Physics 11
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Relationships Between Variables Clicker Questions

1. Consider the equation for momentum

$$p = mv$$

where *p* represents the momentum, *m* represents the mass and *v* represents the velocity.

Which of the following describes the relationship between momentum and velocity?
A. Momentum is directly proportional to velocity.
B. Momentum is inversely proportional to velocity.
C. Momentum is directly proportional to the square of velocity.
D. Momentum is inversely proportional to the square of velocity.

2. If the velocity of the object is increased by a factor of four, what will be the change in the momentum?
A. Momentum is doubled.
B. Momentum is halved.
C. Momentum is increased by a factor of four.
D. Momentum is decreased by a factor of four.

3. Consider the equation for potential energy stored in a spring

$$E_p = \frac{1}{2}kx^2$$

where *k* represents the spring constant, *x* represents the displacement from the equilibrium position.

Which of the following describes the relationship between potential energy and displacement from the equilibrium position?
A. Potential energy is directly proportional to the displacement from the equilibrium position.
B. Potential energy is inversely proportional to the displacement from the equilibrium position.
C. Potential energy is directly proportional to the square of the displacement from the equilibrium position.
D. Potential energy is inversely proportional to the square of the displacement from the equilibrium position.

4. Two identical springs are stretched. Spring A is stretched 10 cm. Spring B is stretched 5 cm. Which spring stores more potential energy?
A. Spring A stores two times more energy.
B. Spring A stores four times more energy.
C. Spring A stores five times more energy.
D. Spring B stores two times more energy.

5. Consider Ohm's law

$$V = IR$$

where V represents voltage, I represents current and R represents resistance.

Which of the following describes the relationship between current and resistance?

A. $I \propto R$
B. $I \propto R^2$
C. $I \propto \frac{1}{R}$
D. $I \propto \frac{1}{R^2}$

6. If resistance is decreased by a factor of four, what is the change in the current?
   A. Current is increased by a factor of four.
   B. Current is decreased by a factor of four.
   C. Current is increased by a factor of 16.
   D. Current is decreased by a factor of 16.

7. Consider an object accelerating uniformly from rest. Which of the following describes the relationship between displacement and time?
   A. Displacement is directly proportional to time.
   B. Displacement is inversely proportional to time.
   C. Displacement is directly proportional to the square of time.
   D. Displacement is inversely proportional to the square of time.

8. Consider an object accelerating uniformly from rest. How does the displacement of the car after 10 seconds compare to the displacement after 2 seconds?
   A. The displacement after 10 seconds is five times greater.
   B. The displacement after 10 seconds is eight times greater.
   C. The displacement after 10 seconds is 25 times greater.
   D. The displacement after 10 seconds is 64 times greater.

9. A small pizza has a diameter of 8 inches. An extra large pizza has a diameter of 16 inches. How does the area of the extra large pizza compare to the area of the small pizza?
   A. The area is two times greater.
   B. The area is four times greater.
   C. The area is eight times greater.
   D. The area is sixteen times greater.

10. Consider two cars, each travelling at a constant velocity. Car A travels at 4 times the velocity as Car B. Car B travels for half the amount of time that Car A travels. The total displacement for Car B is 400 m. What is the total displacement of Car A?
    A. 800 m
    B. 1600 m
    C. 3200 m
    D. 6400 m

11. Two students of equal mass stand on the surface of Planets X and Y. Planet X has twice the radius and twice the mass as Planet Y. Which student weighs more?
    A. The student on Planet X weighs 2 times more.
    B. The student on Planet Y weighs 2 times more.
    C. The student on Planet X weighs 4 times more.
    D. The student on Planet Y weighs 4 times more.

12. An astronaut, above the surface of a planet, experiences a gravitational force of 200 N. What gravitational force will he experience if the distance from the centre of the planet is decreased by a factor of ten?
    A. 2 N
    B. 20 N
    C. 2000 N
    D. 20 000 N

13. An astronaut, above the surface of a planet, experiences a gravitational force of 200 N. What gravitational force will an astronaut of twice the mass experience if he is half the distance from the centre of the planet?
    A. 200 N
    B. 400 N
    C. 800 N
    D. 1600 N

14. Two sacks of potatoes separated by a distance *d* experience a gravitational force of 16 N. What will be the gravitational force between them if the number of potatoes in each sack doubles?
    A. 8 N
    B. 16 N
    C. 32 N
    D. 64 N

15. Two sacks of potatoes separated by a distance *d* experience a gravitational force of 16 N. What will be the gravitational force between them if the number of potatoes in one sack is halved and the distance separating the sacks is increased to 2*d?*
    A. 2 N
    B. 4 N
    C. 16 N
    D. 32 N

16. Planet Alpha has a mass four times greater and a radius twice as great compared to Planet Beta. How does the density of Planet Alpha compare to the density of Planet Beta?
    A. The density of Planet Alpha is twice as great as Planet Beta.
    B. The density of Planet Beta is twice as great as Planet Alpha.
    C. The density of Planet Alpha is eight times greater as Planet Beta.
    D. The density of Planet Alpha is equal to the density of Planet Beta.

Answers:

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