

Kinematics problem set 2.

Name _____

Period _____

Date _____

For the following problems solve for the unknown variable in the equation $x_f = x_i + v_i t + \frac{1}{2} a t^2$.

1. $x_f = 5 \text{ m}$ $x_i = ?$ $v_i = 2 \text{ m/s}$ $a = .5 \text{ m/s/s}$ $t = 3$

2. $x_f = ?$ $x_i = 0 \text{ m}$ $v_i = 0 \text{ m/s}$ $a = 1 \text{ m/s/s}$ $t = 12$

3. $x_f = 0 \text{ m}$ $x_i = 15 \text{ m}$ $v_i = -10 \text{ m/s}$ $a = ?$ $t = 5 \text{ sec}$

4. $x_f = 10 \text{ m}$ $x_i = 0 \text{ m}$ $v_i = 0 \text{ m/s}$ $a = 1 \text{ m/s/s}$ $t = ?$

5. $x_f = 0 \text{ m}$ $x_i = 15 \text{ m}$ $v_i = ?$ $a = 10 \text{ m/s/s}$ $t = 5 \text{ sec}$

6. $v_f = 10 \text{ m/s}$ $v_i = 0 \text{ m}$ $x_i = 5 \text{ m/s}$ $x_f =$ $t = 5 \text{ sec}$

Solve the following word problems.

1. A jogger with a constant velocity of 4.0 meters/second runs by a stationary dog. After 1 second, the dog decides to chase the jogger. The dog accelerates at 1.5 m/s/s.

a) How long (time) does it take the dog to catch the jogger?

b) How far away from the spot where the dog was sitting has the jogger gone when she is caught by the dog?

2. In a classic "Seinfeld" episode, Jerry races one of his old high school friends. Upon hearing a car backfire, Jerry leaves 0.5 seconds before the other guy. Jerry's maximum acceleration is 2.00 m/s/s. His friend's is 2.20 m/s/s.

a) How long will it take the friend to overtake Jerry?

b) How far from the start are they when they are even?

c) What are their respective velocities when they are even?

3. A jalopy is decelerated from 48m/s to 12m/s over 5 s. What is the displacement of the jalopy during this time?

4. How much time will it take a jalopy, starting from rest, to reach a velocity of 24 m/s over a distance of 315 m?