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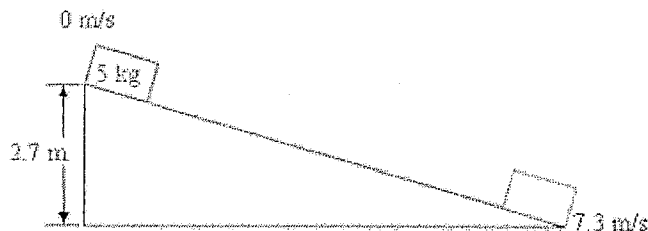
Standard 4: QUIZ

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- B 1) When one end of a short metal bar is heated, the opposite end will eventually become hot. Which of the following processes transfers the heat through the bar?

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

- B 2) A 5 kg box is at the top of a 2.7 m tall frictionless incline as shown in the diagram. It slides to the bottom of the incline, reaching a speed of 7.3 m/s. What type of potential energy does the box have at the top of the incline?



A. Chemical
B. Gravitational
C. Electrostatic
D. Elastic

- A 3) Which of the following increases when a metal spring is stretched horizontally?

A. potential energy
B. kinetic energy
C. gravitational energy
D. electrical energy

- B 4) The gasoline in a car's gas tank contains 1,350,000 J of chemical potential energy. The car's engine converts this to 450,000 J of kinetic energy as the car travels down the road. How much energy is apparently lost?

A. 450,000 J
B. 900,000 J
C. 1,350,000 J
D. 1,800,000 J

- B 5) The law of conservation of energy implies that:

A. Potential and Kinetic energy are always completely changed to useful work
B. The total energy of a system remains constant, if all forms of energy are considered
C. Losses do not occur when energy is converted from one form to another
D. All heat energy is wasted

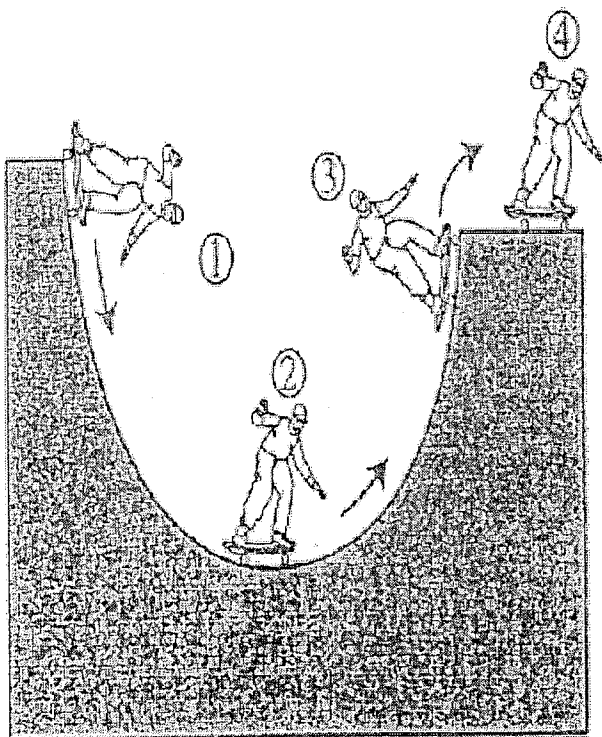
- C 6) A 9 kg model airplane flies horizontally at a constant speed. If the plane suddenly dives from its altitude of 50 m and levels off at 20 m, how much potential energy does it lose in the dive?

A. 4500 J
B. 1800 J
C. 2700 J
D. 9000 J

- D 7) An astronaut drops a 1.0 kg object and a 5.0 kg object on the Moon. Both objects fall a total distance of 2.0 m vertically. Which of the following best describes the objects after they have fallen a distance of 1.0 m?

A. They have each lost kinetic energy.
B. They have each gained the same amount of potential energy.
C. They have each lost the same amount of potential energy.
D. They have each gained one-half of their maximum kinetic energy.

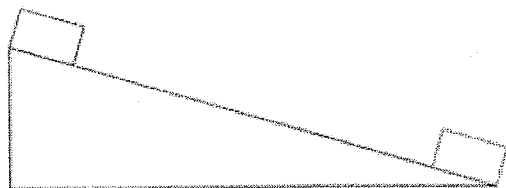
8) A skateboarder travels from location 1 to location 4 as shown below.



At which location does the skateboarder have the most kinetic energy and the least potential energy?

- A. 1
- B. 2
- C. 3
- D. 4

9)



A box is at the top of a frictionless incline as shown in the diagram. It slides to the bottom of the incline. Which equation below best shows the relationship expressing conservation of energy in this situation?

A. $KE_{\text{bottom}} = PE_{\text{top}}$

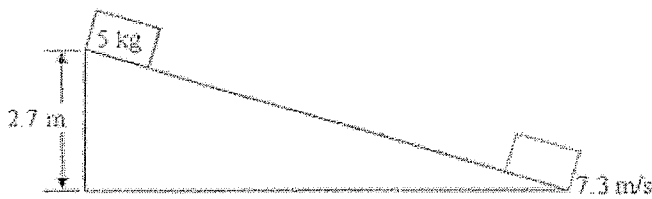
C. $KE_{\text{bottom}} = PE_{\text{bottom}} + \text{Heat}$

B. $KE_{\text{bottom}} = PE_{\text{top}} - \text{Heat}$

D. $KE_{\text{bottom}} = KE_{\text{top}} + PE_{\text{bottom}} + \text{Heat}$

- D 10) A 5 kg box is at the top of a 2.7 m tall frictionless incline as shown in the diagram. It slides to the bottom of the incline, reaching a speed of 7.3 m/s. What is the total energy of this system?

0 m/s



- A. 7.3 J
- B. 18.3 J
- C. 58.3 J
- D. 133 J

- C 11) Which of the following describes the mechanical energy of a cart at rest at the top of a steep hill?

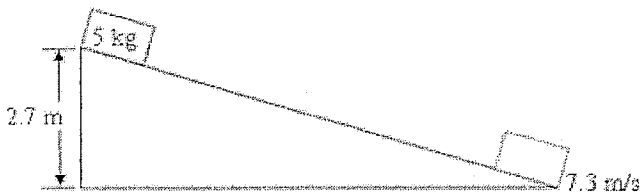
- A. The cart has no mechanical energy.
- B. The cart's mechanical energy is all kinetic.
- C. The cart's mechanical energy is all potential.
- D. The cart's mechanical energy is half potential and half kinetic.

- D 12) A young girl is swinging in a backyard swing. As she moves through the lowest point of her swing, she has reached her

- A. none of these.
- B. minimum KE
- C. maximum PE
- D. maximum KE

- D 13) A 5 kg box is at the top of a 2.7 m tall frictionless incline as shown in the diagram. It slides to the bottom of the incline, reaching a speed of 7.3 m/s. What is the box's kinetic energy at the bottom of the incline?

0 m/s



- A. 7.3 J
- B. 18.3 J
- C. 58.3 J
- D. 133 J

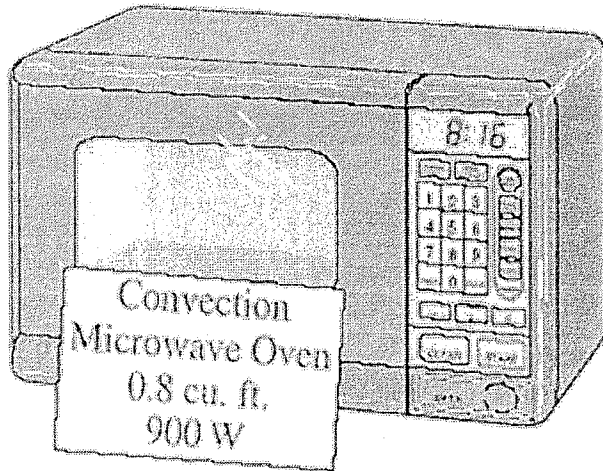
- B 14) A cart at the top of a hill is released and rolls down the hill. Which of the following describes the energy of the cart just as it reaches the bottom of the hill?

- A. The cart has no energy.
- B. The cart has maximum kinetic energy.
- C. The cart has maximum gravitational potential energy.
- D. The cart has equal gravitational potential and kinetic energy.

- D 15) What is the type and amount of energy in a wrecking ball weighing 100 pounds suspended 100 feet above the ground?

- A. Accumulative energy of 1,000 lbs/ft
- B. Floatational energy of 1,000 lbs
- C. Kinetic energy of 5,000 ft. lbs
- D. Potential energy of 10,000 ft. lbs
- E. Weight energy of 10,000 lbs

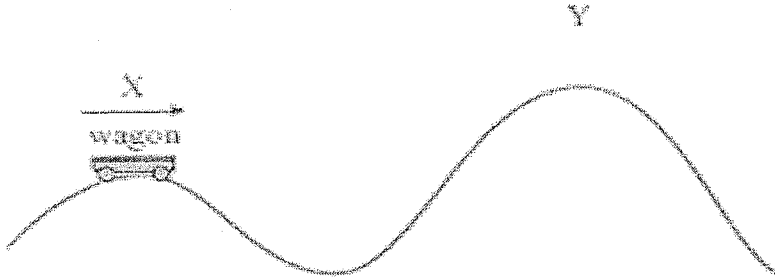
16) The picture below shows a microwave oven.



This microwave is labeled "Convection Microwave Oven." According to this label what is one way heat is transferred in this oven?

- A. by the movement of air inside the oven
- B. by standing waves in air outside the oven
- C. by electrostatic charges on atoms in the food
- D. by direct contact between the oven and the food

17) The figure below shows a wagon that moves from point X to point Y.



Which of the following best describes the wagon's change in energy as it coasts from point X to point Y?

- A. The wagon has the same kinetic energy at point Y and at point X.
- B. The wagon has more kinetic energy at point Y than at point X.
- C. The wagon has the same gravitational potential energy at point Y and at point X.
- D. The wagon has more gravitational potential energy at point Y than at point X.

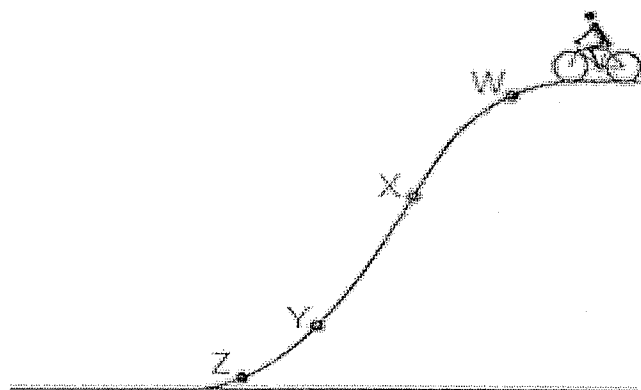
18) Three different boxes are lifted to different heights.

- Box X weighs 115 N and is lifted to 15 m.
- Box Y weighs 210 N and is lifted to 10 m.
- Box Z weighs 305 N and is lifted to 5 m.

Which of the following statements best describes the boxes' change in mechanical energy?

- A. Box X had the greatest change in mechanical energy.
- B. Box Z had the smallest change in mechanical energy.
- C. Boxes X and Y had the same change in mechanical energy.
- D. Boxes Y and Z had the same change in mechanical energy.

- A 19) The diagram below represents a bicyclist at the top of a hill, with four points labeled W, X, Y, and Z.



Assume that the bicyclist does not apply the brakes as he rides down the hill. At which point will the bicyclist's kinetic energy be closest to zero?

- ☒ A. point W
- B. point X
- C. point Y
- D. point Z

- C 20) A 9 kg model airplane flies horizontally at a constant speed. If the plane suddenly dives from its altitude of 50 m and levels off at 20 m, how much potential energy does it lose in the dive?

- A. 450 J
- B. 1800 J
- ☒ C. 2700 J
- D. 9000 J

21) A heated rock is placed in a container of water that is cooler than room temperature. Which of the following statements best describes what happens?

- A. Cold is removed from the container of water until the rock, the container, and the water all reach the same final temperature.
- B. The heated rock loses heat to the container of water until the rock, the container, and the water all reach the same final temperature.
- C. The heated rock loses heat to the container of water until the rock, the container, and the water each reach a different final temperature.
- D. Cold is removed from the container of water until the rock, the container, and the water each reach a final temperature lower than their original temperatures.

22) Which of the following is an example of heat transfer by conduction?

- A. sunlight heating a floor
- B. an electric stove heating an iron pan
- C. a wood stove heating nearby objects through electromagnetic waves
- D. an electric heater heating air, which rises and is replaced with cooler air

(23) A cart at the top of a hill is released and rolls down the hill. Which of the following describes the energy of the cart just as it reaches the bottom of the hill?

- A. The cart has no energy.
- B. The cart has maximum kinetic energy
- C. The cart has maximum gravitational potential energy.
- D. The cart has equal gravitational potential and kinetic energy.

(24) When one end of a short metal bar is heated, the opposite end will eventually become hot. Which of the following processes transfers the heat through the bar?

- A. condensation
- B. conduction
- C. convection
- D. radiation

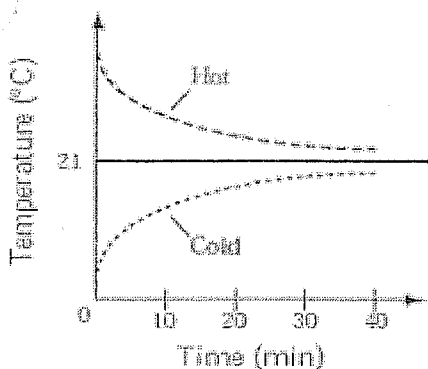
(25) Thermal energy is added to four identical 1.0 kg samples of water at room temperature.

Which of the following increases in each sample?

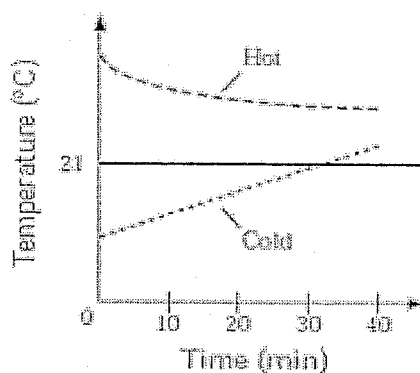
- A. average charge of an electron
- B. average density of a nucleus
- C. average mass of a proton
- D. average speed of a molecule

- 26) A cup containing 25 mL of hot water and a similar cup containing 25 mL of cold water are placed on a table in a room at 21°C . Which of the following graphs shows the most likely change in temperature for each cup from 0 min to 40 min?

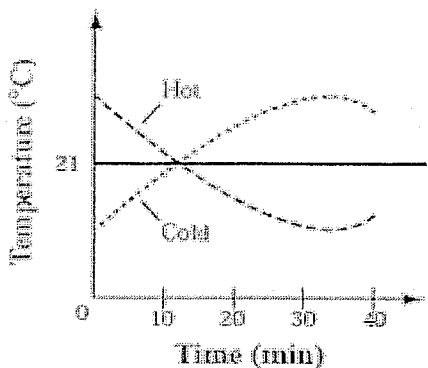
A.



C.



B.



D.

