group. Use it to guide the discussion of each sentence.

Build Sentence #1
"Today we are going to build a sentence that is about our topic of objects in space. We are going to start with a few words, and then we'll add more words to make the sentence longer and longer." *"Here on the table I have some word cards."* **(T reads each card as they lay them out.)** *Can you build a sentence that makes sense using all these word cards?"* ***Word Cards:*** *Earth, fall, rocks, toward*

Teacher allows students to arrange the words to make a sentence, then debriefs with the students and provides feedback, such as:
"OK, read the sentence you wrote." **(Student reads**: ***Rocks fall toward Earth.***) *"Does that sentence make sense?"* **[students answer]** *"Yes. It does, doesn't it?"*

Teacher directs the student to the first question on the <u>prompt card,</u> *"Let's talk about what is going on in this sentence. Here we have some questions on this prompt card that will help us. Our first question is, 'Who or what is the most important part of this sentence?'"* **[Student answers]**

"Yes, rocks are the most important part of this sentence; that's the 'what' in the sentence. We've read a little bit about that in Discovery Reading. Let's look at our second question. What do we know about the rocks? Do we know what they are doing? **[student answers]** *"Yes, we know they are falling."*

"Now, let's add on to this sentence by adding these words in the appropriate places. Where can we put these words to make a longer sentence about our topic that still makes sense? Let's try it."

Word Cards: *space, from*

T gives students time to add words, providing support or feedback as necessary.

"Can you read to me what you have added to this sentence?"
Student may read something like **Rocks fall toward space from Earth**.
"Hmm, does that sound right? When I hear that, I wonder if that sentence really makes sense and matches what we have been learning in our reading. Rocks don't fall in that direction, from Earth toward space. Let's try again."

T gives students more time to build the sentence and follows the feedback routine again, until an appropriate sentence is built:

Rocks fall toward Earth from space. Or
Rocks from space fall toward Earth.

T directs the student back to the prompt card to the third question. *"When we added just those two words, what else do we now know about the rocks?"* **[student answers]** *"Yes, we now know where the rocks are falling from- space."*

<u>Note:</u> After the teacher has given the students *<u>up to two</u>* attempts to arrange the words and if they are still not successful, the teacher should intervene. The teacher can do one of three things while intervening:

1) Teacher can combine the words 'from space' into one phrase and model inserting the words into different places, reading each option aloud and checking it each time, until

they have found the sentence that conveys the idea clearly.

2) Directly explain how the sentence should be organized, such as: "In our first sentence, we said that rocks fall toward Earth. Now let's use these new words to say something about where the rocks come from. Where do the rocks fall from?" Give students a moment to use the cards to build a sentence using this hint.
3) If needed, the teacher can move the cards to the right place, but keep them in the wrong order, so that students can see where they go in the sentence but still have to think about the order of the phrase. "I am going to move our word cards 'space' and 'from' over here after the word 'rocks'. This way it's closer to the word it tells us about. Now can you put them in the right order in this part of the sentence to form an idea that makes sense?"

The teacher should continue to redirect student to the Sentence Workshop Prompt card.

"Let's expand it one more time. Where can we put these cards to add a little more information to this sentence?"

Word Cards: *quickly, [every day]*

T allows students to build sentence, using the feedback routine and helping the student generate one of these possible sentences or equivalent:

Rocks from space fall quickly toward Earth every day.
Rocks fall quickly from space toward Earth every day.
Every day, rocks fall quickly from space toward Earth.

"OK, read the sentence you wrote. Does that sentence make sense?" **[students answer]** *"Yes. It does. It looks like we learn more about these rocks by just adding a few extra words. Let's look again at the third question from our prompt card. Do we learn about where, when, or how often these rocks fall toward Earth?* **[student answers]** *By adding the words, quickly and every day, we learn how the rocks are falling and how often. That's what we have learned from our reading about objects in space. There are lots of small rocks that fall toward our planet."* (Note: If time permits, let students see multiple options so they can see how the words can be positioned differently and still make sense.)

Manipulate Morphosyntactic Structure of Sentence #1

*Note: This routine is placed here in this lesson plan, but it could be done anytime while building sentences (i.e., after you have built a whole expanded sentence, or after the first expansion of a sentence, etc.). The key is that at one point during the lesson, the teacher follows a routine to help students manipulate the morphosyntactic structure of a sentence. Note: this is a verbal activity; you can add or move cards around as needed, but do not alter the original cards because you will need them again for the next part of the routine).

"What if we changed a phrase in this sentence? What if instead of every day, the sentence said last week? What if it said: ***Rocks from space fall quickly toward Earth last week.*** *What would*

we need to change about the rest of the sentence to make that sentence make sense?"

Student provides an answer. *"Right, the problem with this sentence now is the word 'fall'. If this only happened last week instead of every day, that means it happened in the past. So how can we change the word 'fall' to show this only happened in the past?"* **[Student answers.]** *"Yes, we can say 'fell' instead.* ***Rocks from space fell quickly toward Earth last week.*** *Let's look back at our prompt card. What did we learn by changing it this way? Right, we learn about when this happened. Great! This is saying it's not happening every day, but it already happened just last week. But we will keep 'every day' because that's our original sentence we are going to use in this lesson."*

Build Sentence #2

Teacher removes the word cards from Sentence #1 and places them off to the side (<u>note:</u> put them in a nested stack, keeping them in order, to make it easier to quickly rebuild the mystery sentence later).

"Now I'm going to move these and keep them right here because we'll come back to them in a moment, but now we are going to build a different sentence. Can you create a sentence using these word cards?" **Teacher reads each card while displaying it on the table. Teacher places them on the table for students to arrange.**

> ***Word Cards:*** *[burn up], rocks, space*

Students build: ***Space rocks burn up.*** *"OK, read that sentence aloud to me. Does it sound right? Is it logical? Excellent, yes, I agree.* **T refers to the prompt card**; *"Can you tell me who or what is the most important part of this sentence?"* **[Student answers]** *"Yes, we're talking about space rocks, great job! And what do we know about space rocks?* [student answers]. *"That's right, they are burning up. "*

"Let's add on to this sentence with a few more words. Can you add these word cards to the sentence?"

> ***Word Cards:*** *usually, atmosphere, the, in*

Teacher encourages students to manipulate the cards and talk through the sentence as they consider how to arrange the cards.

Students can build the sentence: Space rocks usually burn up in the atmosphere, with the teacher providing feedback and scaffolding as needed. Students should read the sentence aloud after it is built. T refers back to question three on the prompt card, *"By adding these words to our sentence, what else do we learn about these space rocks?*" **[S answers]**

"Let's expand it one more time with these words."

Word Cards: *they, because, [almost never], crash*

Students can build the sentence: Space rocks almost never crash because they usually burn up in the atmosphere, with the teacher providing feedback and scaffolding as needed. Students read the sentence aloud after it is built.
T: *"Can we answer questions about when, how, why, or even how often the space rocks crash?"* **[student responds]**

Combine Sentences to Form the Mystery Sentence

Teacher places sentence #1 (already built) back on the table so that both sentences are arranged in front of the students. Note: Do not spend time asking students to rebuild the sentences; put them back on the table intact.

"Alright, today we have built two sentences. Let's take a second and read each one and talk briefly about the ideas in these sentences. First we built ***Rocks from space fall quickly toward Earth every day****, and our second sentence was* ***Space rocks almost never crash because they usually burn up in the atmosphere.*** *Hm, so in the first sentence, remind me who or what is the most important part? What do you think it means that rocks from space fall toward our Earth every day? Does that surprise you? What do you picture in your mind?"* **[Student shares; teacher leads a very short discussion.]**

"Right. But do we usually walk along and just boom! A rock from space falls on us? Do you see space rocks falling out of the sky all the time? No! Right? Maybe that's because of the second sentence. ***Space rocks almost never crash because they usually burn up in the atmosphere****. What else do we learn about these space rocks? Let's talk about what this sentence is saying."* **T and students discuss.** *"Right. We don't walk along the street getting hit by space rocks because by the time the rocks from space enter Earth's atmosphere, that air that surrounds our planet burns them right up."*
"So we've got two really important ideas here: space rocks are falling towards us every single day, but they are also burning up in the atmosphere. Let's combine these ideas. Now we are going to put these two sentences together to make one big mystery sentence. We are going to combine the two sentences using this word: but." **Teacher lays out *but* word card.** "*Where can we place this word but to combine the two sentences?"* **(Student places word card, with support as necessary.)**

Word Cards: *but*

"Great job. Let's read our big mystery sentence: ***Rocks from space fall quickly toward Earth every day, but space rocks almost never crash because they usually burn up in the atmosphere****. This makes sense, right? But we are repeating 'rocks' and 'space rocks' a lot. Sometimes, when we don't want to say the same noun over and over again, we can use a*

pronoun to replace one of the nouns instead. Look at this word card: they. Now look at your sentence. Which two words could you remove and replace with this word 'they' without changing the meaning of the sentence?"

Word Cards: *they*

T allows student to try it, providing support or feedback as necessary. If the student is stuck, the teacher could try subbing the word *they* in different places (actually moving around the word card), modeling how to test to see if it makes sense, such as: *"What if I took out from space? Rocks they fall quickly toward Earth every day. No, that's not right! How about every day? Rocks from space fall quickly toward Earth they? No, that doesn't make sense either!"* The teacher can also highlight that a pronoun like *they* will usually replace the noun the second time it is used in a sentence, because by that point we know *they* is referring to space rocks.

"Great. Yes, we insert 'they' for 'space rocks' because the first part of the sentence introduced the noun, rocks from space, so we don't need to say space rocks again. Alright, I think we have built our mystery sentence! Can you read this beautiful sentence out loud to me one last time?"

Student reads: *Rocks from space fall quickly toward Earth every day, but they almost never crash because they usually burn up in the atmosphere.*

"Excellent job building this complex sentence today. It's got some really important ideas in it, so let's add it to our inquiry space." **Teacher or student records the sentence on the Inquiry Space.**

DR Lesson C

Discovery Reading Lesson Title: Space Pollution_Lesson C (Blueprint)

Book: *Keeping Track of Objects in Space*

Pages: 5-6

Lesson Reminders:

- Students should practice **at least two routines** from the prompt card after **every text chunk**. Lessons are fast-paced: each routine should be practiced with **urgency.**
- For each prompt routine, invite participation from **at least two students**, rotating strategically to hear from as many students as possible. **Every student** should have a chance to share their ideas **at least once** during the lesson.
- The teacher **does not need to take a turn on every prompt routine.** When the teacher takes a turn, they should model using the prompt card language **succinctly**.
- **Encourage students to talk to each other**, not just to the teacher. During each routine, after the first student contributes, a second student should, when appropriate and whenever possible, be invited to add to or respond to the first student.
- **Full linguistic repertoire (FLR)**: Students can discuss and ask each other questions in their home language to support their mental models of the text.
- Remember to give **wait time**: after inviting students to participate, wait 3-4 seconds to allow some thinking time.

SETTING THE PURPOSE - Before Reading

Ideas from Inquiry Space to Review Before Reading:

- Review 1-2 new learnings from previous lessons about space pollution, using the inquiry space.

Guiding Question Framing:

- Show question: *What are some of the dangers of space debris?*
- "**As we talk and discuss our reading together, we're going to be thinking about how to answer our guiding question."**

Word to Preview Before Reading:

- malfunction: when part of a machine or equipment is broken or does not work properly
  - Note: You may also break this word apart, and if you have Spanish speakers, you could point out that “mal” here means *bad*, just like the word *malo* in Spanish. If they are familiar with *funcionar*, you could point out this cognate as

well. (literally this word is badly or poorly functioning)
- Add the vocabulary word to the Inquiry Space for later reference

METACOGNITIVE DISCUSSION - During Reading

Text Chunk #1: page 5, first paragraph.

Prompt cards should be in front of students and the teacher for all discussions.

- "**Let's stop here and do 'Monitor and Repair.' Let's think of something that made you say 'Wait a minute!' Who would like to take a turn monitoring and repairing? What in that paragraph or in the caption made you say 'wait a minute!'"**
    - Allow students to discuss. It may be helpful to direct students toward the word collisions (which is further elaborated on in the next section.)

- **"For our next routine, let's try Quiz Me. Can someone ask us a question that will show whether we understood the most important part of the text? (Student name), you can ask us a question to check for our understanding and we will try to answer it!"**
    - Make sure students have a chance to speak to one another here.

Text Chunk #2: page 5, second paragraph (continuing onto the top of page 6) + the picture's caption.

- "**As always, let's begin with 'Monitor and Repair.' Let's think of something that made you say 'Wait a minute!' Who would like to take a turn? Was there something in the text that made you say 'wait a minute!'?"**
    - *Note*: If you invite students to monitor and repair and no one wants to take a turn to share, that is okay. Perhaps students had no confusion, and you can move on. However, when this happens it's a good idea to try "Tell what you learned" or "Quiz Me" as a way to check that students understood the chunk. If they struggle to answer your "Quiz Me" question or share a new thing they learned, that allows you to help them clarify ideas.

- **"There were so many interesting things to read on this part! Let's do Tell What You See now because I know I had a movie playing in my head. There were several examples of space debris coming to Earth on this part. Pick an example to re-read and tell us what you see in your mind. Who would like to go first? Be sure to use the prompt card and begin by saying, 'When I was reading this part of the text, I pictured…'"**
    - Call on at least two students to take a turn.

Text Chunk #3: rest of page 6.

- **"Let's stop here and begin with 'Word in the Spotlight' because I think our vocabulary word finally appeared! Who can read us the sentence with the word**

malfunction **in it?"**

- Call on a student to read the sentence and ask the student to explain the meaning of the word.
- Call on another student to come up with an original sentence using the word *malfunction.*

- **Let's do Monitor and Repair one last time. Who would like to share something on this page that made you say "Huh. Wait a minute!"? Let's talk through it together."**
  - Give students time to discuss.

SYNTHESIZING KNOWLEDGE - After Reading

Collaboratively guide students through forming and writing an answer to today's big question. Be sure to review lesson vocabulary before or while answering the question. Add answer to the Inquiry Space.

What are some of the dangers of space debris?

Exemplar answer:
Space debris can collide with spacecraft, which can cause damage and difficulties for space missions. They can also run into satellites and cause them to malfunction, and we need satellites for services like navigation and weather forecasting. Even though some space debris makes it to Earth's surface, it is unlikely to be dangerous to humans here.

CR Lesson C

Confident Reading Lesson Plan C: Elaborative

Text: Space Force Text 3 (maze)

Reminders for Every Lesson:

- Invite participation from **at least two students** each time you pause to discuss, rotating strategically to hear from as many students as possible. **Every student** should have a chance to share their ideas **at least once** during the lesson.
- **Encourage students to talk to each other**, not just to the teacher. During each routine, after the first student contributes, a second student should, when appropriate and whenever possible, be invited to add to or respond to the first student.
- Remember to give **wait time**: after inviting students to participate, wait 3-4 seconds to allow some thinking time.

Text 3 (maze)

[1]Many objects orbit the Earth. [2]They are all different shapes and sizes. [3]While some are very small, bigger pieces can be dangerous. [4]To keep spacecraft and astronauts safe, the U.S. Space Force tracks these objects. [5]This new military branch is similar to the U.S. Air Force. [6]One of [his / them / its] jobs is to protect Earth from space debris. [7] [Once / Finally / For example], Space Force scientists use satellites to create maps of space debris so they can track the debris and watch how the objects move. [8]If any get too close to a spacecraft, then the Space Force tells NASA so [you / they / he] can keep the spacecraft away from them and prevent a [collision / launch / fly]. [9]The Space Force and NASA work together to keep astronauts and spacecraft safe from space debris.

Text: "Space Force Text 3 (Maze)"

Step One. Teacher Intro and Maze Read

"We have read some texts about how the U.S. Space Force keeps spacecraft safe from space debris. Here's another version of that text, but this time you'll notice that a few words are missing. Read this text silently on your own and use your knowledge to pick the right word for each blank. Circle the word with your pencil, and then in a moment I will reveal the correct words."

Students read silently and circle the words that should go in each blank.

Step Two. Teacher Model Reads

"OK, I saw you all really thinking about the language in the text as you chose the words that make sense in each sentence. Great! Now I'm going to read the text with the correct words inserted. Follow along with me. Pay attention to how I read the text aloud and what words should go in each spot."

Teacher reads aloud the text while students follow along and circle the words that should go in each blank, changing their answers if needed.

The teacher should offer a teaching point related to 1-2 of the words, especially any that several students in the group may have had trouble with. This teaching routine can follow the same methods that are usually used for the fluency teaching points in other lessons.

Example:

"Let's re-read the sixth sentence. *One of* [*his*/*them*/its*] jobs is to protect Earth from space debris.*"

"If we look at our choices for the first box, I think I can eliminate the word *his* and *them.* This sentence is describing one of the Space Force's jobs, so the word we choose has to show possession, or that the job belongs to the Space Force. *His* does show possession, but the Space Force isn't one person, it's a big group of people! Well, *them* could be a big group of people, but it doesn't show possession. Hmmm, that means *its* is the best choice here- it shows possession and could be talking about a whole group of people."

"Let's practice this sentence together out loud one more time, reading the word that should go in that blank." Students and teacher read together.

Step Three. Partner Read

"Now I want you to take turns reading the text aloud to your partner. Partner A will read the whole text aloud, and then Partner B will read the text aloud." [Offer any brief reminders related to teaching points covered in prior lessons.]

As students take turns reading the text aloud, the teacher observes and listens carefully, identifying common issues that can be discussed during the feedback and teaching portion of the lesson.

Step Four. Feedback and Quick Practice

Note: for text iii, this routine can be a little shortened (or even skipped) because teachers already offer a teaching point via the maze routine.

Teacher provides feedback in specific areas, such as: (see manual for description)

- reading confidence
- accuracy
- punctuation
- connectives and conjunctions
- words and phrases that signal text structure
  other forms of phrasing

Example:

"While you were reading, I heard some really great things. First, I noticed that you all read at just the right speed. I know last week we were reading a little too quickly, which made it hard for us to understand one another, so it's great that I heard you slow down this time. I also thought that everyone's volume was appropriate. I could hear everyone clearly."

"There was one place where I noticed a few of us making a similar error with our phrasing. When we see a comma, that's the author telling us to take a pause. So let's reread the seventh sentence together: *For example, Space Force scientists use satellites to create maps of space debris so they can track the debris and watch how the objects move.*

Step Five. Bridging Language Teaching Point

The teacher offers a teaching point using the systematic routine:

"Let's all put our finger on the seventh sentence and reread: [7]*For example, Space Force scientists use satellites to create maps of space debris so they can track the debris and watch how the objects move.*

"Who does *they* refer to in sentence 7?"
Students: "Space Force scientists]."
"OK, let's check it and see. Let's place the word "Space Force scientists" in place of "they" in the sentence. Read aloud with me: [7]*For example, Space Force scientists use satellites to create maps of space debris so Space Force scientists can track the debris and watch how the objects move.*

"Does that sound right? Yes! *They* refers to *Space Force scientists*!"

Step Six. Group Read

"Let's read the text one last time, and this time we will choral read aloud, all together. Let's try to make sure we are incorporating the feedback we learned today."

Students and the teacher read the text together, and the teacher provides some brief last bits of feedback.

BW Lesson B

Breaking Words Lesson Plan B (Blueprint)

Space Pollution Module

Word Cards:
- *malfunction*
- *activate*

Affix Cards:
- *de-*
- *-ed*
- *-ly*
- *-ness*
- *-er/-or**

Note: Not all of these affixes will be used in every Breaking Words lesson during this module, but students should have access to the affix cards to experiment with during this section of the lesson. Cards will be used again in future lessons.
*Two sides of the same notecard.

Note: For each part of the lesson, refer back to the BW Prompt Card

Warm Up	Teacher may say: "In our last Breaking Words lesson, we analyzed a bunch of cool words. Let's read them quickly to review them." *Teacher can flash words and kids can read them chorally.* "I've picked one of our words. Who can use this one in a sentence for us?"
Phase	**Word 1: *malfunction***
Count It	● Teacher may say: "Let's begin by looking at a few words related to our topic. The first word is *malfunction*. We've learned a little bit about how space pollution can consist of pieces of old satellites that no longer work, or are malfunctioning." "How many syllables are in the word *malfunction*?"

	• Students may say: three *Note: if students struggle with syllabification, remind them of the vowel rule: one vowel sound for each syllable.*
Read It	• Teacher may say: "Can you read this word aloud?"
Use It	• Teacher may say: "How would you use the word *malfunction* in a sentence having to do with space pollution?" *Note: Give two students an opportunity to contribute a sentence; invite students to use their full linguistic repertoire*
Divide It	• Teacher may say: "Can we divide this word?" • Students may say: mal/func/tion • Check the logic of the syllable breaks by making sure each syllable has exactly one vowel sound.
Assemble It	• Teacher may say: "How do we put this word back together?" *Note:* Scramble the cards and have students put it back together.
Write It	• Teacher may say: "How do you write the word *malfunction*?"
Transform & Use It	• Teacher should display the affix cards *de-, -ed, -ly, -ness, -er/-or**. • Teacher may say: "Let's start by adding *-ed* to the end of the base word *malfunction*. What word do we have now?" "Does adding *-ed* create more syllables?" "How could you use *malfunctioned* in a sentence?" "What happens when we take off *-ed* and add *de-* to the beginning of the word*?"* "Does that word make sense? How do you know?" [Students can discuss why *demalfunction* is not a logical word.] "Let's check our other word parts and see if others work."

	● Teacher will write real words on new cards to add to the warm-up deck *(malfunction, malfunctioned)*. *Note: Demalfunction is not a word and should not be added to the deck. Malfunctioner is somewhat logical but is not a real word either.*

Phase	**Word 2: *activate* *Spanish cognate: activar***
Count It	● Teacher introduces the word *activate* and uses it in a sentence. "We are going to learn about how scientists sometimes *activate*, or create active objects such as satellites to track space debris in our atmosphere ." "How many syllables are in the word *activate*?" ● Students may say: three *Note: If students struggle with syllabification, remind them of the vowel rule: one vowel sound for each syllable.*
Read It	● Teacher may say: "Can you read this word aloud?"
Use It	● Teacher may say: "How would you use the word *activate* in a sentence about space pollution?" *Note: Give two students an opportunity to contribute a sentence; invite students to use their full linguistic repertoire*
Divide It	● Teacher may say: "How would we divide this word?" ● Students may say: act/i/vate or act/i/vate ● Check the vowel sounds.
Assemble It	● Teacher may say: "How do we put this word back together?" *Note: scramble the cards and have students put it back together.*
Write It	● Teacher may say: "How do you write the word *activate?"*
Transform & Use It	● Teacher should display the affix cards *de-, -ed, -ly, -ness, -er/-or**. ● Teacher may say:

	"Let's start by adding *de-* to the beginning of the base word *activate.* What word do we have now?" "Does adding *de-* create more syllables?" "How could you use *deactivate* in a sentence?" "Now I'm going to take off de- from the beginning of this word and add *-or* to the ending of this word. What word do we have now?" "How many syllables does it have?" "How could you use *activator* in a sentence?" "How is it different from *deactivate*?" "Do any of our other word parts work for this word? Why or why not?" ● Teacher will write real words on new cards to add to the warm-up deck *(deactivate, activator, activated)*. Students may add words to the inquiry space to synthesize their knowledge of the module topic.

DR Lesson D

Discovery Reading Lesson Title: Space Pollution_Lesson D (Blueprint)

Book: *Keeping Track of Objects in Space*

Pages: 7-8

Lesson Reminders:

- Students should practice **at least two routines** from the prompt card after **every text chunk**. Lessons are fast-paced: each routine should be practiced with **urgency.**
- For each prompt routine, invite participation from **at least two students**, rotating strategically to hear from as many students as possible. **Every student** should have a chance to share their ideas **at least once** during the lesson.
- The teacher **does not need to take a turn on every prompt routine.** When the teacher takes a turn, they should model using the prompt card language **succinctly**.
- **Encourage students to talk to each other**, not just to the teacher. During each routine, after the first student contributes, a second student should, when appropriate and whenever possible, be invited to add to or respond to the first student.
- **Full linguistic repertoire (FLR)**: Students can discuss and ask each other questions in their home language to support their mental models of the text.
- Remember to give **wait time**: after inviting students to participate, wait 3-4 seconds to allow some thinking time.

SETTING THE PURPOSE - Before Reading

Ideas from Inquiry Space to Review Before Reading:

- Review 1-2 new learnings from previous lessons about space pollution, using the inquiry space.

Guiding Question Framing:

- Show question: *How do scientists keep track of the debris in space?*
- "**As we talk and discuss our reading together, we're going to be thinking about how to answer our guiding question."**

Word to Preview Before Reading:

- estimate: to calculate or predict the approximate value of something
- Add the vocabulary word to the Inquiry Space for later reference

METACOGNITIVE DISCUSSION - During Reading

Text Chunk #1: page 7, first paragraph.

Prompt cards should be in front of students and the teacher for all discussions.

- "**Let's stop here and do 'Monitor and Repair.' Let's think of something that made you say 'Wait a minute!' Who would like to take a turn monitoring and repairing? What in that paragraph or in the caption made you say 'wait a minute!'"**
    - Allow students to discuss. It may be helpful to direct students toward words such as technology, conduct, and avoid. **You may need to direct them back to the picture of the international space station on page 4 of this book so they can picture what it looks like, and they need to understand that astronauts are actually on board of this spacecraft, as is discussed in this paragraph.

- **"For our next routine, let's do Tell What You Learned. I want each of you to turn to your seat partner and take turns sharing one thing you learned in this paragraph."**
    - Debrief if time, or move on to the next chunk.

Text Chunk #2: page 7, second paragraph (continuing onto the top of page 8) + the picture's caption.

- "**Let's begin with 'Monitor and Repair.' Let's think of something that made you say 'Wait a minute!' Who would like to take a turn? Was there something in the text or the picture caption that made you say 'wait a minute!'?"**
    - Allow students to discuss. **You may also refer back to the photo of the space station on p. 4 again to remind students that astronauts control its movement (and in the case of page 7, they had to maneuver it away from space debris.)

- **"I want to do Quiz Me on this next part. I have a question that, if you can answer it, shows you understand the most important ideas of this part. Why did the astronauts on board the space station have to dodge the old piece of spacecraft?"**
    - Call on a student to answer your question, and discuss as needed. If time, call on another student to pose a question to the group.

Text Chunk #3: rest of page 8

- **"Let's stop here and begin with 'Word in the Spotlight' because I think our vocabulary word appeared in this last paragraph! Who can read us the sentence with the word *estimate* in it?"**
    - Call on a student to read the sentence and ask the student to explain the meaning of the word.
    - Call on another student to come up with an original sentence using the word *estimate*.

- **Let's do Monitor and Repair one last time. Who would like to share something on**

this page that made you say "Huh. Wait a minute!"? Let's talk through it together."

- Give students time to discuss.

SYNTHESIZING KNOWLEDGE - After Reading

Collaboratively guide students through forming and writing an answer to today's big question. Be sure to review lesson vocabulary before or while answering the question. Add answer to the Inquiry Space.

How do scientists keep track of the debris in space?

Exemplar answer:
Scientists use special technology such as a radar to track all of the space debris in Earth's orbit. They use this technology to find new pieces of space debris and to estimate where the debris is heading. That way, they can ensure that debris doesn't collide with and cause damage to functioning satellites and spacecraft in our orbit.

UtS Lesson A

Uncover the Structure Lesson Plan A: Elaborative

Text: Space Force Text 3 (Complete)

Reminders for Every Lesson:

- Invite participation from **at least two students** each time you pause to discuss, rotating strategically to hear from as many students as possible. **Every student** should have a chance to share their ideas **at least once** during the lesson.
- **Encourage students to talk to each other**, not just to the teacher. During each routine, after the first student contributes, a second student should, when appropriate and whenever possible, be invited to add to or respond to the first student.
- Remember to give **wait time**: after inviting students to participate, wait 3-4 seconds to allow some thinking time.

Text 3 (complete)

[1]Many objects orbit the Earth. [2]They are all different shapes and sizes. [3]While some are very small, bigger pieces can be dangerous. [4]To keep spacecraft and astronauts safe, the U.S. Space Force tracks these objects. [5]This new military branch is similar to the U.S. Air Force. [6]One of its specific jobs is to protect Earth from space debris. [7]For example, Space Force scientists use satellites to create maps of space debris so they can track the debris and watch how the objects move. [8]If any get too close to a spacecraft, then the Space Force tells NASA so they can keep the spacecraft away from them and prevent a collision. [9]The Space Force and NASA work together to keep astronauts and spacecraft safe from space debris.

Text: "Space Force Text 3 (Complete)"

Step One. Review the Text

"We've read three different versions of a text about the Space Force. Now we will revisit one of them. We've already read this text a couple of times, and we've learned a lot about the Space Force's job from it. Let's quickly re-read it together." **Teacher reads aloud.**

Step Two. Stating the Structure of the Text

"Now, we're going to 'uncover the structure' of this text. That means we are going to figure out how the author has organized the ideas in this text so that we can understand them. When writing, authors make choices about how they communicate ideas to help their readers learn."

"There are lots of different ways that authors can organize their thoughts, but as we learn about our topic, we are just going to focus on a couple."

*Here the teacher shows the empty **descriptive graphic organizer**.

"Sometimes, an author might want to give us lots of information about a topic by providing many details. This is called "descriptive" structure. When we describe a topic, we give lots of details about it. We might talk about how something looks, or sounds, or we might talk about different opinions or ideas people have about the topic. An author chooses the structure that best fits the ideas they want to communicate to their readers."

"The text we are reading today uses the descriptive structure to teach us about how the U.S. Space Force keeps spacecraft safe from objects in space."

Step Three. Identifying Cue Words for Structure

"There are some words that authors sometimes use to signal, or show us, how they are organizing a text. Let's take a moment to look back at our text and see if we can find a few. Some examples of words that signal descriptive are **like, sounds like, for example,** and **such as**."

Teacher will have students reread the text to locate a few examples, which they should circle or highlight on their papers. Continue in this way for a few more examples, pointing out the relationship between ideas and how cues in the text alert the reader to the correct text structure. Cue words should be added to the Inquiry Space for later reference.

For example:

"Let's reread this sentence together: [7]For example, Space Force scientists use satellites to create maps of space debris so they can track the debris and watch how the objects move.

"The words **for example** at the beginning of the sentence tells me I'm about to learn something specific about how the Space Force protects Earth from space debris. This is providing a description of their job!

Step Four. Discussion

"Now, I'm going to ask you a few questions about this text. In order to answer these questions, you will have to think about how the ideas in the text are organized, or structured."
Teacher should ask 2-3 of the following (depending on time):

"What is the U.S. Space Force?"
"What are some ways the U.S. Space Force protects the Earth from space debris?"

"What do they do if there might be a collision?"

"Why does the U.S. Space Force track space debris?"

"Who does the U.S. Space Force work with to protect spacecraft?"

Teacher calls on students to share, prompting them to refer back explicitly in the text to explain their thinking.

Step Five. Graphic Organizer

"Now we are going to take what we learned and put all the ideas from the text into our graphic organizer so that we can really see how this text uses the structure."

As a group, the teacher and students will work together to complete the **descriptive graphic organizer**, paying close attention to the big details about the way words are used to describe the U.S. Space Force. The teacher will transcribe student responses into a shared document by filling out the organizer. ***In later lessons, teachers could release this responsibility to their students based upon ability and comfort.*

"Awesome! So we've 'uncovered' the structure of this text. We know that this text uses the descriptive structure to organize ideas about the U.S. Space Force."

Step Six. Summarizing

"Now, we're going to practice summarizing this text. When we summarize, we want to explain the ideas in the text to someone else who hasn't read it so that they can understand it. That means we want to explain it in a way that uses the same structure that the author used."

"Using your graphic organizer, summarize what you learned about the Space Force from this text."

Teacher gives students a minute to practice with their partners. The teacher can model how to use the graphic organizer to organize the summary.

"Before we go, we are quickly going to write a summary of what we learned together. What should we begin with?"

Teacher will prompt students as the group writes a summary together, which the teacher will record to include on the Inquiry Space for future reference. As the teacher guides students through the shared-writing exercise, make sure to include structural cue words and appropriate academic vocabulary from the text and module.

Example: *The U.S. Space Force has an important job. They protect Earth from space debris. They track space debris with satellites. They create maps. If an object is too close to a spacecraft, they tell NASA. The U.S. Space Force and NASA work together to keep spacecraft and astronauts safe.*

SW Lesson B

Sentence Workshop Lesson B (Blueprint)
Space Pollution Module

Mystery Sentence: While orbiting the Earth, old satellites sometimes malfunction, and some eventually burn up in the atmosphere or fall into the ocean. **Sentence #1:** While orbiting the Earth, old satellites sometimes malfunction. **Sentence #2:** Some old satellites eventually burn up in the atmosphere or fall into the ocean.
Word Cards for Sentence #1: If you are making the cards beforehand, it might be helpful to group them by chunk, paperclip each chunk, and have them ready to go in the order they'll appear in the lesson. [Note: some cards consist of entire phrases as indicated by the brackets.] *satellites, malfunction, sometimes, old* *Earth, orbiting, while, the*
Word Cards for Sentence #2: *satellites, old, some, ocean, in, the, fall* *eventually* *[burn up], or, [in the atmosphere]*
Word Cards for the Mystery Sentence: *and*

Note: Be sure the SW prompt card is visible to the whole group. Use it to guide the discussion of each sentence.

Build Sentence #1
● Teacher prompts students to build the first sentence. ***Word Cards:*** *satellites, malfunction, sometimes, old* ● Students may build: ***"Old satellites sometimes malfunction."*** Or ***"Sometimes, old satellites malfunction."*** ● Teacher prompts students to expand sentence:

Word Cards: *Earth, orbiting, while, the*

- Students may build:
  "While orbiting the Earth, old satellites sometimes malfunction." Or
  "Old satellites sometimes malfunction while orbiting the Earth."

- Use the SW prompt card to discuss the sentence.

Note: Give students time to add /rearrange words, providing support or feedback as necessary. Allow students 1-2 attempts to arrange words; after two unsuccessful attempts, intervene using one of the steps provided in the elaborative plan.

Building Sentence #2

*Note: Teacher removes the word cards from Sentence #1 and places them off to the side (but keep them in a nested stack, in order, to make it easier to quickly re-build mystery sentence later).

- Teacher prompts students to build sentence #2:

  Word Cards: *satellites, old, some, ocean, in, the, fall*

- Students may build:
  "Some old satellites fall in the ocean."

- Teacher prompts students to expand sentence:

  Word Cards: *eventually*

- Students may say:
  "Some old satellites eventually fall in the ocean." Or
  "Eventually, some old satellites fall in the ocean."

- Teacher prompts students to expand sentence:

  Word Cards: *[burn up], or, [in the atmosphere]*

- Students may say:
  "Some old satellites eventually fall in the ocean or burn up in the atmosphere." Or
  "Some old satellites eventually burn up in the atmosphere or fall in the ocean."

- Use the SW prompt card to discuss the sentence.

Note: Give students time to add /rearrange words, providing support or feedback as necessary. Allow students 1-2 attempts to arrange words; after two unsuccessful attempts, intervene using one of the steps provided in the elaborative plan.

Manipulate Morphosyntactic Structure of Sentence #2

- Teacher asks students how the sentence would need to be changed if the phrase *some old satellites* was replaced with *Yesterday, the satellite.* (Note: this is a verbal activity; you can add or move cards around as needed, but do not alter the original cards because you will need them again for the next part of the routine.)

- Teacher and students work together to answer:

  Yesterday, the satellite burned up in the atmosphere. Or
  Yesterday, the satellite fell into the ocean.

  *(The important point is that students notice that the verb changes to match the tense and number of the new phrase. They might also notice that it sounds better to remove *eventually* when talking in past tense and that a single satellite cannot both burn up and fall into the ocean, but these are subtle changes that are not necessary to discuss with all students.)

Combine Sentences to Form the Mystery Sentence

*Note: Teacher places the word cards from sentence #1 back on the table so that both sentences are arranged in front of the students. Do not ask students to rebuild the sentence.

- Teacher helps students briefly discuss the ideas in the sentences, helping students see how the ideas in both sentences are connected.

- Teacher prompts students to combine the two sentences using:

  Word Card: *and*

- Teacher can also prompt students to remove any repeating words that are not necessary in the second part of the sentence (*old satellites*).

- With support as needed, students work together to build the mystery sentence:

  While orbiting the Earth, old satellites sometimes malfunction, and some eventually burn up in the atmosphere or fall into the ocean.

- Teacher and students add the mystery sentence to the Inquiry Space.

Inquiry Space (IS)

Ideas for planning the IS maintenance days

Note to teachers:

While the rest of the K.L.I. components are highly structured, the Inquiry Space, by its very nature, has to be flexible and customizable for each group. Think of this as your "playground" where you and your students have freedom to spend time playing with the big ideas about your topic that have come up across previous lessons. We haven't provided specific lesson plans for IS days. Instead, we provide these ideas below as starting points as you plan for these days.

Menu of Options

During an IS day, you can do one of these activities, a combination of several of them, or design something of your own that accomplishes the goal of this component. Keep in mind that the goal of the Inquiry Space component is to: *re-engage with the vocabulary and concepts your group has been collecting from lesson to lesson so that students can notice and discuss how these ideas fit together.*

1. Review and re-organize the Inquiry Space
    - Show the current version of the group's Inquiry Space.
    - Ask them to work with a partner or individually to re-read all the entries that are there.
    - Then have them work with a partner to identify a few sorting categories they could use to move the entries around into meaningful groups. For instance, maybe there are three entries about the dangers of space pollution and two entries about strategies for helping reduce the danger. You could move these into groups and label each one.

2. Review and connect new words
    - Show the current version of the group's Inquiry Space
    - Ask students to read all the entries and look for new vocabulary words they have learned.
    - After students have each found their list of new words, ask each student to pick one word to share with the group. They have to explain where the word is found on the Inquiry Space and what it means (related to the inquiry topic). You could also ask them to create an action or movement for the word to help the group remember it.
    - For each word, draw lines that connect to other words on the Inquiry Space and create a sentence that shows how the words are related. For example, you might draw a line between the words *accelerate* and *debris* and develop the sentence: "Scientists need special tools to keep track of how quickly space debris is accelerating toward Earth."

3. Revisit the overarching inquiry questions
    - Show the current version of the group's Inquiry Space.
    - Chorally read all the entries as a group to review all the ideas.
    - Then show students the questions from the Day 0 lesson that you used to launch the module.

- Using one question at a time, ask students to work with a partner to find at least two entries on the Inquiry Space that help answer the question.
- The partners can share their ideas with the group, and then color-code or re-arrange the entries into groups based on the question they help answer.

4. Paraphrase the most important or most interesting ideas
    - Show the current version of the group's Inquiry Space and chorally read the entries aloud to review
    - Ask students to pretend they are explaining what they have learned to a friend or relative who hasn't been in the group. They have to pick ONE really important idea and explain it in their own words, in a way that will make sense to their friend or relative (this is a great opportunity for students to explain their new knowledge in a home language or dialect). Alternatively, you can ask them to pick the one idea that is most interesting to them that they think will also be interesting to their friend or relative.
    - Students work in partners or individually to come up with two sentences for their friend or relative. If needed, you can give them a sentence starter to get them started.
    - They share with the group and then record their sentences on the Inquiry Space as new entries.

DR Lesson E

Discovery Reading Lesson Title: Space Pollution_Lesson E (Blueprint)

Book: *What is Space Junk?*

Pages: 4-7

Lesson Reminders:

- Students should practice **at least two routines** from the prompt card after **every text chunk**. Lessons are fast-paced: each routine should be practiced with **urgency.**
- For each prompt routine, invite participation from **at least two students**, rotating strategically to hear from as many students as possible. **Every student** should have a chance to share their ideas **at least once** during the lesson.
- The teacher **does not need to take a turn on every prompt routine.** When the teacher takes a turn, they should model using the prompt card language **succinctly**.
- **Encourage students to talk to each other**, not just to the teacher. During each routine, after the first student contributes, a second student should, when appropriate and whenever possible, be invited to add to or respond to the first student.
- **Full linguistic repertoire (FLR)**: Students can discuss and ask each other questions in their home language to support their mental models of the text.
- Remember to give **wait time**: after inviting students to participate, wait 3-4 seconds to allow some thinking time.

SETTING THE PURPOSE - Before Reading

Ideas from Inquiry Space to Review Before Reading:

- Review 1-2 new learnings from previous lessons about space pollution, using the inquiry space.

Guiding Question Framing:

- Show question: *What can happen if tiny pieces of space debris hit a spacecraft?*
- "**As we talk and discuss our reading together, we're going to be thinking about how to answer our guiding question."**

Word to Preview Before Reading:

- satellite: an object that circles Earth in order to collect information or support communication
- Add the vocabulary word to the Inquiry Space for later reference

METACOGNITIVE DISCUSSION - During Reading

Text Chunk #1: page 4, first paragraph.

Prompt cards should be in front of students and the teacher for all discussions.

- **"Let's stop here and begin with 'Word in the Spotlight' because I know several of us already saw our vocabulary word in this paragraph! Who can read us the sentence with the word *satellite* in it?"**
    - Call on a student to read the sentence and ask the student to explain the meaning of the word.
    - Call on another student to come up with an original sentence using *satellite.*

- "**(Student name), would you like to lead us in monitoring and repairing? Go ahead. Remember to use your prompt card and encourage us to do so too."**
    - Allow a student or volunteer to lead this routine and support them in encouraging discussion among the group.

Text Chunk #2: page 4 second paragraph, plus the text boxes and captions on pages 4-5.

- "**Let's begin with 'Monitor and Repair.' Let's think of something that made you say 'Wait a minute!' Who would like to take a turn? Was there something in the text or the picture captions that made you say 'wait a minute!'?"**
    - Allow students to discuss.

- **"I want to do Quiz Me on this next part. I want you to each think of a question that you will ask your seat partner. Make sure it's a question about the important ideas of the segment we just read. When you're ready, ask your partner your question and see if they can answer it! Then switch and answer your partner's question. Ready? Go!"**
    - Allow students to each take a turn quizzing each other, then ask one group to share their question(s) with the group.

Text Chunk #3: pages 6 and 7

- **"Let's do Monitor and Repair one last time. Who would like to share something on this page that made you say "Huh. Wait a minute!"? Let's talk through it together."**
    - Give students time to discuss. You may need to discuss here that objects moving at very fast speeds behave as if they're 'heavier' when they collide.

- **"Let's close with Tell What You See. There were so many interesting facts on this page. It was like a movie playing in my mind. Who would like to share what they pictured in their mind while we read this part?"**
    - Call on at least 2 students to share and discuss.

SYNTHESIZING KNOWLEDGE - After Reading

Collaboratively guide students through forming and writing an answer to today's big question. Be sure to review lesson vocabulary before or while answering the question. Add answer to the Inquiry Space.

What can happen if tiny pieces of space debris hit a spacecraft?

Exemplar answer:
Tiny pieces of space debris can cause a lot of damage if they collide with spacecraft. This is because they are traveling at very high speeds, which makes them more dangerous if they hit other objects. Spacecraft have to dodge scattered pieces of rocket shells or satellites to avoid damage to their machines.

CR Lesson D

Confident Reading Lesson Plan D: Blueprint

Text: The Space Cemetery Text 1

Reminders for Every Lesson:

- Invite participation from **at least two students** each time you pause to discuss, rotating strategically to hear from as many students as possible. **Every student** should have a chance to share their ideas **at least once** during the lesson.
- **Encourage students to talk to each other**, not just to the teacher. During each routine, after the first student contributes, a second student should, when appropriate and whenever possible, be invited to add to or respond to the first student.
- Remember to give **wait time**: after inviting students to participate, wait 3-4 seconds to allow some thinking time.

Lesson Routine:

1. Teacher reads aloud and models
2. Students read silently
3. Partner Read
4. Discuss
5. Feedback and Teaching Point
6. Bridging Language Routine
7. Whole Group Read

Text 1

[1]When cars no longer work, they are sent to a junkyard. [2]What do you do when a spacecraft no longer works? [3]You might think they just stay in space, but larger objects could become dangerous to other spacecraft. [4]Sometimes, scientists need to bring these objects down from space. [5]Scientists help the objects crash in a safe place. [6]This place is called Point Nemo. [7]Point Nemo was chosen because it is so far from land. [8]The water here is also very deep. [9]It is safe to put these objects here. [10]Many objects are already in this "Space Cemetery." [11]In a few

years, scientists plan to bring down the International Space Station. [12]It is getting old. [13]It will join the other space pollution at the bottom of the sea.

Feedback & Teaching Points (choose 1 or 2):	**Bridging Language Routine (use for purple text):**
• pace and expression • accuracy • punctuation • connectives and conjunctions • words and phrases that signal text structure • other forms of phrasing Routine: Teacher models; students repeat after teacher 1-2 or times; students practice re-reading in unison 1-2 times.	-Reread sentences 2 and 3 (show students place in text with fingers.) -"Who is *they* referring to in the third sentence? Students: "The spacecraft." "The spacecraft? OK, let's check it and see. Let's place the words "the spacecraft" in place of "they" in the next sentences. Read aloud with me, from the beginning: *[2]What do you do when a spacecraft no longer works? [3]You might think the spacecraft just stay in space, but larger objects could become dangerous to other spacecraft.* "Does that make sense? Yes! The first sentence said *a spacecraft*, so we know that at the end of the sentence *they* refers to the spacecraft!"

BW Lesson C

Breaking Words Lesson Plan C (Blueprint)

Space Pollution Module

Word Cards:
- *estimate*
- *useless*

Affix Cards:
- *de-*
- *-ed*
- *-ly*
- *-ness*
- *-er/-or**

Note: Not all of these affixes will be used in every Breaking Words lesson during this module, but students should have access to the affix cards to experiment with during this section of the lesson. Cards will be used again in future lessons.
*Two sides of the same notecard.

Note: For each part of the lesson, refer back to the BW Prompt Card

Warm Up	Teacher may say: "In our last Breaking Words lesson, we analyzed a bunch of cool words. Let's read them quickly to review them." *Teacher can flash words and kids can read them chorally.* "I've picked one of our words. Who can use this one in a sentence for us?"
Phase	**Word 1: *estimate***
Count It	● Teacher may say: "Let's begin by looking at a few words related to our learning about space pollution. The first word is *estimate*. When we *estimate* something, we are making an educated guess. We learned there are many different types of space pollution and we could only *estimate* how much debris is truly in our atmosphere." "How many syllables are in the word *estimate*?"

	• Students may say: three *Note: if students struggle with syllabification, remind them of the vowel rule: one vowel sound for each syllable.*
Read It	• Teacher may say: "Can you read this word aloud?"
Use It	• Teacher may say: "How would you use the word *estimate* in a sentence having to do with space pollution?" *Note: Give two students an opportunity to contribute a sentence; invite students to use their full linguistic repertoire*
Divide It	• Teacher may say: "Can we divide this word?" • Students may say: es/ti/mate
Assemble It	• Teacher may say: "How do we put this word back together?" *Note:* Scramble the cards and have students put it back together.
Write It	• Teacher may say: "How do you write the word *estimate*?"
Transform & Use It	• Teacher should display the affix cards *de-, -ed, -ly, -ness, -er/-or**. • Teacher may say: "Let's start by adding *-ed* to the end of the base word *estimate*. What word do we have now?" "Does adding *-ed* create more syllables?" "How could you use *estimated* in a sentence?" "What happens when we take off *-ed* and add *-or* to the ending of the word*?"* "Does adding *-or* create another syllable? "How could you use *estimator* in a sentence?" "Does that word make sense? How do you know?" "How is it different from using *estimated?"*

	● Teacher will write real words on new cards to add to the warm-up deck *(estimate, estimated, estimator)*.

Phase	Word 2: ***useless***
Count It	● Teacher introduces the word *useless* and uses it in a sentence. "We have learned about old space craft pieces becoming pollution because they no longer work, and are *useless*." "How many syllables are in the word *useless*?" ● Students may say: two *Note: If students struggle with syllabification, remind them of the vowel rule: one vowel sound for each syllable.*
Read It	● Teacher may say: "Can you read this word aloud?"
Use It	● Teacher may say: "How would you use the word *useless* in a sentence about space pollution?" *Note: Give two students an opportunity to contribute a sentence; invite students to use their full linguistic repertoire*
Divide It	● Teacher may say: "How would we divide this word?" ● Students may say: use/less
Assemble It	● Teacher may say: "How do we put this word back together?" *Note: scramble the cards and have students put it back together.*
Write It	● Teacher may say: "How do you write the word *useless?"*
Transform & Use It	● Teacher should display the affix cards *de-, -ed, -ly, -ness, -er/-or**. ● Teacher may say: "Let's start by adding *-ness* to the end of the word. What word do we have now?" "Does adding *-ness* create more syllables?"

	"How could you use *uselessness* in a sentence?" "Now I'm going to take off -ness and replace it with -*ly* at the ending of this word. What word do we have now?" "How many syllables does it have?" "How could you use *uselessly* in a sentence?" "How is it different from *uselessness* ?" "Do any of our other word parts work for this word? Why or why not?" "If I added the word part de- to the word useless, would this make sense?" ● Teacher will write new words on cards to add to the warm-up deck *(useless, uselessly, uselessness)*. Students may add words to the inquiry space to synthesize their knowledge of the module topic.

DR Lesson F

Discovery Reading Lesson Title: Space Pollution_Lesson F (Blueprint)

Book: *What is Space Junk?*

Pages: 8-9

Lesson Reminders:

- Students should practice **at least two routines** from the prompt card after **every text chunk**. Lessons are fast-paced: each routine should be practiced with **urgency.**
- For each prompt routine, invite participation from **at least two students**, rotating strategically to hear from as many students as possible. **Every student** should have a chance to share their ideas **at least once** during the lesson.
- The teacher **does not need to take a turn on every prompt routine.** When the teacher takes a turn, they should model using the prompt card language **succinctly**.
- **Encourage students to talk to each other**, not just to the teacher. During each routine, after the first student contributes, a second student should, when appropriate and whenever possible, be invited to add to or respond to the first student.
- **Full linguistic repertoire (FLR)**: Students can discuss and ask each other questions in their home language to support their mental models of the text.
- Remember to give **wait time**: after inviting students to participate, wait 3-4 seconds to allow some thinking time.

SETTING THE PURPOSE - Before Reading

Ideas from Inquiry Space to Review Before Reading:

- Review 1-2 new learnings from previous lessons about space pollution, using the inquiry space.

Guiding Question Framing:

- Show question: *Why is it easier to track space debris in low orbit than in high orbit?*
- "**As we talk and discuss our reading together, we're going to be thinking about how to answer our guiding question."**

Word to Preview Before Reading:

- radar: a machine that uses radio waves to locate and identify distant objects
- Add the vocabulary word to the Inquiry Space for later reference

METACOGNITIVE DISCUSSION - During Reading

Text Chunk #1: page 8, first paragraph; plus the caption on page 9.

Prompt cards should be in front of students and the teacher for all discussions.

- **"Let's stop here and begin with 'Word in the Spotlight' because I believe we spotted our vocabulary word on this page. Who can read us the sentence with the word *radar* in it?"**
    - Call on a student to read the sentence and ask the student to explain the meaning of the word.
    - Call on another student to come up with an original sentence using the word *radar*.

- "**Now let's Monitor and Repair. Who would like to lead us in practicing this routine? Remember to use your prompt card to guide our discussion."**
    - Allow a student or volunteer to lead this routine and support them in encouraging discussion among the group.

Text Chunk #2: second paragraph on page 8, plus the text box.

- "**Let's begin with 'Monitor and Repair.' Let's think of something that made you say 'Wait a minute!' Who would like to take a turn? Was there something in the text or the picture captions that made you say 'wait a minute!'?"**
    - Allow students to discuss. This paragraph can be a bit tricky- it may be helpful, as a group (since this is a lighter text day), to draw a little diagram of Earth and map smaller and larger objects in "low" versus "high" Earth orbit and discuss how they may need to be tracked differently.

- **"Next, I want you guys to choose which thought routine we should practice. What would be most helpful here? Should we Tell What We Learned, practice visualizing what we saw on this page, or quiz each other?"**
    - Allow students to decide, then call on someone to lead the routine. Practice an additional routine if you have time.

SYNTHESIZING KNOWLEDGE - After Reading

Collaboratively guide students through forming and writing an answer to today's big question. Be sure to review lesson vocabulary before or while answering the question. Add answer to the Inquiry Space.

Why is it easier to track space debris in low orbit than in high orbit?

Exemplar answer:
It is easier to track space debris in low orbit because it is closer to Earth. Objects that are in high orbit are farther away from Earth, making it harder for radar or antennae to track these objects. The larger the objects are, the easier they are to track.

CR Lesson E

Confident Reading Lesson Plan E: Blueprint

Text: The Space Cemetery Text 2

Reminders for Every Lesson:

- Invite participation from **at least two students** each time you pause to discuss, rotating strategically to hear from as many students as possible. **Every student** should have a chance to share their ideas **at least once** during the lesson.
- **Encourage students to talk to each other**, not just to the teacher. During each routine, after the first student contributes, a second student should, when appropriate and whenever possible, be invited to add to or respond to the first student.
- Remember to give **wait time**: after inviting students to participate, wait 3-4 seconds to allow some thinking time.

Lesson Routine:

1. Teacher reads aloud and models
2. Students read silently
3. Partner Read
4. Discuss
5. Feedback and Teaching Point
6. Bridging Language Routine
7. Whole Group Read

Text 2

[1]There is a place in the Pacific Ocean called Point Nemo. It is called the "space cemetery". [2]It is called that because of all the old pieces of space trash that are buried there. [3]Why is there so much space trash in the ocean near Point Nemo?

[4]When cars break down and no longer work, they are sent to a junkyard. [5]The same thing happens when old spacecraft become obsolete. [6]You might think they just stay in orbit forever, but larger objects like satellites could be dangerous. [7]Therefore, scientists have to find a place for these objects to crash to Earth without putting anyone in danger. [8]Scientists help them enter

Earth's atmosphere and crash in a safe place. [9]Point Nemo was chosen because it is so far from land. [10]The water here is also very deep. [11]It is safe to put these objects here.

[12]After decades of space exploration, many objects are already in the space cemetery. [13]In a few years, scientists plan to bring down the International Space Station because it is getting old. [14]It will join the other space objects at the bottom of the sea.

Feedback & Teaching Points (choose 1 or 2):	**Bridging Language Routine (use for purple text):**
• pace and expression • accuracy • punctuation • connectives and conjunctions • words and phrases that signal text structure • other forms of phrasing Routine: Teacher models; students repeat after teacher 1-2 or times; students practice re-reading in unison 1-2 times.	-Reread sentences 6, 7, and 8 (show students place in text with fingers.) -"Who do the words *these objects* and *them* refer to? Students: "The large space objects like satellites." "OK, let's check it and see. Let's place the words "large space objects like satellites" in place of these words. Read aloud with me, from the beginning: *[6]You might think they just stay in orbit forever, but larger objects like satellites could be dangerous. [7]Therefore, scientists have to find a place for these objects to crash to Earth without putting anyone in danger. [8]Scientists help them enter Earth's atmosphere and crash in a safe place.*" "Does that make sense? Yes! The sentence was talking about how scientists bring the large objects down from space."

SW Lesson C

Sentence Workshop Lesson C (Blueprint)
Space Pollution Module

Mystery Sentence: Space debris is dangerous because it can crash into satellites and spacecraft and cause harm to astronauts and important pieces of technology. **Sentence #1:** Space debris can cause harm to astronauts and important pieces of technology. **Sentence #2:** Space debris is dangerous because it can crash into satellites and spacecraft.
Word Cards for Sentence #1: If you are making the cards beforehand, it might be helpful to group them by chunk, paperclip each chunk, and have them ready to go in the order they'll appear in the lesson. [Note: some cards consist of entire phrases as indicated by the brackets.] *[space debris], harm, astronauts, can, technology, and* *Cause, to, pieces, important, of*
Word Cards for Sentence #2: *debris, space, crash, satellites, can, into* *spacecraft, and* *because, dangerous, is, it*
Word Cards for the Mystery Sentence: *and*

Note: Be sure the SW prompt card is visible to the whole group. Use it to guide the discussion of each sentence.

Build Sentence #1
● Teacher prompts students to build the first sentence. ***Word Cards:*** *[space debris], harm, astronauts, can, technology, and* ● Students may build: ***"Space debris can harm astronauts and technology."*** Or ***"Space debris can harm technology and astronauts."***

- Teacher prompts students to expand sentence:

  Word Cards: *cause, to, pieces, important, of*

- Students may build:
  "Space debris can cause harm to astronauts and important pieces of technology."

- Use the SW prompt card to discuss the sentence.

Note: Give students time to add /rearrange words, providing support or feedback as necessary. Allow students 1-2 attempts to arrange words; after two unsuccessful attempts, intervene using one of the steps provided in the elaborative plan.

Building Sentence #2

*Note: Teacher removes the word cards from Sentence #1 and places them off to the side (but keep them in a nested stack, in order, to make it easier to quickly re-build mystery sentence later).

- Teacher prompts students to build sentence #2:

  Word Cards: *debris, space, crash, satellites, can, into*

- Students may build:
  "Space debris can crash into satellites."

- Teacher prompts students to expand sentence:

  Word Cards: *spacecraft, and*

- Students may say:
  "Space debris can crash into satellites and spacecraft."

- Teacher prompts students to expand sentence:

  Word Cards: *because, dangerous, is, it*

- Students may say:
  "Space debris is dangerous because it can crash into satellites and spacecraft."

- Use the SW prompt card to discuss the sentence.

Note: Give students time to add /rearrange words, providing support or feedback as necessary. Allow students 1-2 attempts to arrange words; after two unsuccessful attempts, intervene using one of the steps provided in the

elaborative plan.

Manipulate Morphosyntactic Structure of Sentence #2

- Teacher asks students how the sentence would need to be changed if the phrase *because it can* was replaced with *when it.* (Note: this is a verbal activity; you can add or move cards around if as needed, but do not alter the original cards because you will need them again for the next part of the routine).

- Teacher and students work together to answer:
  Space debris is dangerous when it crashes into satellites and spacecraft.

Combine Sentences to Form the Mystery Sentence

*Note: Teacher places the word cards from sentence #1 back on the table so that both sentences are arranged in front of the students. Do not ask students to rebuild the sentence.

- Teacher helps students briefly discuss the ideas in the sentences, helping students see how the ideas in both sentences are connected.

- Teacher prompts students to combine the two sentences by using this word:

  Word Card: *and*

- Teacher can also prompt students that they will need to remove words that are not necessary in the second part of the sentence (*space debris*)

- With support as needed, students work together to build the mystery sentence:

  Space debris is dangerous because it can crash into satellites and spacecraft and cause harm to astronauts and important pieces of technology. (or other equivalent combinations)

- Teacher and students add the mystery sentence to the Inquiry Space.

DR Lesson G

Discovery Reading Lesson Title: Space Pollution_Lesson G (Elaborative, High Student Responsibility)

Book: What is Space Junk?

Pages: 10-13

Ways to Increase Student Responsibility:

- Select a different **student to lead the discussion** for each text chunk.
- Allow students to **choose which thought routines** would be most appropriate to practice with each chunk of text.
- Encourage the student discussion leader to use the **prompt card**. As needed, and gradually releasing over time, **support the student** in soliciting participation and facilitating discussion among their groupmates.
- **Full linguistic repertoire (FLR)**: Students can discuss and ask each other questions in their home language to support their mental models of the text.

SETTING THE PURPOSE - Before Reading

Ideas from Inquiry Space to Review Before Reading:

- **"Today during Discovery Reading, we are going to read some more from our book called *What is Space Junk.* Let's start by looking at our Inquiry Space to review some of the things we have learned about space pollution. Can someone talk us through some of the most important things we have learned so far?"** Allow one student to share. Encourage them to reference the ideas on the Inquiry Space as they talk to the group.

Guiding Question Framing:

- "**Now let's look at the big question that we are going to be able to answer by the end of this lesson**. (Show and read the question.) **The question we will answer is: *Why did scientists once think it was okay to leave objects floating around in space?* While we read today, let's make sure we are gathering ideas that help us form and understand an answer to this question."**

Word to Preview Before Reading:

- **"Before we start reading, I want to talk about a word we will encounter in this text today. Our word in the spotlight is theory.** (Say and show the word to students.) **A theory is a scientific way of explaining how or why something happens. For example, scientists who study space come up with theories about how the planets move around the sun. Or in everyday life, we might come up with a theory for**

why someone did something. If your friend is upset, you might think you know what made them upset. You could have a theory about why they are upset. Can one person share a quick example of how they have seen or heard that word before? It could be in English or a similar word in another language that you speak." (FLR)

- **"I am going to keep this word card over here to the side so we can remember that we are looking for the word *theory* as we read today. When you see it, be sure to let us know so we can talk about how it is used by the author."**
- Ask a student to add the vocabulary word to the Inquiry Space for later reference.

METACOGNITIVE DISCUSSION - During Reading

Text Chunk #1: page 10 and the photo caption on the bottom of p. 11 (the postage stamp image) (note: there is additional text in the large photograph on p. 11 [dipole dispenser…], but this is too technical and not necessary for answering the guiding question)

Prompt cards should be in front of students and the teacher for all discussions.

- **"I am going to read this page aloud as you follow along. Before I start reading, who wants to be our discussion leader for this chunk?"** (Choose a student). **"As soon as I finish reading, the leader is going to start our conversation using the prompt card. Here we go."** Students follow along while the teacher reads page 10 aloud.

- After reading, the teacher does not jump in to start the conversation. Wait for the designated discussion leader to start. If the discussion leader does not start, give a short prompt or reminder to get the leader started. Prompt cards should be in front of students.
    - The discussion leader might say something like this: *"Okay, we always start with 'Monitor and Repair.' Did anyone see something that made you say 'Wait a minute!' Who would like to take a turn monitoring and repairing?"* Discussion leader can call on a peer to respond and briefly discuss. The teacher can also participate similarly to the students, letting the discussion leader facilitate in the teacher role.

    - Then the discussion leader might continue like this: "*Now let's choose another thinking routine from our prompt card. I think it would help us here to Tell What We See. Can someone tell us what they pictured in their mind when we read this part?"* Discussion leader can either call on a peer or explain their own thinking, using the prompt card language as a guide.

Text Chunk #2: page 12, first paragraph

- **"Let's pick another discussion leader for the next chunk."** (Choose a student). Teacher reads text aloud.

- Discussion leader should notice the word in the spotlight and say something like: *"That was a good place to stop because I see the Word in the Spotlight, theory."* Using the prompt card language, the discussion leader can either explain how the word is used or ask a peer to do it. Teacher can support the group as needed, allowing the discussion leader to facilitate as much as possible.

- Then, the discussion leader should choose another routine from the prompt card. They might say something like this: *"Let's use 'Quiz Me' now. That's a good way to check to see if we are understanding the important idea here."* They can either pose a question or ask for a peer to pose one. In either case, the question should be about a central idea important for understanding that chunk (not a trivial detail). For example: *"Here's my question: What was the big sky theory?"*

Text Chunk #3: rest of page 12 and captions on 12-13

- **"We have one more chunk for today's Discovery Reading before we try to answer our guiding question. We need one more discussion leader.** (Choose a student, ideally someone who hasn't already led). **Let's read this last paragraph together chorally."**

- Like above, discussion leader should begin the conversation, using prompt card language: *"Let's do Monitor and Repair one last time. Who would like to share something on this page that made you say "Huh. Wait a minute!"? Let's talk through it together."*

- Then, the discussion leader chooses one final thought routine. They might say something like: *"Let's use 'Tell What You Learned' for this last part."* Discussion leader can ask for peers to explain something they learned, using the prompt card language, or they can model for the group with their own example.

SYNTHESIZING KNOWLEDGE - After Reading

"Now that we have finished our reading for today, let's return to our guiding question:

Why did scientists once think it was okay to leave objects floating around in space?
Hopefully you noticed that this idea came up a bunch today in our conversation.

"Let's generate an answer to this together. Who has an idea to get us started?"

Walk the students through a discussion, encouraging students to return to the text, and have them work together with you to construct an answer. The teacher leads the students in writing an answer as a group on the **inquiry space** (you write while students dictate.)

*NOTE: You should always ensure that the vocabulary word is reinforced or reviewed after reading. You can either encourage students to use the vocabulary word in the class answer (as in the model sentence below), or you can briefly review the meaning of the word before

answering the question.

Example model answer:
In the 1960s, scientists believed a theory called the big sky theory. They thought space was so big that you could leave things out there and you would never have to worry about them again. For example, they once sent millions of small needles in space to help with radio communication. They didn't think these tiny pieces of metal would cause problems. They thought the needles would fall back to Earth after a few years instead of spreading out and staying in space forever.

CR Lesson F

Confident Reading Lesson Plan F: Blueprint

Text: The Space Cemetery Text 3 (maze)

Reminders for Every Lesson:

- Invite participation from **at least two students** each time you pause to discuss, rotating strategically to hear from as many students as possible. **Every student** should have a chance to share their ideas **at least once** during the lesson.
- **Encourage students to talk to each other**, not just to the teacher. During each routine, after the first student contributes, a second student should, when appropriate and whenever possible, be invited to add to or respond to the first student.
- Remember to give **wait time**: after inviting students to participate, wait 3-4 seconds to allow some thinking time.

Lesson Routine:

1. Teacher intro and maze read: students read silently and select maze choices
2. Teacher model reads and maze teaching point
3. Partner Read
4. Discuss
5. Feedback and Quick Teaching Point
6. Bridging Language Routine
7. Whole Group Read

Text 3 (maze)

[1]There is a special place in the middle of the Pacific Ocean called Point Nemo

that for example then

is sometimes called the "space cemetery". [2]It is called that because of all the old pieces of space debris that are buried there. [3]What caused all this debris to collect in the area around Point Nemo? [4]Believe it or not, scientists put it there on purpose.

[5]When cars break down and become useless, they are sent to a junkyard. [6]The same thing happens when old spacecraft become obsolete. [7]You might think they just stay in orbit forever,

but larger objects like satellites could become dangerous to other spacecraft. [8]Therefore, scientists need a place for these objects to crash to Earth without putting anyone in danger. [9]

Them They It

help the objects re-enter Earth's atmosphere and crash into the Ocean. [10]Point Nemo was chosen because

there she it

is so far from land. [11]Because the water is very deep, it is safe to put these objects there.

[12]As a result of many decades of space exploration, more than 260 space objects are now resting on the ocean floor in this special location. [13]Some of the objects already in the space cemetery are damaged satellites and a worn-out Russian space station. [14]

Last Once Since

it is getting old, scientists plan to bring down the International Space Station in 2031. [15]It will join the other objects at the bottom of the sea, leading to an even larger cemetery at Point Nemo.

Maze Teaching Point	**Bridging Language Routine (use for purple text):**
(choose this one or one your students had the most difficulty with). For example: "Let's re-read sentence 14 and we can consider all the ways this sentence could be completed: *LAST it is getting old, scientists plan to the bring down the International Space Station.* "That doesn't sound right. Last would mean the author is putting different things in order, but that isn't what we are saying here." *ONCE it is getting old, scientists plan to the bring down the International Space Station.* "That doesn't quite make sense either. We	-Reread the sentences 1 and 2 (show with fingers.) -"What is *that* referring to in sentence 2?" -Students: 'space cemetery" "Let's check it and see. Let's place those words in place of *that* in the sentence. Read aloud those two sentences again with me by substituting these words instead." "Does that sound right? Yes! It's telling us what Point Nemo is called. It is called the space cemetery because of all the old debris found there."

don't usually use that word that way." *SINCE it is getting old, scientists plan to the bring down the International Space Station.* "That makes sense because 'since' is another way of saying 'because' in this sentence - they are going to bring it down because it is getting old. That word shows the relationship between the two ideas in the sentence"	
Feedback & Teaching Points (choose 1 or 2): ● reading confidence ● accuracy ● punctuation ● connectives and conjunctions ● words and phrases that signal text structure ● other forms of phrasing Routine: Teacher models; students repeat after teacher 1-2 or times; students practice re-reading in unison 1-2 times.	

BW Lesson D

Breaking Words Lesson Plan D (Elaborative_High Student Responsibility)
Space Pollution Module

Word Cards:
- *satellite*
- *wasteful*

Affix Cards:
- *de-*
- *-ed*
- *-ly*
- *-ness*
- *-er/-or**

Note: Not all of these affixes will be used in every Breaking Words lesson during this module, but students should have access to the affix cards to experiment with during this section of the lesson. Cards will be used again in future lessons.
*Two sides of the same notecard.

Note: For each part of the lesson, refer back to the BW Prompt Card

Warm Up	Teacher may say: "So far we have used our Breaking Words steps to analyze a bunch of new words. Let's read them quickly to review them." *Teacher can flash words and kids can read them chorally.* "I've picked one of our words. Who can use this one in a sentence for us?"
Phase	**Word 1: *satellite*** ***Spanish cognate: satélite***
Count It	"Today we are going to work with two words related to our learning about space pollution. Who wants to lead us through the steps for analyzing our first word?" (Choose a student leader) "The first word is *satellite*. For example, we learned that space pollution can consist of pieces of old satellites that no longer work. Our BW leader is going to lead us through all the steps, starting with—" (Teacher pauses and

	let's the student leader take over.) The discussion leader might say something like: "Let's start with Count it. Before I show you the word, let's count the syllables we hear when we say satellite." *Discussion leader should point to the steps in the prompt card to make sure everyone knows which step they are on.* Students may say: *three, clapping as they say the word aloud* *Discussion leader helps as needed if students have trouble hearing the syllables. The teacher should prompt and support as needed, while continuing to allow the leader to facilitate the steps. The teacher can actively participate as if in the role of a student.*
Read It	Discussion leader shows the word card and asks everyone to read it aloud.
Use It	Discussion leader asks: "How would you use the word *satellite* in a sentence having to do with space pollution?" *Note: Discussion leader can invite peers to use their full linguistic repertoire*
Divide It	Discussion leader asks the group to divide the word into three syllables. ● Students may say: sat/el/lite Then, the discussion leader asks students to check the logic of their syllables: "Each syllable has to have exactly one vowel sound. Let's check each one. What vowel do we hear in the first syllable? Second syllable? Last syllable?" "Now that we have checked the syllables and they make sense, let's cut the word apart." (Discussion leader chooses a peer to cut the word into three pieces on the syllable junctures.)
Assemble It	Discussion leader scrambles the three pieces and chooses a student to put the word back together. Then re-scramble and choose another person to re-assemble one more time.
Write It	Discussion leader covers up the word card and asks students to write the word satellite from memory on their boards or scratch paper, reminding them to think about the three syllables as they spell it. Discussion leader shows the correct spelling and asks students to compare and self-check their spelling. Repeat if needed and if time permits.
Transform & Use It	Discussion leader pulls out the affix cards (Teacher should display the affix cards *de-, -ed, -ly, -ness, -er/-or)* and says something like: "Now let's use the prefixes and suffixes to see if we can transform *satellite* into new

	words." Discussion leader places each card, one at a time, on the word and asks: "Does this make a new word?" Students answer yes or no. When an affix does create a logical word, the discussion leader asks: "Does this affix add a syllable to satellite?" Students count the syllables in the new word to answer. Then they use or define the new form of the word. Discussion leader quickly goes through all the affixes this way. The teacher then adds (*satellite)* and any new transformed word to the cumulative word deck for future use. [Note: in this case, students should notice that none of the affixes can be added to the noun satellite. This is rare, but happens occasionally in BW for some words]

Phase	**Word 2: *wasteful***
Count It	Teacher asks for another volunteer to lead the analysis of this word. "The next word is wasteful. We have learned about the *wasteful* use of old satellites and rockets by leaving them to pollute our atmosphere." Discussion leader asks, "How many syllables are in the word *wasteful*?" Students may say: *two, clapping the syllables to make sure*
Read It	Discussion leader presents the written word card and asks peers to read the word aloud.
Use It	Discussion leader chooses two students to use the word in a sentence about space pollution. *Note: Discussion leader can invite peers to use their full linguistic repertoire*
Divide It	Discussion leader asks: "How would we divide this word to form two syllables?" ● Students may say: *waste/ful* *Discussion leader helps students check the syllables to make sure each one has one vowel sound. For each, they ask "What vowel sound do we hear?" and "How is that sound spelled in this written syllable?"*

	Then, the discussion leader chooses a peer to cut the word apart.
Assemble It	Discussion leader scrambles the pieces and asks a student to put the word back together.
Write It	Discussion leader asks students to get out their boards or scratch paper and to write the word from memory, using the syllables to help them. Then the leader shows the correct spelling so students can compare and self-check.
Transform & Use It	Discussion leader displays the affix cards again. "Now we will see if we can use these prefixes and suffixes to turn *wasteful* into new words." Use each affix, one at a time. For instance, the leader might say: "Let's start by adding -*ly* to the end of our word. What word do we have now?" "Does adding - *ly* create more syllables?" "How could you use *wastefully* in a sentence?" "Now I'm going to take off -*ly* from the ending of this word and add -*ness*. What word do we have now?" "How many syllables does it have?" "How could you use *wastefulness* in a sentence?" "How is it different from *wastefully* ?" "Do any of our other word parts work for this word? Why or why not?" ● Teacher will write real words on new cards to add to the warm-up deck *(wasteful, wastefully, wastefulness)*. Students may add a word(s) to the inquiry space to synthesize their knowledge of the module topic.

DR Lesson H

Discovery Reading Lesson Title: Space Pollution_Lesson H (Blueprint)

Book: *What is Space Junk?*

Pages: 14-15

Ways to Increase Student Responsibility:

- Select a different **student to lead the discussion** for each text chunk.
- Allow students to **choose which thought routines** would be most appropriate to practice with each chunk of text.
- Encourage the student discussion leader to use the **prompt card**. As needed, and gradually releasing over time, **support the student** in soliciting participation and facilitating discussion among their groupmates.
- **Full linguistic repertoire (FLR)**: Students can discuss and ask each other questions in their home language to support their mental models of the text.

SETTING THE PURPOSE - Before Reading

Review ideas from Inquiry Space

Guiding Question: *What are two strategies that scientists use to get rid of old satellites in orbit around the Earth?*

Word in the Spotlight:
Surrounds: when something circles all around something else

METACOGNITIVE DISCUSSION - During Reading

Use the prompt card and DR routines to read aloud and discuss:

Text Chunk #1: page 14, 1st paragraph

Text Chunk #2: page 14, 2nd paragraph and caption on p. 15

SYNTHESIZING KNOWLEDGE - After Reading

Exemplar answer:

Scientists have two ways of getting rid of old satellites. The first way is for satellites that are in lower orbit. Scientists let them fall to the Earth. They mostly burn up in the atmosphere that

surrounds the planet. The pieces that don't burn up land in a special place in the Pacific Ocean. The second way is for satellites in high orbit. When they are really far from Earth, scientists push them out even further so they are really far away from anything important.

UtS Lesson B

Uncover the Structure Lesson Plan B: Elaborative

Text: The Space Cemetery Text 3 (Complete)

Reminders for Every Lesson:

- Invite participation from **at least two students** each time you pause to discuss, rotating strategically to hear from as many students as possible. **Every student** should have a chance to share their ideas **at least once** during the lesson.
- **Encourage students to talk to each other**, not just to the teacher. During each routine, after the first student contributes, a second student should, when appropriate and whenever possible, be invited to add to or respond to the first student.
- Remember to give **wait time**: after inviting students to participate, wait 3-4 seconds to allow some thinking time.

Text 3 (complete)

[1]There is a special place in the middle of the Pacific Ocean called Point Nemo that is sometimes called the "space cemetery". [2]It is called that because of all the old pieces of space debris that are buried there. [3]What caused all this debris to collect in the area around Point Nemo? [4]Believe it or not, scientists put it there on purpose.

[5]When cars break down and become useless, they are sent to a junkyard. [6]The same thing happens when old spacecraft become obsolete. [7]You might think they just stay in orbit forever, but larger objects like satellites could become dangerous to other spacecraft. [8]Therefore, scientists need a place for these objects to crash to Earth without putting anyone in danger. [9]They help the objects re-enter Earth's atmosphere and crash into the Ocean. [10]Point Nemo was chosen because it is so far from land. [11]Because the water is very deep, it is safe to put these objects there.

[12]As a result of many decades of space exploration, more than 260 space objects are now resting on the ocean floor in this special location. [13]Some of the objects already in the space cemetery are damaged satellites and a worn-out Russian space station. [14]Since it is getting old, scientists plan to bring down the International Space Station in 2031. [15]It will join the other objects at the bottom of the sea, leading to an even larger cemetery at Point Nemo.

Text: "The Space Cemetary Text 3 (Complete)"
Step One. Review the Text
"We've read three different versions of a text about where space pollution ends up on Earth. Now we will revisit one of them. We've already read this text a couple of times, and we've learned a lot about space pollution. Let's quickly re-read it together." **Teacher reads aloud.**
Step Two. Stating the Structure of the Text
Now, we're going to 'uncover the structure' of this text. That means we are going to figure out how the author has organized the ideas in this text so that we can understand them. When writing, authors make choices about how they communicate ideas to help their readers learn." "There are lots of different ways that authors can organize their thoughts, but as we learn about our topic, we are just going to focus on a couple." *Here the teacher shows the empty **cause and effect graphic organizer**. "Sometimes, an author wants to show us how events are related to each other. One event might cause another to happen. For example, if it's rainy outside, you stay inside for recess. The rain is the cause- that's the reason you have to stay inside. Indoor recess is the effect- that's what happens because it's raining. These two events are related to each other because one makes the other happen. When authors show us these kinds of relationships within a text, it's called "cause and effect." Authors often want to explain the reasons why something happened, or the effects of something. They choose the structure that best fits the ideas they want to communicate to their readers." "The text we are reading today uses the cause and effect structure to teach us about the special place where space pollution is placed on Earth."

Step Three. Identifying Cue Words for Structure

"There are some words that authors sometimes use to signal, or show us, how they are organizing a text. Let's take a moment to look back at our text and see if we can find a few. Some examples of words that signal cause and effect are ***because, as a result, resulted, caused, affected, since, due to, effect, in order to, lead to.*"**

Teacher will have students reread the text to locate a few examples, which they should circle or highlight on their papers. Continue in this way for a few more examples, pointing out the relationship between ideas and how signal words in the text alert the reader to the structure.

Step Four. Discussion

"Now, I'm going to ask you a few questions about this text. In order to answer these questions, you will have to think about how the ideas in the text are organized, or structured."
Teacher should ask 2-3 of the following (depending on time):

"What causes scientists to bring space objects down to Earth?"

"Why did they choose Point Nemo?"

"Why will scientists bring down the International Space Station in 2031?"

Teacher calls on students to share, prompting them to refer back explicitly in the text to explain their thinking.

Step Five. Graphic Organizer

"Now we are going to take what we learned and put all the ideas from the text into our graphic organizer so that we can really see how this text uses the structure."

<u>As a group</u>, the teacher and students will work together to complete the **cause and effect graphic organizer,** paying close attention to the big details about why scientists have created a "space cemetery."

For example:
On the effect side of the diagram, you can list the effect as: A lot of space debris is located in a space cemetery near Point Nemo
On the cause side: you can list these causes: Large space debris is dangerous; scientists needed a place for these objects to crash; Point Nemo is far away from people

The teacher will transcribe student responses into a shared document by filling out the organizer. **In later lessons, teachers could release this responsibility to their students based upon ability and comfort.*

"Awesome! So we've 'uncovered' the structure of this text. We know that this text uses the

causal structure to organize ideas about why scientists put space debris in the ocean."

Step Six. Summarizing

"Now, we're going to practice summarizing this text. When we summarize, we want to explain the ideas in the text to someone else who hasn't read it so that they can understand it. That means we want to explain it in a way that uses the same structure that the author used."

"Using your graphic organizer, summarize what you learned about the space cemetery at Point Nemo from this text."

Teacher gives students a minute to practice with their partners.

"Before we go, we are quickly going to write a summary of what we learned together. What should we begin with?"

Teacher will prompt students as the group writes a summary together, which the teacher will record to include on the Inquiry Space for future reference. As the teacher guides students through the shared-writing exercise, make sure to include structural cue words and appropriate academic vocabulary from the text and module.

Example: *When space pollution is too big or dangerous, scientists bring it down from orbit. They put it in the ocean at a place called Point Nemo. They chose Point Nemo because it is far away from land and the water is very deep. That makes it a safe place to crash old space objects. That is why there is a space cemetery in the ocean near Point Nemo.*

SW Lesson D

Sentence Workshop Lesson D (Blueprint)
Space Pollution Module

Mystery Sentence: Scientists carefully track space debris orbiting the Earth so that they can predict when an object might crash into the atmosphere. **Sentence #1:** Scientists can predict when an object might crash into the atmosphere. **Sentence #2:** Scientists carefully track space debris orbiting the Earth.
Word Cards for Sentence #1: If you are making the cards beforehand, it might be helpful to group them by chunk, paperclip each chunk, and have them ready to go in the order they'll appear in the lesson. [Note: some cards consist of entire phrases as indicated by the brackets.] *object, crash, might, when, scientists, predict, an, can* *atmosphere, the, into*
Word Cards for Sentence #2: *track, [space debris], scientists* *Earth, orbiting, the* *carefully*
Word Cards for the Mystery Sentence: [so that] they

Note: Be sure the SW prompt card is visible to the whole group. Use it to guide the discussion of each sentence.

Build Sentence #1
• Teacher prompts students to build the first sentence. ***Word Cards:*** *object, crash, might, when, scientists, predict, an, can* • Students may build:

"Scientists can predict when an object might crash."

- Teacher prompts students to expand sentence:

  Word Cards: *atmosphere, the, into*

- Students may build:
  "Scientists can predict when an object might crash into the atmosphere."

- Use the SW prompt card to discuss the sentence.

Note: Give students time to add /rearrange words, providing support or feedback as necessary. Allow students 1-2 attempts to arrange words; after two unsuccessful attempts, intervene using one of the steps provided in the elaborative plan.

Building Sentence #2

*Note: Teacher removes the word cards from Sentence #1 and places them off to the side (but keep them in a nested stack, in order, to make it easier to quickly re-build mystery sentence later).

- Teacher prompts students to build sentence #2:

  Word Cards: *track, [space debris], scientists*

- Students may build:
  "Scientists track space debris."

- Teacher prompts students to expand sentence:

  Word Cards: *Earth, orbiting, the*

- Students may say:
  "Scientists track space debris orbiting the Earth."

- Teacher prompts students to expand sentence:

  Word Cards: *carefully*

- Students may say:
  "Scientists carefully track space debris orbiting the Earth."

- Use the SW prompt card to discuss the sentence.

Note: Give students time to add /rearrange words, providing support or feedback as necessary. Allow students 1-2 attempts to arrange words; after two unsuccessful attempts, intervene using one of the steps provided in the elaborative plan.

Manipulate Morphosyntactic Structure of Sentence #2

- Teacher asks students how the sentence would need to be changed if the word *scientists* is replaced with *the astronomer.* (Note: this is a verbal activity; you can add or move cards around if as needed, but do not alter the original cards because you will need them again for the next part of the routine).
- Teacher and students work together to answer:
  The astronomer carefully tracks space debris orbiting the Earth.

Combine Sentences to Form the Mystery Sentence

*Note: Teacher places the word cards from sentence #1 back on the table so that both sentences are arranged in front of the students. Do not ask students to rebuild the sentence.

- Teacher helps students briefly discuss the ideas in the sentences, helping students see how the ideas in both sentences are connected.
- Teacher prompts students to combine the two sentences by using this connective phrase:

  Word Card: *[so that]*

- Teacher can also prompt students that they will need to remove a repeated word in the second part of the sentence (*scientists*) and replace with this pronoun:

  Word Card: *they*

- With support as needed, students work together to build the mystery sentence:

  Scientists carefully track space debris orbiting the Earth so that they can predict when an object might crash into the atmosphere.

- Teacher and students add the mystery sentence to the Inquiry Space.

Inquiry Space (IS)

Ideas for planning the IS maintenance days

Note to teachers:

While the rest of the K.L.I. components are highly structured, the Inquiry Space, by its very nature, has to be flexible and customizable for each group. Think of this as your "playground" where you and your students have freedom to spend time playing with the big ideas about your topic that have come up across previous lessons. We haven't provided specific lesson plans for IS days. Instead, we provide these ideas below as starting points as you plan for these days.

Menu of Options

During an IS day, you can do one of these activities, a combination of several of them, or design something of your own that accomplishes the goal of this component. Keep in mind that the goal of the Inquiry Space component is to: *re-engage with the vocabulary and concepts your group has been collecting from lesson to lesson so that students can notice and discuss how these ideas fit together.*

1. Review and re-organize the Inquiry Space
    - Show the current version of the group's Inquiry Space.
    - Ask them to work with a partner or individually to re-read all the entries that are there.
    - Then have them work with a partner to identify a few sorting categories they could use to move the entries around into meaningful groups. For instance, maybe there are three entries about the dangers of space pollution and two entries about strategies for helping reduce the danger. You could move these into groups and label each one.

2. Review and connect new words
    - Show the current version of the group's Inquiry Space
    - Ask students to read all the entries and look for new vocabulary words they have learned.
    - After students have each found their list of new words, ask each student to pick one word to share with the group. They have to explain where the word is found on the Inquiry Space and what it means (related to the inquiry topic). You could also ask them to create an action or movement for the word to help the group remember it.
    - For each word, draw lines that connect to other words on the Inquiry Space and create a sentence that shows how the words are related. For example, you might draw a line between the words *accelerate* and *debris* and develop the sentence: "Scientists need special tools to keep track of how quickly space debris is accelerating toward Earth."

3. Revisit the overarching inquiry questions
    - Show the current version of the group's Inquiry Space.
    - Chorally read all the entries as a group to review all the ideas.
    - Then show students the questions from the Day 0 lesson that you used to launch the module.

- Using one question at a time, ask students to work with a partner to find at least two entries on the Inquiry Space that help answer the question.
- The partners can share their ideas with the group, and then color-code or re-arrange the entries into groups based on the question they help answer.

4. Paraphrase the most important or most interesting ideas
    - Show the current version of the group's Inquiry Space and chorally read the entries aloud to review
    - Ask students to pretend they are explaining what they have learned to a friend or relative who hasn't been in the group. They have to pick ONE really important idea and explain it in their own words, in a way that will make sense to their friend or relative (this is a great opportunity for students to explain their new knowledge in a home language or dialect). Alternatively, you can ask them to pick the one idea that is most interesting to them that they think will also be interesting to their friend or relative.
    - Students work in partners or individually to come up with two sentences for their friend or relative. If needed, you can give them a sentence starter to get them started.
    - They share with the group and then record their sentences on the Inquiry Space as new entries.

DR Lesson I

Discovery Reading Lesson Title: Space Pollution_Lesson I (Blueprint)

Book: *What is Space Junk?*

Pages: 16-17

Ways to Increase Student Responsibility:

- Select a different **student to lead the discussion** for each text chunk.
- Allow students to **choose which thought routines** would be most appropriate to practice with each chunk of text.
- Encourage the student discussion leader to use the **prompt card**. As needed, and gradually releasing over time, **support the student** in soliciting participation and facilitating discussion among their groupmates.
- **Full linguistic repertoire (FLR)**: Students can discuss and ask each other questions in their home language to support their mental models of the text.

SETTING THE PURPOSE - Before Reading
Review ideas from Inquiry Space **Guiding Question:** *Why don't old satellites harm people when they fall back to Earth?* **Word in the Spotlight:** atmosphere: the layer of gas that surrounds Earth– it is often called "air"
METACOGNITIVE DISCUSSION - During Reading
Use the prompt card and DR routines to read aloud and discuss: **Text Chunk #1:** page 16, 1st paragraph **Text Chunk #2:** page 16, 2nd paragraph and text box, and caption on p. 17
SYNTHESIZING KNOWLEDGE - After Reading
Exemplar answer: *When orbiting satellites fall back to Earth, they usually burn up in Earth's atmosphere before they make it to Earth's surface. Larger objects don't completely burn, but they usually just fall into oceans.*

CR Lesson G

Confident Reading Lesson Plan G: Blueprint

Text: Robot Round Up Text 1

Reminders for Every Lesson:

- Invite participation from **at least two students** each time you pause to discuss, rotating strategically to hear from as many students as possible. **Every student** should have a chance to share their ideas **at least once** during the lesson.
- **Encourage students to talk to each other**, not just to the teacher. During each routine, after the first student contributes, a second student should, when appropriate and whenever possible, be invited to add to or respond to the first student.
- Remember to give **wait time**: after inviting students to participate, wait 3-4 seconds to allow some thinking time.

Lesson Routine:

1. Teacher reads aloud and models
2. Students read silently
3. Partner Read
4. Discuss
5. Feedback and Teaching Point
6. Bridging Language Routine
7. Whole Group Read

Text 1

[1]Space pollution is a big problem. [2]It is dangerous. [3]Scientists are trying to think of ways to get rid of space pollution. [4]One idea is to use robots. [5]Robots can go to dangerous places like space. [6]The robots have arms that can grab the pollution. [7]They can push the pollution out of the way. [8]Another idea is a machine with a net to catch space pollution. [9]When it is full, it could return to Earth. [10]These ideas are not easy. Scientists must do a lot of work to make them happen. They need to find a way to clean up space pollution so we can safely explore space in the future.

Feedback & Teaching Points (choose 1 or 2):	**Bridging Language Routine (use for purple text):**
• reading confidence • accuracy • punctuation • connectives and conjunctions • words and phrases that signal text structure • other forms of phrasing Routine: Teacher models; students repeat after teacher 1-2 or times; students practice re-reading in unison 1-2 times.	-Reread sentences 1 and 2 (show students place in text with fingers.) -"What is *it* referring to in the second sentence? Students: "Space pollution." "Space pollution? OK, let's check it and see. Let's place the words "space pollution" in place of "it" in the next sentence. Read aloud with me, from the beginning: [1]Space pollution is a big problem. [2]*Space pollution* is dangerous. "Does that make sense? Yes! The first sentence said *space pollution*, so we know that *it* in the second sentence is referring to space pollution!"

BW Lesson E

Breaking Words Lesson Plan E (Blueprint)

Space Pollution Module

Word Cards:
- *surrounds*
- *collide*

Affix Cards:
- *de-*
- *-ed*
- *-ly*
- *-ness*
- *-er/-or**

Note: For each part of the lesson, refer back to the BW Prompt Card

Warm up	Use word deck from previous lessons, students quickly read all the words; pick one and create a sentence
Word 1: *surrounds*	**Count it:** *two* **Read it** **Use it:** *Trash from old space missions surrounds the Earth.* **Divide it:** sur/rounds **Assemble it** **Write it** **Transform & Use it:** surrounded [remove the suffix 's' before transforming]
Word 2*:* *collide*	**Count it:** *two* **Read it** **Use it:** *Sometimes, space junk will collide with other objects.* **Divide it:** col/lide **Assemble it** **Write it** **Transform & Use it:** collided, collider *After lesson, teacher adds new words to cumulative word deck. Students may add a word(s) to the inquiry space to synthesize their knowledge of the module topic.

DR Lesson J

Discovery Reading Lesson Title: Space Pollution_Lesson J (Blueprint)

Book: *What is Space Junk?*

Pages: 18-23

Ways to Increase Student Responsibility:

- Select a different **student to lead the discussion** for each text chunk.
- Allow students to **choose which thought routines** would be most appropriate to practice with each chunk of text.
- Encourage the student discussion leader to use the **prompt card**. As needed, and gradually releasing over time, **support the student** in soliciting participation and facilitating discussion among their groupmates.
- **Full linguistic repertoire (FLR)**: Students can discuss and ask each other questions in their home language to support their mental models of the text.

SETTING THE PURPOSE - Before Reading

Review ideas from Inquiry Space

Guiding Question: *What happens when two pieces of space debris crash into each other?*

Word in the Spotlight:
avoid: to keep away from something or someone or to stop oneself from doing something

METACOGNITIVE DISCUSSION - During Reading

Use the prompt card and DR routines to read aloud and discuss:

Text Chunk #1: pages 18-19

Text Chunk #2: pages 20-21

Text Chunk #3: pages 22-23 (skip the captions on all pages if short on time)

SYNTHESIZING KNOWLEDGE - After Reading

Exemplar answer:

When two pieces of space debris crash into each other, they break apart, often into many

pieces. This usually causes more space debris to orbit in our atmosphere, which can be dangerous for functional satellites and spacecraft. They have to work hard to avoid hitting all of this debris so that they do not experience damage.

CR Lesson H

Confident Reading Lesson Plan H: Blueprint

Text: Robot Round Up Text 2

Reminders for Every Lesson:

- Invite participation from **at least two students** each time you pause to discuss, rotating strategically to hear from as many students as possible. **Every student** should have a chance to share their ideas **at least once** during the lesson.
- **Encourage students to talk to each other**, not just to the teacher. During each routine, after the first student contributes, a second student should, when appropriate and whenever possible, be invited to add to or respond to the first student.
- Remember to give **wait time**: after inviting students to participate, wait 3-4 seconds to allow some thinking time.

Lesson Routine:

1. Teacher reads aloud and models
2. Students read silently
3. Partner Read
4. Discuss
5. Feedback and Teaching Point
6. Bridging Language Routine
7. Whole Group Read

Text 2

[1]Space pollution is a big problem. [2]Scientists are trying to think of ways to get rid of the dangerous pollution in Earth's orbit. [3]Some scientists want to design robots to clean up space pollution. [4]Robots can go to dangerous places like space. [5]Scientists are working on robots that can detect space pollution with sensors. [6]They also have special arms that can grab the pollution. [7]These robots could push the pollution out of the way of nearby spacecraft. [8]Another idea is to build a spacecraft with a net to catch space pollution. [9]When the net is full, the spacecraft could return to Earth. [10]Scientists will have to work hard to invent new technology. [11]They must clean up space pollution if we want to explore space safely in the future.

Feedback & Teaching Points (choose 1 or 2):	**Bridging Language Routine (use for purple text):**
● reading confidence ● accuracy ● punctuation ● connectives and conjunctions ● words and phrases that signal text structure ● other forms of phrasing Routine: Teacher models; students repeat after teacher 1-2 or times; students practice re-reading in unison 1-2 times.	-Reread sentences 5 and 6 (show students place in text with fingers.) -"Who is *they* referring to in sentence 6? Students: "The robots." "The robots? OK, let's check it and see. Let's place the words "the robots" in place of "they" in the next sentence. Read aloud with me, from the beginning: [5]*Scientists are working on robots that can detect space pollution with sensors.* [6]*The robots also have special arms that can grab the pollution.* "Does that make sense? Yes! The fifth sentence was describing the new robots scientists are designing. *They* in the next sentence is referring to the robots as we learn more information about them! Nice work!"

SW Lesson E

Sentence Workshop Lesson E (Blueprint)
Space Pollution Module

Mystery Sentence: Today, spacecraft are covered by a layer of protective material called shielding that can keep them from getting damaged by small pieces of debris. **Sentence #1:** Today, spacecraft are covered by a layer of protective material called shielding. **Sentence #2:** Shielding can keep spacecraft from getting damaged by small pieces of debris.
Word Cards for Sentence #1: If you are making the cards beforehand, it might be helpful to group them by chunk, paperclip each chunk, and have them ready to go in the order they'll appear in the lesson. [Note: some cards consist of entire phrases as indicated by the brackets.] *by, covered, spacecraft, material, are, protective* *shielding, called* *[a layer of], today*
Word Cards for Sentence #2: *getting, shielding, keep, can, spacecraft, damaged, from* *debris, by* *[small pieces of]*
Word Cards for the Mystery Sentence: *that, them*

Note: Be sure the SW prompt card is visible to the whole group. Use it to guide the discussion of each sentence.

Build Sentence #1
● Teacher prompts students to build the first sentence. ***Word Cards:*** *by, covered, spacecraft, material, are, protective* ● Students may build: ***"Spacecraft are covered by protective material."***

- Teacher prompts students to expand sentence:

  Word Cards: *shielding, called*

- Students may build:
  "Spacecraft are covered by protective material called shielding."

- Teacher prompts students to expand sentence:

  Word Cards: *[a layer of], today*

- Students may build:
  Today, spacecraft are covered by a layer of protective material called shielding. **OR**
  Spacecraft today are covered by a layer of protective material called shielding.

- Use the SW prompt card to discuss the sentence.

Note: Give students time to add /rearrange words, providing support or feedback as necessary. Allow students 1-2 attempts to arrange words; after two unsuccessful attempts, intervene using one of the steps provided in the elaborative plan.

Manipulate Morphosyntactic Structure of Sentence #1

- Teacher asks students how the sentence would need to be changed if the word *today* is replaced with *in the past.* (Note: this is a verbal activity; you can add or move cards around if as needed, but do not alter the original cards because you will need them again for the next part of the routine).

- Teacher and students work together to answer:
  In the past, spacecraft were covered by a layer of protective material called shielding.

Building Sentence #2

*Note: Teacher removes the word cards from Sentence #1 and places them off to the side (but keep them in a nested stack, in order, to make it easier to quickly re-build mystery sentence later).

- Teacher prompts students to build sentence #2:

  Word Cards: *getting, shielding, keep, can, spacecraft, damaged, from*

- Students may build:
  "Shielding can keep spacecraft from getting damaged."

- Teacher prompts students to expand sentence:

  Word Cards: *debris, by*

- Students may say:
  "Shielding can keep spacecraft from getting damaged by debris."

- Teacher prompts students to expand sentence:

  Word Cards: *[small pieces of]*

- Students may say:
  "Shielding can keep spacecraft from getting damaged by small pieces of debris."

- Use the SW prompt card to discuss the sentence.

Note: Give students time to add /rearrange words, providing support or feedback as necessary. Allow students 1-2 attempts to arrange words; after two unsuccessful attempts, intervene using one of the steps provided in the elaborative plan.

Combine Sentences to Form the Mystery Sentence

*Note: Teacher places the word cards from sentence #1 back on the table so that both sentences are arranged in front of the students. Do not ask students to rebuild the sentence.

- Teacher helps students briefly discuss the ideas in the sentences, helping students see how the ideas in both sentences are connected.

- Teacher prompts students to combine the two sentences by using this connective word:

  Word Card: *that*

- Teacher can also prompt students that they will need to remove a repeated word in the second part of the sentence (*spacecraft*) and replace with this pronoun:

  Word Card: *them*

- With support as needed, students work together to build the mystery sentence:

Today, spacecraft are covered by a layer of protective material called shielding that can keep them from getting damaged by small pieces of debris.

- Teacher and students add the mystery sentence to the Inquiry Space.

DR Lesson K

Discovery Reading Lesson Title: Space Pollution_Lesson K (Blueprint)

Book: *What is Space Junk?*

Pages: 24-25

Ways to Increase Student Responsibility:

- Select a different **student to lead the discussion** for each text chunk.
- Allow students to **choose which thought routines** would be most appropriate to practice with each chunk of text.
- Encourage the student discussion leader to use the **prompt card**. As needed, and gradually releasing over time, **support the student** in soliciting participation and facilitating discussion among their groupmates.
- **Full linguistic repertoire (FLR)**: Students can discuss and ask each other questions in their home language to support their mental models of the text.

SETTING THE PURPOSE - Before Reading
Review ideas from Inquiry Space **Guiding Question:** *Why is it dangerous to destroy old satellites by blowing them up?* **Word in the Spotlight:** Destruction: the act of causing so much damage to something that it no longer exists or can't be repaired. (the act of destroying)
METACOGNITIVE DISCUSSION - During Reading
Use the prompt card and DR routines to read aloud and discuss: **Text Chunk #1:** page 24, first paragraph (spotlight word in page title) **Text Chunk #2:** page 25, second paragraph and text box **Text Chunk #3:** pages 26, bar graph and caption
SYNTHESIZING KNOWLEDGE - After Reading

Exemplar answer:

It is dangerous to destroy old satellites by blowing them up because this can cause even more space debris. Blowing things up creates many small pieces, which would then continue to orbit in our atmosphere, causing more potential damage and destruction to functioning spacecraft and other space debris.

CR Lesson I

Confident Reading Lesson Plan I: Blueprint

Text: Robot Round Up Text 3 (maze)

Reminders for Every Lesson:

- Invite participation from **at least two students** each time you pause to discuss, rotating strategically to hear from as many students as possible. **Every student** should have a chance to share their ideas **at least once** during the lesson.
- **Encourage students to talk to each other**, not just to the teacher. During each routine, after the first student contributes, a second student should, when appropriate and whenever possible, be invited to add to or respond to the first student.
- Remember to give **wait time**: after inviting students to participate, wait 3-4 seconds to allow some thinking time.

Lesson Routine:

1. Teacher intro and maze read: students read silently and select maze choices
2. Teacher model reads and maze teaching point
3. Partner Read
4. Discuss
5. Feedback and Quick Teaching Point
6. Bridging Language Routine
7. Whole Group Read

Text 3 (maze)

[1]Space pollution is a big problem. [2]Scientists are trying to think of ways to [replace / reduce / reuse] the dangerous pollution in Earth's orbit. [3] [Since / Because / For example], some scientists want to design robots to clean up space pollution. [4]Robots can go to dangerous places like space, so scientists are working on robots that can detect space pollution with sensors. [5]They will have special arms that can grab

debris and push [her / they / it] out of the way of nearby spacecraft. [6]Another idea is to build a spacecraft with a net to catch pollution. [7]When the net is full, it could return to Earth. [8]Scientists will have to work hard to invent this new technology, [but / when / now] they must clean up space pollution if we want to explore space safely in the future.

Maze Teaching Point	**Bridging Language Routine (use for purple text):**
(choose this one or one your students had the most difficulty with): "Let's re-read sentence 8 and we can consider all the ways this sentence could be completed…" "So, this sentence has two big ideas: *scientists will have to work hard to invent this new technology* and *they must clean up space pollution if we want to explore space safely in the future.* Right away, I see that *when* doesn't work. If I put it between those two ideas, it doesn't make sense. *Now* seems like it could work, but it doesn't link those two ideas together. If I used now, I would have to have two sentences instead of one. However, if we use *but* then I can combine the ideas and gain more understanding: one of these things can't happen without the other. In order for us to be able to explore space safely, scientists will have to work hard to invent the new technology that will help us clean up space pollution."	-Reread the sentence 6 and 7 (show with fingers.) -"What is *it* referring to in sentence 7?" -Students: "The spacecraft with the net." -"The spacecraft? Let's check it and see. Let's place the words "the spacecraft" in place of "it" and in the seventh sentence. Read aloud those two sentences again with me by substituting these words instead: [6]*Another idea is to build a spacecraft with a net to catch pollution.* [7]*When the net is full, the spacecraft could return to Earth.* -"Does that sound right? Yes! The *it* in the earlier sentence from the maze activity was talking about the space debris, but the *it* in sentence 7 is talking about the spacecraft because the topic of the sentence changed! Nice work!"

Feedback & Teaching Points (choose 1 or 2): ● reading confidence ● accuracy ● punctuation ● connectives and conjunctions ● words and phrases that signal text structure ● other forms of phrasing Routine: Teacher models; students repeat after teacher 1-2 or times; students practice re-reading in unison 1-2 times.	

BW Lesson F

Breaking Words Lesson Plan F (Blueprint)

Space Pollution Module

Word Cards:
- *avoid*
- *destructive*

Affix Cards:
- *de-*
- *-ed*
- *-ly*
- *-ness*
- *-er/-or**

Note: For each part of the lesson, refer back to the BW Prompt Card

Warm up	Use word deck from previous lessons, students quickly read all the words; pick one and create a sentence
Word 1: *avoid*	**Count it:** *two* **Read it** **Use it:** *Scientists can avoid space junk that comes towards an aircraft by tracking it.* **Divide it:** a/void **Assemble it** **Write it** **Transform & Use it:** avoided, avoider
Word 2*:* *destructive*	**Count it:** *three* **Read it** **Use it:** *Space pollution that lands on Earth's surface can be destructive.* **Divide it:** de/struc/tive **Assemble it** **Write it** **Transform & Use it:** destructiveness, destructively *After lesson, teacher adds new words to cumulative word deck. Students may add words to the inquiry space to synthesize their knowledge of the module topic.

DR Lesson L

Discovery Reading Lesson Title: Space Pollution_Lesson L (Blueprint)

Book: *What is Space Junk?*

Pages: 26-29

Ways to Increase Student Responsibility:

- Select a different **student to lead the discussion** for each text chunk.
- Allow students to **choose which thought routines** would be most appropriate to practice with each chunk of text.
- Encourage the student discussion leader to use the **prompt card**. As needed, and gradually releasing over time, **support the student** in soliciting participation and facilitating discussion among their groupmates.
- **Full linguistic repertoire (FLR)**: Students can discuss and ask each other questions in their home language to support their mental models of the text.

SETTING THE PURPOSE - Before Reading
Review ideas from Inquiry Space **Guiding Question:** *What are some strategies that scientists might use to solve the space pollution problem?* **Word in the Spotlight:** clutter: things that are crowded together, often in a messy way
METACOGNITIVE DISCUSSION - During Reading
Use the prompt card and DR routines to read aloud and discuss: **Text Chunk #1:** pages 26 and 27 **Text Chunk #2:** pages 28 and 29
SYNTHESIZING KNOWLEDGE - After Reading
Exemplar answer: *Scientists have proposed different strategies to get rid of space pollution. These ideas include aiming the sun's energy at space junk to burn it up, using a net to bring space pollution down*

from space, or shooting space debris with a laser. However, none of these strategies have been tried because of their expensive cost. Thus, the hazardous clutter of debris in space remains a problem for the future of space exploration.

UtS Lesson C

Uncover the Structure Lesson Plan C: Elaborative

Text: Robot Round Up Text 3 (Complete)

Reminders for Every Lesson:

- Invite participation from **at least two students** each time you pause to discuss, rotating strategically to hear from as many students as possible. **Every student** should have a chance to share their ideas **at least once** during the lesson.
- **Encourage students to talk to each other**, not just to the teacher. During each routine, after the first student contributes, a second student should, when appropriate and whenever possible, be invited to add to or respond to the first student.
- Remember to give **wait time**: after inviting students to participate, wait 3-4 seconds to allow some thinking time.

Text 3 (complete)

[1]Space pollution is a big problem. [2]Scientists are trying to think of ways to reduce the dangerous pollution in Earth's orbit. [3]For example, some scientists want to design robots to clean up space pollution. [4]Robots can go dangerous places like space, so scientists are working on robots that can detect space pollution with sensors. [5]They also have special arms that can grab debris and push it out of the way of nearby spacecraft. [6]Another idea is to build a spacecraft with a net to catch it. [7]When the net is full, it could return to Earth. [8]Scientists will have to work hard to invent this new technology, but we must clean up space pollution if we want to explore space safely in the future.

Text: "Robot Round Up Text 3 (Complete)"

Step One. Review the Text

"We've read a couple of different versions of a text about how scientists are tackling the problem of space pollution. Now we will revisit one of them. We've already read this text a couple of times, and we've learned a lot about how scientists are designing robots to clean up space. Let's quickly re-read it together." **Teacher reads aloud.**

Step Two. Stating the Structure of the Text

"Now, we're going to 'uncover the structure' of this text. That means we are going to figure out how the author has organized the ideas in this text so that we can understand them. When writing, authors make choices about how they communicate ideas to help their readers learn."

In this module, we have talked about two structures: cause and effect and descriptive. **[Show the two graphic organizers.** Ask students to choose the one that is most appropriate for this text. Students should recognize that this text is organized descriptively.]

"Exactly. Sometimes, an author might want to give us lots of information about a topic by providing many details. This is called "descriptive" structure. This text we are reading today uses the descriptive structure to teach us about how scientists are developing robots to clean up space pollution."

Step Three. Identifying Cue Words for Structure

"There are some words that authors sometimes use to signal, or show us, how they are organizing a text. Let's take a moment to look back at our text and see if we can find a few. Some examples of words that signal descriptive are **like, sounds like, for example,** and **such as**."

Teacher will have students reread the text to locate a few examples, which they should circle or highlight on their papers. Continue in this way for a few more examples, pointing out the relationship between ideas and how cues in the text alert the reader to the correct text structure. Cue words should be added to the Inquiry Space for later reference.

For example:

"Let's reread these sentences together: [2]Scientists are trying to think of ways to reduce the dangerous pollution in Earth's orbit. [3]For example, some scientists want to design robots to clean up space pollution.

*"*The words **for example** at the beginning of the sentence tells me I'm about to learn something specific about how scientists are trying to reduce space pollution. In this case, they're designing robots!

Step Four. Discussion

"Now, I'm going to ask you a few questions about this text. In order to answer these questions, you will have to think about how the ideas in the text are organized, or structured."
Teacher should ask 2-3 of the following (depending on time):

"How are scientists trying to clean up space pollution?"

"What are some of the features of the robots that allow them to clean up space?"

"What kind of spacecraft could scientists use to clean up space pollution?"

"What would the robots do with their long arms?"

"What would the space nets be able to do?"

Teacher calls on students to share, prompting them to refer back explicitly in the text to explain their thinking.

Step Five. Graphic Organizer

"Now we are going to take what we learned and put all the ideas from the text into our graphic organizer so that we can really see how this text uses the structure."

As a group, the teacher and students will work together to complete the **descriptive graphic organizer**, paying close attention to the big details about the way words are used to describe how robots could help clean up space pollution. The teacher will transcribe student responses into a shared document by filling out the organizer. **In later lessons, teachers could release this responsibility to their students based upon ability and comfort.*

"Awesome! So we've 'uncovered' the structure of this text. We know that this text uses the descriptive structure to organize ideas about using robots to clean up space pollution."

Step Six. Summarizing

"Now, we're going to practice summarizing this text. When we summarize, we want to explain the ideas in the text to someone else who hasn't read it so that they can understand it. That means we want to explain it in a way that uses the same structure that the author used."

"Using your graphic organizer, summarize what you learned about the robots scientists are designing to clean up space pollution from this text."

Teacher gives students a minute to practice with their partners.

"Before we go, we are quickly going to write a summary of what we learned together. What should we begin with?"

Teacher will prompt students as the group writes a summary together, which the teacher will record to include on the Inquiry Space for future reference. As the teacher guides students through the shared-writing exercise, make sure to include structural cue words and appropriate academic vocabulary from the text and module.

Example: *Space pollution is a problem scientists need to solve. They are starting to design robots to clean it up. These robots have sensors that can detect pollution. They also have arms that can grab it. Another kind of robot has a net to catch space pollution and bring it back to Earth.*

SW Lesson F

Sentence Workshop Lesson F (Blueprint)
Space Pollution Module

Mystery Sentence: Astronomers can accurately track large pieces of space debris to prevent collisions, but they cannot keep track of the millions of tiny objects in space.

Sentence #1: Astronomers can accurately track large pieces of space debris to prevent collisions.

Sentence #2: Astronomers cannot keep track of the millions of tiny objects in space.

Word Cards for Sentence #1: If you are making the cards beforehand, it might be helpful to group them by chunk, paperclip each chunk, and have them ready to go in the order they'll appear in the lesson. [Note: some cards consist of entire phrases as indicated by the brackets.]

track, prevent, to, collisions, astronomers, debris, can
accurately
large, of, pieces, space

Word Cards for Sentence #2:
astronomers, tiny, [keep track], cannot, objects, of, [in space]
of, the, millions

Word Cards for the Mystery Sentence:
but, they

Note: Be sure the SW prompt card is visible to the whole group. Use it to guide the discussion of each sentence.

Build Sentence #1

- Teacher prompts students to build the first sentence.

  Word Cards: *track, prevent, to, collisions, astronomers, debris, can*

- Students may build:
  "Astronomers can track debris to prevent collisions."

- Teacher prompts students to expand sentence:

  Word Cards: *accurately*

- Students may build:
  "Astronomers can accurately track debris to prevent collisions."

- Teacher prompts students to expand sentence:

  Word Cards: *large, of, pieces, space*

- Students may build:
  "Astronomers can accurately track large pieces of space debris to prevent collisions."

- Use the SW prompt card to discuss the sentence.

Note: Give students time to add /rearrange words, providing support or feedback as necessary. Allow students 1-2 attempts to arrange words; after two unsuccessful attempts, intervene using one of the steps provided in the elaborative plan.

Manipulate Morphosyntactic Structure of Sentence #1

- Teacher asks students how the sentence would need to be changed if the word *track* is changed to *tracks*. (Note: this is a verbal activity; you can add or move cards around if as needed, but do not alter the original cards because you will need them again for the next part of the routine).

- Teacher and students work together to answer:
  The astronomer accurately tracks large pieces of space debris to prevent collisions.

Building Sentence #2

*Note: Teacher removes the word cards from Sentence #1 and places them off to the side (but keep them in a nested stack, in order, to make it easier to quickly re-build mystery sentence later).

- Teacher prompts students to build sentence #2:

  Word Cards: *astronomers, tiny, [keep track], cannot, objects, of, [in space]*

- Students may build:

"Astronomers cannot keep track of tiny objects in space."

- Teacher prompts students to expand sentence:

  Word Cards: *of, the, millions*

- Students may say:
  "Astronomers cannot keep track of the millions of tiny objects in space."

- Use the SW prompt card to discuss the sentence.

Note: Give students time to add /rearrange words, providing support or feedback as necessary. Allow students 1-2 attempts to arrange words; after two unsuccessful attempts, intervene using one of the steps provided in the elaborative plan.

Combine Sentences to Form the Mystery Sentence

*Note: Teacher places the word cards from sentence #1 back on the table so that both sentences are arranged in front of the students. Do not ask students to rebuild the sentence.

- Teacher helps students briefly discuss the ideas in the sentences, helping students see how the ideas in both sentences are connected.

- Teacher prompts students to combine the two sentences by using this connective word:

  Word Card: *but*

- Teacher can also prompt students that they will need to remove a repeated word in the second part of the sentence (*astronomers*) and replace with this pronoun:

  Word Card: *they*

- With support as needed, students work together to build the mystery sentence:

  Astronomers can accurately track large pieces of space debris to prevent collisions, but they cannot keep track of the millions of tiny objects in space.

- Teacher and students add the mystery sentence to the Inquiry Space.

Inquiry Space (IS)

Ideas for planning the IS maintenance days

Note to teachers:

While the rest of the K.L.I. components are highly structured, the Inquiry Space, by its very nature, has to be flexible and customizable for each group. Think of this as your "playground" where you and your students have freedom to spend time playing with the big ideas about your topic that have come up across previous lessons. We haven't provided specific lesson plans for IS days. Instead, we provide these ideas below as starting points as you plan for these days.

Menu of Options

During an IS day, you can do one of these activities, a combination of several of them, or design something of your own that accomplishes the goal of this component. Keep in mind that the goal of the Inquiry Space component is to: *re-engage with the vocabulary and concepts your group has been collecting from lesson to lesson so that students can notice and discuss how these ideas fit together.*

1. Review and re-organize the Inquiry Space
    - Show the current version of the group's Inquiry Space.
    - Ask them to work with a partner or individually to re-read all the entries that are there.
    - Then have them work with a partner to identify a few sorting categories they could use to move the entries around into meaningful groups. For instance, maybe there are three entries about the dangers of space pollution and two entries about strategies for helping reduce the danger. You could move these into groups and label each one.

2. Review and connect new words
    - Show the current version of the group's Inquiry Space
    - Ask students to read all the entries and look for new vocabulary words they have learned.
    - After students have each found their list of new words, ask each student to pick one word to share with the group. They have to explain where the word is found on the Inquiry Space and what it means (related to the inquiry topic). You could also ask them to create an action or movement for the word to help the group remember it.
    - For each word, draw lines that connect to other words on the Inquiry Space and create a sentence that shows how the words are related. For example, you might draw a line between the words *accelerate* and *debris* and develop the sentence: "Scientists need special tools to keep track of how quickly space debris is accelerating toward Earth."

3. Revisit the overarching inquiry questions
    - Show the current version of the group's Inquiry Space.
    - Chorally read all the entries as a group to review all the ideas.
    - Then show students the questions from the Day 0 lesson that you used to launch the module.

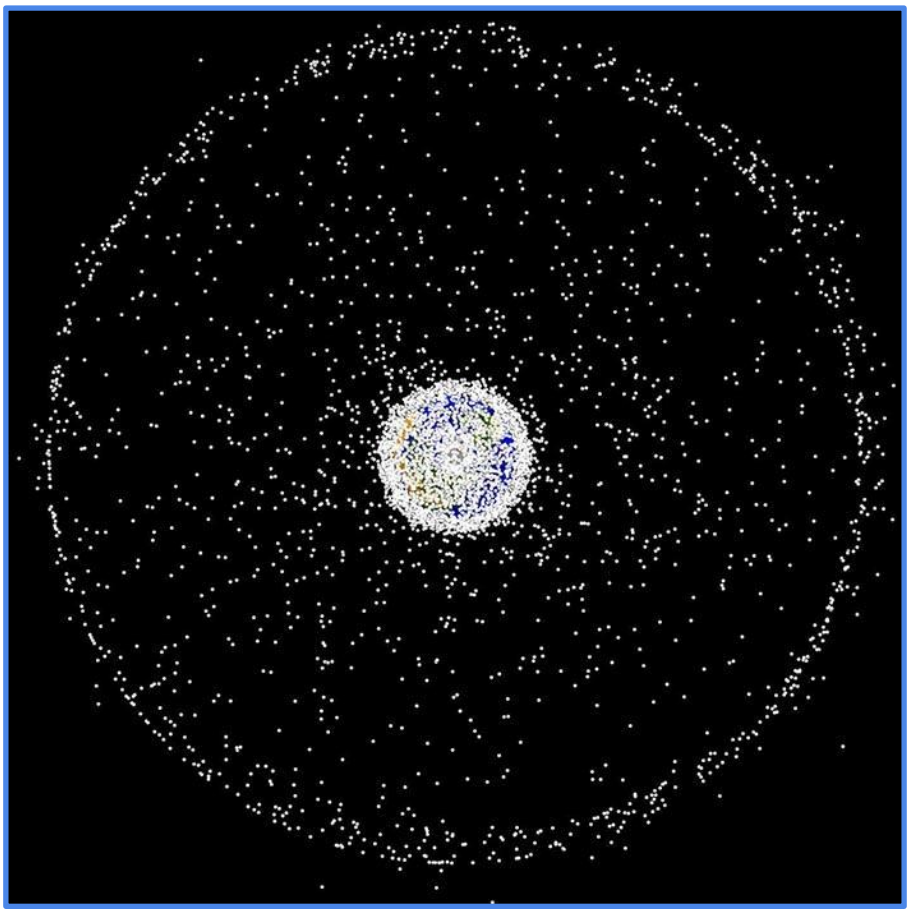
- Using one question at a time, ask students to work with a partner to find at least two entries on the Inquiry Space that help answer the question.
- The partners can share their ideas with the group, and then color-code or re-arrange the entries into groups based on the question they help answer.

4. Paraphrase the most important or most interesting ideas
    - Show the current version of the group's Inquiry Space and chorally read the entries aloud to review
    - Ask students to pretend they are explaining what they have learned to a friend or relative who hasn't been in the group. They have to pick ONE really important idea and explain it in their own words, in a way that will make sense to their friend or relative (this is a great opportunity for students to explain their new knowledge in a home language or dialect). Alternatively, you can ask them to pick the one idea that is most interesting to them that they think will also be interesting to their friend or relative.
    - Students work in partners or individually to come up with two sentences for their friend or relative. If needed, you can give them a sentence starter to get them started.
    - They share with the group and then record their sentences on the Inquiry Space as new entries.

Discovery Reading Book:

“Keeping Track of Objects in Space”

(print copies for students to use during Discovery Reading lessons)



Keeping Track of Objects in Space

SPACE ROCKS

When you close your eyes and try to picture our solar system, you probably picture the planets, including our own Earth, spinning around the sun. You probably also picture a lot of empty black space. Believe it or not, there is a lot of other stuff flying around in outer space. In addition to the planets, there are other smaller objects that orbit the sun. For example, there are millions of asteroids. Asteroids are smaller than planets, and most of them are found in a special region of space called the asteroid belt, located between Mars and Jupiter. Asteroids come in many shapes and sizes. The largest known asteroid is named Ceres, and it is 590 miles wide. That's the length of the whole state of North Carolina.

Image of Ceres taken by NASA

Some space objects are closer to Earth. Meteors are space rocks that fly toward Earth. If they get close enough, the Earth's gravity will pull them in toward the planet.

Scientists believe that one of the main reasons that dinosaurs no longer live on Earth is because a giant meteorite hit the planet millions of years ago. The crash created a huge crater in the ground and kicked up enough dust to block the sun's light, which made it hard for plants and animals to survive. Some scientists believe this meteorite landed near Mexico, where a large crater has been discovered.

Meteor crater formed in Mexico

Don't worry. Large crashes like that are very rare. Most space rocks are very small. They get so hot when they enter the air surrounding Earth that they burn up completely before hitting the ground. If you have seen a shooting star in the night sky, what you witnessed was a small meteor burning up miles above the Earth. Sometimes this process can be dramatic. In 2013, a 55 foot wide rock entered Earth's atmosphere and exploded over Russia, creating a giant fireball that many people witnessed.

JUNK IN ORBIT

A meteorite

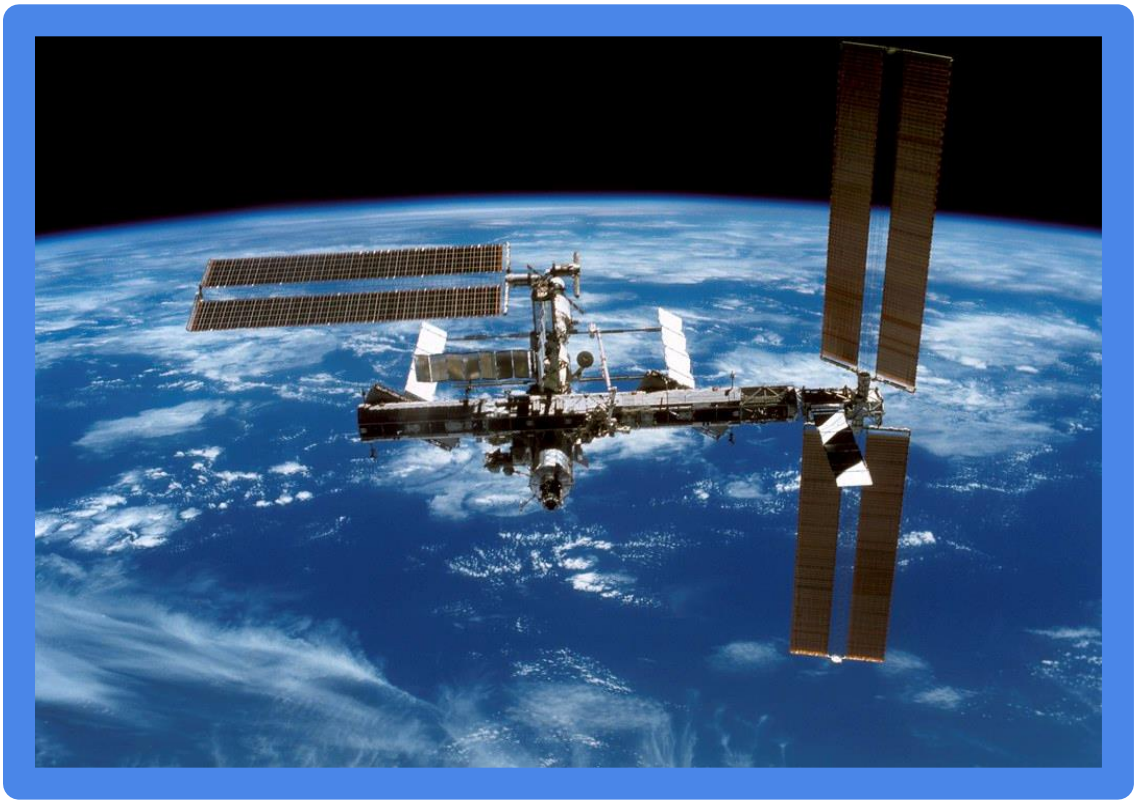
Space rocks are not a risk for humans. Even in rare cases where a meteor does not burn up and makes it all the way to the surface, it usually lands in the ocean because most of Earth is covered in water. But there is another danger in space that scientists are trying to solve before it's too late.

People have been sending objects like satellites, rockets, and probes into space for over seventy years. These objects have created a space pollution problem. Pieces of old spacecraft are often left in space when the mission is over. If something breaks off a satellite, it is left to float away.

A satellite orbiting Earth

Early astronauts would often leave their garbage in space. Other times, astronauts have accidentally dropped things while working in space, including cameras and tools. These objects are still floating around in Earth's orbit.

There is a lot of debris orbiting around the Earth. Some pieces of debris are large, like broken down satellites and huge pieces of metal from rockets and old space stations. Other pieces are so small you can barely see them, like tiny specks of paint that have chipped off the side of spacecraft.

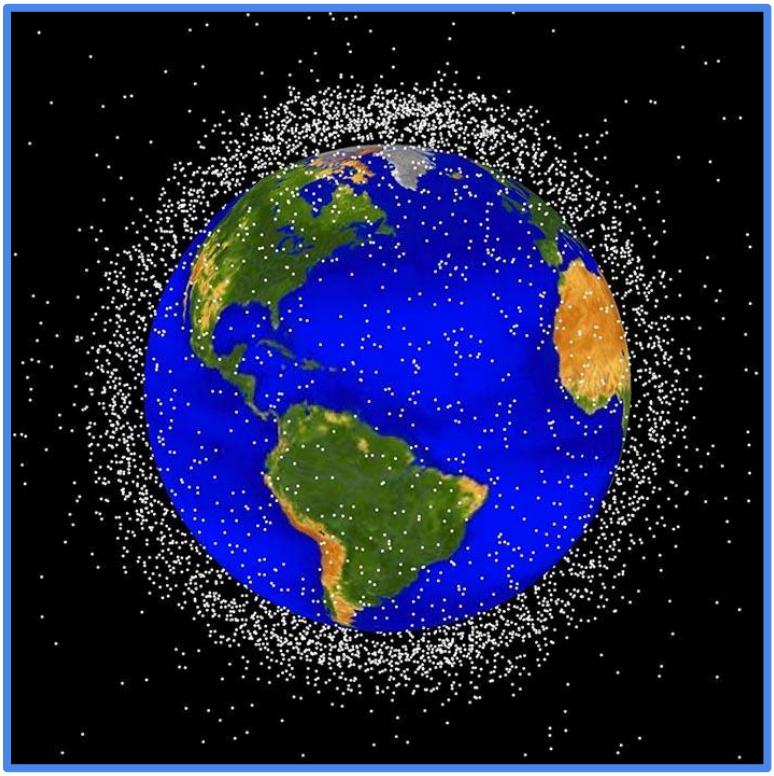


The International Space Station

FALLING FROM THE SKY?

Like meteors, space debris rarely hits the Earth. Sometimes pieces of space junk will fall from orbit and head toward the ground. However, most of it is small enough that it completely burns away before making it to the surface. Luckily, it is very unlikely that anyone will ever be injured by falling space junk. But there have been some collisions.

Pieces of space trash have landed in several countries over the years. The first reported example was in 1969, when a Japanese ship was damaged by falling debris from a satellite. Pieces of another satellite scattered across Canada in the 1970s. In 1979, pieces of NASA's first space station, called Skylab, crashed in Australia.



In 2019, NASA used a computer to generate this image of all the debris orbiting within 2,000 km of the Earth's surface.

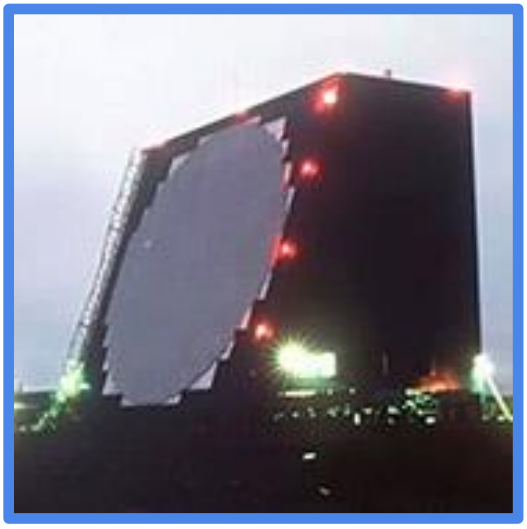
In 1997, a tiny piece of an old rocket gently landed on a woman's shoulder in Oklahoma. It was so small, she barely felt it, and she kept it as a souvenir.

Fallen launch vehicle from a spaceship

Even though space debris probably won't hit you on Earth, it can be dangerous to space missions. It can crash into astronauts or spacecraft. It can also damage satellites and cause them to malfunction. We rely on satellites for weather reports, cell phones, and the Internet. If satellites are damaged in orbit, then we will not have those important services on Earth.

TRACKING SPACE POLLUTION

Scientists around the world use technology to keep track of space pollution. They have to know where the debris is so that they can plan the paths that rockets will take when traveling to space. They also have to know if any of the debris will put astronauts in danger. The International Space Station always has astronauts on board. They live on the space station for months at a time and conduct important research. Sometimes, if a piece of space pollution is moving too close to the space station, they have to quickly move the whole station out of the way to avoid danger.



This radar system in Shemya Island, Alaska, detects and tracks space debris near Earth.

In 2021, scientists noticed that a large piece of an old spacecraft from the 1990s was heading dangerously close to the space station. The astronauts on board had to use a special rocket to push the station to a safer orbit to dodge the debris. Even a small piece of space trash could cause tremendous damage if it collided with the station.

In the United States, NASA and the Department of Defense have a special program that monitors every

known piece of space junk orbiting the Earth. They keep detailed maps of Earth's orbit, showing all the debris they have discovered. They have identified 27,000 pieces of debris that are large enough to track, but they estimate that there could be millions of other smaller pieces of pollution as well.

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