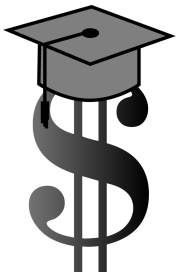
Section 1.2
Operations with Real Numbers and Simplifying Algebraic Expressions

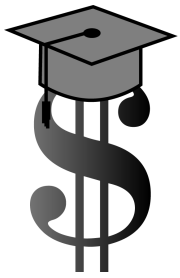
Show me the Money!!

College students have money to spend, and the most sophisticated college marketers, from American Eagle to Apple to Red Bull, are increasingly turning to social media focused on students' wants and needs.



In 2011, there were nearly 10,000 student reps on U.S. campuses facebooking, tweeting, and partying their way to selling things vital and specific to college students.

In this section's Exercise Set, you'll be working with a model that addresses how much college students have to spend. In order to use the model, we need to review operations with real numbers, our focus of this section.



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 1.2 of your textbook which begins on page 15.
- ☐ Complete the ***Concept and Vocabulary Check*** on page 26 of the textbook.

Guided Practice:

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

Objective #1: Find a number's absolute value.

✔ ***Solved Problem #1***

1. Find the absolute value: $|-6|$

-6 is 6 units from 0.
Thus, $|-6| = 6$

✎ ***Pencil Problem #1***

1. Find the absolute value: $|-7.6|$

Objective #2: Add real numbers.

✔ ***Solved Problem #2***

2. Add: $-10 + (-18)$

$-10 + (-18) = -(10 + 28)$
$= -28$

✎ ***Pencil Problem #2***

2. Add: $12.4 + (-12.4)$

Objective #3: Find opposites.

✔ *Solved Problem #3*

3. Find $-x$ if $x = -8$.

The opposite of -8 is 8.

$$-x = -(-8)$$
$$= 8$$

✎ *Pencil Problem #3*

3. Find $-x$ if $x = 11$.

Objective #4: Subtract real numbers.

✔ *Solved Problem #4*

4. Subtract: $-\frac{4}{5} - \left(-\frac{1}{5}\right)$

$$-\frac{4}{5} - \left(-\frac{1}{5}\right) = -\frac{4}{5} + \frac{1}{5}$$
$$= -\frac{3}{5}$$

✎ *Pencil Problem #4*

4. Subtract: $0 - \left(-\sqrt{2}\right)$

Objective #5: Multiply real numbers.

✔ *Solved Problem #5*

5. Multiply: $(-6)(-11)$

The product of two real numbers with the same sign is found by multiplying their absolute values. The product is positive.

$(-6)(-11) = 66$

✎ *Pencil Problem #5*

5. Multiply: $(9)(-10)$

Objective #6: Evaluate exponential expressions.

✔ *Solved Problem #6*

6a. Evaluate: $(-5)^2$

$$(-5)^2 = (-5)(-5)$$
$$= 25$$

✎ *Pencil Problem #6*

6a. Evaluate: $(-2)^3$

6b. Evaluate: -5^2

$-5^2 = -(5 \cdot 5)$
$= -25$

6b. Evaluate: -10^2

Objective #7: Divide real numbers.

✔ ***Solved Problem #7***

7. Divide: $-\frac{2}{3} \div \left(-\frac{5}{4}\right)$

$-\frac{2}{3} \div \left(-\frac{5}{4}\right) = -\frac{2}{3} \cdot \left(-\frac{4}{5}\right)$
$= \frac{8}{15}$

✎ ***Pencil Problem #7***

7. Divide: $6 \div \left(-\frac{2}{5}\right)$

Objective #8: Use the order of operations.

✔ ***Solved Problem #8***

8. Simplify: $3 - 5^2 + 12 \div 2(-4)^2$

$3 - 5^2 + 12 \div 2(-4)^2 = 3 - 25 + 12 \div 2(16)$
$= 3 - 25 + 6(16)$
$= 3 - 25 + 96$
$= -22 + 96$
$= 74$

✎ ***Pencil Problem #8***

8. Simplify: $15 - \sqrt{3-(-1)} + 12 \div 2 \cdot 3$

Objective #9: Use commutative, associative, and distributive properties.

✔ ***Solved Problem #8***

9a. Use an associative property to write an equivalent expression and simplify: $6 + (12 + x)$

$6 + (12 + x) = (6 + 12) + x$
$= 18 + x$

✎ ***Pencil Problem #8***

9a. Use an associative property to write an equivalent expression and simplify: $-7(3x)$

9b. Use the distributive property to write an equivalent expression: $-4(7x+2)$

$-4(7x+2) = -28x-8$

9b. Use the distributive property to write an equivalent expression: $-(3x-6)$

Objective #10: Simplify algebraic expressions.

✔ ***Solved Problem #10***

10a. Simplify: $3x+14x^2+11x+x^2$

$$\begin{aligned} 3x+14x^2+11x+x^2 &= (14x^2+x^2)+(3x+11x) \\ &= (14+1)x^2+(3+11)x \\ &= 15x^2+14x \end{aligned}$$

✎ ***Pencil Problem #10*** ✎

10a. Simplify: $8(3x-5)-6x$

10b. Simplify: $6+4[7-(x-2)]$

$$\begin{aligned} 6+4[7-(x-2)] &= 6+4[7-x+2] \\ &= 6+4[9-x] \\ &= 6+36-4x \\ &= 42-4x \end{aligned}$$

10b. Simplify: $7-4\left[3-\left(4y-5\right)\right]$

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

1. 7.6 *(1.2 #5)* **2.** 0 *(1.2 #27)* **3.** −11 *(1.2 #29)* **4.** $\sqrt{2}$ *(1.2 #45)* **5.** −90 *(1.2 #47)*

6a. −8 *(1.2 #63)* **6b.** −100 *(1.2 #61)* **7.** −15 *(1.2 #81)* **8.** 31 *(1.2 #97)*

9a. $-21x$ *(1.2 #107)* **9b.** $-3x+6$ *(1.2 #115)* **10a.** $18x-40$ *(1.2 #123)* **10b.** $16y-25$ *(1.2 #127)*

Homework:

- ☐ **Review the Section 1.2 summary** which begins on page 93 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.