

Multiple Choice

1. What are heat, light and sound forms of?
 - A. motion
 - B. matter
 - C. energy
 - D. insulators

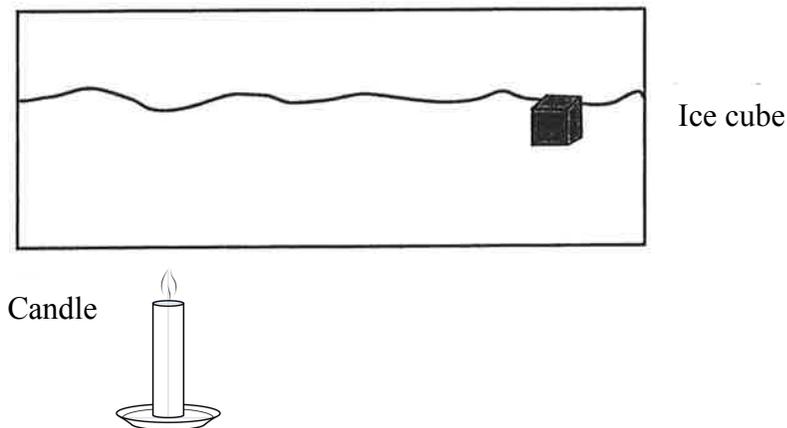
2. How does energy from the sun get to Earth?
 - A. conduction
 - B. convection
 - C. radiation
 - D. insulation

3. Which of these materials would you expect to insulate the transfer of heat?
 - A. metal
 - B. glass
 - C. steam
 - D. wood

4. What direction does heat move?
 - A. upward
 - B. downward
 - C. from cool objects to warm objects
 - D. from warm objects to cool objects

1. Warm air rising from a fireplace is an example of which type of heat transfer?
 - A. conduction
 - B. convection
 - C. radiation
 - D. insulation

6. Which of the following is an example of heat conduction?
- A. An air vent from a furnace sending hot air into the house
 - B. A metal cup heating up when hot water is poured into it
 - C. The sun melting the ice formed on a frosty lawn
 - D. Cool air sinking to the ground on a cold night



7. Where will water near the candle move?
- A. It will sink to the bottom of the water
 - B. It will rise to the top of the water
 - C. It will stay in the same place
 - D. It will expand and fill the container
8. A student takes the temperatures of air in several places in a room, including near the ceiling and floor. What question might the student be investigating?
- A. Does air conduct heat better than water?
 - B. Does radiation from the sun travel through walls?
 - C. What time of day does a room get the warmest?
 - D. Does warm air rise in a room?
9. What happens to the light particles when light hits an uneven surface?
- A. They are reflected off in a straight line.
 - B. They are scattered in many directions.
 - C. They are absorbed by the surface.
 - D. They pass through the surface.

10. Which light source has the greatest intensity?

- A. A candle
- B. A light bulb
- C. A streetlight
- D. The sun

11. Which surface would light reflect most from?

- A. Aluminum foil
- B. Wood
- C. Paper
- D. Cloth

12. What happens to light as it passes from air through various materials such as a prism or water?

- A. It is unchanged
- B. It is bent
- C. It is blocked
- D. It turns into energy

13. What creates a sound?

- A. A vibration
- B. Light energy
- C. Matter
- D. A reflection

14. What happens to a sound as the vibrations of an object increase in strength?

- A. The sound becomes louder
- B. The sound becomes softer
- C. The sound waves get further apart
- D. The pitch of the sound is higher

Answers for Standard 6 Unit Test 1

Multiple Choice

1. C
2. C
3. D
4. D
5. B
6. B
7. B
8. D
9. B
10. D
11. A
12. B
13. A
14. A
15. C
16. A

Constructed Response

1. Metal conducts heat very well and wood does not conduct heat very well. The heat in the soup will be conducted to the metal spoon and make it too hot to touch, but would not make a wooden spoon too hot.
2. When the light entered the glass and the water it was bent or refracted and caused the straw to appear bent and broken. The curved glass caused the light rays to bend or refract and acted as a magnifying glass and made the straw appear larger.
3. He should pluck the strings harder, with more energy to increase the loudness of the sound.

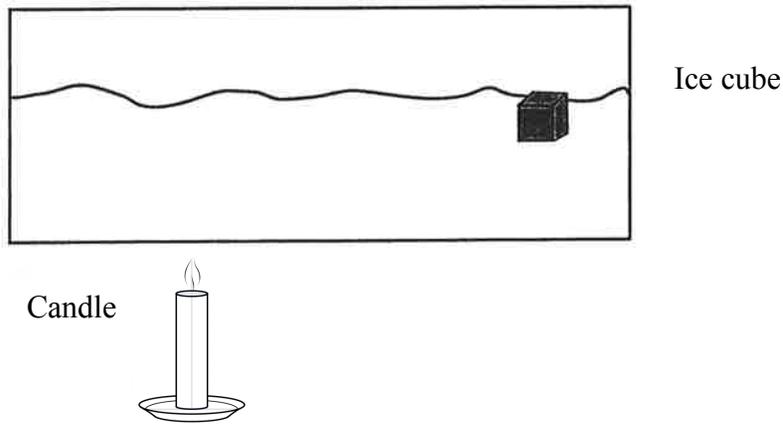
1. By what process does heat energy travel from the sun to Earth?
 - A. Convection of heat through air currents
 - B. Heat is conducted through air molecules
 - C. Heat is radiated through space
 - D. Heat travels through the wind

2. What do conduction, convection and radiation have in common?
 - A. They are all forms of the same type of matter
 - B. They travel from cooler objects to warmer objects
 - C. They are ways heat moves between objects
 - D. None of them can be found in outer space.

3. Which of these materials would you expect to conduct heat?
 - A. Metal
 - B. Wood
 - C. Fabric
 - D. Foam

4. Which type of heat energy is transferred when objects are touching?
 - A. Insulation
 - B. Convection
 - C. Radiation
 - D. Conduction

5. In a room in the wintertime, where would you find the warmest air?
 - A. Near the floor
 - B. Near the ceiling
 - C. In the corners
 - D. By a window



6. Where will water from the melting ice go?
- A. It will rise to the top of the water
 - B. It will sink to the bottom of the water
 - C. It will stay with the ice cube
 - D. The ice cube will not melt
7. A student holds a wooden spoon and a metal spoon in hot water. What question might the student be investigating?
- A. Does hot water rise?
 - B. What substance conducts heat best?
 - C. Can radiation make water hot?
 - D. Do different types of spoons heat water faster?
8. Brian is wearing a red t-shirt. Why does it appear red?
- A. All colors of the spectrum combine to form red.
 - B. Blue and green waves are bounced off the shirt.
 - C. The red waves of the visible spectrum are absorbed.
 - D. The red in the visible spectrum is reflected.
9. What is one difference in the light of a candle on a table and a light bulb overhead?
- A. The light is traveling in different directions
 - B. The light is traveling by convection in a candle
 - C. The light in a light bulb has electricity
 - D. The light in the candle cannot be measured.

10. Which surface would you expect the light to reflect least from?

- A. Glass
- B. Aluminum foil
- C. Cloth
- D. A mirror

11. Why does a pencil in a glass of water appear to be bent or broken?

- A. It is dissolving in the water
- B. The light is blocked by the water
- C. The pencil blocks the light
- D. The water bends the light

12. How does sound travel?

- A. By conduction
- B. By convection
- C. In waves
- D. In rays

13. What would happen if you increased the intensity of a sound?

- A. The sound would get louder
- B. The sound would get softer
- C. The sound would be higher
- D. The sound would be lower

14. If you were arranging the aluminum tubes shown below to play a tune, which tube would make the lowest pitch?



A



B



C



D

Constructed Response

1. Explain why you are able to see the colors of the rainbow when you look at sunlight shining through the spray from a sprinkler.
2. What could Whitney do to her drum if she wanted to raise the pitch of the sound her drum makes?
3. Explain how the size and shape of a sound source affect the pitch of a sound. Give two examples to support your idea.

Answers for Standard 6-Unit Test 2:

Multiple Choice

1. C
2. C
3. A
4. D
5. B
6. B
7. B
8. D
9. C
10. C
11. D
12. C
13. A
14. A

Constructed Response

1. The water droplets separate while light into the spectrum of colors. White light is made up of seven colors of the rainbow.
2. She could tighten the drumhead so that it would be smaller and make more vibrations per second which would raise the pitch.
3. Objects that are smaller, shorter, or stretched more tightly produce a higher pitch than do those of objects that are larger or longer because they vibrate at a faster rate. Examples may be such things as a piccolo versus a flute, or a violin versus a bass fiddle.

Activity Description: Students will compare the temperatures of soda pop cans filled with water when they are placed in various insulation materials.

Materials:

Per group of four students:

4 – empty soda pop cans

4 – 32 oz. “Big Gulp” paper cups

Assorted insulation materials: shredded newspaper, quilt batting, Styrofoam packing “peanuts,” home insulation, etc.

4 thermometers (calibrated identically)

For class:

Ice water to fill cans for entire class

Pitchers

Funnels

Worksheets (see “keeping cool” worksheet)

Prior to assessment: Students need to know how to conduct a controlled experiment. They should be able to read thermometers and organize data in a table.

Time needed: 1 or 2 class 45-minute classes

Procedure:

1. Students are directed to conduct a controlled experiment to investigate which kind of insulation keeps the ice water coolest.
2. In the experiment students place empty soda pop cans in the large paper cups. They put three different kinds of insulation around three of the soda pop cans.
3. They should use one soda pop can as a control for the experiment, and no insulation should be placed around it. Students pour cold ice water into each can.
4. Thermometers are placed in the cans, and students measure and record the temperature of the ice water every minute for ten minutes. Students should create a method for recording their temperatures. The teacher may choose to give students guidance in some areas of the assessment. For example, the data table below could be given to the students.

Teachers may want to use a worksheet for students to complete their work.

Scoring Rubric:

1 point: Attempts to conduct a controlled experiment

2 points: Completes some aspects of the controlled experiment

3 points: Completes most aspects of the controlled experiment

4 points: Successfully completes most aspects of the controlled experiment

Name

Date

Title: Keeping Cool

Introduction: In this activity you will see how different insulation materials help keep a can of water cold. After your teacher has explained what materials you will use, make a prediction about which materials will work best to insulate the can.

Prediction:

Procedure:

1. Place the insulating materials in the paper cup and then place the aluminum can side them.
2. Carefully pour cold water into the can and then place a thermometer in the can.
3. Record the temperatures every other minute for 20 minutes. Write the temperatures in the data table.
4. Clean up as directed.

Data:

Insulating Material

Minute			
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

Questions:

1. What is the experimental variable in the experiment?
2. What are some of the controlled variables in the experiment?
3. What materials insulated the best?

Worst?

CONCLUSION: (What you have learned in the experiment?)

Activity Description: Students will compare the angle of a light beam coming into a mirror with the angle of the light beam going out from the mirror.

Materials: (Per group of 4 students)

Flashlight

Mirror

Slit card (a 3" x 5" card with a narrow 2 ½" vertical slit cut in it to allow a single beam of light to pass through)

Degrees Reflection Sheet

Prior to assessment: Students need to know how to organize data in a table.

Time needed: a 45-minute class period

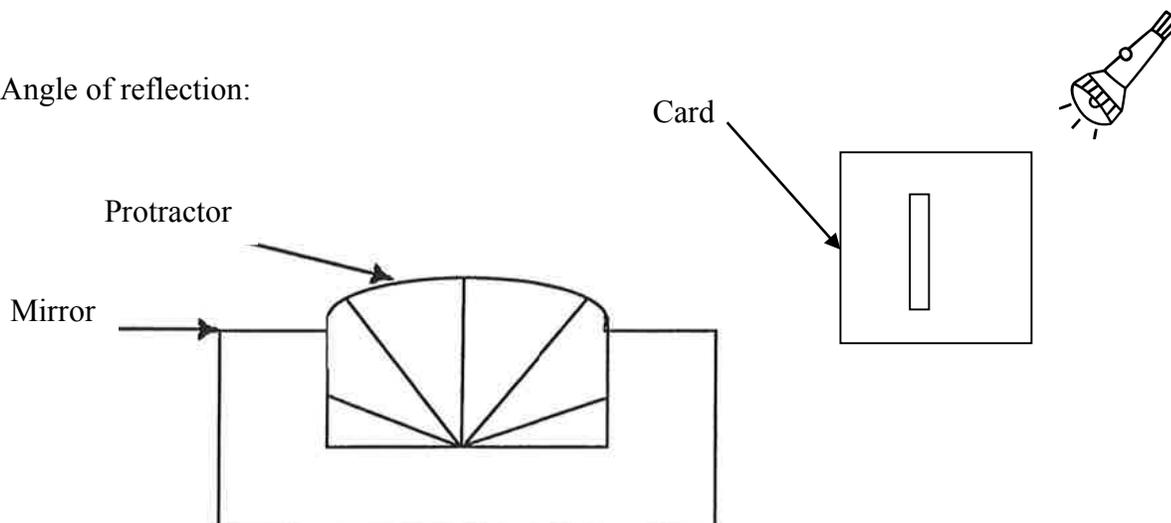
Procedure:

1. Working in partners, one student holds the mirror perpendicular to the back of the protractor.
2. The other student shines the flashlight through the slit card so that a light beam follows one of the degree lines to the center of the protractor. The lights in the room may need to be dimmed.
3. Students observe where the reflected light beam bounces, and record the angle of the reflected beam in the chart.
4. Students write a conclusion about the angle of light reflection.

Angle of Light Reflection:

Angle of incoming light rays:

Angle of reflection:



Scoring Rubric:

- 1 point: Student attempts to complete experiment but does not show angle of incidence equaling angle of reflection.
- 2 points: Student successfully completes some aspects of experiment but does not show equal angles.
- 3 points: Student successfully completes most aspects of experiment and shows equal angles.
- 4 points: Student successfully completes the most aspects of experiment successfully and shows equal angles.

Activity Description: Students will formulate and test a hypothesis about how the pitch changes in sounds made when glass bottles with varying amounts of water in them are tapped with a mallet.

Materials

For each group of four students or at an individual work station

Four empty soda pop bottles or glasses

Mallet

Graduated cylinders or other ways to measure water

Water

Prior to assessment: Students should have had experience with conducting experiments using the scientific method.

Time needed: 1 45-minute class periods

Procedure:

Students are given the materials and asked to formulate a hypothesis about how the sound produced when glass bottles filled with varying amounts of water are tapped with a mallet. Students are instructed to write their hypothesis and then devise an experiment to test the hypothesis. Students should be instructed to use measurements where applicable (water amounts should be measured, for example).

Students should record their findings from the experiment in an organized way such as a data table. Finally students should write a conclusion about their findings.

Scoring Rubric:

1 point: attempts to formulate a hypothesis and conduct an experiment

2 points: formulates a hypothesis and conducts an experiment in which there are some elements of measurement, organization of data and conclusion.

3 points: formulates a hypothesis and conducts an experiment in which there are most elements of measurement, organization of data, and conclusion.

4 points: formulates a hypothesis, conducts an experiment in which there are all elements of measurement, organization of data, and conclusion.

Activity Description: Students will make three different string telephones to test sound absorption.

Materials needed: (per group of four students)

- 3 2-meter pieces of string
- 2 plastic cups* with a hole drilled in the bottom of each
- 2 paper cups* with a hole drilled in the bottom of each
- 2 metal cups (empty 10 oz. cans)* with a hole drilled in the bottom of each, tape rim to avoid sharp edges
- Paper clips

*In all cups the variables of size and shape should be as identical as possible

Prior to assessment: Students need to know how to construct a table and record observations.

Time needed: 1-2 45-minute class periods

Procedure:

Students construct three different string telephones. They send messages and listen in each of the different telephones. They record observations in a data table and rank each telephone as to quality of sound.

Kind of Telephone	Observations	Ranking
Plastic cups		
Paper cups		
Metal Cups		

Scoring Rubric:

- 1 point: Student makes some attempt to conduct experiment with little or no observations or rankings.
- 2 points: Student conducts experiment but does not record accurate observations or rankings
- 3 points: Student conducts experiment and makes mostly accurate observations and rankings
- 4 points: Student conducts thorough experiment, records accurate observations and rankings.