Grade 11

Physical and Chemical Sciences
Energy

Additional FCAT Practice Questions

Directions: Select the best answer for each of the following questions

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1. A group of students design an experiment that involves launching a rocket. The rocket is launched in conditions where it experiences large amounts of air friction. Which of the following is most likely to describe the results of this experiment?

   A. The potential energy of the rocket will be greatest on the launch pad
   B. The kinetic energy of the rocket will stay the same
   C. The total mechanical energy of the rocket will change
   D. The speed of the rocket will be greater when it returns to Earth compared to when it was launched

2. A group of student design and experiment with toy that launches straight upward. The experiment is conducted in conditions where the toy does not experience air resistance going up or coming down. Which of the following is most likely to describe the results of this experiment?

   A. The kinetic energy of the rocket will stay constant throughout the experiment
   B. The total mechanical energy of the rocket will change
   C. When the toy returns to the launch point, the speed will be the same as when it was launched upward
   D. The potential energy of the rocket will be greatest on the launch pad

3. On a large frozen pond, a student throws a boulder so that it slides on the ice. The boulder slides for a while before coming to a stop. Which of the following best describes the energy involved in this sliding boulder situation?

A. Frictional force has caused the kinetic energy of the rock to decrease
B. Frictional force has caused the kinetic energy of the rock to increase
C. Work due to friction was done on the rock due to a decrease in the rock's potential energy
D. Work due to friction was done on the rock due to a increase in the rock's potential energy

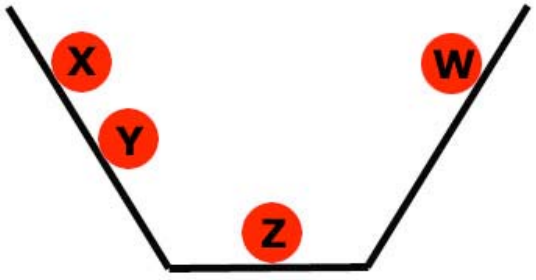
4. A student studying energy transfer suggests several factors may affect the potential energy of a buggy lifted up onto a lab bench:

1. Whether the lab is located on the top floor or the bottom floor of the building
2. The mass of the buggy
3. How high the lab bench is
4. The time it takes to lift the buggy to its new position on the lab bench
5. If the cart was lifted diagonally or vertically

Which of the factors suggested by the student actually affects the potential energy gained by the buggy?

A. 3, 4, and 5
B. 1, 2, 3, 4 and 5
C. 2 and 3 only
D. 1, 4 and 5

5. The following diagram illustrates a ball at different locations in trench.



Which of the following statements best describes the mechanical (potential + kinetic) energy of the ball?

A. The mechanical energy at all the points is positive
B. The mechanical energy at all the points is negative
C. The mechanical energy is positive at points W, X and Y, but negative at point Z
D. The mechanical energy is positive at point Z, but negative at points W, X and Y

6. A pendulum swings back and forth. On each swing, the object on the end of the pendulum string loses height from its previous swing. Which of the following best explains this situation?

A. The potential energy of a swing is equal the potential energy of the next swing
B. The object does not go as high with each swing because energy is lost to the surroundings
C. The pendulum should continue to swing indefinitely
D. The pendulum is a simple and complete conversion from potential to kinetic energy

7. Large, heavy vehicles with big engines tend to be inefficient. What does it mean to describe such vehicles as inefficient?

A. These vehicles use energy to force the pistons in their engines
B. These vehicles tend to violate the law of energy conservation
C. These vehicles tend to violate the law of mass conservation
D. These vehicles convert a lot of the chemical energy in gasoline into waste heat

8. A student sets up a pop bottle terrarium experiment by adding a small plant to some soil and water in a sealed pop bottle (A).

The student then leaves the pop bottle in a sunny area for a few weeks. In that time, the plant inside the pop bottle grows considerably (B). Which of the following best describes the exchange of matter and energy in this experiment?

A. During the experiment, the pop bottle gained mass and energy.
B. During the experiment, the pop bottle gained mass but lost energy.
C. During the experiment, the pop bottle gained energy, but it's mass remained constant
D. During the experiment, the pop bottle did not gain mass or energy.

9. The analysis of a food chain shows that energy is transferred as follows. INSERT GRAPHIC HERE. The analysis further shows that only about 15 percent of the energy is available for each organism at the next trophic level. Why is there a reduction in energy?

   A. Heat energy is lost, and some living matter is converted to undigested material.
   B. The Sun burns inefficiently
   C. As one organism eats another, mass is transferred but energy is not
   D. As the transfers take place, chemical and electrical energy is lost.

10. An old-style mousetrap is set by stretching a strong spring. The trap is triggered when the mouse releases the spring.

Which of the following correctly describes the energy conversion in the mousetrap when it is triggered?

   A. Mechanical energy is converted to elastic energy
   B. Elastic energy is converted to mechanical and sound energy
   C. Mechanical energy is converted to thermal energy and sound
   D. Chemical energy is converted to mechanical energy

Answers

1. C
2. C
3. A
4. C
5. A
6. B
7. D
8. C
9. A
10. B