

Section 1.7

Multiplication and Division of Real Numbers

Who is doing all the work?



The average number of hours that U.S. women devote to household chores and child care exceeds the average number of hours that U.S. men devote to these same activities.

In the textbook's Exercise Set for this section, you will be presented with mathematical formulas that approximate these values for women and men.



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 1.7 of your textbook which begins on page 73.
- Complete the *Concept and Vocabulary Check* on page 83 of the textbook.

Guided Practice:

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

Objective #1: Multiply real numbers.

✓ *Solved Problem #1*

1a. Multiply: $-\frac{1}{3} \cdot \frac{4}{7}$

$$-\frac{1}{3} \cdot \frac{4}{7} = -\frac{1 \cdot 4}{3 \cdot 7}$$

$$= -\frac{4}{21}$$

✎ *Pencil Problem #1* ✎

1a. Multiply: $-\frac{3}{5} \cdot \left(-\frac{4}{7}\right)$

1b. Multiply: $(-12)(-3)$

$$(-12)(-3) = 36$$

1b. Multiply: $5(-9)$

1c. Multiply: $(-543)(0)$

$$(-543)(0) = 0$$

1c. Multiply: $0(-19)$

Objective #2: Multiply more than two real numbers.

 **Solved Problem #2**

2a. Multiply: $(-2)(3)(-1)(4)$

$$(-2)(3)(-1)(4) = 24$$

 **Pencil Problem #2** 

2a. Multiply: $(-5)(-2)(3)$

2b. Multiply: $(-1)(-3)(2)(-1)(5)$

$$(-1)(-3)(2)(-1)(5) = -30$$

2b. Multiply: $(-4)(-3)(-1)(6)$

Objective #3: Find multiplicative inverses.

 **Solved Problem #3**

3a. Find the multiplicative inverse of 7.

The multiplicative inverse of 7 is $\frac{1}{7}$ because $7 \cdot \frac{1}{7} = 1$.

$$\frac{1}{7}$$

 **Pencil Problem #3** 

3a. Find the multiplicative inverse of -10 .

3b. Find the multiplicative inverse of $-\frac{7}{13}$.

The multiplicative inverse of $-\frac{7}{13}$ is $-\frac{13}{7}$

because $\left(-\frac{7}{13}\right)\left(-\frac{13}{7}\right) = 1$.

$$-\frac{13}{7}$$

3b. Find the multiplicative inverse of $\frac{1}{5}$.

Objective #4: Use the definition of division.

 **Solved Problem #4**

4a. Use the definition of division to find the quotient:
 $-28 \div 7$

$$\begin{aligned} -28 \div 7 &= -28 \cdot \frac{1}{7} \\ &= -4 \end{aligned}$$

 **Pencil Problem #4** 

4a. Use the definition of division to find the quotient:
 $120 \div (-10)$

4b. Use the definition of division to find the quotient:

$$\frac{-16}{-2}$$

$$\begin{aligned}\frac{-16}{-2} &= -16 \cdot \left(-\frac{1}{2}\right) \\ &= 8\end{aligned}$$

4b. Use the definition of division to find the quotient:

$$\frac{12}{-4}$$

Objective #5: Divide real numbers.

 **Solved Problem #5**

5a. Divide: $-\frac{2}{3} \div \frac{5}{4}$

$$\begin{aligned}-\frac{2}{3} \div \frac{5}{4} &= -\frac{2}{3} \cdot \frac{4}{5} \\ &= -\frac{8}{15}\end{aligned}$$

 **Pencil Problem #5** 

5a. Divide: $-\frac{1}{2} \div \left(-\frac{3}{5}\right)$

5b. Divide: $\frac{0}{-5}$

$$\frac{0}{-5} = 0$$

5b. Divide: $\frac{7}{0}$

Objective #6: Simplify algebraic expressions involving multiplication.

 **Solved Problem #6**

6a. Simplify: $-7(3x-4)$

$$\begin{aligned}-7(3x-4) &= -7(3x) - 7(-4) \\ &= -21x + 28\end{aligned}$$

 **Pencil Problem #6** 

6a. Simplify: $-4(2x-3)$

6b. Simplify: $4(3y-7) - (13y-2)$

$$\begin{aligned}4(3y-7) - (13y-2) &= 12y - 28 - 13y + 2 \\ &= 12y - 13y - 28 + 2 \\ &= -1y - 26 \\ &= -y - 26\end{aligned}$$

6b. Simplify: $4(2y-3) - (7y+2)$

Objective #7: Determine whether a number is a solution of an equation. **Solved Problem #7**

7. Determine whether -3 is a solution of $2x - 5 = 8x + 7$

$$2x - 5 = 8x + 7$$

$$2(-3) - 5 = 8(-3) + 7$$

$$-6 - 5 = -24 + 7$$

$$-11 = -17, \text{ false}$$

-3 is not a solution of the equation.

 **Pencil Problem #7** 

7. Determine whether -4 is a solution of $-7y + 18 = -10y + 6$

Objective #8: Use mathematical models involving multiplication and division. **Solved Problem #8**

8. The data for doctorate degrees earned by men can be described by $M = -0.6n + 64.4$, where M is the percentage of doctorate degrees awarded to men n years after 1989. According to this mathematical model what percentage of doctorate degrees are projected to be received by men in 2014?

$$M = -0.6n + 64.4$$

$$M = -0.6(25) + 64.4$$

$$= -15 + 64.4$$

$$= 49.4$$

According to this model, 49.4% of doctorate degrees will be awarded to men in 2014.

 **Pencil Problem #8** 

8. The percentage of American adults who smoked cigarettes is described by $C = -0.5x + 41$, where C is the percentage who smoked cigarettes n years after 1965. Use the mathematical model to project the percentage of American adults who will smoke cigarettes in 2015.

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

1a. $\frac{12}{35}$ (1.7 #15) 1b. -45 (1.7 #1) 1c. 0 (1.7 #9) 2a. 30 (1.7 #23) 2b. -72 (1.7 #25)

3a. $-\frac{1}{10}$ (1.7 #39) 3b. 5 (1.7 #37) 4a. -12 (1.7 #59) 4b. -3 (1.7 #47) 5a. $\frac{5}{6}$ (1.7 #69)

5b. undefined (1.7 #55) 6a. $-8x + 12$ (1.7 #89) 6b. $y - 14$ (1.7 #95) 7. -4 is a solution (1.7 #99)

8. 16% (1.7 #119b)

Homework:

- Review the Section 1.7 summary** that begins on page 106 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.