1. Solve each formula for the specified letter.

a. Solve $a = b + c + d$ for b.

$$\begin{aligned} a &= b + c + d \\ a - c - d &= b + c + d - c - d \\ a - c - d &= b \end{aligned}$$

b. Solve $a = bcd$ for b.

$$\begin{aligned} a &= bcd \\ \frac{a}{cd} &= \frac{b\cancel{c}\cancel{d}}{\cancel{c}\cancel{d}} \\ \frac{a}{cd} &= b \end{aligned}$$

c. Solve $a = \frac{b}{3}(c+d)$ for b.

$$\begin{aligned} a &= \frac{b}{3}(c+d) \\ 3 \cdot a &= \cancel{3} \cdot \frac{b}{\cancel{3}}(c+d) \\ 3a &= b(c+d) \\ \frac{3a}{(c+d)} &= \frac{b\cancel{(c+d)}}{\cancel{(c+d)}} \\ \frac{3a}{c+d} &= b \end{aligned}$$

d. Solve $a = bc + d$ for b.

$$\begin{aligned} a &= bc + d \\ a - d &= bc + d - d \\ a - d &= bc \\ \frac{a-d}{c} &= \frac{b\cancel{c}}{\cancel{c}} \\ \frac{a-d}{c} &= b \end{aligned}$$

e. Solve $a = b + cd$ for b.

$$\begin{aligned} a &= b + cd \\ a - cd &= b + cd - cd \\ a - cd &= b \end{aligned}$$

f. Solve $a = \frac{b}{3}(c+d)$ for d.

$$\begin{aligned} a &= \frac{b}{3}(c+d) \\ 3 \cdot a &= \cancel{3} \cdot \frac{b}{\cancel{3}}(c+d) \\ 3a &= b(c+d) \\ 3a &= bc + bd \\ 3a - bc &= bc + bd - bc \\ 3a - bc &= bd \\ \frac{3a - bc}{b} &= \frac{\cancel{b}d}{\cancel{b}} \\ \frac{3a - bc}{b} &= d \end{aligned}$$

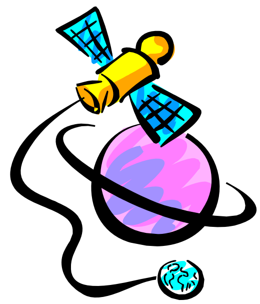
g. Solve $a = \dfrac{bc}{d}$ for b.

$$a = \frac{bc}{d}$$
$$\frac{d}{c}\cdot a = \frac{\cancel{d}}{\cancel{c}}\cdot\frac{b\cancel{c}}{\cancel{d}}$$
$$\frac{ad}{c} = b$$

h. Solve $a = \dfrac{b}{c} + d$ for b.

$$a = \frac{b}{c} + d$$
$$a - d = \frac{b}{c} + d - d$$
$$a - d = \frac{b}{c}$$
$$c(a-d) = \cancel{c}\cdot\frac{b}{\cancel{c}}$$
$$ca - cd = b$$

2. The Spuntick satellite is on a journey through our solar system. Spuntick cruises at a constant speed of 35,466 mph. The distance from Jupiter to Saturn is about 4.0×10^8 miles. How many *years* did it take Spuntick to fly from Jupiter to Saturn? Round your solution to the nearest tenth.



We know that $D = 4.0\times10^8$ miles and $r = 35{,}466\,\dfrac{\text{miles}}{\text{hr}}$.

From the formula $D = rt$ we get $t = \dfrac{D}{r}$. So,

$$\begin{aligned} t &= \frac{D}{r} \\ &= \frac{400{,}000{,}000\text{ miles}}{\left(35{,}466\,\dfrac{\text{miles}}{\text{hr}}\right)} \\ &\approx 11{,}278.4\text{ hr} \end{aligned}$$

Unit Analysis

$$\frac{\text{miles}}{\dfrac{\text{miles}}{\text{hr}}} = \frac{\dfrac{\text{miles}}{1}}{\dfrac{\text{miles}}{\text{hr}}}$$
$$= \frac{\cancel{\text{miles}}}{1}\cdot\frac{\text{hr}}{\cancel{\text{miles}}}$$
$$= \text{hr}$$

We were asked to find the number of *years* the journey takes.

$$\begin{aligned} 11{,}278.4\text{ hr} &= \left(11{,}278.4\ \cancel{\text{hr}}\right)\cdot\left(\frac{1\ \cancel{\text{day}}}{24\ \cancel{\text{hr}}}\right)\cdot\left(\frac{1\text{ year}}{365\ \cancel{\text{days}}}\right) \\ &\approx 1.29\text{ years} \end{aligned}$$

So the journey takes about 1.29 years.

CAUTION

Remember that in these type problems you need to write the units ***into your calculation***.

3. For a certain trapezoid the area is 100 cm^2, the length of one base is 5 cm, and the height is 4 cm. Use the formula $A = \frac{1}{2}h\left(b_1 + b_2\right)$ to determine the length of the other base showing work consistent with that illustrated in class.

In class we established that $b_1 = \frac{2A - b_2 h}{h}$. We know that $A = 100\text{ cm}^2$, $b_2 = 5\text{ cm}$, and $h = 4\text{ cm}$. So …

$$\begin{aligned} b_1 &= \frac{2A - b_2 h}{h} \\ &= \frac{2\left(100\text{ cm}^2\right) - \left(5\text{ cm}\right)\left(4\text{ cm}\right)}{4\text{ cm}} \\ &= 45\text{ cm} \end{aligned}$$

Hence, the other base has a length of 45 cm.