

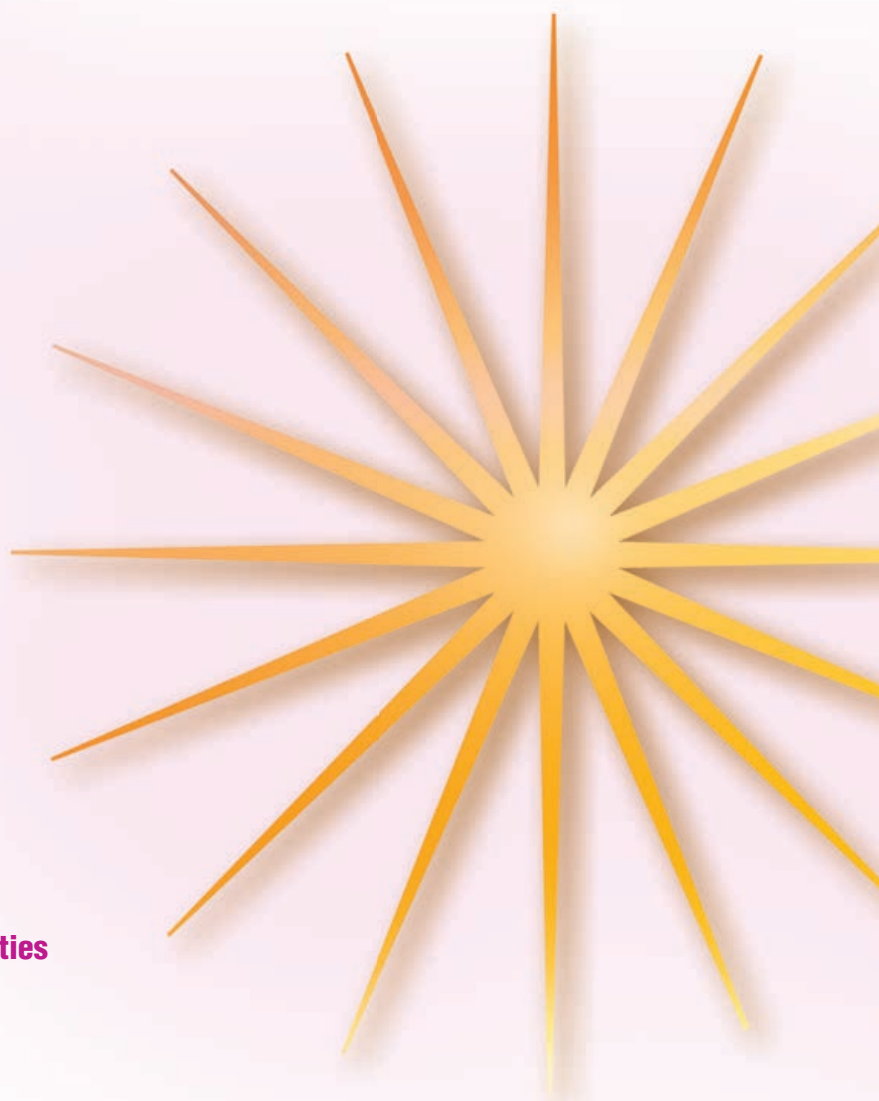
# SPECTRUM<sup>®</sup> Math

GRADE  
**7**



## Focused Practice for Math Mastery

- Positive and negative integers
- Ratios and proportions
- Algebraic equations and inequalities
- Geometric problem-solving
- Probability and statistics
- Answer key



**Check What You Know****Adding and Subtracting Rational Numbers**

Evaluate each expression.

**a**

1. opposite of 45 \_\_\_\_\_

2. opposite of 21 \_\_\_\_\_

3. opposite of 52 \_\_\_\_\_

4.  $|7| =$  \_\_\_\_\_

5.  $-|35| =$  \_\_\_\_\_

**b**

opposite of  $-9$  \_\_\_\_\_

opposite of 6 \_\_\_\_\_

opposite of  $-89$  \_\_\_\_\_

$|-34| =$  \_\_\_\_\_

$-|-56| =$  \_\_\_\_\_

**c**

opposite of  $-10$  \_\_\_\_\_

opposite of  $-31$  \_\_\_\_\_

opposite of 18 \_\_\_\_\_

$|58| =$  \_\_\_\_\_

$|-39| =$  \_\_\_\_\_

Identify the property of addition described as *commutative*, *associative*, or *identity*.

6. The sum of any number and zero is the original number. \_\_\_\_\_

7. When two numbers are added, the sum is the same regardless of the order of addends.  
\_\_\_\_\_

8. When three or more numbers are added, the sum is the same regardless of how the addends are grouped. \_\_\_\_\_

**a**

9.  $7 + (1 + 9) = (7 + 1) + 9$   
\_\_\_\_\_

10.  $9 + 5 = 5 + 9$   
\_\_\_\_\_

11.  $6 + (-6) = 0$   
\_\_\_\_\_

12.  $15 + 0 = 15$   
\_\_\_\_\_

**b**

$3 + 0 = 3$   
\_\_\_\_\_

$8 + 10 = 10 + 8$   
\_\_\_\_\_

$(6 + 3) + 7 = 6 + (3 + 7)$   
\_\_\_\_\_

$13 + 2 = 2 + 13$   
\_\_\_\_\_



# Check What You Know

## Adding and Subtracting Rational Numbers

Add or subtract. Write fractions in simplest form.

**13.**

<b>a</b>
$2\frac{1}{4}$
$+2\frac{2}{3}$
<hr/>

**b**

$3\frac{1}{2}$
$+2\frac{1}{7}$
<hr/>

**c**

$2\frac{1}{8}$
$+4\frac{2}{3}$
<hr/>

**d**

$1\frac{5}{7}$
$+2\frac{4}{5}$
<hr/>

**14.**

$6\frac{1}{3}$
$-2\frac{1}{4}$
<hr/>

**b**

$\frac{3}{8}$
$-\frac{1}{4}$
<hr/>

**c**

$5\frac{3}{10}$
$-2\frac{4}{5}$
<hr/>

**c**

$3\frac{4}{7}$
$-1\frac{1}{2}$
<hr/>

**15.**      **a**

$-3 + 2 =$  \_\_\_\_\_

**b**

$3 + (-2) =$  \_\_\_\_\_

**c**

$7 + (-4) =$  \_\_\_\_\_

**16.**      **a**

$-8 + (-3) =$  \_\_\_\_\_

**b**

$-7 + 6 =$  \_\_\_\_\_

**c**

$-4 + (-9) =$  \_\_\_\_\_

**17.**      **a**

$6 - 12 =$  \_\_\_\_\_

**b**

$3 - (-4) =$  \_\_\_\_\_

**c**

$-2 - 4 =$  \_\_\_\_\_

### SHOW YOUR WORK

Solve each problem.

- 18.** One box of clips weighs  $4\frac{2}{3}$  ounces. Another box weighs  $5\frac{3}{8}$  ounces. What is the total weight of the two boxes?

The total weights is \_\_\_\_\_ ounces.

- 19.** Luggage on a certain airline is limited to 2 pieces per person. Together, the 2 pieces can weigh no more than  $58\frac{1}{2}$  pounds. If a passenger has one piece of luggage that weighs  $32\frac{1}{3}$  pounds, what is the most the second piece can weigh?

The second piece can weigh \_\_\_\_\_ pounds.

- 20.** Mavis spends  $1\frac{1}{4}$  hours on the bus every weekday (Monday through Friday). How many hours is she on the bus each week?

She is on the bus \_\_\_\_\_ hours each week.

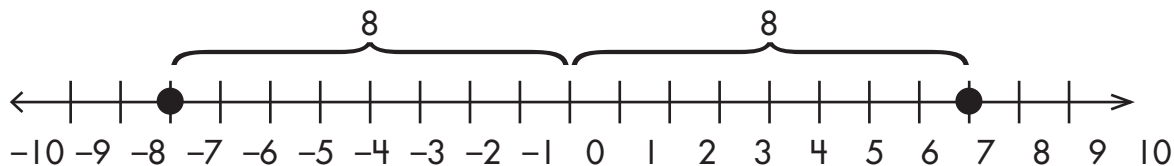
**18.**

**19.**

**20.**

## Lesson 1.1 Understanding Absolute Value

The **absolute value** of a number is a number that is the same distance from zero on a number line as the given number, but on the opposite side of zero.



$-8$  and  $8$  are absolute value because they are the same distance from zero on opposite sides of the number line.

Evaluate the expressions below.

**a**

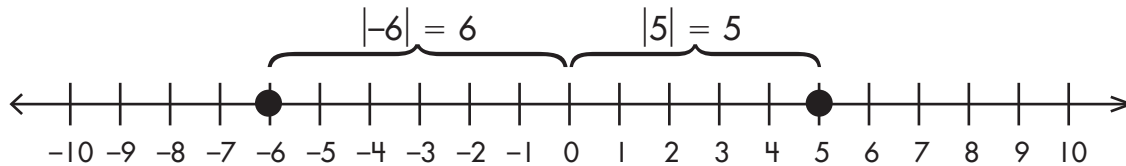
**b**

**c**

- |                             |                         |                         |
|-----------------------------|-------------------------|-------------------------|
| 1. opposite of 19 _____     | opposite of $-7$ _____  | opposite of $-2$ _____  |
| 2. opposite of 28 _____     | opposite of $-50$ _____ | opposite of 10 _____    |
| 3. opposite of 92 _____     | opposite of $-31$ _____ | opposite of $-74$ _____ |
| 4. opposite of 936 _____    | opposite of 76 _____    | opposite of 65 _____    |
| 5. opposite of $-32$ _____  | opposite of $-36$ _____ | opposite of 73 _____    |
| 6. opposite of 55 _____     | opposite of $-47$ _____ | opposite of 87 _____    |
| 7. opposite of $-61$ _____  | opposite of 37 _____    | opposite of $-23$ _____ |
| 8. opposite of 25 _____     | opposite of 68 _____    | opposite of $-53$ _____ |
| 9. opposite of 71 _____     | opposite of $-99$ _____ | opposite of 90 _____    |
| 10. opposite of 40 _____    | opposite of 44 _____    | opposite of $-77$ _____ |
| 11. opposite of $-52$ _____ | opposite of 66 _____    | opposite of $-95$ _____ |
| 12. opposite of 15 _____    | opposite of $-20$ _____ | opposite of $-9$ _____  |

## Lesson 1.2 Absolute Values and Integers

The **absolute value** of a number is the distance between 0 and the number on a number line. Remember that distance is always a positive quantity (or zero). Absolute value is shown by vertical bars on each side of the number.



Evaluate the expressions below.

**a****b****c**

1.  $|91| = \underline{\hspace{2cm}}$

$|-19| = \underline{\hspace{2cm}}$

$|-9| = \underline{\hspace{2cm}}$

2.  $|1| = \underline{\hspace{2cm}}$

$|-199| = \underline{\hspace{2cm}}$

$|0| = \underline{\hspace{2cm}}$

3.  $|-762| = \underline{\hspace{2cm}}$

$|78| = \underline{\hspace{2cm}}$

$|-302| = \underline{\hspace{2cm}}$

4.  $|-4002| = \underline{\hspace{2cm}}$

$|-668| = \underline{\hspace{2cm}}$

$-|-8701| = \underline{\hspace{2cm}}$

5.  $|23| = \underline{\hspace{2cm}}$

$|-56| = \underline{\hspace{2cm}}$

$-|432| = \underline{\hspace{2cm}}$

6.  $|-53| = \underline{\hspace{2cm}}$

$|694| = \underline{\hspace{2cm}}$

$-|-274| = \underline{\hspace{2cm}}$

7.  $|-516| = \underline{\hspace{2cm}}$

$|883| = \underline{\hspace{2cm}}$

$-|637| = \underline{\hspace{2cm}}$

8.  $|413| = \underline{\hspace{2cm}}$

$|-590| = \underline{\hspace{2cm}}$

$|739| = \underline{\hspace{2cm}}$

9.  $|-281| = \underline{\hspace{2cm}}$

$|40| = \underline{\hspace{2cm}}$

$-|-826| = \underline{\hspace{2cm}}$

10.  $|206| = \underline{\hspace{2cm}}$

$|372| = \underline{\hspace{2cm}}$

$|973| = \underline{\hspace{2cm}}$

11.  $-|533| = \underline{\hspace{2cm}}$

$|-836| = \underline{\hspace{2cm}}$

$|954| = \underline{\hspace{2cm}}$

12.  $|-344| = \underline{\hspace{2cm}}$

$-|-711| = \underline{\hspace{2cm}}$

$|-219| = \underline{\hspace{2cm}}$

**Lesson 1.3** Subtraction as an Inverse Operation

Subtraction is the same as the process of adding the additive inverse, or opposite, of a number to another number.

$$7 - 4 = 7 + (-4)$$

Write an equivalent equation using the additive inverse.

**a**

**1.**  $8 - 3 =$  \_\_\_\_\_

**2.**  $12 + (-7) =$  \_\_\_\_\_

**3.**  $52 - 13 =$  \_\_\_\_\_

**4.**  $67 + (-11) =$  \_\_\_\_\_

**5.**  $30 - 15 =$  \_\_\_\_\_

**6.**  $3 + (-56) =$  \_\_\_\_\_

**7.**  $87 - 85 =$  \_\_\_\_\_

**8.**  $50 + (-17) =$  \_\_\_\_\_

**9.**  $89 - 57 =$  \_\_\_\_\_

**10.**  $96 + (-20) =$  \_\_\_\_\_

**11.**  $83 - 67 =$  \_\_\_\_\_

**12.**  $76 + (-20) =$  \_\_\_\_\_

**b**

$9 - 2 =$  \_\_\_\_\_

$8 + (-12) =$  \_\_\_\_\_

$23 - 10 =$  \_\_\_\_\_

$45 + (-6) =$  \_\_\_\_\_

$74 - 23 =$  \_\_\_\_\_

$62 + (-32) =$  \_\_\_\_\_

$54 - 20 =$  \_\_\_\_\_

$41 + (-12) =$  \_\_\_\_\_

$46 - 40 =$  \_\_\_\_\_

$94 + (-90) =$  \_\_\_\_\_

$98 - 34 =$  \_\_\_\_\_

$90 + (-76) =$  \_\_\_\_\_

## Lesson 1.4 Adding Fractions and Mixed Numbers

To add fractions or mixed numbers when the denominators are different, rename the fractions so the denominators are the same.

$$\begin{array}{r} \frac{2}{3} \\ + \frac{3}{7} \\ \hline \end{array} = \begin{array}{r} \frac{2}{3} \times \frac{7}{7} \\ + \frac{3}{7} \times \frac{3}{3} \\ \hline \end{array} = \begin{array}{r} \frac{14}{21} \\ + \frac{9}{21} \\ \hline \frac{23}{21} = 1\frac{2}{21} \end{array}$$

$$\begin{array}{r} 3\frac{1}{2} \\ + 2\frac{2}{3} \\ \hline \end{array} = \begin{array}{r} 3\frac{3}{6} \\ + 2\frac{4}{6} \\ \hline 5\frac{7}{6} = 6\frac{1}{6} \end{array}$$

Add. Write each answer in simplest form.

**a****b****c****d****1.**

$$\begin{array}{r} \frac{3}{4} \\ + \frac{5}{8} \\ \hline \end{array}$$

$$\begin{array}{r} \frac{1}{2} \\ + \frac{1}{3} \\ \hline \end{array}$$

$$\begin{array}{r} \frac{3}{4} \\ + \frac{2}{5} \\ \hline \end{array}$$

$$\begin{array}{r} \frac{1}{6} \\ + \frac{1}{3} \\ \hline \end{array}$$

**2.**

$$\begin{array}{r} \frac{3}{8} \\ + \frac{4}{5} \\ \hline \end{array}$$

$$\begin{array}{r} \frac{1}{2} \\ + \frac{3}{10} \\ \hline \end{array}$$

$$\begin{array}{r} \frac{2}{3} \\ + \frac{3}{12} \\ \hline \end{array}$$

$$\begin{array}{r} \frac{3}{4} \\ + \frac{7}{10} \\ \hline \end{array}$$

**3.**

$$\begin{array}{r} \frac{1}{4} \\ + \frac{3}{8} \\ \hline \end{array}$$

$$\begin{array}{r} \frac{2}{5} \\ + \frac{3}{7} \\ \hline \end{array}$$

$$\begin{array}{r} \frac{1}{7} \\ + \frac{7}{8} \\ \hline \end{array}$$

$$\begin{array}{r} \frac{2}{3} \\ + \frac{1}{5} \\ \hline \end{array}$$

**4.**

$$\begin{array}{r} 1\frac{1}{3} \\ + 2\frac{1}{4} \\ \hline \end{array}$$

$$\begin{array}{r} 3\frac{3}{8} \\ + 7\frac{1}{2} \\ \hline \end{array}$$

$$\begin{array}{r} 4\frac{2}{7} \\ + 2\frac{1}{3} \\ \hline \end{array}$$

$$\begin{array}{r} 1\frac{2}{5} \\ + 3\frac{3}{10} \\ \hline \end{array}$$

**5.**

$$\begin{array}{r} 4\frac{4}{9} \\ + 3\frac{1}{3} \\ \hline \end{array}$$

$$\begin{array}{r} 1\frac{1}{8} \\ + 1\frac{7}{10} \\ \hline \end{array}$$

$$\begin{array}{r} 2\frac{1}{6} \\ + 3\frac{5}{8} \\ \hline \end{array}$$

$$\begin{array}{r} 1\frac{3}{7} \\ + 2\frac{1}{5} \\ \hline \end{array}$$

**6.**

$$\begin{array}{r} 3\frac{1}{2} \\ + 2\frac{1}{4} \\ \hline \end{array}$$

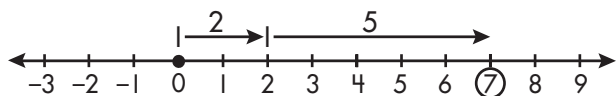
$$\begin{array}{r} 2\frac{5}{6} \\ + 1\frac{5}{9} \\ \hline \end{array}$$

$$\begin{array}{r} 3\frac{4}{7} \\ + 1\frac{1}{10} \\ \hline \end{array}$$

$$\begin{array}{r} 4\frac{1}{3} \\ + 2\frac{1}{2} \\ \hline \end{array}$$

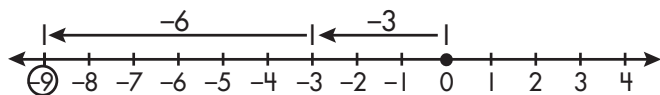
## Lesson 1.5 Adding Integers

The sum of two positive integers is a positive integer.



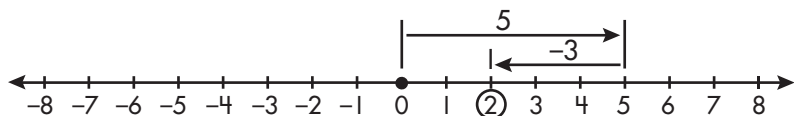
$$2 + 5 = 7$$

The sum of two negative integers is a negative integer.



$$-3 + -6 = -9$$

To find the sum of two integers with opposite signs, subtract the digit of lesser value from the digit of greater value and keep the sign of the greater digit.



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

Add.

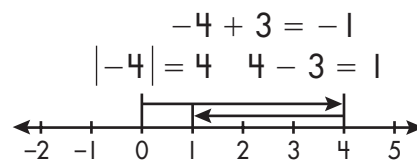
- |            | <b>a</b>          | <b>b</b>          | <b>c</b>          | <b>d</b>          |
|------------|-------------------|-------------------|-------------------|-------------------|
| <b>1.</b>  | $3 + 4$ _____     | $-3 + (-4)$ _____ | $3 + (-4)$ _____  | $-3 + 4$ _____    |
| <b>2.</b>  | $-3 + (-3)$ _____ | $3 + (-3)$ _____  | $-3 + 3$ _____    | $3 + 3$ _____     |
| <b>3.</b>  | $5 + (-1)$ _____  | $-5 + 1$ _____    | $-5 + (-1)$ _____ | $5 + 1$ _____     |
| <b>4.</b>  | $-7 + 3$ _____    | $-7 + (-3)$ _____ | $7 + (-3)$ _____  | $7 + 3$ _____     |
| <b>5.</b>  | $4 + 7$ _____     | $4 + (-7)$ _____  | $-4 + (7)$ _____  | $-4 + (-7)$ _____ |
| <b>6.</b>  | $8 + (-8)$ _____  | $-8 + (-8)$ _____ | $8 + 8$ _____     | $-8 + 8$ _____    |
| <b>7.</b>  | $-3 + 0$ _____    | $3 + 0$ _____     | $-5 + (-6)$ _____ | $-5 + 6$ _____    |
| <b>8.</b>  | $5 + (-6)$ _____  | $5 + 6$ _____     | $-8 + 0$ _____    | $8 + 0$ _____     |
| <b>9.</b>  | $-3 + 6$ _____    | $-3 + (-6)$ _____ | $3 + 6$ _____     | $3 + (-6)$ _____  |
| <b>10.</b> | $-6 + (-4)$ _____ | $-6 + 4$ _____    | $6 + (-4)$ _____  | $6 + 4$ _____     |



## Lesson 1.5 Adding Integers

To find the sum of two integers with different signs, find their absolute values. Remember, **absolute value** is the distance (in units) that a number is from 0, expressed as a positive quantity. Subtract the lesser number from the greater number. Absolute value is written as  $|n|$ .

The sum has the same sign as the integer with the larger absolute value.



$4 > 3$ , so the sum is negative.

Add.

**a**

**b**

**c**

1.  $6 + 2 = \underline{\hspace{2cm}}$

$9 + (-4) = \underline{\hspace{2cm}}$

$7 + (-9) = \underline{\hspace{2cm}}$

2.  $-4 + 7 = \underline{\hspace{2cm}}$

$-3 + (-6) = \underline{\hspace{2cm}}$

$-12 + 11 = \underline{\hspace{2cm}}$

3.  $-16 + 0 = \underline{\hspace{2cm}}$

$13 + (-24) = \underline{\hspace{2cm}}$

$-6 + 8 = \underline{\hspace{2cm}}$

4.  $0 + (-9) = \underline{\hspace{2cm}}$

$-1 + 2 = \underline{\hspace{2cm}}$

$1 + (-2) = \underline{\hspace{2cm}}$

5.  $-4 + 4 = \underline{\hspace{2cm}}$

$3 + (-6) = \underline{\hspace{2cm}}$

$7 + (-17) = \underline{\hspace{2cm}}$

6.  $-45 + 21 = \underline{\hspace{2cm}}$

$41 + 44 = \underline{\hspace{2cm}}$

$33 + 25 = \underline{\hspace{2cm}}$

7.  $27 + (-39) = \underline{\hspace{2cm}}$

$20 + 1 = \underline{\hspace{2cm}}$

$3 + (-3) = \underline{\hspace{2cm}}$

8.  $-12 + (-12) = \underline{\hspace{2cm}}$

$35 + (-26) = \underline{\hspace{2cm}}$

$-22 + 16 = \underline{\hspace{2cm}}$

9.  $31 + 17 = \underline{\hspace{2cm}}$

$-9 + (-6) = \underline{\hspace{2cm}}$

$-47 + 36 = \underline{\hspace{2cm}}$

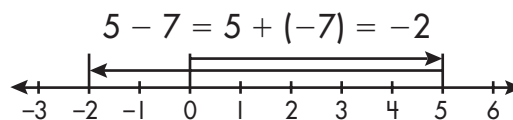
10.  $4 + 5 = \underline{\hspace{2cm}}$

$-43 + 35 = \underline{\hspace{2cm}}$

$24 + (-33) = \underline{\hspace{2cm}}$

## Lesson 1.6 Subtracting Integers

To subtract an integer, add its opposite.



Subtract.

**a**

**b**

**c**

1.  $3 - 11 = \underline{\hspace{2cm}}$

$5 - 2 = \underline{\hspace{2cm}}$

$-4 - 6 = \underline{\hspace{2cm}}$

2.  $-12 - 3 = \underline{\hspace{2cm}}$

$-5 - (-6) = \underline{\hspace{2cm}}$

$14 - 19 = \underline{\hspace{2cm}}$

3.  $4 - 19 = \underline{\hspace{2cm}}$

$-11 - (-1) = \underline{\hspace{2cm}}$

$16 - (-27) = \underline{\hspace{2cm}}$

4.  $-6 - (-6) = \underline{\hspace{2cm}}$

$-11 - 0 = \underline{\hspace{2cm}}$

$-2 - 2 = \underline{\hspace{2cm}}$

5.  $8 - 1 = \underline{\hspace{2cm}}$

$8 - (-1) = \underline{\hspace{2cm}}$

$-13 - 3 = \underline{\hspace{2cm}}$

6.  $43 - 15 = \underline{\hspace{2cm}}$

$-27 - (-39) = \underline{\hspace{2cm}}$

$-24 - (-38) = \underline{\hspace{2cm}}$

7.  $-46 - (-31) = \underline{\hspace{2cm}}$

$-48 - (-47) = \underline{\hspace{2cm}}$

$-38 - (-17) = \underline{\hspace{2cm}}$

8.  $9 - (-6) = \underline{\hspace{2cm}}$

$15 - (-1) = \underline{\hspace{2cm}}$

$-19 - (-22) = \underline{\hspace{2cm}}$

9.  $(-3) - 24 = \underline{\hspace{2cm}}$

$-11 - 44 = \underline{\hspace{2cm}}$

$42 - 45 = \underline{\hspace{2cm}}$

10.  $-33 - 12 = \underline{\hspace{2cm}}$

$-37 - (-40) = \underline{\hspace{2cm}}$

$5 - (-32) = \underline{\hspace{2cm}}$

**Lesson 1.6** Subtracting Integers

Subtract.

**a**

1.  $-32 - (-27) = \underline{\hspace{2cm}}$

2.  $7 - (-37) = \underline{\hspace{2cm}}$

3.  $16 - (-1) = \underline{\hspace{2cm}}$

4.  $-44 - 24 = \underline{\hspace{2cm}}$

5.  $-49 - (-46) = \underline{\hspace{2cm}}$

6.  $-32 - (-50) = \underline{\hspace{2cm}}$

7.  $-5 - (-30) = \underline{\hspace{2cm}}$

8.  $-33 - 39 = \underline{\hspace{2cm}}$

9.  $32 - (-41) = \underline{\hspace{2cm}}$

10.  $-50 - 19 = \underline{\hspace{2cm}}$

11.  $-18 - (-4) = \underline{\hspace{2cm}}$

12.  $56 - (-21) = \underline{\hspace{2cm}}$

13.  $31 - (-31) = \underline{\hspace{2cm}}$

14.  $-87 - 6 = \underline{\hspace{2cm}}$

**b**

$-26 - 3 = \underline{\hspace{2cm}}$

$-9 - 48 = \underline{\hspace{2cm}}$

$24 - (-49) = \underline{\hspace{2cm}}$

$-31 - 34 = \underline{\hspace{2cm}}$

$-16 - 49 = \underline{\hspace{2cm}}$

$-32 - (-21) = \underline{\hspace{2cm}}$

$14 - (-20) = \underline{\hspace{2cm}}$

$4 - (-8) = \underline{\hspace{2cm}}$

$40 - 44 = \underline{\hspace{2cm}}$

$48 - (-32) = \underline{\hspace{2cm}}$

$-45 - 13 = \underline{\hspace{2cm}}$

$-11 - 34 = \underline{\hspace{2cm}}$

$26 - (-9) = \underline{\hspace{2cm}}$

$-90 - 12 = \underline{\hspace{2cm}}$

**c**

$28 - (-20) = \underline{\hspace{2cm}}$

$28 - (-15) = \underline{\hspace{2cm}}$

$-30 - (-36) = \underline{\hspace{2cm}}$

$-31 - (-13) = \underline{\hspace{2cm}}$

$18 - 28 = \underline{\hspace{2cm}}$

$-48 - (-47) = \underline{\hspace{2cm}}$

$9 - (-47) = \underline{\hspace{2cm}}$

$1 - (-42) = \underline{\hspace{2cm}}$

$-13 - (-39) = \underline{\hspace{2cm}}$

$-14 - (-39) = \underline{\hspace{2cm}}$

$8 - (-67) = \underline{\hspace{2cm}}$

$24 - (-17) = \underline{\hspace{2cm}}$

$-83 - (-3) = \underline{\hspace{2cm}}$

$-46 - (-9) = \underline{\hspace{2cm}}$