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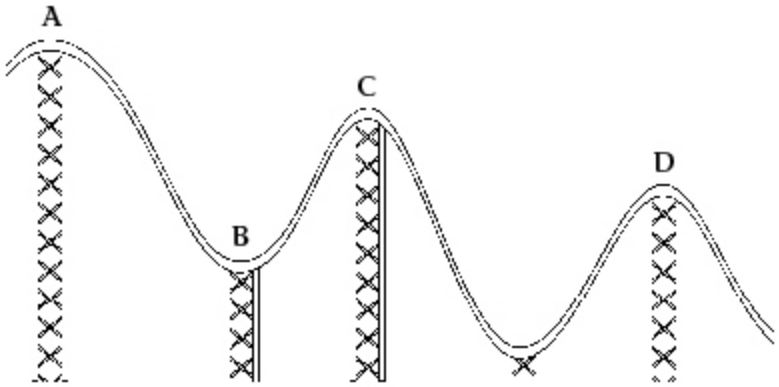
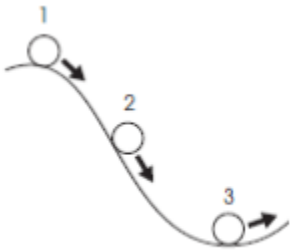


Use the diagram above to answer the following question.

1. At which point will the roller coaster have the greatest amount of potential energy?

2. At which point will the roller coater have the least amount of potential energy?

. A ball is released from rest at position 1. The diagram shows the ball in three positions as it rolls along a track from left to right.



Use the diagram above to answer the following questions.

3. When is the potential energy of the ball being transformed into kinetic energy?

4. At which point does the ball have the most kinetic energy?

5. At which point does the ball have the most potential energy?

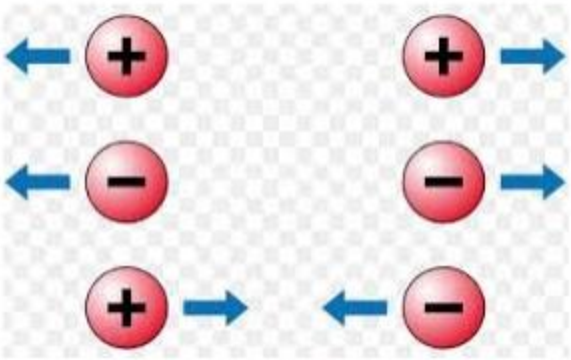
6.

Label the following 3 charges as either Attract or Repel

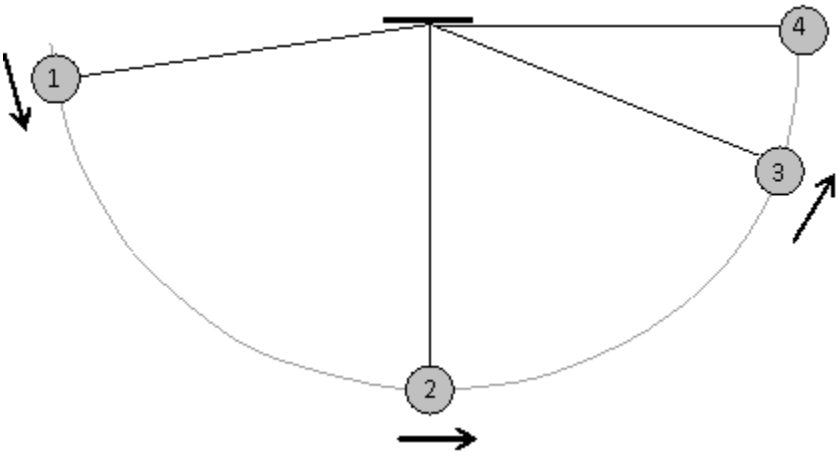
A _____

B _____

C _____



The diagram below represents different points in a pendulum's swing. The arrow indicates direction of motion. Assume that the system is frictionless.



7. At which position in the pendulum's swing, is kinetic energy decreasing and potential energy increasing?

a. 1
b. 2
c. 3
d. 4

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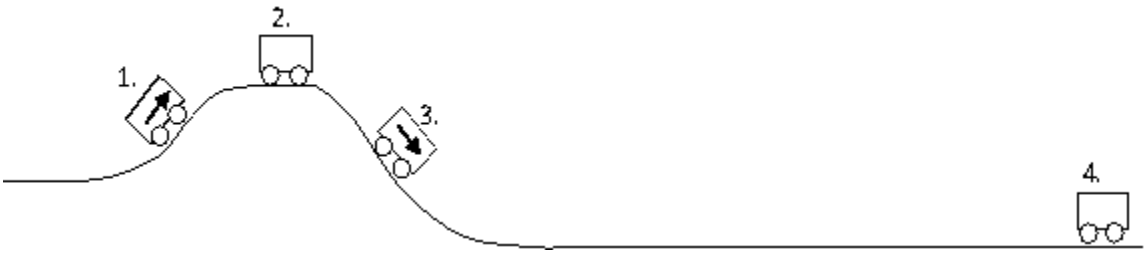
The diagram below shows a series of positions for a cart on a roller coaster. The arrows show the direction the cart is moving.



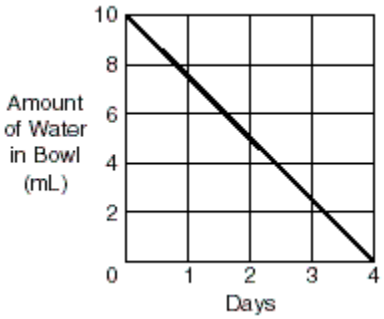
8. Which of the following best describes what has happened at position #2?
   a. Kinetic energy has increased.
   b. Kinetic energy has been destroyed.
   c. Kinetic and potential energy has become zero.
   d. Kinetic energy has changed into potential energy.

. 9. Which of the following is an example of kinetic energy being changed to potential energy?
   a. An car racing down the road
   b. A train moving along a level track
   c. A sled pulled up to the top of a hill
   d. A plate sitting on the edge of a table

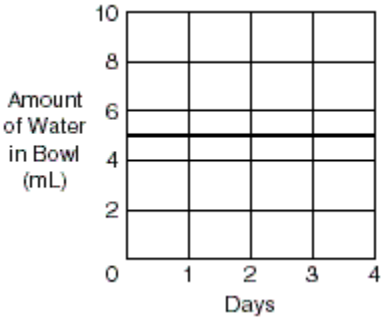
. 10. Which of the following is an example of kinetic energy?
   a. A football ready for kickoff
   b. A baseball flying through the air
   c. A golf ball sitting at the edge of a hole
   d. A basketball ready to drop through the hoop

11. An uncovered bowl of water was placed on a window sill. Each day the amount of water left in the bowl was recorded. Which graph probably shows the results?

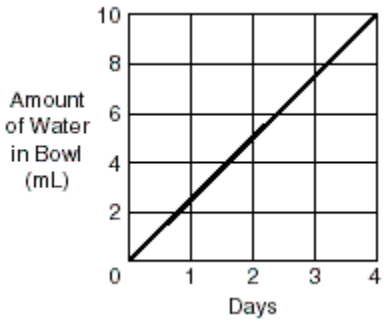
a.



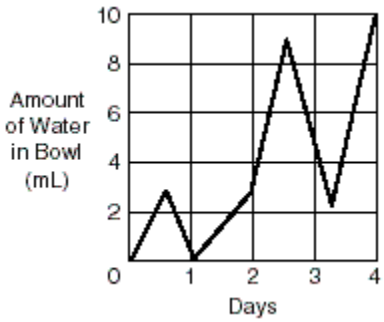
c.



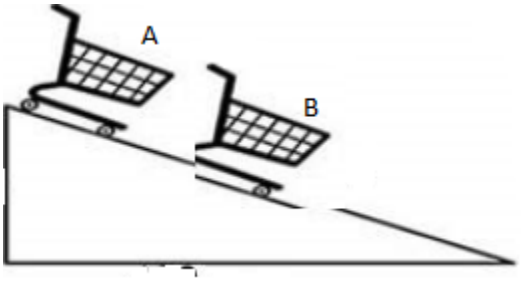
b.



d.



12. Two identical shopping carts are rolling down a hill. Cart B is rolling faster than Cart A.



13. Which cart has more kinetic energy? Why?

14. As the carts roll down the hill, the wheels get a little warmer. What energy transformation happens while the cart is going down the hill?

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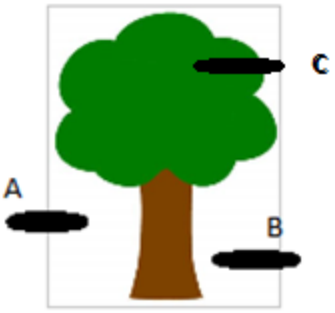


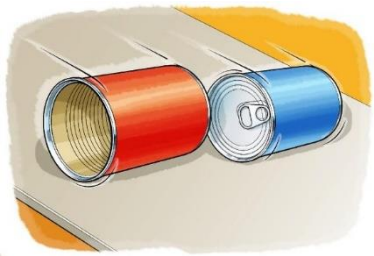
Using the diagram to the left answer questions 15 and 16.

15. Two frisbees are falling from a tree. Both frisbees are falling at the same speed. If frisbee B weighs less then frisbee A, which frisbee has more kinetic energy?

16. Which frisbee has the most potential energy?

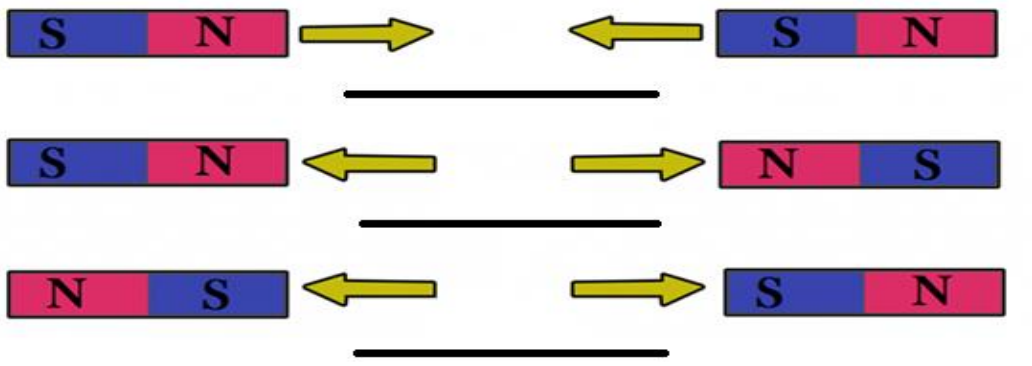
Using the diagram to the right answer question 17.

17. Both cans are identical. One can is unopened and the other is empty. They leave the ramp at the same time and at the same height. Which can has the greatest kinetic energy and why?



18. **Using the diagram below**. Explain what is happening between the balloon and the person's head. Be sure to include the following properties in your explanation: Attraction and Repulsion, Distance, and Strength.

19. **Use the diagram below to label the spaces between the arrows with attract or repel.**



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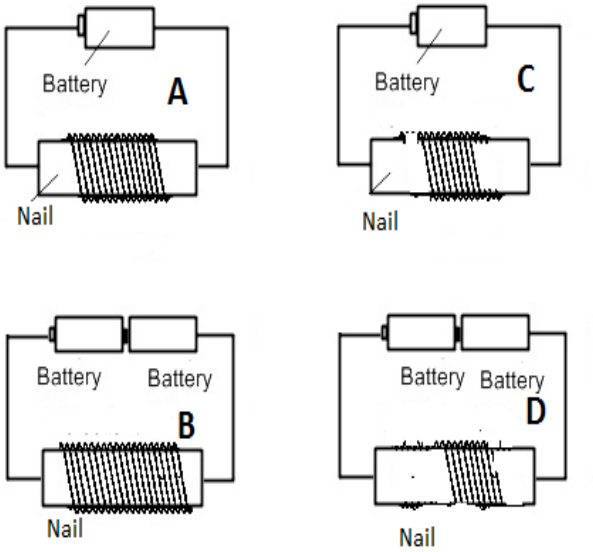
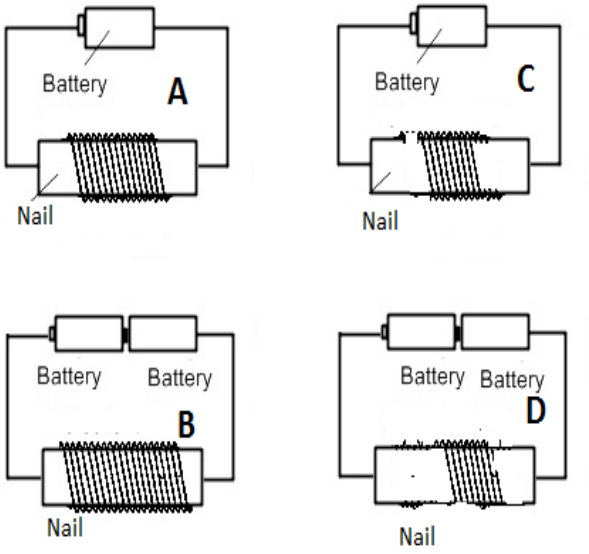
Directions: Look at the diagram and chart and answer the questions below. Remember, the number of tacks listed indicates the strength of the electromagnet. The more tacks, the stronger the magnet.



Magnet	Number of Tacks
A	12
B	24
C*	22
D*	44

***indicates thicker wire**

20. Make a bar graph using the data provided in the chart above. Make sure to label the x and y axis correctly, provide units and a title.



21. Make 2 observations about the construction of the electromagnets above.

22. Describe how the electromagnet works. Make sure to include the cause (the construction) and effect(number of tacks).

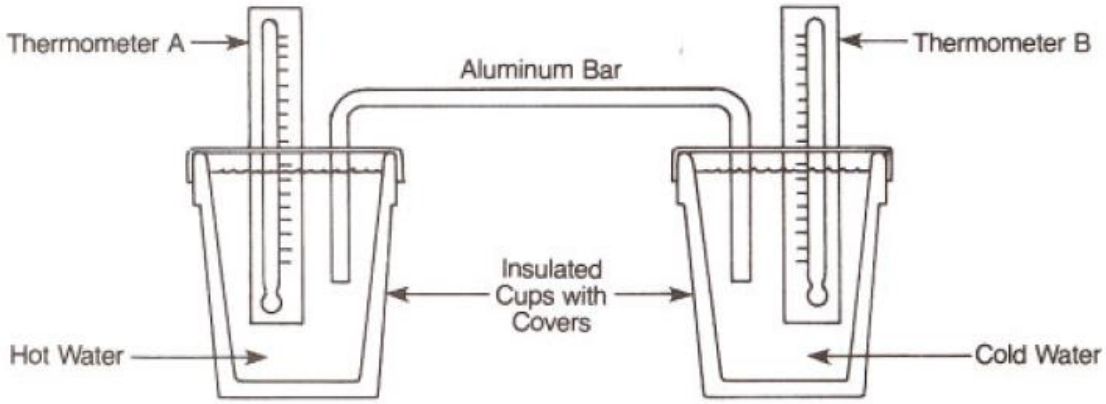
23. Make a claim about the construction of the electromagnet and its strength.

24. Describe the relationship between temperature and thermal energy.

25. Why would you be able to smell something faster in a hot room than in a cold one?

26. Why would sugar dissolve more quickly in a hot cup of tea than a cold one?

Use this diagram below to answer questions 27-29.



27. In which cup do the water molecules have higher average kinetic energy?

28. What will happen to the temperature of the water in the hot water cup over time?

29. What will happen to the temperature of the water in the cold water cup over time?

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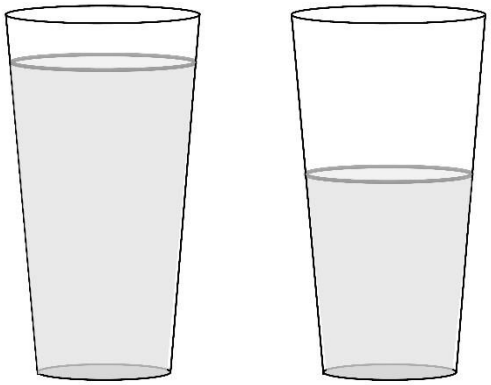
A student has two identical glasses that have different amounts of water in them. Glass 1 has more water in it than Glass 2.

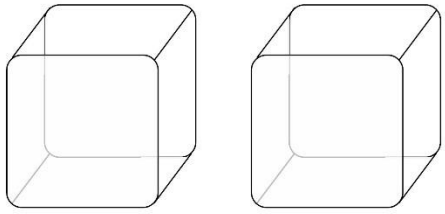


Glass 1 Glass 2

30. If the temperature of the water in the glasses is the same, how does the thermal energy of Glass 1 compare to the thermal energy of Glass 2?

A. Glass 1 has more thermal energy than Glass 2.
B. Glass 1 has less thermal energy than Glass 2.
C. Glass 1 has the same amount of thermal energy as Glass 2.
D. Neither glass of water has any thermal energy.

A student has two ice cubes. Ice Cube 1 and Ice Cube 2 are both made up of the same number of molecules. The average speed of the molecules of Ice Cube 1 is less than the average speed of the molecules of Ice Cube 2.



Ice Cube 1
Slower moving molecules

Ice Cube 2
Faster moving molecules

31. Which ice cube has less thermal energy and why?

A. Ice Cube 1 has less thermal energy because its molecules are moving slower than the molecules of Ice Cube 2.
B. Ice Cube 2 has less thermal energy because its molecules are moving faster than the molecules of Ice Cube 1.
C. Ice Cube 1 and Ice Cube 2 have the same amount of thermal energy because anything made of ice has the same amount of thermal energy no matter how fast the molecules are moving.
D. Ice Cube 1 and Ice Cube 2 do not have any thermal energy because frozen things do not have thermal energy.

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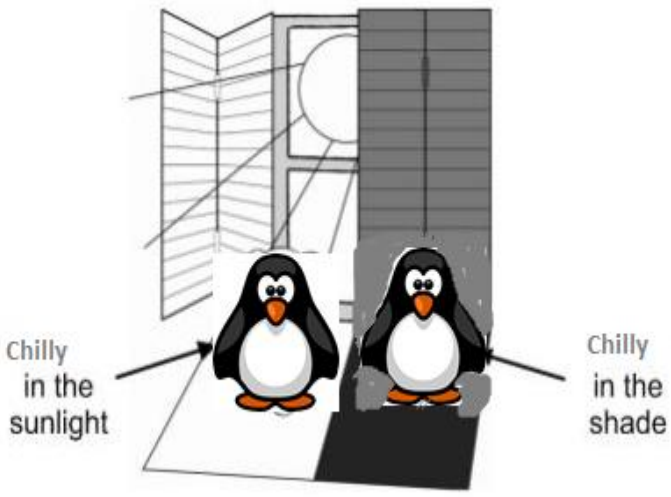
32. Two students made Olaf the Snowman on a snow day. After the sun came out and the students returned to observe that Olaf is now a puddle. Draw two models to represent the molecules.

- One model must represent the water molecules that make up Olaf before the sun came out.
- One model must represent Olaf after the sun came out.
- Include labels and a legend with your models.

Before

After



Use the diagram to the left to answer the question below.

33. Describe the differences in thermal energy of Chilly in the sunlight verses Chilly in the Shade.

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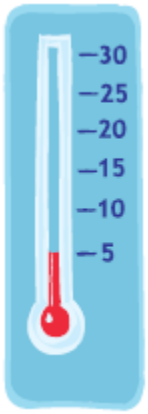
Read the passage and answer the questions that follow.



Temperature and Thermometers

- **How can you and out just how much heat is in the part of the atmosphere where you are?**

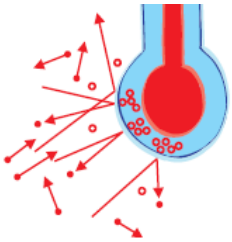
With a thermometer.

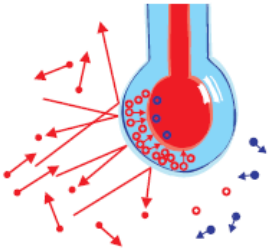
A thermometer measures temperature. Temperature is a measure of the average kinetic energy of the molecules in a material. If a thermometer is surrounded by air, it measures the average kinetic energy of the air molecules. If it is surrounded by water, it measures the kinetic energy of the water molecules. If you hold the thermometer bulb between your fingers, the thermometer measures the average kinetic energy of the molecules on the surface of your fingers. If you stick a thermometer in a cup of cocoa, under your tongue, or in a freezer, it will measure the average kinetic energy of the molecules touching it in those places.

How Does a Thermometer Work?

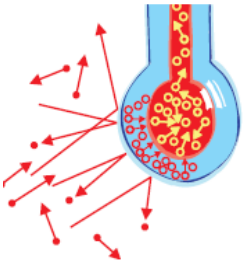
Think about an alcohol thermometer on the wall in a cold cabin. The kinetic energy in the air molecules is low. The kinetic energy in the glass and alcohol molecules is low. The air molecules and the glass thermometer bulb have the same kinetic energy. The top of the column of alcohol is at 5°C. Brrrr, it's cold, so you turn on the heater. Pretty soon warm air is flowing into the room. Warm air has more kinetic energy than cooler air. The energy added to the room in the form of fast-moving air molecules starts a chain of events.

- Molecules in the warm air collide more often with the glass thermometer bulb. Energy transfers to the molecules of glass by conduction.





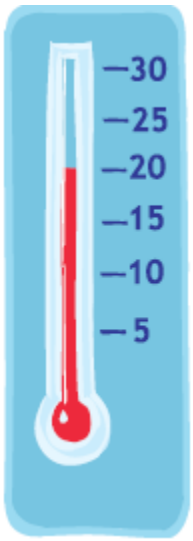
- Kinetic energy transfers by conduction from molecule to molecule in the glass bulb until all of the glass molecules are warm.



- Energy transfers by conduction from the glass molecules to the alcohol molecules inside the bulb. Kinetic energy transfers throughout the alcohol by conduction.—collisions between alcohol molecules.

- The alcohol molecules push on one another more forcefully because of the increased kinetic energy. The molecules push farther apart, expanding the volume of alcohol. As the volume of alcohol gets bigger, the only place it can go is into the tube.
- The alcohol will continue to expand as long as more and more energy is transferred to the alcohol. The alcohol will continue to push up the tube.

When the room is warm, you turn off the heater. In a few minutes, all the molecules in the room are at the same level of kinetic energy. The alcohol stops rising. The top of the column of alcohol is right next to the 20°C mark on the thermometer. Nice and warm.



As long as the kinetic energy of the alcohol molecules stays the same, the level of the column of alcohol will stay the same, and we say the temperature is steady at 20°C. What happens if you open the window? The whole process goes into reverse. Molecules in cool air have less kinetic energy. Heat energy transfers by conduction from the glass tube to the air. Heat then transfers from the alcohol to the now-cooler glass. The alcohol molecules lose kinetic energy and slow down, and the alcohol contracts. The liquid level gets lower in the tube. Kinetic energy will transfer from the molecules in the room to the molecules outside through the open window. The chill of low kinetic energy will set in once again. The thermometer will once again dip to 5°C. Brrrr.

34. Based on the passage, what is conduction?
   A. Conduction is the transfer of energy between molecules through movement of matter
   B. Conduction is the transfer of energy through electromagnetic waves
   C. Conduction is the transfer of energy due to density differences
   D. Conduction is the transfer of kinetic energy from one molecule to another through collisions between molecules.

35. After a few minutes of heating the cabin, the alcohol in the thermometer stops rising. According to the reading why does this happen?

36. A thermometer measures the temperature, which is the “average kinetic energy of the molecules in a material.” The text provides an example of a thermometer measuring the air temperature in a cabin. Describe the process of what happens to a thermometer that is placed in a cup of hot cocoa.