

## **Expert Pack: The Goldilocks Zone**

Submitted by: DC Public Schools

Grade: 4-5

Date: December 2014

<b>Topic/Subject</b>
Astronomy: Exploring the Goldilocks Zone
<b>Texts/Resources</b>
<p>Article(s)</p> <ol style="list-style-type: none"><li>1. "The Day Aliens Attacked America"</li><li>2. "Telltale Signs"</li><li>3. "Other Earths?"</li><li>4. "The Planet Hunters"</li></ol> <p>Other Media</p> <ol style="list-style-type: none"><li>5. "Solar System 101" [<a href="#">Video</a>]</li><li>6. "War of the Worlds Broadcast" [<a href="#">Video</a>]</li><li>7. "Why Can't We See Evidence of Alien Life?" [<a href="#">Video</a>]</li><li>8. "Hubble's Top Shots" [<a href="#">Photos</a>]</li><li>9. "Selected Sounds of Space" [<a href="#">Audio Clips</a>]</li><li>10. "Astrobiology and the Search for Alien Life" [<a href="#">Video</a>]</li><li>11. "The Voyager Interstellar Record – 1/31" [<a href="#">Audio Clip</a>]</li></ol> <p>Each Expert Pack contains a variety of selections grouped to create as coherent and gradual a learning process for students as possible, generally beginning with lower levels as measured by quantitative and qualitative measures, and moving to more complex levels in the latter selections. This graduated approach helps support students' ability to read the next selection and to become 'experts' on the topic they are reading about.</p>
<b>Rationale and suggested sequence for reading</b>
<p>This Expert Pack is designed to provide students with an overview on where technology has placed us in terms of exploring the universe and ultimately finding a planet similar to ours. The set begins with a video overview about our Solar System for those students who may have yet to learn about this topic. It is also brief enough to provide a refresher for students that are familiar with the information. After the brief review, students dive into what is needed to sustain life, the field of astrobiology, and technological advances that have helped us learn more about the universe. The set concludes with a video that gives a broad overview of where we were, where we have been, and what needs to happen to propel us forward in answering this question: Are we alone?</p> <ol style="list-style-type: none"><li>1. "Solar System 101"<ul style="list-style-type: none"><li>• This video gives a brief overview of the Solar System and characteristics of each planet.</li></ul></li><li>2. "The Ware of the Worlds Radio Broadcast- Short Version"<ul style="list-style-type: none"><li>• Introduces students to a 1938 fictional radio broadcast about aliens attacking the world.</li></ul></li><li>3. "The Day Aliens Attacked America"<ul style="list-style-type: none"><li>• Captures students' interest. Explores the idea of life on other planets from being highly fictionalized 50 years ago to becoming a reality in the future.</li></ul></li><li>4. "Telltale Signs"<ul style="list-style-type: none"><li>• Explains how life on Earth needs water.</li></ul></li><li>5. "Astrobiology and the Search for Alien Life"<ul style="list-style-type: none"><li>• Introduces the idea of a field dedicated to finding life on other planets, and the scenarios that</li></ul></li></ol>

would be necessary to sustain life on other planets.

6. "Other Earths?"
  - Describes the Kepler telescope and how it supports the search for other earth-like planets.
7. "The Planet Hunters"
  - Explains the vastness of our galaxy and updates the Kepler search.
8. "Hubble's Top Shots"
  - More than 100 pictures taken of the Universe from the Hubble telescope. The pictures include other galaxies, nebulae and star clusters.
9. "Selected Sounds of Space"
  - These are some of Professor Don Gurnett's favorite sounds of space, recorded by University of Iowa instruments on a variety of spacecraft over the past 50 years.
10. "Why Can't We See Evidence of Alien Life?"
  - Brings everything full circle—talks about the vastness of the universe, what life will mean on other planets, how we need to support the search and encourages students to keep being curious.
11. "The Voyager Interstellar Record – 1/31"
  - Fascinating way to end the set and keep students' interests piqued—contains audio from records that were included aboard the *Voyager* in 1977, and are intended for any intelligent life forms who may find them.

#### The Common Core Shifts for ELA/Literacy:

1. Regular practice with complex text and its academic language
2. Reading, writing and speaking grounded in evidence from text, both literary and informational
3. *Building knowledge through content-rich nonfiction*

Though use of these Expert Packs, student proficiency will be enhanced with most or all of the Common Core Standards. They will focus primarily on Shift 3, and the highlighted portions of the standards below.

#### College and Career Readiness Anchor Standards for Reading Literary and/or Informational Texts (*the darkened sections of the standards are the focus of the Expert Pack learning for students*):

1. ***Read closely to determine what the text says explicitly and to make logical inferences from it;*** cite specific textual evidence when writing or speaking to support conclusions drawn from the text.
2. ***Determine central ideas or themes of a text and analyze their development;*** summarize the key supporting details and ideas.
10. **Read and comprehend complex literary and informational texts independently and proficiently**

#### Content Standard(s):

<http://bit.ly/StateSocialStudiesStandardsK-5>

<http://bit.ly/StateScienceStandardsK-5>

Link to basal table of contents

#### Annotated Bibliography and suggested sequence for reading

#### N/A "Solar System 101"

Author: National Geographic

Genre: Informational Video

Length: 3 Minutes 21 Seconds

Step 4 on Checklist for Creating an Expert Pack

Synopsis: Our Solar System is made up of eight unique planets which rotate around the Sun including the Earth. Although we are part of the Milky Way Galaxy, our star is one of billions of stars in this galaxy; in a universe comprised of billions of galaxies.

Citation: "Solar System 101" YouTube.com. Web. 19 Nov 2014.

<<http://www.youtube.com/watch?v=txppyWYDbDk>>

Cost/Access: \$0.00/YouTube

Recommended Student Activities: \*Students should have a journal (may call it the Extraterrestrial Investigations) to keep track of their notes for each text. After watching this video multiple times, students should draw and label our solar system, our galaxy, and create a representation of the other stars in our galaxy and our relation to galaxies beyond. The goal is for students to gain a conceptual understanding of Earth's presence in the universe and to start allowing students to think about what is beyond Earth and our Solar System.

#### **N/A "The War of the Worlds Radio Broadcast- Short Version"**

Author: Orson Welles

Genre: Nonfiction Audio

Length: 2 Minutes 18 Seconds

Synopsis: The audio provided is from a 1938 radio broadcast featuring a fictional story about an army of aliens taking over Earth.

Citation: "The War of the Worlds Radio Broadcast- Short Version." YouTube.com. Web. 18 Dec 2014.

<https://www.youtube.com/watch?v=ClreKtEi4dM>

Cost/Access: \$0.00/ YouTube

Recommended Student Activities: Students document main events from this broadcast in their ET Investigations. Using supporting details from the broadcast, students describe why this broadcast was so believable.

#### **900L "The Day Aliens Attacked America"**

Author: Lauren Tarshis

Genre: Nonfiction

Length: 6 pages

Synopsis: This article covers three topics: An event in 1938, the current study of space, and how we imagine alien life.

Citation: TARSHIS, LAUREN. "The Day Aliens Attacked America." *Scholastic Scope* 59.8 (2011): 4. *Middle Search Plus*. Web. 17 Sep. 2014. <<http://elit.mullinfm.net/Documents/SCOPE-011011-Nonfiction.pdf>>.

Cost/Access: \$0.00/ EBSCO Database

Recommended Student Activities: Students may answer these questions in their journal: "What was the attitude toward life from other planets in 1938? How has our approach changed since then?"

#### **660L "Telltale Signs"**

Author: European Space Agency

Genre: Nonfiction

Length: 1 page

Synopsis: Water is the main source of continued life on Earth and when looking for life on other planets, scientists are searching for water.

Citation: "Telltale Signs." ESA. Web. 18 Sep 2014.

[http://www.esa.int/esaKIDSen/SEMGQIWJD1E\\_LifeinSpace\\_2.html](http://www.esa.int/esaKIDSen/SEMGQIWJD1E_LifeinSpace_2.html)

Cost/Access: \$0.00/ Web

Recommended Student Activities: In notebook, list what makes Earth able to support life.

#### **990L "Astrobiology and the Search for Alien Life"**

Author: SciShow

Genre: Informational Video

Length: 4 Minutes, 7 Seconds

Synopsis: Hank talks about astrobiology - the study of and search for life in the universe off Earth. Right now, the field has more questions than answers, but all they all seek to answer that one fundamental query: Are we alone in the universe?

Citation: "Astrobiology and the Search for Alien Life." YouTube.com. Web. 17 Nov 2014.

<http://www.youtube.com/watch?v=cuZrQUY5AF4>

Cost/Access: \$0.00/YouTube

Recommended Student Activities: In notebooks, students define astrobiology and describe the two different groups of astrobiologists. Which group would they prefer to be in? Why?

#### **1180L "Other Earths?"**

Author: Scholastic News

Genre: Nonfiction

Length: 1 page

Synopsis: The Kepler is a powerful telescope that was originally launched on a three-year mission by NASA to find other earth-like planets in our galaxy, the Milky Way.

Citation: "Other Earths?." *Scholastic News -- Edition 5/6* 77.19 (2009): 2. *Education Research Complete*. Web. 20 Sep. 2014. Retrieved from EBSCO.

Cost/Access: \$0.00/ EBSCO

Recommended Student Activities: In notebooks, explain what the Kepler is and what are its goals.

## **890L "The Planet Hunters"**

Author: Storyworks

Genre: Nonfiction

Length: 2 pages

Synopsis: Our galaxy is comprised of more than 200 billion stars and Kepler was created to find any habitable planets that revolve around any of those stars. So far, Kepler has found one planet that seems to be the same size as Earth and revolving similarly distant from its sun.

Citation: Kurzius, Alexa C. "Planet Hunters." *Scholastic Math* 35.2 (2014): 6. *MAS Complete*. Web. 20 Sep. 2014. Retrieved from EBSCO.

Cost/Access: \$0.00/ EBSCO

Recommended Student Activities: Draw and explain how the Kepler finds exoplanets.

## **N/A "Hubble's Top Shots"**

Author: Hubble Telescope

Genre: Nonfiction Images

Length: Webpage

Synopsis: This photo gallery walks viewers through the plethora of images taken from the Hubble Telescope during the past 20 years. These images depict galaxies, nebulae, and star clusters among many other images.

Citation: "Hubble's Top Shots." Hubble Telescope. Web. 21 Nov 2014. <<http://hubblesite.org/gallery/album/>>

Cost/Access: \$0.00

Recommended Student Activities: Students could divide their paper into four columns and list characteristics they saw from the pictures of galaxies, nebulae, planets, and star clusters. Additionally, students may select the most intriguing photo and click on the "learn more" button with the picture to dive more deeply into their selection.

**N/A    “Selected Sounds of Space”**

Author: University of Iowa

Genre: Nonfiction Sounds

Length: Webpage

Synopsis: These are some of Professor Don Gurnett's favorite sounds of space, recorded by University of Iowa instruments on a variety of spacecraft over the past 50 years. Sounds are from Space surrounding Earth and Jupiter.

Citation: “Selected Sounds of Space.” University of Iowa. Web. 21 Nov 2014. <http://www-pw.physics.uiowa.edu/space-audio/sounds/>

Cost/Access: \$0.00/ Web

Recommended Student Activities: Students could select three to four sounds and document in their ET Investigations the similarities and differences between the sounds.

**N/A    “Why Can’t We See Evidence of Alien Life?”**

Author: Andrew Park and Chris Anderson

Genre: Informational Video

Length: 6 minutes and 3 seconds

Synopsis: Given the vast number of planets in the universe, many much older than Earth, why haven't we yet seen obvious signs of alien life? The potential answers to this question are numerous and intriguing, as well as alarming and hopeful.

Citation: “Why Can’t we see Evidence of Alien Life?” Ed.TED.com. Web. 17 Sep 2014. <http://ed.ted.com/lessons/why-can-t-we-see-evidence-of-alien-life>

Cost/Access: \$0.00

Recommended Student Activities: Students list where they think we are in terms of finding evidence of life on other planets. Do they think alien life will be found in their lifetime? Also, students may list any additional questions this video has elicited. They may conduct independent research to answer any remaining answerable questions.

## Supports for Struggling Students

By design, the **gradation of complexity** within each Expert Pack is a technique that provides struggling readers the opportunity to read more complex texts. Listed below are other measures of support that can be used when necessary.

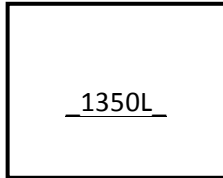
- Provide a brief **student-friendly glossary** of some of the academic vocabulary (tier 2) and domain vocabulary (tier 3) essential to understanding the text.
- Download the Wordsmyth widget to classroom computers/tablets for students to access student-friendly definitions for unknown words. <http://www.wordsmyth.net/?mode=widget>
- Provide brief **student friendly explanations** of necessary background knowledge.
- Include **pictures or videos** related to the topic within and in addition to the set of resources in the pack.
- Select a small number of texts to **read aloud** with some discussion about vocabulary work and background knowledge.
- Provide **audio recordings** of the texts being read by a strong reader (teacher, parent, etc.).
- **Chunk the text** and provide brief questions for each chunk of text to be answered *before* students go on to the next chunk of text.
- Pre-reading activities that focus on the **structure and graphic elements** of the text.
- Provide **volunteer helpers** from the school community during independent reading time.

## Text Complexity Guide

“Scientists: We’re ‘very close’ to finding another Earth,” by Suzanne Presto

### 1. Quantitative Measure

Go to <http://www.lexile.com/> and enter the title of the text in the Quick Book Search in the upper right of home page. Most texts will have a Lexile measure in this database. You can also copy and paste a selection of text using the Lexile analyzer.



2-3 band	420 -820L
4-5 band	740 -1010L
6-8 band	925 - 1185L
9 -10 band	1050 – 1335L
11 – CCR	1185 - 1385

### 2. Qualitative Features

Consider the four dimensions of text complexity below. For each dimension\*, note specific examples from the text that make it more or less complex.

<p>The article explicitly states that scientists are closer to finding life on other planets than they have ever been, however the purpose for finding another planet is briefly mentioned. There is a centuries-old curiosity about whether or not there is another Earth-like planet out there, and finding that is very important to people.</p>	<p>Ideas are cohesive, but the article uses graphics and videos to support the ideas delivered and introduce new ideas.</p>
<p><b>Meaning/Purpose</b></p>	<p><b>Structure</b></p>
<p><b>Language</b></p> <p>The article does not contain overly specific academic terms, but does have some figurative language (“holy grail,” “spotting a firefly beside a searchlight”) and a few words or ideas that may be unfamiliar to students (stellar, stalwart, evolving, multitude, improbable).</p>	<p><b>Knowledge Demands</b></p> <p>Both the subject matter and intercontextuality are high. There are many references to Kepler, Hubble, NASA, and other concepts that a reader may be unfamiliar with if they haven’t been following the research.</p>

### 3. Reader and Task Considerations

*What will challenge students most in this text? What supports can be provided?*

- This article, although short, is packed with information. To support students with accessing and remembering the information provided, it would be helpful to have a graphic organizer where students can note the timeline of the progress in finding earth-like planets.

\*For more information on the qualitative dimensions of text complexity, visit [http://www.achievethecore.org/content/upload/Companion\\_to\\_Qualitative\\_Scale\\_Features\\_Explained.pdf](http://www.achievethecore.org/content/upload/Companion_to_Qualitative_Scale_Features_Explained.pdf)



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### **Learning Worth Remembering**

**Cumulative Activities** – The following activities should be completed and updated after reading each resource in the set. The purpose of these activities is to capture knowledge building from one resource to the next, and to provide a holistic snapshot of central ideas of the content covered in the expert pack. *It is recommended that students are **required** to complete one of the Cumulative Activities (Rolling Knowledge Journal or Rolling Vocabulary) for this Expert Pack.*

#### **1. Rolling Knowledge Journal**

1. Read each selection in the set, one at a time.
2. After you read *each* resource, stop and think what the big learning was. What did you learn that was new *and important* about the topic from *this* resource? Write, draw, or list what you learned from the text about (topic).
3. Then write, draw, or list how this new resource added to what you learned from the last resource(s).

#### **Sample Student Responses**

Title	Write, Draw, or List	
	New and important learning about the topic	How does this resource add to what I learned already?
1. "Solar System 101" (Video)	Background information about our, solar system and each of the planets.	Acts as an introduction to our solar system and each planet and ends with the vastness of the galaxy and how our solar system is only one tiny system within that galaxy.
2. "The War of the Worlds Radio Broadcast- short Version"	This radio broadcast is from a 1938 show featuring a fictional story about any army of aliens taking over the Earth. It highlights how people felt about the idea of aliens almost a century ago.	Introduces the traditional view of aliens- scary creatures that want to take over the Earth and potentially harm people. It is a great primary source to contextualize this conversation about finding life elsewhere.
3. "The Day Aliens Attacked America"	Introduces the idea of what could support life on other planets and demonstrates how alien life was fictionalized in the early part of the 20 <sup>th</sup> century.	Explains the concept of "Goldilocks Planets," and the job of astrobiologists. Introduces the Hubble and Kepler Space Telescopes. Encourages students to think critically about what is necessary to support life and what life on other planets could look like
4. "Telltale Signs"	Water is the main source of continued life on Earth. Explains that when scientists are looking for life on other planets, they are searching for "biomarkers": water, correct	Adds to the understanding of what would be needed to sustain life on other planets and what biomarkers scientists are searching for. Solidifies the concept of "Goldilocks Zone."

	temperature, and gases.	
5. “Astrobiology and the Search for Alien Life” <b>(Video)</b>	Explains the field of astrobiology is the study of and search for life in the universe.	It expands on the definition of astrobiologists from “Day Aliens Attacked” and reinforces what they need to measure and detect on other planets. Introduces SETI.
6. “Other Earths?”	Detailed information on the Kepler telescope’s mission	Explains how Kepler can detect planets through changes in the brightness of stars.
7. “The Planet Hunters”	Reinforces the vastness of the universe with specific size examples. Gives details of how Kepler undertakes its mission and introduces a NASA astronomer and member of the Kepler Mission Team.	“Other Earths” explained how Kepler detects planets through brightness. This article expands to include that Kepler also looks for another telltale sign, a “wobble.” Also shows an example of Kepler’s success: a planet named Kepler 22b.
8. “Hubble’s Top Shots” and “Kepler’s Search for Habitable Planets” <b>(Websites)</b>	Hubble site shows the photos of faraway galaxies and NASA’s Kepler site gives details	Hubble images give students a real picture of what we have found in our universe and NASA’s Kepler site can answer more detailed questions about Kepler’s mission and team, including a running counter of planets discovered (996!)
9. “Selected Sounds of Space”	Examples of what space sounds like based on devices we have in space.	Contextualizes space.
10. “Why Can’t We See Evidence of Alien Life?” <b>(Video)</b>	Gives a humorous graphic representation of scientists’ search for life on other planets, including Kepler data and SETI, and why we need to stay curious.	Although this series doesn’t end conclusively with life found outside of earth, this video encourages students to stay curious, not just about the universe, but about everything.
11. “The Voyager Interstellar Record – 1/31”	This audio clip contains recordings that were included aboard the <i>Voyager</i> in 1977. These recordings described Earth and its people’s way of life for any intelligent life form that might find it.	This clip helps to bring the topic full circle and is an interested way to exemplify our continued interest in finding life on other planets.

## 2. Rolling Vocabulary: “Fantastic Four”

- Read each resource then determine the 5 words from each text that most exemplify the central idea of the text.
- Next use your 5 words to write about the most important idea of the text. You should have as many sentences as you do words.
- Continue this activity with EACH selection in the Expert Pack.
- After reading all the selections in the Expert Pack, go back and review your words.
- Now select the “**Fantastic Five**” words from ALL the word lists.
- Use the “**Fantastic Five**” words to summarize the most important learning from this Expert Pack.

Title	Five Vocabulary Words & Sentences
“The Day Aliens Attacked America”	<p><b>Words:</b> Ingenious, Sextillion, Astrobiologists, Interstellar, Cyborg</p> <p><b>Sentences:</b></p> <ol style="list-style-type: none"> <li>1. In some depictions, aliens are portrayed as <b>ingenious</b> beings who are using their brains to plot against humans.</li> <li>2. There are 70 <b>sextillion</b> stars in the universe.</li> <li>3. <b>Astrobiologists</b> are scientists working to find life on other planets.</li> <li>4. <b>Interstellar</b> space hopefully has an exoplanet similar to Earth.</li> <li>5. Some people believe that <b>cyborgs</b> could inhabit Earth now.</li> </ol>
“Telltale Signs”	<p><b>Words:</b> Orbit, Creatures, Biomarkers, Methane, Ozone</p> <p><b>Sentences:</b></p> <ol style="list-style-type: none"> <li>1. The planets in our Solar System <b>orbit</b> the Sun.</li> <li>2. Scientists are firm in their beliefs that <b>creatures</b> need certain things to survive, one of those being water.</li> <li>3. We look for certain <b>biomarkers</b>, like methane and oxygen, to determine if a planet is habitable.</li> <li>4. <b>Methane</b> is a gas that we look for on other planets to indicate life.</li> <li>5. The <b>Ozone</b> keeps the oxygen in the Earth’s atmosphere.</li> </ol>
“Other Earths?”	<p><b>Words:</b> Launched, Detect, Milky Way, , Galaxy, Indicate</p> <p><b>Sentences:</b></p> <ol style="list-style-type: none"> <li>1. The Kepler was <b>launched</b> into space to find another habitable planet.</li> <li>2. In order to <b>detect</b> planets orbiting a star, the Kepler looks for periods of dimness in the star.</li> <li>3. Our Solar System is part of the <b>Milky Way</b> galaxy.</li> <li>4. A <b>galaxy</b> is a cluster of stars and planets.</li> <li>5. If we find no other planets like Earth, it would <b>indicate</b> that we are the only habitable planets</li> </ol>
“The Planet Hunters”	<p><b>Words:</b> Light years, Precise, Data, Atmosphere, Habitable</p> <p><b>Sentences:</b></p> <ol style="list-style-type: none"> <li>1. Space is measured in <b>light years</b>, which is a unit based on the speed in which light travels in one year.</li> <li>2. The Kepler is the most <b>precise</b> telescope ever created.</li> <li>3. Experts study <b>data</b> given from the Kepler to determine if they have found a planet in the habitable zone.</li> <li>4. A planet’s <b>atmosphere</b> is the layer of gases that block it from a star’s rays.</li> <li>5. Conditions found on Earth, like water and temperature, make it <b>habitable</b> for life.</li> </ol>

**Fantastic Five**

Galaxy, Astrobiologists, Data, Biomarkers, Habitable

**Summary:**

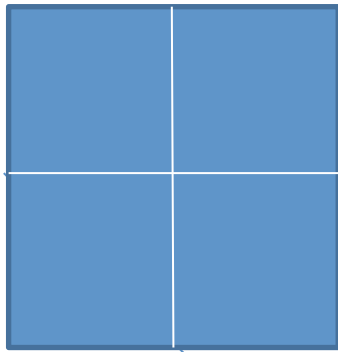
Our Milky Way **Galaxy**, is just one of millions in the vast Universe. Thanks to **data** on **biomarkers** from the Hubble and Kepler, **astrobiologists** have made tremendous strides in the quest to find other **habitable** planets.

**Learning Worth Remembering**

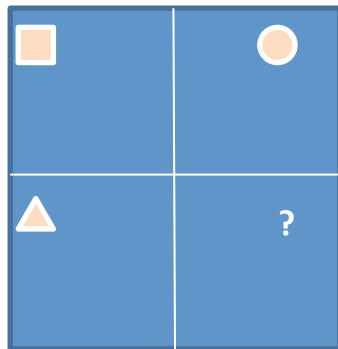
**Singular Activities** – the following activities can be assigned for each resource in the set. The purpose of these activities is to check for understanding, capture knowledge gained, and provide variety of ways for students to interact with each individual resource. Students may complete some or none of the suggested singular activities for each text. Singular activities should be assigned at the discretion of the teacher.

**1. A Picture of Knowledge** (Recommended for “The Day Aliens Attacked America”)

- Take a piece of paper and fold it two times: once across and once top to bottom so that it is divided into 4 quadrants.



- Draw these shapes in the corner of each quadrant.



1. Square
2. Triangle
3. Circle
4. Question Mark

- Write!

Square:	What one thing did you read that was interesting to you?
Triangle:	What one thing did you read that taught you something new?
Circle:	What did you read that made you want to learn more?
Question Mark:	What is still confusing to you? What do you still wonder about?

- Find at least one classmate who has read “The Day Aliens Attacked America” and talk to each other about what you put in each quadrant.

## 2. Quiz Maker (Recommended for “Other Earths?”)

- Make a list of # questions that would make sure another student understood the information.
- Your classmates should be able to find the answer to the question from the resource.
- Include answers for each question.
- Include where you can find the answer in the resource.

Question	Answer
1.	
2.	
3.	

## 3. Pop Quiz (Recommended “The Planet Hunters”)

Answer the following questions.

Question	Possible Answer
1. Scientists think that there are over 70 sextillion stars outside the Milky Way, which equals more stars than what?	More stars than all the grains of sand on every beach and desert on Earth.
2. Steve Howell, NASA astronomer, is part of what important team?	Kepler Mission Team
3. When scientists look at Kepler’s star data, what 2 telltale signs of a planet do they look for?	1. “Wobble” meaning that a star is being tugged back and forth by a planet’s gravity. 2. A change in a star’s light
4. From Kepler’s data, scientists found a new planet, Kepler 22b, in the “Goldilocks Zone” of a star. What does this mean could exist on the planet?	Water and temperatures that could support life
5. What do the scientists need to study to determine if Kepler 22b is habitable?	The planet’s atmosphere, looking for “biomarkers” like gases

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Submitted by: DC Public Schools

Grade: 4-5

Date: December 2014

#### Expert Pack Glossary

##### **“The Day Aliens Attacked America”**

<i>Word</i>	<i>Student-Friendly Definition</i>
Ingenious	Ingenious means having or showing cleverness or creativity, especially in designing or in solving problems. Ex. A person can be ingenious at finding ways to work more quickly.
Sextillion	Sextillion is the number represented as one followed by 21 zeros (1,000,000,000,000,000,000,000). Ex. There are around 1 sextillion stars in the universe.
Astronomers	Astronomers specialize in the scientific study of stars, planets, and other objects in outer space. Ex. Astronomers are individuals who specialize at studying space.
Interstellar	Interstellar means existing or occurring between stars. Ex. As you get outside the solar system, into interstellar space, particles become few and far between.
Cyborg	A cyborg is a person whose body contains mechanical or electrical devices and whose abilities are greater than the abilities of normal humans. Ex. A cyborg is neither dead nor alive; it is purely a man-made person.

##### **“Telltale Signs”**

<i>Word</i>	<i>Student-Friendly Definition</i>
Orbiting	Orbiting is the curved path that something (such as a moon or satellite) follows as it goes around something else (such as a planet). Ex. The earth is continually orbiting the sun once every 365.25 days.
Creatures	Creatures are animals of any type. Ex. They say that some forests are filled with wild creatures.
Biomarkers	A biomarker is a distinct characteristic or substance that is an indicator of a particular biological condition or process. Ex. A blood test can measure biomarker proteins for cancer.
Methane	Methane is a colorless gas that has no smell and that can be burned for fuel. Ex. A great fire can erupt from the leakage of methane gas.
Ozone	Ozone is a form of oxygen that is found in a layer high in the earth's atmosphere. Ex. You, using less gas and buying less stuff will rebuild the ozone.

### “Other Earths?”

<i>Word</i>	<i>Student-Friendly Definition</i>
Launched	Launch means to send or shoot (something, such as a rocket) into the air, water or into outer space. Ex. Rockets can be launched midway in a battle.
Detects	Detect is to discover or notice the presence of (something that is hidden or hard to see, hear, taste, etc.). Ex. The scanners in airports can detect all the items in a locked suitcase.
Milky Way	Milky Way is a broad band of light that can be seen in the night sky and that is caused by the light of a very large number of faint stars. Ex. The Milky Way is also the swath of light in the night sky produced by the other stars in the galaxy.
Telescope	A telescope is a device shaped like a long tube that you look through in order to see things that are far away. Ex. An optical instrument you use to look at the stars that makes the stars appear closer is an example of a telescope.
Galaxy	Galaxy is any one of the very large groups of stars that make up the universe. Ex. An example of a galaxy is the Milky Way.
Indicate	Indicate means to point out or to show. Ex. A student can point to a room to indicate which teacher you like best.

### “The Planet Hunters”

<i>Word</i>	<i>Student-Friendly Definition</i>
Exoplanet	Exoplanet is a planet orbiting a star. Ex. Many planets (over 200) have been discovered in the nineties that don't go around our Sun. They are exoplanets.
Precise	Precise means exact. Ex. An example of precise is having the exact amount of money needed to buy a notebook.
Experts	An expert is a person who has special skill or knowledge relating to a particular subject. Ex. Like astronomers are experts of the sky, doctors are experts on deadly diseases.
Light years	Light years is a unit of distance equal to the distance light can travel in a year, or approximately six trillion miles. Ex. My new computer is light-years ahead of the old one.
Habitable	Habitable is suitable or fit to live in. Ex. A home is habitable when one (humans) can dwell in it.
Solar System	The solar system is our sun and the planets that move around it. Ex. We all grew up learning, in school, that there were nine planets in the solar system.

References:

[www.learnersdictionary.com](http://www.learnersdictionary.com)

[www.dictionary.reference.com](http://www.dictionary.reference.com)

<http://www.wordsmyth.net/blog/children-dictionary/>