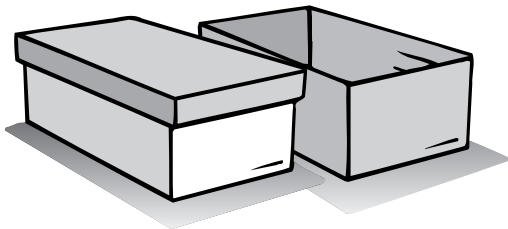
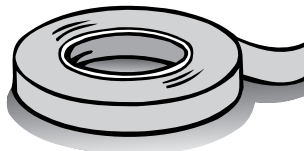


Comparing the Surfaces of the Moon and Earth

WHAT YOU NEED



two clear plastic shoe boxes, one with lid



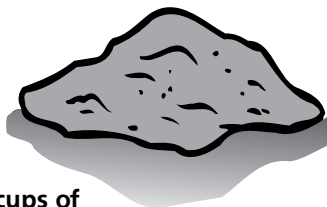
two file folder labels or masking tape



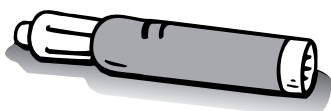
one cup of gravel



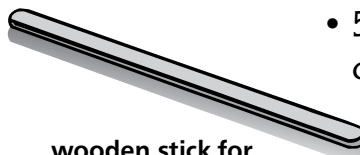
two cups of sand



two cups of potting soil



marker



wooden stick for stirring mixture

Find Out

Do this activity to find out how weather affects the surface of both Earth and the moon.

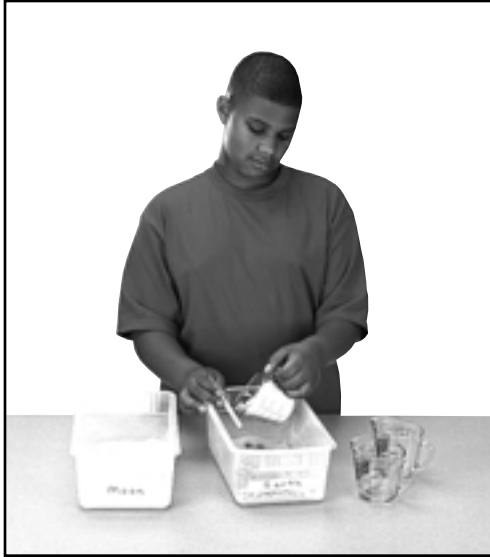
Process Skills

Experimenting
Controlling Variables
Observing
Communicating
Interpreting Data

Time

- 30 minutes the first day
- 5 minutes each day for two weeks

WHAT TO DO



1. Label one shoe box “Earth” and the other “Moon.”
2. Pour 1 cup of sand, 1 cup of potting soil, and 1/2 cup of gravel into each shoe box. Stir the contents of each box thoroughly.
3. Using the same shoe, carefully make a footprint in each box.

4. Put the lid on the box labeled “Moon.” Do not put a lid on the shoe box labeled “Earth.” Place both boxes in a safe place outside for the next few weeks.



Wash your hands after working with the soil.

5. **Predict** what will happen to the footprint in each shoe box.
6. Each day for two weeks, **observe** the footprint in each box. **Record** any changes you see on your *Effects of Atmosphere Log*.



Prediction: _____ Predictions will vary.

Effects of Atmosphere Log		
Time	Observations	
	Moon Box	Earth Box
Week 1	Observations will vary. The students will likely see the effects of weathering on the soil mixture in the "Earth" box but not on the soil mixture in the "Moon" box.	
Day 1		
Day 2		
Day 3		
Day 4		
Day 5		
Week 2		
Day 1		
Day 2		
Day 3		
Day 4		
Day 5		

Conclusions

1. How did the “Moon” footprint compare to the “Earth” footprint?

Answers will vary but should include that the “Moon” footprint remained about the same and the “Earth” footprint changed.

2. How did weather affect the “Earth” footprint?

Answers will vary but may include that weather caused the footprint to erode.

3. Why was the “Moon” footprint undisturbed?

The “Moon” footprint did not change because it was not affected by weather.

4. Explain why a footprint on the moon would be different from one on Earth over time because Earth has an atmosphere.

Because the moon has no atmosphere, it does not have weather. The footprint would, therefore, stay the same over time. Because Earth has an atmosphere, it has weather. Because it has weather, the footprint would change over time because of the effects of weather on the footprint.

New Questions

1. What were the controlled variables in this investigation?

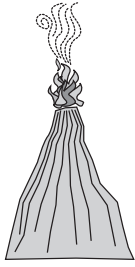
the soil in boxes and the shape of boxes

2. What were the dependent variables in this investigation? In other words, what factors were different in the “Earth” box compared to the “Moon” box?

The effect of weathering, or erosion, was a dependent variable in the investigation because it was a factor that changed as a result of the independent variable. The independent variable in the investigation was the lack of a lid, which allowed weather conditions, such as wind and precipitation, to affect the “Earth” footprint.



Name _____



ACTIVITY

Investigating Moon Craters

Predict which marble will make the biggest crater and why.

Answers will vary.

Record the results of steps 5 through 7 in the chart below.

Answers will vary but the marble with the greatest mass will likely have wider and deeper craters.

Mass of Marble	Height	Surface of Clay	Width of Crater	Depth of Crater

Name _____

Conclusions

1 What effect, if any, did the mass of the marbles have on the clay?
Answers may vary but should include that the greater the mass, the larger the crater.

2 **Infer** what force caused the marbles to fall into the clay.
gravity

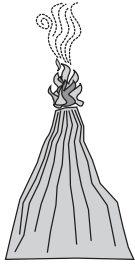
3 How were the marbles like objects moving through space and striking a planet?
Both the marbles and objects in space form craters by falling and striking surfaces due to gravitational attraction.

Asking New Questions

1 What might have happened to the clay craters if the marbles had been dropped from a greater height?
Answers may include that the marbles' respective craters might have been larger.

2 How did the craters in this model compare to actual craters?
Both craters were caused by falling objects attracted by Earth's gravity. Actual craters can be very large and can be formed by objects with much greater masses than the marbles used in the activity.

Name _____



ACTIVITY

Modeling Planets

Record the diameter and **calculate** the scaled diameter for each planet.

Planet	Diameter (km)	Distance Multiplied by 0.01	Other Characteristics
Mercury	4878	48.78	Answers will vary.
Venus	12,104	121.04	Answers will vary.
Earth	12,756	127.56	Answers will vary.
Mars	6794	67.94	Answers will vary.
Jupiter	142,984	1429.84	Answers will vary.
Saturn	120,538	1205.38	Answers will vary.
Uranus	51,118	511.18	Answers will vary.
Neptune	50,530	505.30	Answers will vary.
Pluto	2290	22.90	Answers will vary.

Name _____

Conclusions

1 How are the posterboard planets like the planets in the solar system? How are they different?

Answers will vary but may include that the diameters of the posterboard planets are to scale. The actual planets are three-dimensional, have different compositions, and are very large.

2 In this lesson, the planets were classified as terrestrial or Jovian. Based on the characteristics of the planets, name two other ways the planets could be classified.

Answers will vary but may include by color, by size, by distance from the sun, by chemical composition, by number of satellites, by presence of rings, and so on.

Asking New Questions

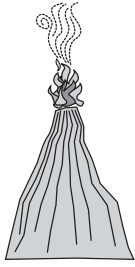
1 Based on their diameters, how many Earths would fit in Jupiter?

approximately 11

2 How many Plutos would fit in Earth?

approximately five

Name _____



ACTIVITY

Investigating Brightness

Record the brightness of each light.

The brightness of the two lights will likely be the same.

Predict which light will seem brighter if one partner moves closer to you and one moves farther away.

Answers will vary.

How does the brightness of each light compare when one partner moves closer to you and one moves farther away?

The light that is nearer to the student will likely appear brighter than the one farther away.

Name _____

Conclusions

- ① Compare your prediction with your observations.
Answers will vary based on predictions made. Students should observe that the closer light appears brighter.

- ② Was the absolute magnitude of the two flashlights different? Why?
No, the flashlights gave off the same amount of light.

- ③ Was the apparent magnitude of the flashlights different?
Explain.
Yes, the closer flashlight seemed brighter than the one held at a greater distance.

Asking New Questions

- ① How were the flashlights like stars you see from Earth?
Like stars, the flashlights can appear brighter or dimmer depending on the distances from which they are observed.

- ② What did this activity show you about the way distance affects brightness?
The farther away a light source is, the less bright the star may appear.