MATH DOESN'T SUCK

Solution Guide – Chapter 21

Introduction to "Solving for *x*" in Word Problems

Doing the Math from p. 261-3

2) Let's go in order of what we know:

If the price of one poster is "*p*" then the price of 4 posters would be "$4 \times p$", or $4p$.

Brandon also bought a book that cost $15.

So the total price Brandon paid at the store would be: $4p + 15$.

2a) Answer: $4p + 15$

2b) Now the problem says that the total cost was $95, so we can set up the equality:

$$4p + 15 = 95$$

We're playing the "what if" game: "*What if* the total were $95, then what would the cost of the posters have to be to make this a true statement?" And once we find out the value of "*p*", then we'll have the answer to that question. Let's solve it:

$$4p + 15 = 95$$

In an attempt to get the *p*'s by themselves, let's subtract **15** from both sides of the equation:

$$4p + 15 - \mathbf{15} = 95 - \mathbf{15}$$

$$\rightarrow \quad 4p = 80$$

Now let's divide both sides by 4:

$$\frac{4p}{4} = \frac{80}{4}$$

And now we cancel the 4's, taking a factor of 4 out of 80, leaving 20 behind:

$$\frac{\cancel{4}p}{\cancel{4}} = \frac{^{20}\cancel{80}}{\cancel{4}}$$

$$\rightarrow p = 20$$

Let's check our answer, by plugging in 20 for "p" in the equation, and see if we get a true statement:

$4\boldsymbol{p} + 15 = 95$

substituting 20 for p

$4 \times \mathbf{20} + 15 = 95$

$\rightarrow 80 + 15 = 95$

$\rightarrow \quad 95 = 95$

2b) Answer: Each poster cost $20.

3) If each box has c chocolates in it, then 5 boxes would have a total of $5 \times c$, or $5c$ chocolates. If I ate 6 individual chocolates out of one box, then I'd be left with a total number of chocolates equal to: $5c - 6$.

3a) Answer: "$5c - 6$" pieces of chocolate are left.

3b) Now, if I told you that there are 69 pieces left, we could write down the math sentence:

$$5c - 6 = 69$$

And now we can solve for "c"!

First, we want to get all the numbers on one side, so let's add 6 to both sides:

$$5c - 6 + \mathbf{6} = 69 + \mathbf{6}$$

$$\rightarrow 5c = 75$$

And now we can divide both sides by 5:

$$\frac{5c}{\mathbf{5}} = \frac{75}{\mathbf{5}}$$

And then cancel the 5's, canceling the factor "5" from 75, leaving us with 15

(since $5 \times 15 = 75$)

$$\frac{\cancel{5}c}{\cancel{5}} = \overset{15}{\frac{\cancel{75}}{\cancel{5}}}$$

$$\rightarrow \; c = 15$$

If $c = 15$, this means there are **15** chocolates in a full box. Let's test that answer by plugging in 15 where there used to be a c, in the original equation:

$5\boldsymbol{c} - 6 = 69$

(substituting 15 for c)

$5 \times \mathbf{15} - 6 = 69$

$\rightarrow \; 75 - 6 = 69$

$\rightarrow \quad 69 = 69$

Yep! For the original equation to give us a true statement, it means we indeed found the right value for c!

3b) Answer: There are 15 chocolates in each full box; $c = 15$.

4) What's Lucy's age *one year from now*?

Well, she said that *one year from now*, her age would be <u>double</u> Victoria's age today, which is v. So Lucy's age will be <u>double</u> "v." That's $2 \times v$ or $2v$.

4a) Answer: Lucy's age one year from now will be $2v$.

4b) What is Lucy's age *today*? It will be 1 year less than her future age, right? So her age today would be: $2v - 1$.

4b) Answer: Lucy's age today is $2v - 1$.

4c) If we know that Lucy's age today is 15, then we can set up the equality:

$$2v - 1 = 15$$

…and solve for "*v*"!

We want to get *v* by itself, so first let's add 1 to both sides:

$$2v - 1 + \mathbf{1} = 15 + \mathbf{1}$$

$$\rightarrow \; 2v = 16$$

You can probably already see that $v = 8$, but I'll take you through the process. Alright, to continue in our quest to get *v* all by itself, next let's divide both sides by 2:

$$\frac{2v}{\mathbf{2}} = \frac{16}{\mathbf{2}}$$

Now let's cancel the 2's from top and bottom, and take a factor of 2 out of 16, leaving 8 behind:

$$\frac{\cancel{2}v}{\cancel{2}} = \frac{8\,1\cancel{6}}{\cancel{2}}$$

$$\rightarrow \; v = 8$$

So Victoria's age today is 8.

Sure, we could plug in $v = 8$ to our original equation and see if we get a true statement, but what if we set up our original equation incorrectly? For this one, let's talk it out logically:

Hm… If Lucy is 15 today, and Victoria is 8 today, then next year, Lucy will be 16 – twice Victoria's age today, which is 8. Yep, that's what the original problem said should happen!

4c) Answer: Today, Victoria is 8 years old; $v = 8$