

AP Physics: Due 1st day of class. Please try this self-assessment.

Part 1: Algebra Review

Throughout the year, we'll be rearranging formulas and equations to solve for the variable we want to know. Refresh your algebra skills with the following:

Example:

Suppose we want to know the acceleration, a , in the following formula:

$$y = v_0 t + \frac{1}{2} a t^2$$

y is the distance

v_0 is the initial velocity

t is the time

Isolate the term with the variable of interest, a . In other words, get the $\frac{1}{2} a t^2$ term by itself on one side of the equal sign. To do this we would have to subtract $v_0 t$ term from both sides.

$$\begin{array}{r} y = v_0 t + \frac{1}{2} a t^2 \\ - v_0 t \quad - v_0 t \\ \hline y - v_0 t = \frac{1}{2} a t^2 \end{array}$$

Common error – dividing the $\frac{1}{2} a t^2$ by $\frac{1}{2} t^2$ before isolating the term with the acceleration. If we wanted to do this, we would have to divide all the terms by $\frac{1}{2} t^2$, not just the $\frac{1}{2} a t^2$ term.

Isolate the variable of interest, a . Now we can multiply both sides by 2 and divide both sides by t^2 .

$$y - v_0 t = \frac{1}{2} a t^2$$

$$\frac{2(y - v_0 t)}{t^2} = \frac{2(\cancel{\frac{1}{2} a t^2})}{\cancel{t^2}}$$

$$\frac{2(y - v_0 t)}{t^2} = a$$

Example: Solve the following.

$$6 = \frac{18 + 3x}{x}$$

In this case, we have to get all the terms with x 's into 1 term. Multiply both sides by x .

$$6x = 18 + 3x$$

Combine the terms with the x 's by subtracting $3x$ from each side

$$6x = 18 + 3x$$

$$\begin{array}{r} -3x \quad -3x \\ \hline 3x = 18 \end{array}$$

Divide both sides by 3.

$$x = 6$$

Common error – dividing only the 6 and the $3x$ terms by x . We can't do this because the entire numerator ($18 + 3x$) is divided by x in the problem.

Name: _____

Solve these to refresh your algebra skills.

1. $X + 47 = 95$

2. $55 + a = -78$

3. $1/r = 1/5 + 1/15$

4. $1/32 = 1/f + 1/-8$

5. $37 = \frac{314.5}{x}$

6. $5 = \frac{3x - 4}{x}$

7. $2x = \frac{3x^2 - 16}{x}$

Solve for the given letter

1. $A = p + prt$ for t

2. $A = \frac{1}{2} d_1 d_2$ for d_1

3. $f_o = f_s \frac{(v + v_o)}{(v - v_s)}$ for v_o

4. $y = mx + b$ for m

5. $v = \sqrt{\frac{GM}{r}}$ for r

6. $F = k \frac{Q_1 Q_2}{r^2}$ for r

7. $F = \frac{m v^2}{r^2}$ for v