Name _____ Date _____ Block _____

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. $x=v_it+\frac{1}{2}at^2$ *(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.