Isolating Unknown Variables

Name: Key

Using algebra, rearrange the following equations to isolate the unknown variable in terms of the other variables. Start by circling the unknown variable and show all your work!

Examples:

"d": $v = \frac{d}{t}$ → ***Answer:*** $d = v * t$

"t": $v = \frac{d}{t}$ → ***Answer:*** $t = \frac{d}{v}$

switch! unknown is in denominator

1. **Δv:** $a = \frac{\Delta v}{t}$ $\Delta v = at$

2. **t:** $a = \frac{\Delta v}{t}$ $t = \frac{\Delta v}{a}$

switch!

3. v_i: $v_f = v_i + at$

$-at \quad -at$

$v_i = v_f - at$

* put #s in if you get stuck!

ex) $8 = 2 + 3x$

* remind yourself of what you'd do algebraically

4. **t:** $v_f = v_i + at$

$-v_i \quad -v_i$

$\frac{v_f - v_i}{a} = \frac{at}{a}$

$\boxed{t = \frac{v_f - v_i}{a}}$

5. **a:** $v_f = v_i + at$

$-v_i \quad -v_i$

$\frac{v_f - v_i}{t} = \frac{at}{t}$

$\boxed{a = \frac{v_f - v_i}{t}}$

6. **a:** $2x \quad d = \frac{1}{2}at^2 \times 2$

$\frac{2d}{t^2} = \frac{at^2}{t^2}$

$\boxed{a = \frac{2d}{t^2}}$

7. **t:** $2x \quad d = \frac{1}{2}at^2 \times 2$

$\frac{2d}{a} = \frac{at^2}{a}$

$\sqrt{t^2} = \sqrt{\frac{2d}{a}}$

$\boxed{t = \sqrt{\frac{2d}{a}}}$ or $\boxed{t = \sqrt{\frac{d}{\frac{1}{2}a}}}$

8. v_f: $\sqrt{v_f^2} = \sqrt{v_i^2 + 2ad}$

$\boxed{v_f = \sqrt{v_i^2 + 2ad}}$

* square root must be over the entire right side

★ square root must be over entire right side

9. v_i: $v_f^2 = v_i^2 + 2ad$

$-2ad \quad -2ad$

$\sqrt{v_f^2 - 2ad} = \sqrt{v_i^2}$

$v_i = \sqrt{v_f^2 - 2ad}$

10. **a:** $v_f^2 = v_i^2 + 2ad$

$-v_i^2 \quad -v_i^2$

$\frac{v_f^2 - v_i^2}{2d} = \frac{2ad}{2d}$

$a = \frac{v_f^2 - v_i^2}{2d}$

11. **d:** $v_f^2 = v_i^2 + 2ad$

$-v_i^2 \quad -v_i^2$

$\frac{v_f^2 - v_i^2}{2a} = \frac{2ad}{2a}$

$d = \frac{v_f^2 - v_i^2}{2a}$