Heat and Technological Design (6.P.3.3)

Name: _____ **Date:** _____

1. A tight metal lid on a glass jar of jelly may loosen when held under a flow of hot water. The hot water causes the

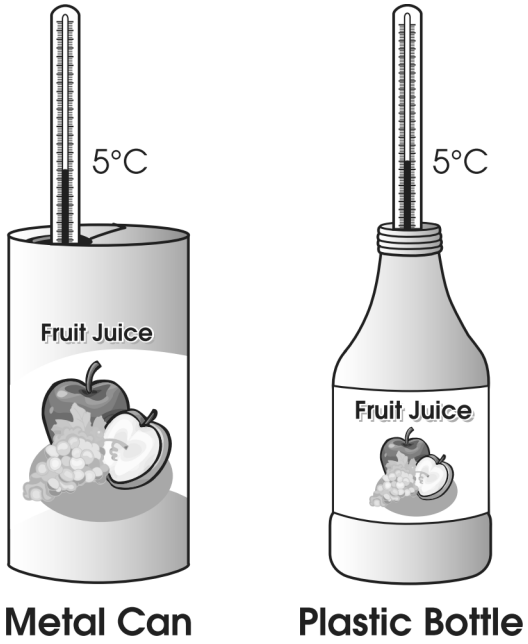
   A. metal lid to contract.

   B. metal lid to expand more than the glass jar expands.

   C. glass jar to contract.

   D. glass jar to expand more than the metal lid expands.

2. Two juice containers are in a cooler. One is plastic and one is metal. The metal can feels colder than the plastic bottle. Students place a thermometer in each container. They find that the juices in the bottle and in the can are the same temperature.



   Why does the can feel colder than the bottle?

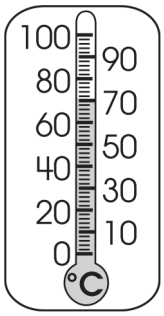
   A. The metal can holds colder juice than the plastic bottle.

   B. Plastic is a better conductor of thermal energy than metal.

   C. Metal is a better conductor of thermal energy than plastic.

   D. The outside of the metal can is drier than the plastic bottle.

3. Use the information below to answer the question.



   Students observe the liquid in the thermometer rising as the temperature increases.

   What is the effect of the transfer of thermal energy that explains this observation?

   A. The liquid expands.

   B. The liquid contracts.

   C. The glass around the liquid expands.

   D. The glass around the liquid contracts.

4. A new type of light bulb uses less electricity and gives off the same light as ordinary light bulbs. Why would the new type of light bulb use less electricity compared to ordinary light bulbs?

   A. No heat is given off.
   B. Less heat is given off.
   C. More heat is given off.
   D. Equal heat is given off.

5. An architect knows that a home receiving a lot of exposure to the Sun will benefit from the heating effects of sunlight if there is a lot of glass in the home's design.

   By which of the following methods will sunlight heat the home?

   A. conduction
   B. convection
   C. evaporation
   D. radiation

6. Birds sometimes fluff their feathers, which traps a layer of air next to their bodies.

   How does fluffing its feathers help a bird control its temperature?

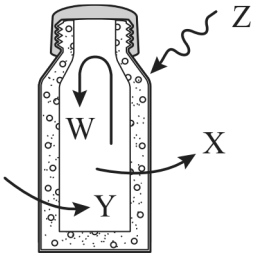
   A. It keeps the bird warm because air is a good insulator.

   B. There is less space in the nest so the bird traps in heat.

   C. This increase in size of the bird will create areas for airflow.

   D. The movement of the bird will keep it warm from body heat.

7. The drawing below shows a cross section of an insulated bottle filled with hot coffee. Several arrows labeled W, X, Y, and Z are drawn to show possible paths for heat transfer.



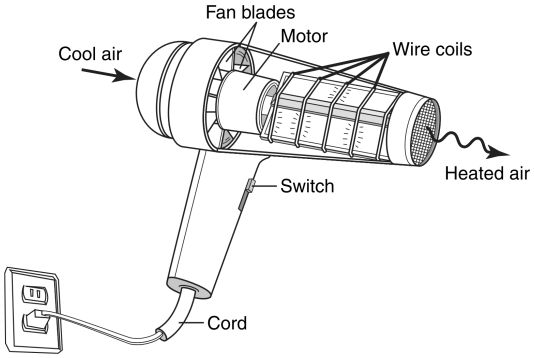
This insulated bottle was filled with hot coffee and allowed to sit at room temperature for several hours. The temperature of the coffee cooled from 86°C to 58°C.

Which of the following *best* represents the heat transfer path by conduction as the coffee cools?

A. W B. X C. Y D. Z

8. Use the information below to answer the following question(s).

The hair dryer in the cross section diagram below transforms one type of energy into other types of energy.



Wire coils in the hair dryer become hot when in use.

What energy transformation occurs in the wire coils?

A. electrical to heat B. heat to mechanical

C. chemical to mechanical D. mechanical to electrical

9. Stan needs to line the walls of his garage so he can use it as a practice studio for his band.

Why should he choose to line the walls with panels made from cork rather than panels made from aluminum or wood?

A. Cork is harder than aluminum or wood.

B. Cork is denser than aluminum or wood.

C. Cork insulates sound better than aluminum or wood.

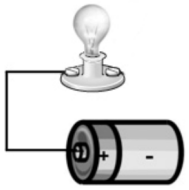
D. Cork conducts sound better than aluminum or wood.

10. What would be the *best* material to use when making the handle of a tea kettle?

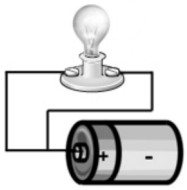
A. glass B. aluminum C. wood D. tin

11. Each picture shows a light bulb connected to a battery. Which bulb will light?

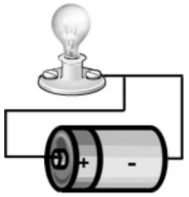
A.



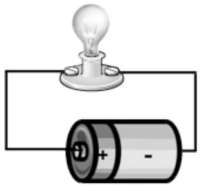
B.



C.



D.



12. How does insulation in the attic of a house help to conserve heat energy in the winter?

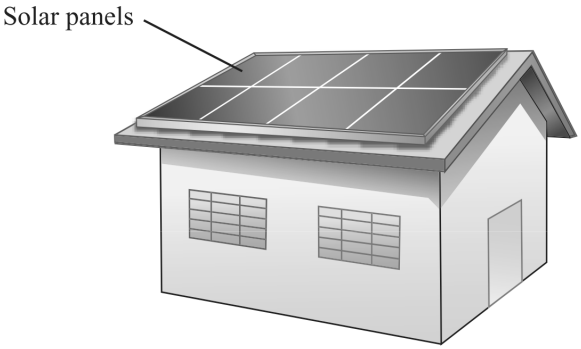
A. It slows the rate at which energy leaves the house.

B. It removes energy from the house.

C. It stops rain from coming into the house.

D. It slows the rate at which energy enters the house.

13. A solar panel is used to collect energy from the Sun and change it into other forms of energy. The picture below shows some solar panels on the roof of a building.

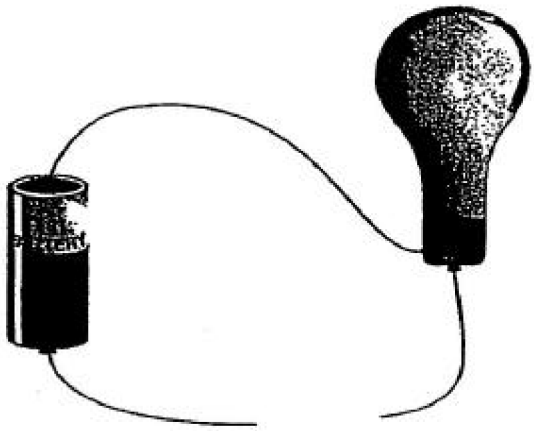


Which form of energy is collected by the solar panels?

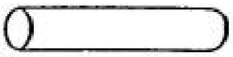
A. wind B. sound C. magnetic D. light

14. Electricity in circuits can produce light, heat, sound, and magnetic effects. Electrical circuits require a complete loop through which the electrical current can pass.

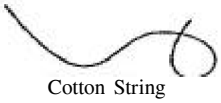
Which object would you attach to the wires in this picture to enable the bulb to light up. Explain why you chose this object.



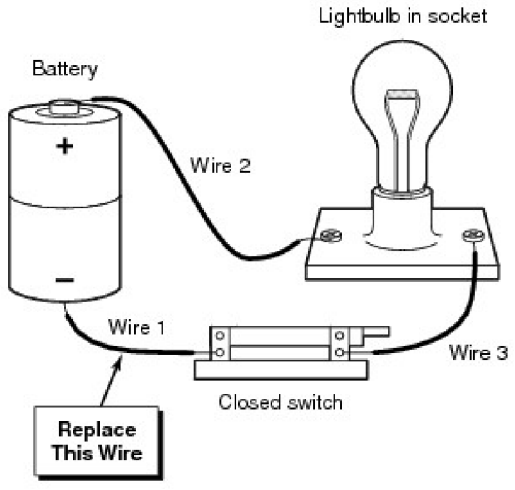
A.
Tooth Pick

B. 
Chalk

C. 
Metal Paper Clip

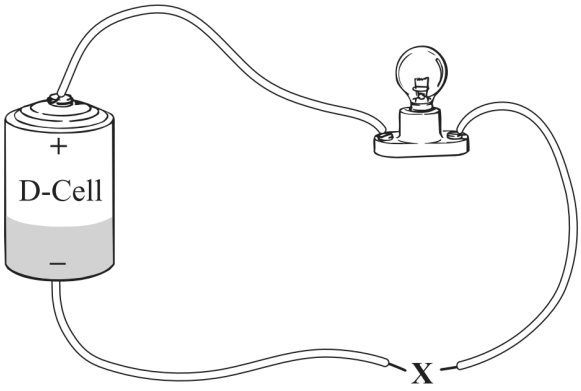
D. 
Cotton String

15. In the electric circuit shown, a student wants to replace Wire 1 with a different conductor. Which of the following materials could be used in place of Wire 1 to make the bulb light?



A. A plastic ruler
B. A wooden pencil
C. A steel clothes hanger
D. A cotton ribbon

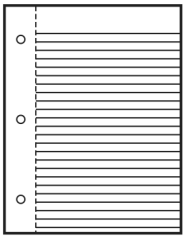
16. The diagram below shows an incomplete circuit due to a break in the wire at point *X*.



A student is testing materials to see if they conduct electricity. The student places each item shown at position *X*, making sure the object is in contact with the loose end of each wire. Which item will electricity flow through, causing the bulb to light?

A. 
Crayon

B. 
Plastic comb

C. 
Notebook paper

D. 

Penny

17. Which statement *best* explains the reason that electrical wires are made of copper?

A. Copper is strong.
B. Copper is flexible.
C. Copper is a conductor.
D. Copper is an insulator.

18. Which of the following *best* explains why electrical wires are usually covered with plastic or rubber?

A. to insulate the electrical wire

B. to keep the electrical wire warm

C. to make the electrical wire stronger

D. to make the electrical wire more flexible

19. Foam weather stripping is often placed in the frames of doors and windows in a home. What is the purpose of this weather stripping?

A. The weather stripping increases heat transfer by radiation.

B. Heat is conducted quickly through the weather stripping.

C. The weather stripping reduces heat loss due to convection.

D. Heat can transfer through the weather stripping due to reflection.

20. Which of the following would *best* increase the year-round energy efficiency of a building that is subjected to hot summers and cold winters?

A. black exterior paint

B. fiberglass insulation

C. large glass windows

D. white exterior paint

21. Amelia designed a special cup to keep drinks cold even on hot days. The cup has a layer of gel between layers of plastic.

Why is Amelia's cup better able to keep drinks colder than a regular glass cup?

A. Gel is a better insulator than glass.

B. Glass is a better insulator than plastic.

C. Gel is a better conductor than plastic.

D. Plastic is a better conductor than glass.

22. Why do clothing manufacturers study the structure of duck feathers to help them develop materials for use in winter coats?

A. Duck feathers are made from fibers, which conduct heat well.

B. Duck feathers are soft, and soft materials make good insulators.

C. The structure of duck feathers conducts cold away from the body.

D. The structure of duck feathers traps air, which is a good heat insulator.

23. The figure below shows insulation being sprayed into a wall.

Which of the following is the *most* desirable property of this type of insulation?

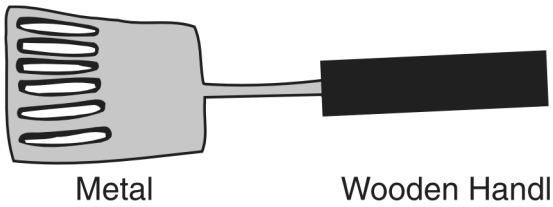
A. high retention of water

B. high thermal expansion

C. low coefficient of elasticity

D. low heat transfer coefficient

24. Some metal tools used for cooking have wooden handles.



Which property of wood makes it a good material for the handle on a cooking tool?

A. Wood is a natural material.

B. Wood is unaffected by metal.

C. Wood does not conduct heat well.

D. Wood does not conduct electricity well.