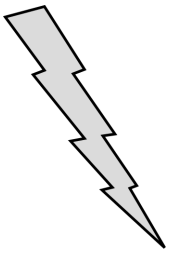
Section 2.2
The Multiplication Property of Equality

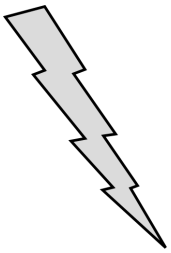
DO YOU FEEL SAFE????



You just heard some booming thunder shortly after you saw a huge flash of lightning!!!

How far away from you is that storm?

Well, one of the application exercises in this section of your textbook offers you a quick mathematical way to determine exactly that!



First Steps:

- ☐ **Take comprehensive notes** from your instructor's lecture and insert your notes into this section of the *Learning Guide*. Be sure to write down all examples, definitions, and other key concepts. Additional learning resources include the *Lecture Series on DVD*, the *PowerPoints*, and Section 2.2 of your textbook which begins on page 122.
- ☐ Complete the ***Concept and Vocabulary Check*** on page 129 of the textbook.

Guided Practice:

- ☐ Review each of the following ***Solved Problems*** and complete each ***Pencil Problem***.

Objective #1: Use the multiplication property of equality to solve equations.

✔ *Solved Problem #1*

1a. Solve and check: $\frac{x}{3} = 12$

$$\frac{x}{3} = 12$$
$$3 \cdot \frac{x}{3} = 12 \cdot 3$$
$$1x = 36$$
$$x = 36$$

The solution set is $\{36\}$.

Check: $\frac{x}{3} = 12$

$$\frac{36}{3} = 12$$
$$12 = 12, \text{ true}$$

✎ *Pencil Problem #1* ✎

1a. Solve and check: $\frac{x}{6} = 5$

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1b. Solve: $-11y = 44$

$$-11y = 44$$
$$\frac{-11y}{-11} = \frac{44}{-11}$$
$$1x = -4$$
$$x = -4$$

The solution set is $\{-4\}$.

1b. Solve: $-28 = 8z$

1c. Solve: $\frac{2}{3}y = 16$

$$\frac{2}{3}y = 16$$
$$\frac{3}{2}\left(\frac{2}{3}y\right) = \frac{3}{2}\cdot 16$$
$$1y = 24$$
$$y = 24$$

The solution set is $\{24\}$.

1c. Solve: $28 = -\frac{7}{2}x$

Objective #2: Solve equations in the form $-x = c$.

✔ ***Solved Problem #2***

2a. Solve: $-x = 5$

$$-x = 5$$
$$-1x = 5$$
$$(-1)(-1x) = (-1)5$$
$$1x = -5$$
$$x = -5$$

The solution set is $\{-5\}$.

Pencil Problem #2

2a. Solve: $-x = 17$

2b. Solve: $-x = -3$

$$-x = -3$$
$$-1x = -3$$
$$(-1)(-1x) = (-1)(-3)$$
$$1x = 3$$
$$x = 3$$

The solution set is $\{3\}$.

2b. Solve: $-47 = -y$

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Objective #3: Use the addition and multiplication properties to solve equations.

✔ *Solved Problem #3*

3a. Solve: $-4y-15=25$

$$\begin{aligned}-4y-15&=25\\-4y-15+15&=25+15\\-4y&=40\\\frac{-4y}{-4}&=\frac{40}{-4}\\y&=-10\end{aligned}$$

The solution set is $\{-10\}$.

✎ *Pencil Problem #3*

3a. Solve: $2x+1=11$

3b. Solve: $2x-15=-4x+21$

$$\begin{aligned}2x-15&=-4x+21\\2x+4x-15&=-4x+4x+21\\6x-15&=21\\6x-15+15&=21+15\\6x&=36\\\frac{6x}{6}&=\frac{36}{6}\\x&=6\end{aligned}$$

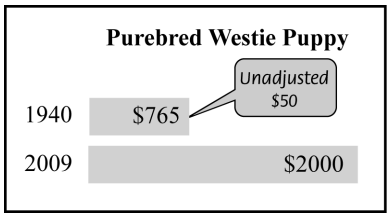
The solution set is $\{6\}$.

3b. Solve: $6x+14=2x-2$

Objective #4: Solve applied problems using formulas.

✔ *Solved Problem #4*

4. The bar graph shows the inflation-adjusted price of a Westie puppy in 1940 and in 2009.



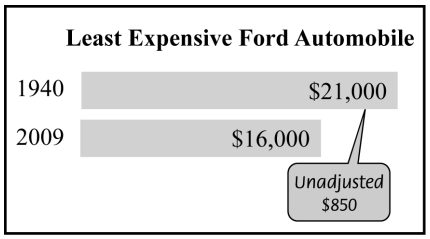
Using today's dollars, the data can be described by the mathematical model

$$P=18n+765,$$

where P is the puppy's price n years after 1940.

✎ *Pencil Problem #4*

4. The graph shows the inflation-adjusted price of the least expensive Ford automobile in 1904 and in 2009.



Using today's dollars, the data can be described by the mathematical model

$$F=-48n+21{,}000,$$

where F is the price of the least expensive Ford automobile n years after 1904.

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4a. Does the formula underestimate or overestimate the price of a Westie puppy in 2009? By how much?

The bar graph indicates that the price of a Westie puppy was \$2000 in 2009.

Since 2009 is 69 years after 1940, substitute 69 into the formula for n.

$$P = 18n + 765$$
$$P = 18(69) + 765$$
$$P = 1242 + 765$$
$$P = 2007$$

The formula indicates that the price of a Westie puppy was \$2007 in 2009.
The formula overestimates by \$7.

4b. If trends shown by the formula continue, when will the price of a Westie puppy be \$2151?

$$P = 18n + 765$$
$$2151 = 18n + 765$$
$$2151 - 765 = 18n + 765 - 765$$
$$1386 = 18n$$
$$\frac{1386}{18} = \frac{18n}{18}$$
$$77 = n$$

The formula estimates that the price will be \$2151 for a Westie puppy 77 years after 1940, or in 2017.

4a. Does the formula underestimate or overestimate the price of the least expensive Ford automobile in 2009? By how much?

4b. If trends shown by the formula continue, when will the least expensive Ford automobile cost \$15,000?

Answers for Pencil Problems *(Textbook Exercise references in parentheses)*:

1a. {30} *(2.2 #1)* **1b.** $\left\{-\frac{7}{2}\right\}$ *(2.2 #9)* **1c.** {−8} *(2.2 #19)* **2a.** {−17} *(2.2 #21)* **2b.** {47} *(2.2 #23)*

3a. {5} *(2.2 #29)* **3b.** {−4} *(2.2 #51)* **4a.** Underestimates by \$40 *(2.2 #71a)* **4b.** 2029 *(2.2 #71b)*

Homework:

- ☐ **Review the Section 2.2 summary** that begins on page 198 of the textbook.
- ☐ **Insert your homework** into this section of the *Learning Guide*. Show all work neatly and check your answers. Strive to work through difficulties when possible, making note of any exercises where you need additional help. Remember, even if your instructor assigns homework through *MyMathLab*, you should still write out your work.

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