

Substitution Challenges:

1. Rearrange the three variable formula $3y + 5x = 6z$ to solve for 'x'.

If $y = 20$, and $z = 5$, then solve for x.

2. Use the formula $E = mgh$.

If $E = 1000$, $m = 20$, and $g = 10$, then solve for 'h'.

3. Given these equations, solve for 'v' if $m = 30$, $E = 400$.

$$E = \frac{1}{2}mv^2$$

4. Given these equations, solve for d if $v_i = 10$, $v_f = 15$, and $t = 4$.

$$d = \bar{v}t \qquad \bar{v} = \frac{v_i + v_f}{2}$$

5. Given these equations, solve for 'a' if $F_A = 1500$, $g = 9.81$, $m = 15$, and $\mu = 2$.

$$F_A - F_f = ma \qquad F_f = \mu F_N \qquad F_N = mg$$

6. Given these equations, solve for d if $v_i = 9$, $\mu = 2.5$, $g = 9.81$, $m = 15$, and $t = 4$.

$$d = v_i t + \frac{1}{2}at^2 \qquad -F_f = ma \qquad F_f = \mu F_N \qquad F_N = mg$$

7. Given these equations, solve for v_f if $F = 800$, $m = 3$, $v_i = 9$ and $\Delta t = 15$.

$$\Delta p = F\Delta t \qquad \Delta p = m\Delta v \qquad \Delta v = v_f - v_i$$

8. Given these equations, solve for v if $m = 150$, $g = 9.81$, $h = 10$ and $Q = 2500$.

$$E_i = E_f + Q \qquad E_i = E_p \qquad E_f = E_k$$

$$E_p = mgh \qquad E_k = \frac{1}{2}mv^2$$

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9. Given these equations, solve for a if $F_T = 1600$, $d = 20$, and $v_f = 14$, $m = 4$, and $g = 9.81$.

$$v_f^2 = v_i^2 + 2ad$$

$$F_g = mg$$

$$v_i = 0$$

10. Given these equations, solve for P if $F = 250$, $d = 12$, and $\Delta t = 15$.

$$W = Fd \quad P = \frac{W}{\Delta t}$$

11. Given these equations, solve for d if $v_i = 6$, $a = 2.5$, and $t = 8$.

$$v_f = v_i + at \quad d = \left(\frac{v_i + v_f}{2} \right) t$$

12. Given these equations, solve for v_f if $m = 10$, $v_i = 4$, $F = 45$, and $d = 8$.

$$W = Fd \quad W = \Delta E$$

$$E_{kf} = \frac{1}{2}mv_f^2 \quad E_{ki} = \frac{1}{2}mv_i^2 \quad \Delta E = E_{kf} - E_{ki}$$

13. Given these equations, solve for d if $F_{\text{net}} = -900$, $m = 75$, $v_i = 20$, and $v_f = 0$.

$$F_{\text{net}} = ma \quad v_f^2 = v_i^2 + 2ad$$

14. Given these equations, solve for Δt if $m = 40$, $g = 9.8$, $h = 6$, and $P = 800$.

$$E_p = mgh \quad W = E_p \quad P = \frac{W}{\Delta t}$$