

Habitable Exoplanets

Investigation Information and Standards Alignment

Subject

Science

Discipline

Earth Space Science

Grade band

6-8

Description of Investigation

Students figure out if any other of the exoplanets that were discovered by scientists during the Kepler mission have a good chance of supporting life.

Core Idea(s)

ESS1: Characteristics of the Universe and Solar System

ESS4: Earth Materials and Systems

Practices

SEP1: Asking questions and defining problems

SEP3: Planning and carrying out investigations

SEP4: Analyzing and interpreting data

SEP5: Using mathematics and computational thinking

SEP7: Engaging in argument from evidence

SEP8: Obtaining, evaluating, and communicating information

Crosscutting Concepts

CC3: Scale, proportion, and quantity

CC4: Systems and system models

Alignment with Academic Standards for Science

Teachers can use this investigation to help students reach any of the performance expectations for science that are listed in the table below.

Source	Code	Performance Expectation
NGSS	MS-ESS1-3	Analyze and interpret data to determine scale properties of objects in the solar system.
Alabama	6.ESS.3	Develop and use models to determine scale properties of objects in the solar system (e.g., scale model representing sizes and distances of the sun, Earth, moon system based on a one-meter diameter sun).
Arizona	6.E2U1.7	Use ratios and proportions to analyze and interpret data related to scale, properties, and relationships among objects in our solar system.
Arkansas	8-ESS1-3	Analyze and interpret data to determine scale properties of objects in the solar system
Colorado	MS-ESS1-3	Analyze and interpret data to determine scale properties of objects in the solar system.
Florida	SC.8.E.5.7	Compare and contrast the properties of objects in the Solar System including the Sun, planets, and moons to those of Earth, such as gravitational force, distance from the Sun, speed, movement, temperature, and atmospheric conditions.
Georgia	--	--

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Indiana	6.ESS.3	Compare and contrast the Earth, its moon, and other planets in the solar system, including comets and asteroids. (Comparisons should be made in regard to size, surface features, atmospheric characteristics, and the ability to support life.)
Minnesota	6E.3.1.1.1	Develop and use scale models of solar system objects to describe the sizes of objects, the location of objects, and the motion of the objects; and include the role that gravity and inertia play in controlling that motion
Mississippi	E.5.8A.1	Develop and use scaled models of Earth's solar system to demonstrate the size, composition (i.e., rock or gas), location, and order of the planets as they orbit the Sun
Missouri	6-8.ESS1.B.1	Analyze and interpret data to determine scale properties of objects in the solar system.
Montana	ESS.3	Analyze and interpret data to determine scale properties of objects in the solar system
Nebraska	SC.8.11.6.C	Analyze and interpret data to determine scale properties of objects in the solar system.
North Carolina	6.E.1.2	Explain why Earth sustains life while other planets do not based on their properties (including types of surface, atmosphere and gravitational force) and location to the Sun
Ohio	5.ESS.1	The solar system includes the sun and all celestial bodies that orbit the sun. Each planet in the solar system has unique characteristics.
South Carolina	8.E.4B.1	Obtain and communicate information to model and compare the characteristics and movements of objects in the solar system (including planets, moons, asteroids, comets, and meteors).
Texas	--	--
Utah	6.1.3	Use computational thinking to analyze data and determine the scale and properties of objects in the solar system. Examples of scale could include size or distance. Examples of properties could include layers, temperature, surface features, or orbital radius. Data sources could include Earth and space-based instruments such as telescopes or satellites. Types of data could include graphs, data tables, drawings, photographs, or models
Virginia	ES.3	The student will investigate and understand the characteristics of Earth and the solar system. Key concepts include: a) position of Earth in the solar system; b) sun-Earth-moon relationships; (seasons, tides, and eclipses); c) characteristics of the sun, planets and their moons, comets, meteors, and asteroids; and d) the history and contributions of space exploration.
Wyoming	MS-ESS1-3	Analyze and interpret data to determine scale properties of objects in the solar system.

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Alignment with Common Core State Standards for English Language Arts

Teachers can use this investigation to help students reach any of the performance expectations for reading, writing, or speaking and listening that are listed in the table below. For this investigation, we list the grade 8 standards, as these are the targets for students in the grade range this investigation is intended to be used.

Strand	Code	Standard
Reading	RST.6-8.1	Cite specific textual evidence to support analysis of science and technical texts.
	RST.6-8.2	Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions.
	RST.6-8.4	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to <i>grades 6-8 texts and topics</i> .
	RST.6-8.5	Analyze the structure an author uses to organize a text, including how the major sections contribute to the whole and to an understanding of the topic.
	RST.6-8.6	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text.
	RST.6-8.7	Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).
	RST.6-8.8	Distinguish among facts, reasoned judgment based on research findings, and speculation in a text.
	RST.6-8.9	Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.
	RST.6-8.10	By the end of grade 8, read and comprehend science/technical texts in the grades 6-8 text complexity band independently and proficiently.
	Writing	WHST.6-8.1.A
WHST.6-8.1.B		Support claim(s) with logical reasoning and relevant, accurate data and evidence that demonstrate an understanding of the topic or text, using credible sources.
WHST.6-8.1.C		Use words, phrases, and clauses to create cohesion and clarify the relationships among claim(s), counterclaims, reasons, and evidence.
WHST.6-8.1.D		Establish and maintain a formal style.
WHST.6-8.1.E		Provide a concluding statement or section that follows from and supports the argument presented.
WHST.6-8.2.A		Introduce a topic clearly, previewing what is to follow; organize ideas, concepts, and information into broader categories as appropriate to achieving purpose; include formatting (e.g., headings), graphics (e.g., charts, tables), and multimedia when useful to aiding comprehension.

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	WHST.6-8.2.B	Develop the topic with relevant, well-chosen facts, definitions, concrete details, quotations, or other information and examples.
	WHST.6-8.2.C	Use appropriate and varied transitions to create cohesion and clarify the relationships among ideas and concepts.
	WHST.6-8.2.D	Use precise language and domain-specific vocabulary to inform about or explain the topic.
	WHST.6-8.2.E	Establish and maintain a formal style and objective tone.
	WHST.6-8.2.F	Provide a concluding statement or section that follows from and supports the information or explanation presented.
	WHST.6-8.4	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
	WHST.6-8.5	With some guidance and support from peers and adults, develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on how well purpose and audience have been addressed.
	WHST.6-8.6	Use technology, including the Internet, to produce and publish writing and present the relationships between information and ideas clearly and efficiently.
	WHST.6-8.9	Draw evidence from informational texts to support analysis, reflection, and research.
	WHST.6-8.10	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.
Speaking and Listening	SL.8.1	Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade (6-)8 topics, texts, and issues, building on others' ideas and expressing their own clearly.
	SL.8.1.A	Come to discussions prepared, having read or researched material under study; explicitly draw on that preparation by referring to evidence on the topic, text, or issue to probe and reflect on ideas under discussion.
	SL.8.1.B	Follow rules for collegial discussions and decision-making, track progress toward specific goals and deadlines, and define individual roles as needed.
	SL.8.1.C	Pose questions that connect the ideas of several speakers and respond to others' questions and comments with relevant evidence, observations, and ideas.
	SL.8.1.D	Acknowledge new information expressed by others, and, when warranted, qualify or justify their own views in light of the evidence presented.
	SL.8.3	Delineate a speaker's argument and specific claims, evaluating the soundness of the reasoning and relevance and sufficiency of the evidence and identifying when irrelevant evidence is introduced.
	SL.8.4	Present claims and findings, emphasizing salient points in a focused, coherent manner with relevant evidence, sound valid reasoning, and

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		well-chosen details; use appropriate eye contact, adequate volume, and clear pronunciation.
	SL.8.5	Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest.
	SL.8.6	Adapt speech to a variety of contexts and tasks, demonstrating command of formal English when indicated or appropriate.

Alignment with English Language Proficiency Standards

Teachers can use this investigation to help emerging multilingual students reach the performance expectations for English language proficiency listed in the table below.

Modality	Code	Standard
Receptive	ELP 1	Construct meaning from oral presentations and literary and informational text through grade-appropriate listening, reading, and viewing.
	ELP 8	Determine the meaning of words and phrases in oral presentations and literary and informational text.
Productive	ELP 3	Speak and write about grade-appropriate complex literary and informational texts and topics.
	ELP 4	Construct grade-appropriate oral and written claims and support them with reasoning and evidence.
	ELP 7	Adapt language choices to purpose, task, and audience when speaking and writing.
	ELP 9	Create clear and coherent grade-appropriate speech and text.
	ELP 10	Make accurate use of standard English to communicate in grade-appropriate speech and writing.
Interactive	ELP 2	Participate in grade-appropriate oral and written exchanges of information, ideas, and analyses, responding to peer, audience, or reader comments and questions.
	ELP 5	Conduct research and evaluate and communicate findings to answer questions or solve problems.
	ELP 6	Analyze and critique the arguments of others orally and in writing.