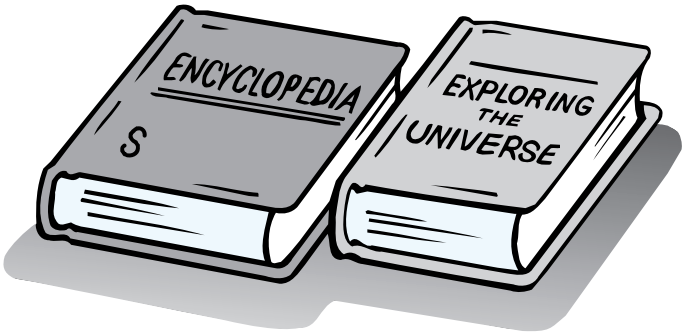
Chapter Science Investigation Name _____

Researching Space Technology

What You Need



reference and nonfiction books on space exploration, or the Internet

Find Out

Do this activity to see what kinds of technology are used to gather different types of astronomical data.

Process Skills

Predicting
Communicating

Time

- 20 minutes each day for two weeks

What to Do

1. Study the chart. **Predict** which tool would be appropriate for each exploration.

2. Select appropriate books on the subject from the library or Internet and look up the areas of study listed either at the left or across the top of the chart.

3. For each exploration listed across the top, determine which type of technology at the left of the chart could be a tool in increasing your understanding of the topic to be studied. There may be more than one tool for each area of study. **Communicate** your ideas with your partners and share ideas.

4. Mark an **X** in the box under the area of study and across from the tool to be used for exploration. Write a reason for selecting each tool.

Researching Space Technology						
	Determine the existence and effects of black holes.	Gather evidence to support the expanding-universe theory.	Analyze signals coming from distant stars.	Assess changes in the amount of light coming from Mira or Omicron.	Consider the possibility of living on Mars.	Analyze other planets.
Earth-based Telescopes						
Space-based Telescopes						
Other Artificial Satellites Orbiting Earth						
Fly-by Space Probes						
Orbital Space Probes						
Lander Space Probes						
Staffed Spacecraft Including Shuttles						
Space Stations						

Conclusions

1. Did the students in your group agree on their predictions? Why or why not?
   Predictions will vary. More than one technology can be used to explore some phenomena.

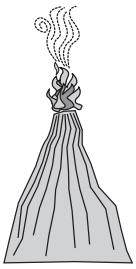
2. What were some advantages of using the Earth-based methods to explore each of the topics?
   Answers will vary, depending on students' results.

3. What were some advantages of exploring space from space for each of the topics?
   Answers will vary, depending on students' results.

New Questions

1. Which of these topics would you like to investigate further? What sources of information are available?
   Answers will vary, depending on students' interests.

2. How would you conduct your research?
   Answers will vary, but should incorporate techniques that students found to be advantageous for that phenomenon.



Name _____

ACTIVITY

Creating an Eclipse Model

Sketch your **model** of a solar eclipse.
order of items: self, marble, tennis ball

Sketch your **model** of a lunar eclipse.
order of items: self, tennis ball, marble

Name _____

Conclusions

1. What is a solar eclipse?
Earth passes into the moon's shadow.

2. What is a lunar eclipse?
The moon passes into Earth's shadow.

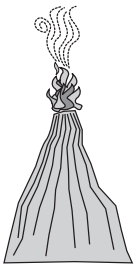
Asking New Questions

1. How would you show a partial eclipse?
A part of Earth or the moon would pass into the other's shadow.

What would be different from a full eclipse?
In a full eclipse, Earth or the moon would pass completely into the other's shadow.

2. If you lived on the moon and observed Earth from there, would you see any eclipses?
probably

If so, describe them.
The moon is much smaller than Earth, so Earth would never be entirely within the moon's shadow. As Earth blocked out the sun, you would see a partial solar eclipse.



Name _____

ACTIVITY

Comparing Planets

Use this page for your chart about the planets.
Students should create their own chart and list the planets on the left. Other possible headings include: color, size, atmosphere, distance from sun, and temperature. Almanac pages R12 and R13 may be useful.

Name _____

Conclusions

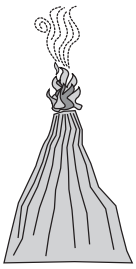
1. Is classification by size a good way to separate the planets?
Answers will vary. No, because while all inner planets are small, not all outer planets are large.

2. What is the best way to distinguish each planet?
Answers will vary.

Asking New Questions

1. What are some other facts about planets that would be interesting to find out?
Answers will vary depending on the information students find.

2. What would you tell an imaginary visitor from another galaxy about the planets in our solar system?
Answers should reflect facts about our solar system.



Name _____

ACTIVITY

Seeing Stars

Globe Position	Visible Areas
Northeastern America	Students will see areas of Earth that are at the same latitudes as the areas that were visible when northeastern America was visible.
Antarctica	Students will see areas of Earth that are at the same latitudes as the areas that were visible when Antarctica was visible.
Do you see Sweden?	no

Draw a circle to represent Earth and follow the additional steps on page B160 and B161 of your text.

Name _____

Conclusions

1. Do the two shaded areas overlap anywhere?
yes

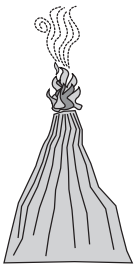
2. Is it possible that some stars would be visible from both places?
yes; Students should conclude that there are some stars that can be seen from any place.

3. Are there some stars that could be visible only from one or two places?
yes; Students should conclude that there are some stars that can only be seen from certain places.

Asking New Questions

1. How does Earth's curvature affect what stars you can see?
Students should realize that which stars would be visible from each point on Earth is a result of Earth's curvature. The curvature of Earth gives each selected location a different angle to view the rest of the universe.

2. Who would be a good person to talk to if you wanted to learn more about stars?
Answers will vary but may include an astronomer or astronaut.



Name _____

ACTIVITY

Expanding the Universe

Use the chart to **record** the distance between the dots.

Comparison of Dots	**Distances Between Dots**			
	Measurement 1	**Measurement 2**	**Measurement 3**	**Measurement 4**
Dots 1 and 2				
Dots 3 and 4				
Dots 5 and 6				
Dots 7 and 8				
Dots 9 and 10				
Dots A and B				
Dots A and C	Answers will vary based on the position of students' dots. Students should observe that the distance between dots that were farther apart in measurement 1 will increase at a greater rate than dots that were closer together.			

Name _____

Conclusions

1. What happened to the distances between the ten dots as the balloon got bigger?
They increased.

2. What do you think would happen to the distances if the balloon could stretch forever without popping?
The distances would continue to increase.

3. Did the distance between dot *A* and dot *B* change the same amount as the distance between dot *A* and dot *C* each time you put more air in the balloon?
No; The distance between dot *A* and dot *C* increased much faster.

4. What would happen to the distances if the inflated balloon was left for a long time? (Think of what happens to balloons left over from parties.)
They might decrease if air leaked out; if not, they would stay the same.

Asking New Questions

1. What do these models tell you about the way scientists think the universe is changing?
The universe is expanding.

2. What other model might test the same ideas?
Accept all reasonable answers.