

Physics ↔ Math Worksheet - Algebra and Substitution

Solve the following equations for the variable indicated. There should be enough room to do one step at a time.

1. $v = \frac{x}{t}$ (for t)

2. $\frac{1}{2}mv^2 = \frac{1}{2}kx^2$ (for k)

3. $mgh = \frac{1}{2}mv^2$ (for v)

4. $\frac{m_1v^2}{r} = m_2gh$ (for r)

5. $T = 2\pi\sqrt{\frac{L}{g}}$ (for g)

6. $m_1v_1 + m_2v_2 = m_1v_f + m_2v_f$ (for v_f)

7. $x = v_i t + \frac{1}{2}at^2$ (for a)

8. $\frac{1}{R_1} + \frac{1}{R_2} = \frac{1}{R_{eq}}$ (for R_2)

9. $m_1(x) = m_2(3-x)$ (for x)

Evaluate the following using the information given. Try algebraically solving for the unknown variable first.

1. $v_f = v_i + at$ (find a , if $v_i=2$, $v_f=16$, $t=2$)

2. $F = \frac{mv^2}{r}$ (find r , if $F=10$, $m=5$, $v=4$)

3. $T = 2\pi\sqrt{\frac{m}{k}}$ (find m , if $T=3$, $k=50$)

4. $\frac{P_1^2}{d_1^3} = \frac{P_2^2}{d_2^3}$ (find d_2 , if $P_1=10$, $P_2=8$, $d_1=2$)

5. $\frac{1}{d_o} + \frac{1}{d_i} = \frac{1}{f}$ (find d_o , if $d_i=20$, $f=12$)

6. $x = v_i t + \frac{1}{2} a t^2$ (find t , if $v_i=0$, $x=125$, $a=10$)

Hint: Do any terms drop out?

Solve the following word problems using the information and steps (I, II, III) provided.

7. If an airplane travels at 120 m/s (v), how long would it take (t) for the plane to travel a distance (x) of 300 meters?

(I) List givens: $v =$
 $x =$
 $t = ?$

Concept Equation: $v = \frac{x}{t}$

(II) Derive Equation (solve for t)

(III) Substitute the given values into your derived equation for time and evaluate.

8. A toy car accelerates from an initial velocity (v_i) of 5 m/s, to a final velocity (v_f) of 17 m/s, in 6 seconds. Find the acceleration of the car?

(I) List Givens: $v_i =$
 $v_f =$
 $t =$
 $a = ?$

Concept Equation: $v_f = v_i + at$

(II) Derive Equation (solve for a)

(III) Substitute the given values into your derived equation for acceleration and evaluate.