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Important Symbols

<  less than
\leq  less than or equal to
>  greater than
\geq  greater than or equal to
=  equal to
\neq  not equal to
\equiv  congruent to
()  parenthesis
[]  brackets
{}  braces
...  and so on
\cdot \text{ or } \times  multiply
\infty  infinity
a^n  the n^{th} power of a number
\sqrt{}  square root
\emptyset, \{\}  the empty or null set
\therefore  therefore
\cdot  degree
\pi  pi
\{\}  set
||  absolute value
.\overline{n}  repeating decimal symbol
1/a  the reciprocal of a number
\%  percent
(x,y)  ordered pair
\bot  perpendicular
\parallel  parallel to
\angle  angle
\in  element of
\notin  not an element of
\cap  intersection
\cup  union
\subset  subset of
\subsetneq  not a subset of
\triangle  triangle
Note to students and teachers: This section will include necessary review problems from all types covered in this book. Here are some sample problems with which to get started.

1. 364 + 79 + 716 =
2. 705 - 269 =
3. 7 × 326 =

### Helpful Hints
A set is a well-defined collection of objects. \( A = \{1,2,3,4,5\} \) is read, "A is the set whose members are 1, 2, 3, 4, and 5." Each object in a set is called an element or member. **Infinite sets** are sets whose number of members is uncountable.

**Example:** \( A = \{1,2,3,...\} \) **Finite sets** are sets whose number of members is countable.

**Example:** \( B = \{3,4,5\} \) **Disjoint sets** have no members in common. The **null set** or **empty set** is the set with no members, and is written as \( \{\} \) or \( \emptyset \).

**Equivalent sets** can be paired in a one-to-one correspondence. **Example:** \( A = \{1,2,3,4\} \)

\[ U = \text{the universal set; the set that contains all the members.} \]

\[ B = \{2,3,4,5\} \]

\( \in \) means "is a member of."

\( \notin \) means "is not a member of."

Use the information and examples given in the Helpful Hints to answer the following questions. Explain each answer in the space below.

1. Is \( A = \{2,4,6,8,10\} \) an infinite set?
2. Is \( B = \{2,4,6,...\} \) a finite set?
3. Are \( A = \{1,2,3\} \) and \( B = \{3,4,5\} \) disjoint sets?
4. Are \( C = \{0,1,2,3\} \) and \( D = \{2,4,6,8\} \) equivalent sets?
5. List two disjoint sets.
6. List two equivalent sets.
7. For 5-10, list the members of each set.
   5. \{the odd numbers between 2 and 12\}
   6. \{the even numbers less than 13\}
   7. \{the whole numbers between 2 and 10\}
   8. \{the multiples of five between 9 and 32\}
   9. The members common to \( A = \{1,2,3,4,5\} \) and \( B = \{1,3,5,7\} \)
   10. \{the whole numbers greater than 7 and less than 13\}

### Problem Solving
In a class of 38 students, one-half are girls. How many girls are there in the class?
Review Exercises

1. List two disjoint sets.
2. List two equivalent sets.
3. List an infinite set.
4. List a finite set.
5. Are \( A = \{1,5,10\} \) and \( B = \{5,10,15\} \) disjoint sets? Why?
6. Are \( C = \{2,4,5\} \) and \( D = \{0,1,2,3\} \) equivalent sets? Why?

Use the sets below for the following examples that pertain to subset, intersection, and union.

\[
A = \{1,2,3\} \quad B = \{0,1,2,3,4\} \quad C = \{2,4,6,8,10\}
\]

If \( A \) and \( B \) are sets and all the members of \( A \) are members of \( B \), then \( A \) is a subset of \( B \) and is written \( A \subseteq B \). Example: Is \( A \subseteq B \)? Yes, because all the members of \( A \) are members of \( B \).

If \( A \) and \( B \) are sets then \( A \) intersection \( B \) is the set whose members are included in both sets \( A \) and \( B \), and is written \( A \cap B \). Example: Find \( A \cap C \)

\[
A \cap C = \{2\} \quad \text{(Two is the only member included in both} \ A \text{ and} \ C \text{.)}
\]

If \( A \) and \( B \) are sets then \( A \) union \( B \) is the set whose members are included in \( A \) or \( B \), or both \( A \) and \( B \), and is written \( A \cup B \). Example: Find \( B \cup C \)

\[
B \cup C = \{0,1,2,3,4,6,8,10\} \quad \text{\( B \cup C \) contains all members in \( B \), \( C \), or both} \ B \text{ and} \ C \text{.)}
\]

Use the sets below to answer the questions on this page.
Explain in the space if necessary.

\[
A = \{5,6,7\} \quad B = \{1,2,3,4,5,6,7\} \quad C = \{1,2,4,5,7,8\} \quad D = \{1,2,4,6,8,10\}
\]

1. Is \( A \subseteq B \)? Why?
2. Find \( A \cap B \).
3. Find \( B \cup C \).
4. Is \( A \subseteq D \)? Why?
5. List all subsets of \( A \).
(Hint: there are seven of them.)
6. Find \( B \cap C \).
7. Find \( C \cap D \).
8. Find \( A \cup B \).
9. Find \( B \cup D \).
10. Are \( C \) and \( D \) equivalent sets? Why?
11. Are \( A \) and \( D \) disjoint sets? Why?

Problem Solving

Three weeks ago you Jose sold seven of his baseball cards from his collection, and last week he bought 12 new cards. If he now has 85 cards, how many did he start with three weeks ago?

Score
Use $A = \{1,2,3,5,6\}$, $B = \{2,4,8\}$, and $C = \{1,2,3,6\}$ to answer the following questions.

1. Find $A \cap B$.
2. Find $B \cup C$.
3. Find $A \cap C$.
4. Find $B \cap C$.

5. Are $A$ and $C$ equivalent sets? Why?

6. Is $A$ an infinite set? Why?

### Helpful Hints

**Integers are the set of whole numbers and their opposites.**

Integers to the left of zero are negative and less than zero. Integers to the right of zero are positive and greater than zero. When two integers are on a number line, the one farthest to the right is greater. Hint: When adding integers, always find the sign of the answer first.

**Examples:**

- The sum of two negatives is a negative.
  - $-7 + -5 = -12$ (the sign is negative)
  - $7 + 5 = 12$ (the sign is positive)

- When adding a negative and a positive, the sign is the same as the integer farthest from zero. Then subtract.
  - $-7 + 9 = 2$ (the sign is positive)
  - $7 - 5 = 2$ (the sign is negative)

<table>
<thead>
<tr>
<th>Equation</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>$-9 + 12 = $</td>
<td>$3$</td>
</tr>
<tr>
<td>$-15 + -6 = $</td>
<td>$-21$</td>
</tr>
<tr>
<td>$-12 + -6 = $</td>
<td>$-18$</td>
</tr>
<tr>
<td>$42 + -56 = $</td>
<td>$-14$</td>
</tr>
<tr>
<td>$-15 + -16 = $</td>
<td>$-31$</td>
</tr>
<tr>
<td>$8 + 32 = $</td>
<td>$40$</td>
</tr>
<tr>
<td>$-39 + 76 = $</td>
<td>$37$</td>
</tr>
<tr>
<td>$-96 + -72 = $</td>
<td>$-168$</td>
</tr>
<tr>
<td>$73 + -86 = $</td>
<td>$-13$</td>
</tr>
<tr>
<td>$-15 + -19 = $</td>
<td>$-34$</td>
</tr>
<tr>
<td>$71 + -81 = $</td>
<td>$-10$</td>
</tr>
</tbody>
</table>

### Problem Solving

At 3:00 a.m. the temperature was $-8^\circ$. By 6:00 a.m. the temperature was another $-12^\circ$ colder. What was the temperature at 6:00 a.m.?


### Review Exercises

1. \(-16 + 9 = \)
2. \(-6 + 19 = \)
3. \(-26 + -13 = \)
4. \(-26 + 26 = \)
5. Carefully define “set.”
6. Carefully define “finite set.”

<table>
<thead>
<tr>
<th>Helpful Hints</th>
<th>When adding more than two integers, group the negatives and positives separately, then add.</th>
<th>Examples:</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \text{S1} )</td>
<td>(-3 + 5 + -6 =)</td>
<td>(-6 + 4 + -5 = 11)</td>
</tr>
<tr>
<td>( \text{S2} )</td>
<td>(-7 + 6 + -9 + 3 = )</td>
<td>(-11 + 4 = -4)</td>
</tr>
<tr>
<td>( \text{S3} )</td>
<td>(-3 + -4 + 5 = )</td>
<td>(7 = -7)</td>
</tr>
</tbody>
</table>

### Problem Solving

Alice started the week with no money. On Monday she earned $45.00. On Tuesday she spent $27.00. On Wednesday she earned $63.00. On Thursday she spent $26.00. How much money does she have left?
Use the sets to answer problems 1 through 6.

\[ A = \{1, 4, 8, 9, 12\}, \quad B = \{0, 5, 10, 15\}, \quad \text{and} \quad C = \{9, 10, 11, 15\} \]

to answer the following questions.

1. Find \( A \cap B \).
2. Find \( A \cup B \).
3. Find \( B \cap C \).
4. Find \( A \cup C \).
5. Find \( A \cup \emptyset \).
6. Find \( B \cap \emptyset \).

**Helpful Hints**

To subtract an integer means to add its opposite.

<table>
<thead>
<tr>
<th>Example</th>
<th>Example</th>
<th>Example</th>
<th>Example</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>(-3 - 8 = )</td>
<td>(8 - 10 = )</td>
<td>(6 - 7 = )</td>
<td>(6 + 7 = )</td>
<td></td>
</tr>
<tr>
<td>(-3 + 8 = + )</td>
<td>(-3 = )</td>
<td>(-8 = )</td>
<td>(+6 = )</td>
<td></td>
</tr>
<tr>
<td>(sign is positive)</td>
<td>(sign is negative)</td>
<td>(sign is positive)</td>
<td>(sign is positive)</td>
<td></td>
</tr>
<tr>
<td>(5 = +5 )</td>
<td>(2 = -2 )</td>
<td>(13 = +13 )</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Problem Solving**

A boy jumped off a diving board that was 15 feet high. He touched the bottom of the pool that was 12 feet below the surface of the water. How far is it from the diving board to the bottom of the pool?
Review Exercises

1. \(-72 + 16 = \)  
2. \(55 + -33 = \)  
3. \(-16 + -19 = \)  
4. \(7 - 16 = \)  
5. \(-5 - 6 = \)  
6. \(-5 - -9 = \)

Helpful Hints

The product of two integers with different signs is negative. The product of two integers with the same sign is positive. (\(\times\) means multiply.)

Examples:

\[
\begin{align*}
7 \times -16 &= -112 \\
(\text{sign is negative}) \\
16 \\
\times 7 &= -112 \\
(\text{sign is positive}) \\
8 \\
\times 7 &= -112 \\
(\text{sign is positive}) \\
56 &= +56
\end{align*}
\]

Examples:

\[
\begin{align*}
2 \times -3 (-6) &= -6 \\
(2 \times -3) (-6) &= -36 \\
-6 (-6) &= +36 \\
(\text{sign is positive}) \\
6 \times 8 &= +48 \\
(\text{sign is negative}) \\
4 \times -8 &= -48
\end{align*}
\]

\[
\begin{align*}
-3 \times 16 &= \text{S1} \\
-18 \times 7 &= \text{S2} \\
-4 \times -17 &= \text{SI}
\end{align*}
\]

\[
\begin{align*}
16 \times -4 &= 2 \\
-24 \times -12 &= 3 \\
23 \times -16 &= 4
\end{align*}
\]

\[
\begin{align*}
-23 \times 32 &= 5 \\
(-2) (-3) (-4) &= 6 \\
-8 (-1) \times 1 (-4) &= 7
\end{align*}
\]

\[
\begin{align*}
4 (-3) \times 2 (-3) &= 8 \\
(-3) (-2) (3) (4) &= 9 \\
10 (-11) (-3) &= 10
\end{align*}
\]

Problem Solving

An elevator started on the 28th floor. It went up seven floors, down 13 floors, and up nine floors. On what floor is the elevator located now?

Score
Review Exercises

1. \(-27 + 16 = \)  
2. \(-37 + -19 = \)  
3. \(7 - 9 = \)

4. \(-6 - -8 = \)  
5. \(5 \cdot -7 = \)  
6. \(-2 \cdot -6 \cdot 3 = \)

Helpful Hints

The quotient of two integers with different signs is negative. The quotient of two integers with the same signs is positive. (HINT: Determine the sign, then divide.)

Examples:

\[
\begin{align*}
36 \div -4 &= -9 \\
(\text{sign is negative}) \quad 4 \div 36 &= \frac{4}{36} = \frac{1}{9} \\
\frac{-123}{-2} &= +61.5 \\
(\text{sign is positive}) \quad 3 \div -123 &= -\frac{1}{41}
\end{align*}
\]

Use what you have learned to solve problems like these.

Examples:

\[
\begin{align*}
\frac{-36 \div -9}{4 \div 2} &= \frac{4}{2} = -2 \\
(\text{sign is negative}) \quad \frac{4 \times -8}{-8 \div 2} &= \frac{-32}{-4} = +8
\end{align*}
\]

Problem Solving

At midnight the temperature was 7°. By 2:00 a.m. the temperature had dropped 12°. By 4:00 a.m. it had dropped another 6°. What was the temperature at 4:00 a.m.?
Pre-Algebra Concepts

Reviewing All Integer Operations

1. \(-9 + 7 = \)  
2. \(9 + -7 = \)  
3. \(-9 + -7 = \)

4. \(-7 + -8 + 14 = \)  
5. \(-32 + 16 + 21 + -24 = \)  
6. \(7 - 9 = \)

7. \(4 - -9 = \)  
8. \(-3 - 9 = \)  
9. \(-13 - 14 = \)

10. \(16 - 17 = \)  
11. \(3 \cdot -16 = \)  
12. \(-4 \cdot -19 = \)

13. \(2 \cdot -7 \cdot -4 = \)  
14. \(-2 \cdot 3 \cdot -4 \cdot 2 = \)  
15. \(-36 \div 4 = \)

16. \(-126 \div -3 = \)  
17. \(\frac{-128}{-8} = \)  
18. \(\frac{-36 \div 2}{24 \div -4} = \)

19. \(-6 \cdot -3 \div -54 \div -6 = \)  
20. \(\frac{-20 \cdot -3}{-30 \div -10} = \)

1.  
2.  
3.  
4.  
5.  
6.  
7.  
8.  
9.  
10.  
11.  
12.  
13.  
14.  
15.  
16.  
17.  
18.  
19.  
20.  

11
Review Exercises

Use the following sets to find the answers.

A = \{1,3,4,5,9\}, \quad B = \{1,2,4,6\}, \quad \text{and} \quad C = \{1,3,6,7\}

1. Find \( A \cap B \).
2. Find \( B \cup C \).
3. Find \( B \cap C \).
4. Find \( A \cup B \).
5. Find \( A \cup C \).
6. Find \( A \cup \emptyset \).

Helpful Hints

The rules for integers apply to positive and negative fractions.

**Examples:**

\[-\frac{1}{2} + \frac{3}{5} = \quad \frac{-3}{5} + \frac{1}{3} = \]

\[-\frac{5}{10} + \frac{6}{10} = + \quad \left( \text{the sign is positive} \right) \]

\[-\frac{9}{15} + \frac{5}{15} = - \quad \left( \text{the sign is negative} \right) \]

\[\frac{6}{10} - \frac{5}{10} = \frac{1}{10} \quad \frac{9}{15} + \frac{5}{15} = \frac{14}{15} \]

\[\frac{3}{5} \times -\frac{3}{2} = -\frac{9}{10} \]

A negative multiplied or divided by a positive is negative.

\[-\frac{2}{3} + -\frac{2}{3} = \]

A negative divided by a negative is a positive.

\[-\frac{2}{3} \times -\frac{2}{1} = \frac{4}{3} = \frac{4}{3} \]

1. \( \frac{1}{5} + \frac{1}{2} = \)
2. \( \frac{1}{2} + -\frac{2}{5} = \)
3. \( \frac{1}{2} - \frac{3}{4} = \)
4. \( -\frac{2}{3} + -\frac{1}{2} = \)
5. \( -\frac{4}{5} \times -\frac{2}{1} = -\)
6. \( \frac{5}{8} + -\frac{1}{4} = \)
7. \( -\frac{1}{3} - -\frac{1}{4} = \)
8. \( -\frac{2}{3} \times -\frac{1}{2} = \)
9. \( \frac{5}{8} + -\frac{1}{2} = \)
10. \( \frac{2}{1} + -\frac{1}{4} = \)

Problem Solving

There are two sixth-grade classes. One has 35 students and another has 32 students. If a total of 17 sixth graders received A’s, how many did not receive A’s?
## Review Exercises

1. \(-75 + 16 = \)
2. \(-19 - 17 = \)
3. \(16 \times -4 = \)
4. \(-9 - 19 = \)
5. \(-36 \div -9 = \)
6. \(2 \times -7 \times -2 = \)

### Helpful Hints

The rules for integers apply to positive and negative decimals.

**Example:**
\(- .71 + .9 = + \) (the sign is positive)
\[
\begin{align*}
\text{.90} \\
-.71 \\
\hline
.19
\end{align*}
\]

**Example:**
\(-.5 \times 1.23 = - \) (a negative multiplied or divided by a positive is a negative)
\[
\begin{align*}
1.23 \\
\times .5 \\
\hline
.615
\end{align*}
\]

**Example:**
\(-2.9 \times -3.2 = + \) (a negative multiplied or divided by a negative is a positive)
\[
\begin{align*}
2.9 \\
+ 3.2 \\
\hline
-6.1
\end{align*}
\]

Work the following problems. If necessary, review the rules for integers.

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>S1</td>
<td>-3.21 + 2.3 =</td>
</tr>
<tr>
<td>S2</td>
<td>5.15 \div -0.5 =</td>
</tr>
<tr>
<td>I1</td>
<td>-5.2 - 7.61 =</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>5.63 + -2.46 =</td>
</tr>
<tr>
<td>3</td>
<td>-0.7 \times 6.12 =</td>
</tr>
<tr>
<td>4</td>
<td>5.9 - -6.23</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>-7.11 \div -3 =</td>
</tr>
<tr>
<td>6</td>
<td>-0.72 + 0.9 =</td>
</tr>
<tr>
<td>7</td>
<td>-2.13 \times -0.2 =</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>-6.2 + -0.73 =</td>
</tr>
<tr>
<td>9</td>
<td>5.2 - -3.19 =</td>
</tr>
<tr>
<td>10</td>
<td>-5.112 \div 0.3 =</td>
</tr>
</tbody>
</table>

### Problem Solving

Anna weighed 120.5 pounds. She lost 7.3 pounds and then gained back 4.8 pounds. How much does she weigh now?

**Score**
### Pre-Algebra Concepts

#### Review Exercises

1. \(-0.3 + 0.7 = \)

2. \(-2.7 + 3.2 = \)

3. \(3 \times -2.6 = \)

4. \(-\frac{1}{2} + -\frac{1}{3} = \)

5. \(\frac{2}{5} + -\frac{1}{2} = \)

6. \(-\frac{1}{2} \times -1 \frac{1}{5} = \)

#### Helpful Hints

In the expression \(5^3\), the number 5 is called the **base** and the number 3 is called the **power** or **exponent**. The exponent tells how many times the base is to be multiplied by itself. In the example \(5^3\), you would multiply 5 three times: \(5^3 = 5 \times 5 \times 5 = 125\). Negative numbers can have exponents: \((-2)^3 = (-2) \times (-2) \times (-2) = 4 \times (-2) = -8\). Any number to the power of 1 = the number. Any number to the power of 0 = 1.

#### Examples:

\[
\begin{align*}
3^4 &= 3 \times 3 \times 3 \times 3 \\
&= 9 \times 9 \\
&= 81 \\
\end{align*}
\]

\[
\begin{align*}
(-5)^4 &= (-5) \times (-5) \times (-5) \times (-5) \\
&= 25 \times 25 \\
&= 625 \\
\end{align*}
\]

\[
\begin{align*}
5^1 &= 5 \\
6^0 &= 1 \\
\end{align*}
\]

1. \(4^2 = \)

2. \((-3)^3 = \)

3. \(6^3 = \)

4. \(5^0 = \)

5. \((-2)^4 = \)

6. \(2^5 = \)

7. \(7^1 = \)

8. \(8^3 = \)

9. \((-1)^5 = \)

10. \((-3)^4 = \)

### Problem Solving

A certain number to the third power is equal to eight. What is the number?

Score
Review Exercises

1. \(7^2 = \)

2. \(9^3 = \)

3. \((-6)^2 = \)

4. \(5 + (-6 + 8 + 3) = \)

5. \(7^0 = \)

6. \(9^1 = \)

Helpful Hints

Many numbers can be written as exponents. Examples:

- \(5 \times 5 \times 5 = 5^4\)
- \((-2) \times (-2) \times (-2) = (-2)^3\)
- \(7 \times 7 \times 7 \times 7 = 7^5\)
- \((-60) \times (-60) \times (-60) = (-60)^3\)
- \(125 = 5^3\)
- \(36 = 6^2 \text{ or } (-6)^2\)
- \(8 = 2^3\)
- \(25 = 5^2 \text{ or } (-5)^2\)

Rewrite each of the following as an exponent.

1. \(2 \times 2 \times 2 \times 2 \times 2 = \)

2. \((-9) \times (-9) \times (-9) = \)

3. \(16 \times 16 \times 16 \times 16 = \)

4. \(49 = \)

5. \(100 = \)

6. \(121 = \)

7. \((-1) \times (-1) \times (-1) \times (-1) = \)

8. \(32 = \)

9. \(16 = \)

10. \(9 \times 9 \times 9 \times 9 \times 9 \times 9 = \)

Problem Solving

A number to the third power is equal to -27. What is the number?
1. \(-36 \div 4 = \)
2. \(-9 - (-6) = \)
3. \(-\frac{1}{3} + \frac{1}{4} = \)

4. \(-2.7 + 6.3 = \)
5. \(-3.12 + 3 = \)
6. \(\frac{3}{4} \times -\frac{1}{2} = \)

\[\sqrt{}\] is the symbol for square root.
\(\sqrt{36}\) is read "the square root of 36."
The answer is the number that when multiplied by itself equals 36.
\(\sqrt{36} = 6\), because \(6 \times 6 = 36\).
\(\sqrt{49} = 7\), because \(7 \times 7 = 49\).
\(\sqrt{81} = 9\), because \(9 \times 9 = 81\).

Find the square roots of the following numbers.

1. \(\sqrt{25} = \)
2. \(\sqrt{144} = \)
3. \(\sqrt{16} = \)
4. \(\sqrt{121} = \)
5. \(\sqrt{1} = \)
6. \(\sqrt{900} = \)
7. \(\sqrt{100} = \)
8. \(\sqrt{400} = \)
9. \(\sqrt{256} = \)
10. \(\sqrt{1,600} = \)

**Problem Solving**
The product of \(-7\) and \(5\) is added to \(-6\).
Find the number.

Score
## Review Exercises

1. \( 6^2 = \)
2. \((-2)^3 = \)
3. Write \(6 \times 6 \times 6 \times 6\) as an exponent

4. \(\sqrt{64} = \)
5. \(\sqrt{169} = \)
6. \(\sqrt{121} = \)

### Helpful Hints

Use what you have learned about exponents and square roots to solve the following problems.

Examples:

\[
\frac{\sqrt{64}}{2^2} = \frac{8}{4} = 2 \\
\frac{4^2}{2^3} = \frac{16}{8} = 2 \\
\frac{3^3}{\sqrt{9}} = \frac{27}{3} = 9 \\
\sqrt{36} \times 3^3 = 6 \times 27 = 162
\]

Solve each of the following.

1. \(\sqrt{16} \times 3^2 = \)
2. \(\frac{4^3}{\sqrt{64}} = \)
3. \(\frac{5^3}{\sqrt{25}} = \)
4. \(2^3 \times \sqrt{121} = \)
5. \(3^2 \times 4^2 = \)
6. \(\frac{2^3 \times 4^2}{\sqrt{4}} = \)
7. \(\sqrt{81} \times \sqrt{36} = \)
8. \(\frac{2^4}{\sqrt{16}} = \)
9. \(2^2 \times 3^2 \times \sqrt{16} = \)
10. \(\frac{3^4}{\sqrt{81}} = \)

### Problem Solving

5 to the second power added to the square root of what number is equal to 34?
Pre-Algebra Concepts

Reviewing Exponents and Square Roots

For 1-6, rewrite each as an exponent.

1. \(13 \times 13 \times 13 \times 13 = \)
2. \(2 \times 2 \times 2 \times 2 \times 2 \times 2 = \)
3. \(64 = \)
4. \((-2) \times (-2) \times (-2) \times (-2) = \)
5. \(8 = \)
6. \(100 = \)

For 7-12, find the square root of each number.

7. \(\sqrt{16} = \)
8. \(\sqrt{64} = \)
9. \(\sqrt{16 + 9} = \)
10. \(\sqrt{400} \)
11. \(\sqrt{9} \)
12. \(\sqrt{4 \times 9} = \)

Solve each of the following

13. \(\sqrt{36} + 4^2 = \)
14. \(\frac{\sqrt{64}}{\sqrt{4}} = \)
15. \(6^2 + 7^2 = \)
16. \((4^2) \times (5^2) = \)
17. \(\sqrt{49} \times \sqrt{81} = \)
18. \(3^2 \times 5^2 \times \sqrt{9} = \)
19. \(\frac{5^3}{5} = \)
20. \(\frac{\sqrt{100} \times \sqrt{25}}{\sqrt{25}} = \)
Review Exercises

1. \(7^2 =\)
2. \(\sqrt{36} =\)
3. \(-9 - (-7) =\)
4. \(16 + (-72) =\)
5. \(\frac{16 + (-2)}{-4 \times (-2)} =\)
6. \(7^2 - 5^2 =\)

Helpful Hints

It is necessary to follow the correct order of operations when simplifying an expression.

1. Evaluate within grouping symbols.
2. Eliminate all exponents.
3. Multiply and divide in order from left to right.
4. Add and subtract in order from left to right.

Examples:

\[3^2 (3 + 5) + 3 = 3^2 (8) + 3 = 9 (8) + 3 = 72 + 3 = 75\]

Sometimes there are no grouping symbols.

\[4 + 12 \times 3 - 8 \div 4 = 4 + 36 - 2 = 40 - 2 = 38\]

*A number next to a grouping symbol means multiply.

\[3 \times (2 + 1) = 3 \times (2 + 1)\]

Solve each of the following. Be sure to follow the correct order of operations.

1. \(5 + 9 \times 3 - 4 =\)
2. \(8 + 3^2 \times 4 - 6 =\)
3. \(4 (6 + 2) - 5^2 =\)
4. \((14 - 6) + 56 \div 2^3 =\)
5. \(5^2 + (15 + 3) \div 2 =\)
6. \(7 \times 4 - 9 \div 3 =\)
7. \((3 \times 12) \div (9 \div 3) =\)
8. \(5^2 + 2^3 - 2 \times 3 =\)
9. \(7.12 - 6 \div 3 + 4 =\)
10. \(3^2 - 2^3 + 6 \div 2 =\)
11. \((3 + 8 \div 2) \times (2 \times 6 \div 3) =\)
12. \(9 + [(4 + 5) \times 3] =\)

Problem Solving

A running back gained 12 yards. The next play he lost 18 yards, and on the third play he gained five yards. What was his net gain or net loss?
Pre-Algebra Concepts

Review Exercises

More Order of Operations

Use the following sets to find the answers.

\[ A = \{1, 5, 7, 8, 9\}, \quad B = \{2, 4, 6, 8, 10\}, \quad \text{and} \quad C = \{1, 2, 4, 5\} \]

1. Find \( B \cap C \).
2. Find \( A \cap B \).
3. Find \( C \cap \emptyset \).
4. Find \( A \cup C \).
5. Find \( B \cup C \).
6. Find \( (A \cap B) \cup C \).

### Helpful Hints

*Remember the correct order of operations:
1. Evaluate within grouping symbols.
2. Eliminate all exponents.
3. Multiply and divide in order from left to right.
4. Add and subtract in order from left to right.*

### Examples:

<table>
<thead>
<tr>
<th></th>
<th>[ \frac{5}{2} \times \frac{8}{3} - \frac{3}{4} ]</th>
<th>[ \frac{1}{2} \times \frac{2}{3} + \frac{3}{4} ]</th>
<th>[ \frac{1}{2} \times \frac{2}{3} - \frac{3}{4} ]</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>[ 14 \div 2 \times 3 + 4 \div 2 - 1 ]</td>
<td>[ 14 \div 2 \times 3 + 16 - 1 ]</td>
<td>[ 7 \times 3 + 16 - 1 ]</td>
</tr>
<tr>
<td>2</td>
<td>[ 21 + 16 - 1 ]</td>
<td>[ 37 - 1 ]</td>
<td>[ 36 ]</td>
</tr>
<tr>
<td>3</td>
<td>[ 5 \times (5 - 2) \div 3 + 2 ]</td>
<td>[ 3 + 2 \times (9 - 7) ]</td>
<td>[ 5 \times (5 - 4) \div 3 + 2 ]</td>
</tr>
<tr>
<td>4</td>
<td>[ 25 \div 4 ]</td>
<td>[ 21 \div 7 ]</td>
<td>[ 3 ]</td>
</tr>
</tbody>
</table>

### Problem Solving

John started the week with $64. Each day, Monday through Friday, he spent $7 for lunch. How much money did he have left at the end of the week?

Score
Review Exercises

1. $3^3 =$
2. $5 + 3 \times 7 + 2 =$
3. $-7 - 6 =$
4. Carefully define "set."
5. $\frac{1}{2} \times -2 \frac{1}{2} =$
6. $-0.91 + 0.5 =$

Helpful Hints

For any real numbers $a$, $b$, and $c$, the following properties are true:

1. Identity Property of Addition
   $0 + a = a$
2. Identity Property of Multiplication
   $1 \times a = a$
3. Inverse Property of Addition
   $a + (-a) = 0$
4. Inverse Property of Multiplication
   $a \times \frac{1}{a} = 1$ (a ≠ 0)
5. Associative Property of Addition
   $(a + b) + c = a + (b + c)$
6. Associative Property of Multiplication
   $(a \times b) \times c = a \times (b \times c)$
7. Commutative Property of Addition
   $a + b = b + a$
8. Commutative Property of Multiplication
   $a \times b = b \times a$
9. Distributive Property
   $a \times (b + c) = a \times b + a \times c$

Examples:

$0 + 2 = 2$
$1 \times 7 = 7$
$5 + (-5) = 0$
$6 \times 1 = 1$
$\frac{2 + 3 + 4}{6} = 2 + (3 + 4)$
$(2 \times 3) \times 4 = 2 \times (3 \times 4)$
$5 + 6 = 6 + 5$
$4 \times 3 = 3 \times 4$
$5 \times (3 + 2) = 5 \times 3 + 5 \times 2$

Name the property that is illustrated.

1. $7 + 9 = 9 + 7$
2. $3 \times (7 + 4) = 3 \times 7 + 3 \times 4$
3. $7 + (-7) = 0$

4. $3 \times (4 \times 5) = (3 \times 4) \times 5$
5. $0 \times (-6) = -6$
6. $5 \times \frac{1}{5} = 1$

7. $9 + (6 + 5) = 9 + (5 + 6)$
8. $9 \times 7 = 7 \times 9$
9. $(6 + 5) + 7 = 6 + (5 + 7)$
10. $1 \times \frac{7}{8} = 7$

11. $3 \times 2 + 3 \times 4 = 3 \times (2 + 4)$
12. $16 + (-16) = 0$

Problem Solving

Five times a certain number is equal to 95. Find the number.

Score
Review Exercises

1. \( 3 + 6 \times 2 - 4 = \)
2. \( 3 (5 + 2) - 2^2 = \)
3. \( 3 \times 4 - 6 \div 3 = \)

4. \( 2^2 + 3^3 - 2 \times 4 = \)
5. \( (4 + 4 \div 2) \times (2 \times 10 \div 2) = \)
6. \( 3 [(4 + 3) \times 2] = \)

Helpful Hints

Use what you have learned to solve the following problems.

Example: Use the indicated property to complete the statement with the correct answer.

Inverse Property of Addition: \(27 + ( \_ \_ ) = 0 \) answer: -27
Distributive Property: \( 4 \times (5 + 7) = \) answer: 4 \times 5 + 4 \times 7

Use the indicated property to complete the statement with the correct answer.

1. Associative Property of Addition: \( (3 + 7) + 9 = \)
2. Commutative Property of Multiplication: \( 7 \times 15 = \)
3. Inverse Property of Multiplication: \( 9 \times ( \_ \_ ) = 1 \)
4. Distributive Property: \( 3 \times (6 + 2) = \)
5. Commutative Property of Addition: \( 9 + 12 = \)
6. Associative Property of Multiplication: \( 3 \times (9 \times 5) = \)
7. Distributive Property: \( 3 \times 5 + 3 \times 7 = \)
8. Inverse Property of Addition: \( 9 + ( \_ \_ ) = 0 \)
9. Identity Property of Multiplication: \( 7 \times ( \_ \_ ) = 7 \)
10. Inverse Property of Multiplication: \( \frac{1}{5} \times ( \_ \_ ) = 1 \)
11. Associative Property of Addition: \( 3 + (5 + 6) = \)
12. Distributive Property: \( 6 \times (4 + (-2)) = \)

Problem Solving

Mr. Andrews rents a car for one day. He pays $30 per day for the rental plus $.30 per mile he drives. How much will the total price of the rental car be if he drives 40 miles?

Score
Review Exercises

1. $\sqrt{100}$
2. $5^3 =$
3. $\frac{\sqrt{36} \times \sqrt{49}}{2} =$
4. $-3 \times -5 \times -6 =$
5. $-2\frac{1}{2} + -\frac{1}{2} =$
6. $-\frac{1}{3} + -\frac{1}{2} =$

Scientific notation is used to express very large and very small numbers. A number in scientific notation is expressed as the product of two factors. The first factor is a number between 1 and 10 and the second factor is a power of 10 as in the examples $2.346 \times 10^5$ and $3.976 \times 10^{-7}$.

Example for a large number: Change 157,000,000,000 to scientific notation. Move the decimal between the 1 and the 5. Since the decimal has moved 11 places to the left, the answer is $1.57 \times 10^{11}$.

Example for a small number: Change 0.0000000468 to scientific notation. Move the decimal between the 4 and the 6. Since the decimal has moved eight places to the right, the answer is $4.68 \times 10^{-8}$.

Change the following numbers to scientific notation.

1. 2,360,000,000
2. .000000149
3. 653,000,000,000
4. 159,700
5. 106,000,000
6. .000007216
7. 1,096,000,000
8. .001963
9. .00000000016
10. 7,000,000,000,000
11. .00000001287

Problem Solving

Light travels at 186,000 miles per second. Write this speed in scientific notation.
Pre-Algebra Concepts

**Review Exercises**

1. Change 123,000 to scientific notation.
2. Change .000321 to scientific notation.
3. Which property of numbers is illustrated? \(3 \times 5 + 3 \times 7 = 3 \times (5 + 7)\)
4. \(-9 - 8 = \)
5. \(\frac{36}{-3} \div -16 \div -4 = \)
6. \(2^3 + 3^3 = \)

**Helpful Hints**

It is easy to change numbers in scientific notation to conventional numbers.

**Examples:**

Change \(3.458 \times 10^8\) to a conventional number.
Move the decimal eight places to the right. The answer is 345,800,000.

Change \(4.5677 \times 10^{-7}\) to a conventional number.
Move the decimal seven spaces to the left. The answer is .00000045677.

Change each number in scientific notation to a conventional number.

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>S1</td>
<td>7.032 \times 10^6</td>
<td>S2</td>
</tr>
<tr>
<td>2</td>
<td>9.13 \times 10^-8</td>
<td>3</td>
</tr>
<tr>
<td>5</td>
<td>1.127 \times 10^3</td>
<td>6</td>
</tr>
<tr>
<td>8</td>
<td>2.1 \times 10^4</td>
<td>9</td>
</tr>
</tbody>
</table>

**Problem Solving**

The distance to the sun is approximately \(9.3 \times 10^7\) miles.
Change this distance to a conventional number.
Review Exercises

1. Change 123,000 to scientific notation.
2. Change .000056 to scientific notation.
3. Change $2.76 \times 10^6$ to a conventional number.
4. Change $3.75 \times 10^{-5}$ to a conventional number.
5. List two equivalent sets.
6. List two disjoint sets.

### Helpful Hints

A ratio compares two numbers or groups of objects.

Example: □ □ □ □ For every three circles there are four squares.

The ratio can be written in the following ways: 3 to 4, $3 : 4$, and $\frac{3}{4}$. Each of these is read as “three to four.”

* Ratios are often written in fraction form. The first number mentioned is the numerator. Ratios that are expressed as fractions can be reduced to lowest terms.

Write each of the following ratios as a fraction reduced to lowest terms.

1. 5 nickels to 3 dimes
2. 18 horses to 4 cows
3. 7 to 2
4. 6 children to 5 adults
5. 30 books to 25 pencils
6. 15 bats to 3 balls
7. 24 to 20
8. 16 to 12
9. 7 dimes to 3 pennies
10. 6 chairs to 4 desks
11. 4 cats to 8 dogs
12. 9 : 3

### Problem Solving

A team won 24 games and lost 10. Write the ratio of games won to games lost as a fraction reduced to lowest terms.

Score
Review Exercises

1. Write \(0.00027\) in scientific notation.
2. Write \(2,916,000\) in scientific notation.
3. Write \(7.21 \times 10^5\) as a conventional number.
4. Write \(6.23 \times 10^{-5}\) as a conventional number.
5. \((-3) \times 2 \times (-5) =\)
6. \(-0.264 \div 0.2 =\)

Two equal ratios can be written as a proportion.

Example: \(\frac{4}{6} = \frac{2}{3}\) In a proportion, the cross products are equal.

Examples: Is \(\frac{3}{4} = \frac{5}{6}\) a proportion? To find out, cross multiply.
\(3 \times 6 = 18, 4 \times 5 = 20, 18 \neq 20\). It is not a proportion.

Is \(\frac{6}{9} = \frac{8}{12}\) a proportion? To find out, cross multiply.
\(6 \times 12 = 72, 9 \times 8 = 72, 72 = 72\). It is a proportion.

Cross multiply to determine whether each of the following is a proportion.

1. \(\frac{2}{5} = \frac{6}{15}\)
2. \(\frac{5}{3} = \frac{14}{9}\)
3. \(\frac{18}{2} = \frac{27}{3}\)
4. \(\frac{4}{5} = \frac{12}{15}\)
5. \(\frac{15}{20} = \frac{6}{8}\)
6. \(\frac{5}{2} = \frac{11}{4}\)
7. \(\frac{2}{5} = \frac{12}{30}\)
8. \(\frac{3}{1.3} = \frac{9}{3.5}\)
9. \(\frac{\sqrt{4}}{4} = \frac{\sqrt{8}}{8}\)
10. \(\frac{5}{8} = \frac{6}{7}\)

Problem Solving

A whole number to the power of three, added to five, equals 13. Find the whole number.

Score
Review Exercises

1. Write 25 to 15 as a fraction in lowest terms.

2. Is \( \frac{4}{5} = \frac{8}{10} \) a proportion? Why?

3. Is \( \frac{2}{5} = \frac{5}{7} \) a proportion? Why?

4. \( \sqrt{49} + 3^2 = \)

5. \( 4^3 - 2^4 = \)

6. \( -225 + 500 = \)

Helpful Hints

It is easy to find the missing number in a proportion.

Examples: Solve each proportion.

\[
\frac{4}{n} = \frac{2}{3} \\
\text{First, cross multiply}: \quad 2 \times n = 4 \times 3 \\
\quad 2 \times n = 12 \\
\text{Next, divide 12 by 2}: \quad \frac{6}{2} \quad \boxed{n = 6}
\]

\[
\frac{4}{5} = \frac{y}{7} \\
\text{First, cross multiply}: \quad 5 \times y = 4 \times 7 \\
\quad 5 \times n = 28 \\
\text{Next, divide 28 by 5}: \quad \frac{5\frac{3}{5}}{5 \frac{28}{75}} \quad \boxed{y = 5\frac{3}{5}}
\]

Find the missing number in each proportion.

1. \( \frac{3}{15} = \frac{n}{5} \)

2. \( \frac{4}{7} = \frac{x}{28} \)

3. \( \frac{n}{4} = \frac{12}{16} \)

4. \( \frac{x}{40} = \frac{5}{100} \)

5. \( \frac{1}{3} = \frac{14}{y} \)

6. \( \frac{n}{4} = \frac{8}{5} \)

7. \( \frac{15}{20} = \frac{n}{8} \)

8. \( \frac{7}{n} = \frac{3}{9} \)

9. \( \frac{27}{3} = \frac{n}{2} \)

10. \( \frac{n}{2} = \frac{7}{5} \)

Problem Solving

The temperature at midnight is -12°. By 6:00 a.m., the temperature has dropped another 20°. What is the temperature at 6:00 a.m.?
1. Is \( \frac{3}{4} = \frac{9}{12} \) a proportion? Why?

2. Solve the proportion: \( \frac{n}{12} = \frac{5}{2} \)

3. Solve the proportion: \( \frac{5}{6} = \frac{10}{n} \)

4. Write 234,000,000 in scientific notation.

5. Write .00235 in scientific notation.

6. Write \( 7.2 \times 10^5 \) as a conventional number.

**Helpful Hints**

**Ratios and proportions** can be used to solve problems.

**Example:** A car can travel 384 miles in six hours. How far can the car travel in eight hours?

First set up a proportion. \( \frac{384 \text{ miles}}{6 \text{ hours}} = \frac{n \text{ miles}}{8 \text{ hours}} \)

Next, cross multiply. \( 6 \times n = 8 \times 384 \)

\( 6 \times n = 3072 \)  \( \frac{512}{6} \quad n = 512 \)

The car can travel 512 miles in eight hours.

Use a proportion to solve each problem.

**S1.** A car can travel 85 miles on five gallons of gas. How far can the car travel on 12 gallons of gas?

**S2.** If two pounds of beef cost $4.80, how much will five pounds cost?

1. A car can travel 100 miles on five gallons of gas. How many gallons will be needed to travel 40 miles?

2. Two pounds of chicken cost $7. How much will five pounds cost?

3. In a class, the ratio of boys to girls is four to three. If there are 20 boys in the class, how many girls are there?

4. A runner takes three hours to go 24 miles. At this rate, how far could he run in five hours?

5. Seven pounds of nuts cost $5. How many pounds of nuts can you buy with $2?

**Problem Solving**

At 6:00 a.m. the temperature was -16°. By noon the temperature had risen 28°. What was the temperature at noon?
Pre-Algebra Concepts

Reviewing Ratios and Proportions

For 1-3, write each ratio as a fraction reduced to lowest terms.

1. 12 to 4
2. 24 to 10
3. 16 to 6

For 4-6, determine whether each is a proportion and why.

4. \( \frac{12}{15} = \frac{24}{30} \)
5. \( \frac{7}{8} = \frac{8}{9} \)
6. \( \frac{5}{3} = \frac{15}{9} \)

For 7-15, solve each proportion.

7. \( \frac{12}{15} = \frac{n}{5} \)
8. \( \frac{1}{3} = \frac{11}{n} \)
9. \( \frac{1}{20} = \frac{n}{100} \)

10. \( \frac{5}{7} = \frac{25}{n} \)
11. \( \frac{3}{4} = \frac{n}{6} \)
12. \( \frac{15}{20} = \frac{n}{12} \)

13. \( \frac{10}{100} = \frac{2}{n} \)
14. \( \frac{x}{5} = \frac{9}{15} \)
15. \( \frac{3}{16} = \frac{n}{48} \)

For 16-20, use a proportion to solve each problem.

16. If four pounds of pork cost $4.80, how much will seven pounds cost?

17. In a class the ratio of girls to boys is two to three. If there are 20 girls, how many boys are in the class?

18. A cyclist can travel 42 miles in three hours. How far can he travel in five hours?

19. A car can travel 120 miles on five gallons of gas. How many gallons will be needed to travel 48 miles?

20. If six pounds of nuts cost $18, how many pounds of nuts can you buy with $12?
Pre-Algebra Concepts

Review Exercises

1. Solve the proportion: \( \frac{7}{6} = \frac{n}{18} \)
2. Solve the proportion: \( \frac{n}{3} = \frac{6}{5} \)
3. \( 3 \times 2 + 6 ÷ 2 = \)
4. \( 4^2 + (5 \times 2) ÷ 5 = \)
5. \( 4^2 + 2^2 + 12 ÷ 2 = \)
6. \( 5 (-2 + -6) + 7 = \)

Helpful Hints

Percent means “per hundred” or “hundredths.”

Percents can be expressed as decimals and as fractions. The fraction form may sometimes be reduced to its lowest terms.

Examples: \( 25\% = .25 = \frac{25}{100} = \frac{1}{4} \) \( 8\% = .08 = \frac{8}{100} = \frac{2}{25} \)

Change each percent to a decimal and to a fraction reduced to its lowest terms.

1. \( 20\% = \) 2. \( 9\% = \) 3. \( 16\% = \)
4. \( 6\% = \) 5. \( 75\% = \) 6. \( 40\% = \)
7. \( 1\% = \) 8. \( 45\% = \) 9. \( 12\% = \)
10. \( 5\% = \) 11. \( 50\% = \) 12. \( 13\% = \)

Problem Solving

95% of the students enrolled in a school are present. What fraction are present? (Reduce to lowest terms.)
Pre-Algebra Concepts

Review Exercises

1. Change 80% to a decimal.
2. Change 7% to a decimal.
3. Change 25% to a fraction reduced to lowest terms.

4. \( 156 \times 0.7 \)
5. \( 400 \times 0.32 \)
6. \( 300 \times 0.06 \)

Helpful Hints

To find the percent of a number, you may use either fractions or decimals. Use what is the most convenient.

Example: Find 25% of 60.

\[
\begin{align*}
\text{.25} \times 60 &= \frac{25}{100} \\
300 \times \frac{1}{4} &= \frac{120}{15} \\
15.00 &
\end{align*}
\]

\[\text{OR} \quad \frac{1}{4} \times 60 = 15 = 15\]

1. Find 70% of 25.
2. Find 50% of 300.
3. Find 6% of 72.

4. Find 60% of 85.
5. Find 25% of 60.
6. Find 45% of 250.

7. Find 10% of 320.
8. Find 40% of 200.
9. Find 4% of 250.

10. Find 90% of 240.
11. Find 75% of 150.
12. Find 2% of 660.

Problem Solving

Arlene took a test with 40 questions. If she got a score of 85% correct, how many problems did she get correct?

Score
Review Exercises

1. Find 15% of 310.
2. Find 20% of 120.
3. Find .86.

4. Change .7 to a percent.
5. Find .9 of 150.
6. Find .0510.

Helpful Hints

When finding the percent, first write a fraction, change the fraction to a decimal, and then change the decimal to a percent.

Examples:

4 is what percent of 16?

\[
\frac{4}{16} = \frac{1}{4}
\]

\[
\frac{20}{20} = 1
\]

\[
\frac{5}{25} = \frac{1}{5}
\]

\[
\frac{20}{100} = 20\%
\]

S1. 4 is what percent of 16?
S2. 5 is what percent of 25?

4. 20 is what percent of 25?

7 is what percent of 28?

40 = what percent of 80?

12 is what percent of 20?

15 = what percent of 20?

400 is what percent of 500?

Problem Solving

A rancher had 800 cows. He sold 600 of them. What percent of the cows did he sell?
Pre-Algebra Concepts

Review Exercises

1. Find 4% of 80.

2. Find 40% of 80.

3. Twelve is what percent of 16?

4. 45 is what percent of 50?

5. \( \frac{52}{19} - 1.96 = \)

6. \( .06 \div 12 \)

Helpful Hints

To find the whole when the part and the percent are known, simply change the equal sign (" = ") to the division sign (" ÷ ").

Examples:

- 6 = 25% of what number?
  \( 6 \div 25\% \) (Change = to ÷ .)
  \( 6 \div .25 \) (Change % to decimal.)
  \( 6 \div .25 = 24 \) \( 25 \cdot 6.00 \) * Be careful to move decimal points properly.

- Twelve is 80% of what?
  \( 12 \div 80\% \) (Change = to ÷ .)
  \( 12 \div .8 \) (Change % to decimal.)
  \( 12 \div .8 = 15 \) \( 15 \)

1. \( 5 = 25\% \) of what?

2. Six is 20% of what?

1. 12 = 25% of what?

2. 32 = 40% of what?

3. Five is 20% of what?

4. 3 = 75% of what?

5. Twelve is 80% of what?

6. 8 = 40% of what?

7. 15 is 25% of what?

8. Fifteen is 20% of what?

9. 9 is 20% of what?

10. 25 is 20% of what?

Problem Solving

There are 15 girls in a class. If this is 60% of the class, how many students are there in the class?

Score
### Review Exercises

1. Change $\frac{72}{100,000}$ to a decimal.  
2. Change 2.0019 to a mixed numeral.  
3. Change $\frac{9}{15}$ to a percent.

4. $\frac{3}{5} \times 25 = \underline{15}$  
5. $8 \div 16 = \underline{0.5}$  
6. $0.03 \div 2.4 = \underline{0.0125}$

### Helpful Hints

Use what you have learned to solve the following word problems.

**Examples:**

A man earns $300 and spends 40% of it. How much does he spend?

Find 40% of 300.

$$300 \times 0.4 = 120$$

He spends $120.

In a class of 25 students, 15 are girls. What % are girls?

$$15 = \text{what % of 25}$$

$$\frac{15}{25} = \frac{3}{5} = 0.60 = \frac{60}{100} = 60\%$$

60% are girls.

Five students got A’s on a test. This is 20% of the class. How many are in the class?

$$5 = 20\% \text{ of what?}$$

$$5 \div 20\% = 25$$

25 are in the class.

---

### Problem Solving

Nacho’s monthly income is $4,800. What is his annual income? (Hint: How many months are there in a year?)

---

**Score**
Review Exercises

1. \(7.68 + 19.7 + 5.364 = \)  
   \(- 4.765\)  
2. 7.123  
3. 3.14 \(\times 7\)
4. \(.208 \times .06\)
5. \(31.44\)
6. \(.15 \times 1.215\)

Helpful Hints
Use what you have learned to solve the following problems.

*Refer to the examples on the previous page if necessary.

S1. Find 20% of 150.

S2. 6 is 20% of what?

1. 8 is what % of 40?

2. Change \(\frac{18}{20}\) to a percent.

3. A school has 600 students. If 5% are absent, how many students are absent?

4. A quarterback threw 24 passes and 75% of them were caught. How many were caught?

5. Riley has 250 marbles in his collection. If 50 of them are red, what percent of them are red?

6. A team played 60 games and won 45 of them. What % did they win?

7. There are 50 sixth graders in a school. This is 20% of the school. How many students are in the school?

8. A coat is on sale for $20. This is 80% of the regular price. What is the regular price?

9. Steve has finished \(\frac{3}{5}\) of his test. What percent of the test has he finished?

10. Alex wants to buy a computer priced at $640. If sales tax is 8%, what is the total cost of the computer?

Problem Solving
Ann took five tests and scored a total of 485 points. What was her average score?
Pre-Algebra Concepts

Reviewing Percents

Change numbers 1 - 5 to percents.

1. \( \frac{13}{100} = \) 2. \( \frac{3}{100} = \) 3. \( \frac{7}{10} = \) 4. .19 = 5. .6 =

Change numbers 6 - 8 to a decimal and a fraction expressed in lowest terms.

6. 8% = ._____ = _____ 7. 18% = ._____ = _____ 8. 80% = ._____ = _____

Solve the following problems. Label the word problem answers.

9. Find 3% of 74. 10. Find 40% of 320.

11. 20 is what percent of 25? 12. 15 is what percent of 20?

13. 3 = 25% of what? 14. 15 = 20% of what?

15. Change \( \frac{16}{20} \) to a %. 16. Change \( \frac{3}{5} \) to a percent.

17. 640 students attend Lincoln School. If 40% of the students are girls, how many girls attend Lincoln School?

18. A team played 40 games. If they won 65% of them, how many games did the team win?

19. A pitcher threw 40 pitches. If 30 were strikes, what percent were strikes?

20. Thirty students attended an assembly. This was 20% of the seventh grade. How many students are there in the seventh grade?
1. Change .7 to a percent.  
2. Change $\frac{4}{5}$ to a percent.  
3. Change .12 to a fraction reduced to lowest terms.

4. Find 6% of 200.  
5. Three is what percent of 12?  
6. 5 = 20% of what?

**Helpful Hints**

A **factor** of a whole number is a whole number that divides into it evenly, without a remainder.

**Examples:** Find all factors of 20.

$1 \times 20 = 20$  
$2 \times 10 = 20$  
$4 \times 5 = 20$

All the factors of 20 are: 1, 20, 2, 20, 4, 5

Find all factors of 84.

$1 \times 84 = 84$  
$2 \times 42 = 84$  
$3 \times 28 = 84$  
$4 \times 21 = 84$  
$6 \times 14 = 84$  
$7 \times 12 = 84$

All the factors of 84 are: 1, 84, 2, 42, 3, 28, 4, 21, 6, 14, 7, 12

Find all the factors of each number.

S1: 30  
S2: 36  
S3: 100

2. 42  
3. 70  
4. 81

5. 50  
6. 40  
7. 75

8. 90  
9. 20  
10. 50

**Problem Solving**

A test contained 60 questions. If a student’s score was 90%, how many questions did he get correct?

Score
1. \(-9 - 6 + 3 = \)  
2. \(-3 \times -2 \cdot 4 = \)  
3. \(\sqrt{121} + \sqrt{81} = \)  

4. Solve the proportion.  
\[
\frac{3}{4} = \frac{n}{10}
\]

5. 3 = 20% of what?  
6. Two is what % of eight?

**Helpful Hints**

The **greatest common factor** is the largest factor that two or more numbers have in common.

**Example:** Find the greatest common factor of 12 and 16.

Find the factors of each number:  
12: 1, 2, 3, 4, 6, 12  
16: 1, 2, 4, 8, 16  

\[
\text{greatest common factor} = 4
\]

* "Greatest common factor" is abbreviated as GCF.

Find the greatest common factor of each pair of numbers.

1. 8 and 10  
2. 12 and 15  
3. 42 and 56  
4. 64 and 80  
5. 100 and 120  
6. 90 and 70  
7. 45 and 25  
8. 60 and 72  
9. 48 and 36  
10. 20 and 40

**Problem Solving**

Light travels approximately \(5.879 \times 10^{12}\) miles in one year.  
Write the distance travelled as a conventional number.

**Score**
### Review Exercises

1. Write .0000012 in scientific notation.  
2. Write 496,000,000 in scientific notation.  
3. Write $1.32 \times 10^7$ as a conventional number.  
4. Write $4.64 \times 10^{-6}$ as a conventional number.  
5. Find all the factors of 60.  
6. Find the GCF (greatest common factor) of 36 and 40.

### Helpful Hints

A **multiple** of a number is the product of that number and any whole number. The multiples of a number can be found by multiplying it by 0, 1, 2, 3, 4, and so on.  

**Example:** Find the first six multiples of 3.  
3: 0, 3, 6, 9, 12, 15  
These are found by multiplying 3 by 0, 1, 2, 3, 4, and 5.

Complete the list of multiples for each number.

<p>| | | | | | | | | | | | |</p>
<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td><strong>S1:</strong> 2: 0, 2, □, □, □, □</td>
<td><strong>S2:</strong> 6: □, 6, □, □, □, 24, □</td>
<td></td>
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</tr>
</tbody>
</table>

1. 5: 0, 5, □, □, □, □  
2. 3: □, 3, □, 9, □, □  
3. 10: □, 10, 20, □, □, □  
4. 4: □, □, □, 12, 16, 20  
5. 11: 0, 11, □, □, □, 55  
6. 8: 0, 8, 16, □, □, □  
7. 20: 0, 20, 40, □, □, □  
8. 7: 0, 7, □, 21, □, □  
9. 30: 0, 30, 60, □, □, □  
10. 9: 0, 9, 18, □, 36, □

### Problem Solving

A pitcher threw 30 pitches that were strikes. This was 25% of all the pitches thrown. How many pitches were thrown by the pitcher?

**Score:**
1. List all the factors of 30.  
2. Find the GCF of 32 and 60.  
3. List the first six multiples of eight.

4. Find 6% of 50.  
5. 3 is what % of 12?  
6. 7 = 20% of what?

### Helpful Hints

The **least common multiple** of two or more whole numbers is the smallest whole number, other than zero, that they all divide into evenly.

**Examples:** The least common multiple of:

- 2 and 3 is 6
- 4 and 6 is 12
- 3 and 9 is 9

*Least common multiple is abbreviated as LCM.

Find the least common multiple of each pair of numbers.

<table>
<thead>
<tr>
<th>S1</th>
<th>S2</th>
<th>S3</th>
<th>S4</th>
<th>S5</th>
<th>S6</th>
<th>S7</th>
<th>S8</th>
<th>S9</th>
<th>S10</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 and 4</td>
<td>6 and 8</td>
<td>3 and 5</td>
<td>6 and 10</td>
<td>12 and 20</td>
<td>10 and 15</td>
<td>12 and 18</td>
<td>15 and 60</td>
<td>16 and 12</td>
<td>8 and 20</td>
</tr>
</tbody>
</table>

### Problem Solving

A CD costs $12. If the sales tax is 8%, what is the total cost of the CD?
For 1-6, find all factors for each number.

<p>| | | |</p>
<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>24</td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td>28</td>
<td>5</td>
</tr>
</tbody>
</table>

For 7-12, find the greatest common factor for each pair of numbers.

<p>| | | |</p>
<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>7</td>
<td>12 and 8</td>
<td>8</td>
</tr>
<tr>
<td>10</td>
<td>45 and 50</td>
<td>11</td>
</tr>
</tbody>
</table>

For 13 - 15, complete the list of multiples of each number.

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>13</td>
<td>3: 0, 3, 6, , , ,</td>
<td>14</td>
</tr>
<tr>
<td>15</td>
<td>15: 0, , , , , 75</td>
<td></td>
</tr>
</tbody>
</table>

For 16-20, find the least common multiple of each pair of numbers.

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>16</td>
<td>4 and 6</td>
<td>17</td>
</tr>
<tr>
<td>19</td>
<td>12 and 4</td>
<td>20</td>
</tr>
</tbody>
</table>
1. Find the GCF of 40 and 56.

2. Find the LCM of 4 and 6.

3. List all factors of 28.

4. List the first six multiples of 12.

5. Is \( \frac{6}{8} = \frac{3}{4} \) a proportion? Why?

6. Solve the proportion. \( \frac{6}{8} = \frac{n}{12} \)

Numbers can be assigned to a point on a **number line**. **Positive numbers** are to the right of zero. **Negative numbers** are to the left of zero.

Use the number line to state the coordinates of the given points.

A D I N J P E T B S K R F L Q C M H G

-8 -7 -6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6 7 8 9 10

1. B

2. D, E, and G

3. L and H

4. R and F

5. K, F, and C

6. N and A

7. G, H, I, and Q

8. H, D, and S

9. A, M, B, and P

10. B, C, and M

11. I, F, and P

12. L, P, H, and A

**Problem Solving**

At midnight the temperature was -4°.

By 6:00 a.m. the temperature had risen 12°.

What was the temperature at 6:00 a.m.?
Pre-Algebra Concepts  Graphing Solutions to Equations on Number Lines

Review Exercises

Use \(A = \{2, 4, 6, 8, 10\}\), \(B = \{1, 3, 4, 5, 6, 8, 10\}\), and \(C = \{4, 5, 6, 8, 9, 10\}\) to answer the following questions.

1. \(A \cap B = \)
2. \(B \cup C = \)
3. \(A \cup C = \)
4. \(B \cap C = \)

5. Are \(B\) and \(C\) equivalent sets? Why?
6. Are \(A\) and \(C\) disjoint sets? Why?

**Helpful Hints**

Equations can be solved and graphed on a number line.

\[
\begin{align*}
0 & \quad 1 \quad 2 \quad 3 \quad 4 \quad 5 \quad 6 \quad 7 \quad 8 \quad 9 \quad 10 \quad 11 \quad 12 \quad 13 \quad 14 \quad 15 \quad 16 \quad 17 \\
=0 & \quad 1 \quad 2 \quad 3 \quad 4 \quad 5 \quad 6 \quad 7 \quad 8 \quad 9 \quad 10 \quad 11 \quad 12 \quad 13 \quad 14 \quad 15 \quad 16 \quad 17 \quad 18 \\
\end{align*}
\]

Examples:

\[
\begin{align*}
x + 5 &= 7 \\
2 + 5 &= 7 \\
x &= 2 \\
\end{align*}
\]

\[
\begin{align*}
n - 3 &= 2 \\
5 - 3 &= 2 \\
x &= 5 \\
\end{align*}
\]

\[
\begin{align*}
3y &= 21 \\
3 \times 7 &= 21 \\
y &= 7 \\
\end{align*}
\]

\[
\begin{align*}
m &= 5 \\
\frac{m}{2} &= 5 \\
m &= 10 \\
\end{align*}
\]

Solve each equation and graph each solution on the number line.
Also place each solution in the answer column.

1. 
2. 
3. 
4. 
5. 
6. 
7. 
8. 
9. 
10.

**Problem Solving**

A car can travel 320 miles in five hours.
At this rate, how far can it travel in eight hours?

Score
**Review Exercises**

1. \(-2 + 9 = \)
2. \(-7 - 15 = \)
3. \(-7 - (-15) = \)
4. \(6 \times -7 = \)
5. \(-45 \div -9 = \)
6. \(-24 \div -2 \quad 18 \div -3 = \)

**Helpful Hints**

Ordered pairs can be graphed on a coordinate system.

The first number of an ordered pair shows how to move across. It is called the **x-coordinate**.

The second number of an ordered pair shows how to move up and down. It is called the **y-coordinate**.

Examples: To locate B, move across to the right to 3 and up 4. The ordered pair is (3,4).

To locate C, move across to the left to -5 and up 2. The ordered pair is (-5,2).

Use the coordinate system to find the point associated with each ordered pair.

<table>
<thead>
<tr>
<th>S1. D</th>
<th>S2. L</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. F</td>
<td>2. J</td>
</tr>
<tr>
<td>5. B</td>
<td>6. C</td>
</tr>
<tr>
<td>7. I</td>
<td>8. G</td>
</tr>
</tbody>
</table>

**Problem Solving**

A shirt that regularly sells for $30 is on sale for 20% off. How much is the sale price?
Review Exercises

1. \( \frac{1}{3} + \frac{-4}{5} = \)
2. \( -0.29 + -0.39 = \)
3. \( -\frac{1}{8} - (-\frac{1}{2}) = \)
4. \( \frac{-2}{3} \times -1\frac{1}{2} = \)
5. \( 2\frac{1}{2} + \frac{1}{2} = \)
6. \( -5 + -2\frac{1}{2} = \)

A point can be found by matching it with an ordered pair.

Examples: (-5, 3) is found by moving across to the left to -5, and up 3. This is represented by point B. -5 is the x-coordinate and 3 is the y-coordinate.

(6, 3) is found by moving across to the right to 6, and up 3. This is represented by point C. 6 is the x-coordinate and 3 is the y-coordinate.

Use the coordinate system to find the point associated with each ordered pair.

1. (6, 2)  
2. (-5, 5)  
3. (3, 5)  
4. (7, -6)  
5. (-6, -4)  
6. (0, 3)  
7. (-2, -4)  
8. (-2, 2)  
9. (-6, 2)  
10. (4, 2)  

Problem Solving

In a class of 40 students, 38 were present. What percent of the class was present?

Score
Review Exercises

1. \( 2^5 = \)
2. \( \sqrt{36} + 4^2 = \)
3. \( \frac{4^2 + 3^2}{\sqrt{25}} = \)
4. \( 2^3 \times 3^2 = \)
5. Write .00017 in scientific notation.
6. Write 213,000 in scientific notation.

Helpful Hints

The **slope** of a line refers to how steep the line is. It is the ratio of **rise** to **run**.

\[
slope = \frac{y_2 - y_1}{x_2 - x_1}
\]

**Example:**
What is the slope of the line passing through the ordered pairs (1, 5) and (6, 9)?

\[
slope = \frac{y_2 - y_1}{x_2 - x_1} = \frac{9 - 5}{6 - 1} = \frac{4}{5}
\]

The run is 5 and the rise is 4.

Find the slope of each line that passes through the given point.

1. (2, 3), (5, 4)
2. (3, -2), (5, 1)
3. (4, 3), (2, 6)
4. (4, 1), (7, 2)
5. (-2, 1), (-3, 3)
6. (-2, -2), (6, 3)
7. (4, 5), (6, 6)
8. (1, 2), (3, 9)
9. (1, -1), (6, 5)
10. (3, 2), (8, 6)
11. (2, -1), (4, 2)
12. (9, 2), (7, 5)

**Problem Solving**

In a school the ratio of boys to girls is five to four. If there are 400 boys, how many girls are there in the school?
Pre-Algebra Concepts

Reviewing Number Lines and Coordinate Systems

Use the number line to state the coordinates of the given points.


Solve each equation and graph each solution on the number line. Be sure to label your answers. Also, place each solution in the answer column.

5. \( n + 2 = 5 \)  6. \( x - 2 = 4 \)  7. \( 3y = 15 \)  8. \( \frac{m}{2} = 4 \)

Use the coordinate system to find the ordered pair associated with each point.


14. Find the slope of the line that passes through points A and G.

Use the coordinate system to find the ordered pair associated with each point.

15. (6, 3)  16. (-2, 2)  17. (-5, -5)  18. (7, 6)  19. (5, -3)

20. Find the slope of the line that passes through points B and I.
Review Exercises

1. \(-36 \div -6 = \)

2. \(-9 - 6 + 3 = \)

3. \(-2 \times -3 \times -4 = \)

4. \(-7 - 9 = \)

5. \(-56 \div 8 = \)

6. \((-2)^3 = \)

Helpful Hints

The graph of a linear equation is always a line. A linear equation can have an infinite number of solutions, so to make a graph we select a few points and graph them, and then draw a line that connects them.

Example: Draw a graph of the solutions to the following equation.

\[ y = x + 3 \]

First, select four values for \(x\) and find the values for \(y\). Start with \(x = 0\) and make a chart like the one to the right.

\[
\begin{array}{c|c}
0 & 3 \\
1 & 4 \\
2 & 5 \\
4 & 7 \\
\end{array}
\]

(0,3) (1,4) (2,5) (4,7)

Next, plot the points and connect them with a line.

Make a table of 4 solutions. Graph the points. Connect them with a line.

Problem Solving

If three pounds of meat costs $3.60, how much will five pounds cost?
Review Exercises

1. Solve the proportion.  \[ \frac{5}{6} = \frac{7}{n} \]

4. \[ -\frac{1}{3} + -\frac{3}{8} = \]

2. Find 15% of 20.

5. \[ 2 \times -1\frac{1}{2} = \]

3. 15 = 20% of what?

6. \[ -6.3 \div 3 = \]

Use what you have learned to work the following problems.

**Example:** Draw a graph of the solutions to the following equation.

\[ y = \frac{x}{2} + 2 \]

<table>
<thead>
<tr>
<th>x</th>
<th>y</th>
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<tbody>
<tr>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>-2</td>
<td>1</td>
</tr>
</tbody>
</table>

Make a table of 4 solutions. Graph the points. Connect them with a line.

**Problem Solving:** John has finished \( \frac{4}{5} \) of the problems on a test. What percent has he finished?
Pre-Algebra Concepts

Review Exercises

1. Write 1,720,000 in scientific notation.
2. Write .00000038 in scientific notation.
3. Write $1.963 \times 10^8$ as a conventional number.
4. Write $3.4 \times 10^{-4}$ as a conventional number.
5. $-9 - 7 - 6 =$
6. $-.34 + .53 =$

The goal with any equation is to end up with the variable (letter), an equal sign, and the answer. You can add, subtract, multiply, and divide on each side of the equal sign with the same number, and won’t change the solution.

Examples:

- $x + 2 = 9$
- $n - 6 = -5$
- $4n = 24$
- $\frac{x}{6} = 4$
- $+2 = -2$
- $+ 6 = 6$
- $4n = 24$
- $\frac{6}{1} \times \frac{x}{6} = 4 \times 6$
- $\frac{x}{7}$
- $n = 1$
- $\frac{4}{4}$
- $n = \frac{6}{1}$
- $\frac{x}{24}$

Add -2 to both sides
Add 6 to both sides.
Divide both sides by 4.
Multiply both sides by 6.

Check your work by substituting your answer in the original equation.

Solve the equations. Refer to the examples above.

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<tbody>
<tr>
<td>1.</td>
<td>$x + 3 = 8$</td>
<td>$3n = 96$</td>
</tr>
<tr>
<td>2.</td>
<td>$n = 8$</td>
<td>$n + 6 = -7$</td>
</tr>
<tr>
<td>3.</td>
<td>$n + 6 = 7$</td>
<td>$n = -3$</td>
</tr>
<tr>
<td>4.</td>
<td>$15n = 60$</td>
<td>$n - 6 = -5$</td>
</tr>
</tbody>
</table>

Problem Solving

What is the slope of a line that passes through the points $(6, 1)$ and $(9, 8)$?
**Pre-Algebra Concepts**  

**More Solving One-Step Equations**

<table>
<thead>
<tr>
<th>Review Exercises</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. (\frac{3^2 + 2^2 + 7}{2} = )</td>
</tr>
<tr>
<td>2. (3 + 7 \times 2 + 6 = )</td>
</tr>
<tr>
<td>3. (3 \times (7^2 - 15) = )</td>
</tr>
<tr>
<td>4. (n + 5 = -3)</td>
</tr>
<tr>
<td>5. (3n + 18 = )</td>
</tr>
<tr>
<td>6. (\frac{n}{3} = 7)</td>
</tr>
</tbody>
</table>

---

**Helpful Hints**

Be careful with negative signs when solving equations.

**Examples:**  
\[-x + 7 = -9\]  
\[\frac{-7}{-16} = \frac{7}{16}\]  
If \(-x = -16\), then \(x = 16\)  
Divide both sides by \(-3\).  
\[n = -6\]

\[\frac{n}{-5} = 7\]  
\[\frac{-5 \times \frac{n}{-5} = 7 \times -5}{1}\]  
Multiply both sides by \(-5\).  
\[n = -35\]

* Remember to check your work by substituting your answer in the original equation.

---

Solve the equations. Refer to the examples above.

<table>
<thead>
<tr>
<th>S1. (-x + 7 = -5)</th>
<th>S2. (-4n = -12)</th>
<th>S3. (-n - 6 = 8)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. (\frac{n}{-2} = 6)</td>
<td>3. (-x + 7 = 2)</td>
<td>4. (-3n = 15)</td>
</tr>
<tr>
<td>5. (n - 6 = 12)</td>
<td>6. (5n = -30)</td>
<td>7. (-n - 6 = -8)</td>
</tr>
<tr>
<td>8. (\frac{n}{-4} = -5)</td>
<td>9. (3n = -45)</td>
<td>10. (-n + 6 = -20)</td>
</tr>
</tbody>
</table>

---

**Problem Solving**

Write the ratio 18 to 8 as a fraction reduced to lowest terms.

Score
Review Exercises

1. \(-7 - 9 + 6 - 7 = \)
2. \(3 \times -2 \times 4 \times -3 = \)
3. \(-64 \div 8 \div -6 = \)

4. Write 210,000 in scientific notation.
5. Write .00316 in scientific notation.
6. \((-2)^4 = \)

Some equations require two steps.

**Examples:**

\[
\begin{align*}
2x - 5 &= 71 \\
&+ 5 = 5 \\
\frac{2x}{2} &= \frac{76}{2} \\
x &= 38
\end{align*}
\]

Add 5 to both sides.

\[
\begin{align*}
\frac{n}{5} - 3 &= 8 \\
&+ 3 = -3 \\
\frac{5}{5} \times \frac{n}{5} &= 5 \times 5 \\
n &= 25
\end{align*}
\]

Add 3 to both sides.

\[
\begin{align*}
-3n - 4 &= 11 \\
&+ 4 = 4 \\
\frac{-3n}{-3} &= \frac{15}{-3} \\
n &= -5
\end{align*}
\]

Divide both sides by -3.

**Helpful Hints**

* Remember to check your work by substituting your answer in the original equation.

---

S1. \(3x - 5 = 16\)
S2. \(\frac{x}{2} + 2 = 4\)
1. \(7x + 3 = -4\)

2. \(-14n - 7 = 49\)
3. \(2n + 45 = 15\)
4. \(\frac{n}{5} + -6 = 9\)

5. \(4x - 10 = 38\)
6. \(-2m + 9 = 7\)
7. \(35x + 12 = 82\)

8. \(\frac{m}{5} - 7 = 3\)
9. \(3x - 12 = 18\)
10. \(5x + 2 = -13\)

---

**Problem Solving**

Six students were absent Monday at Jefferson School. If this was 3% of the total enrollment, how many students are enrolled at Jefferson School?

---

**Score**
**Review Exercises**

<table>
<thead>
<tr>
<th>Exercise</th>
<th>Equation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>[- \frac{2}{5} + \frac{1}{2} = ]</td>
</tr>
<tr>
<td>2.</td>
<td>[- \frac{2}{5} + \frac{-2}{5} = ]</td>
</tr>
<tr>
<td>3.</td>
<td>[\frac{2}{3} + \frac{-1}{2} = ]</td>
</tr>
<tr>
<td>4.</td>
<td>[1 \frac{1}{2} \times -2 = ]</td>
</tr>
<tr>
<td>5.</td>
<td>[.2 \times -3.2 = ]</td>
</tr>
<tr>
<td>6.</td>
<td>[-.6 + -.5 = ]</td>
</tr>
</tbody>
</table>

**Helpful Hints**

Sometimes the **distributive property** can be used to solve equations.

**Examples:**

\[
2(x + 7) = 30
\]

First use the distributive property.

\[
2 \times x + 2 \times 7 = 30
\]

\[
2x + 14 = 30
\]

Add 14 to both sides.

\[
\frac{2x = 16}{2x = 16}
\]

Divide both sides by 2.

\[
x = 8
\]

\[
3(4x - 3) = -33
\]

First use the distributive property.

\[
3 \times 4x - 3 \times 3 = -33
\]

\[
12x - 9 = -33
\]

Add 9 to both sides.

\[
\frac{12x = -24}{12x = -24}
\]

Divide both sides by 12.

\[
x = -2
\]

* Remember to check your answers.

**Solve the following equations. Use the distributive property when necessary.**

<table>
<thead>
<tr>
<th>Exercise</th>
<th>Equation</th>
</tr>
</thead>
<tbody>
<tr>
<td>S1.</td>
<td>5(m + 6) = 45</td>
</tr>
<tr>
<td>S2.</td>
<td>[\frac{x}{5} + -6 = 3]</td>
</tr>
<tr>
<td>1.</td>
<td>3(m - 2) = 18</td>
</tr>
<tr>
<td>2.</td>
<td>3x + 7 = -2</td>
</tr>
<tr>
<td>3.</td>
<td>4m - 9 = 31</td>
</tr>
<tr>
<td>4.</td>
<td>2(m + 2) = -10</td>
</tr>
<tr>
<td>5.</td>
<td>-6x + 2 = -28</td>
</tr>
<tr>
<td>6.</td>
<td>-x + 8 = 12</td>
</tr>
<tr>
<td>7.</td>
<td>[\frac{x}{2} + 3 = -2]</td>
</tr>
<tr>
<td>8.</td>
<td>2x + 1 = -13</td>
</tr>
<tr>
<td>9.</td>
<td>5x - 3 = -18</td>
</tr>
<tr>
<td>10.</td>
<td>4(x + 2) = 48</td>
</tr>
</tbody>
</table>

**Problem Solving**

Find the greatest common factor of 42 and 56.

**Score**
### Review Exercises

1. $6^3 = \phantom{000}$

2. $7^0 = \phantom{000}$

3. $9^1 = \phantom{000}$

4. $\sqrt{36} + \sqrt{49} = \phantom{000}$

5. $2^3 + \sqrt{16} = \phantom{000}$

6. $33 + 5^3 = \phantom{000}$

### Helpful Hints

Sometimes there are variables on both sides of the equal sign.

**Examples:**

\[
\frac{5x - 6}{3} = \frac{2x + 9}{3} \quad \text{Add } -2x \text{ to both sides.} \\
+ \frac{-2x}{3} = \frac{-2x}{3} \\
\frac{3x - 6}{6} = \frac{9}{6} \\
+ \frac{6}{6} = \frac{6}{6} \\
\frac{3x}{3} = \frac{3}{3} \\
x = \frac{1}{1}
\]

\[
\frac{-6x + 12}{6} = \frac{4x - 8}{6} \quad \text{Add } 6x \text{ to both sides.} \\
+ \frac{6x}{6} = \frac{6x}{6} \\
\frac{12}{6} = \frac{10x - 8}{6} \\
+ \frac{8}{6} = \frac{8}{6} \\
\frac{20}{10} = \frac{10x}{10} \\
\frac{10}{10} = \frac{2}{2} \\
x = \frac{1}{2}
\]

### Problem Solving

Susan had 30 apples and used six of them to make a pie. What percent of the apples did she use to make the pie?
## Review Exercises

1. Solve the proportion. \( \frac{n}{4} = \frac{25}{5} \)
2. Is \( \frac{4}{7} = \frac{3}{5} \) a proportion? Why?
3. Write 16 to 6 as a fraction reduced to lowest terms.

4. Find 20% of 300.
5. Six is what % of 24?
6. 7 = 20% of what?

## Helpful Hints

Use what you have learned to solve the following equations.
* If necessary, refer to the previous Helpful Hints sections.
* Check your answers by substituting them in the original equation.

Solve the following equations. Use the distributive property when necessary.

<table>
<thead>
<tr>
<th>S1</th>
<th>7n = 28</th>
</tr>
</thead>
<tbody>
<tr>
<td>S2</td>
<td>( \frac{n}{5} = 3 )</td>
</tr>
<tr>
<td>S1</td>
<td>2x + 6 = 2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2</th>
<th>3x + 7 = -2</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>4m - 9 = 31</td>
</tr>
<tr>
<td>4</td>
<td>4(x + 3) = -8</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>5</th>
<th>3(n - 2) = 30</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>3x + 6 = x + 8</td>
</tr>
<tr>
<td>7</td>
<td>4x - 12 = 2x + 2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>8</th>
<th>-5x + 2 = -13</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>( \frac{x}{5} - 2 = -7 )</td>
</tr>
<tr>
<td>10</td>
<td>3(x + 4) = -18</td>
</tr>
</tbody>
</table>

## Problem Solving

Jeff has a marble collection. The ratio of red marbles to blue marbles is three to two. If he has 12 red marbles, how many blue marbles does he have? (Use a proportion.)
**Review Exercises**

1. List all the factors of 48.

2. What is the GCF of 16 and 24?

3. What is the LCM of 6 and 10?

4. $3n = 15$, $n =$

5. $\frac{n}{2} = 10$, $n =$

6. $-x = 5$, $x =$

---

**Helpful Hints**

To solve algebra word problems, it is necessary to translate words into algebraic expressions containing a variable. A variable is a letter that represents a number. Here are some examples:

- Three more than a number $\rightarrow x + 3$
- Twice a number $\rightarrow 2x$
- The quotient of $x$ and five $\rightarrow \frac{x}{5}$
- Seven less than three times a number $\rightarrow 3x - 7$
- Twice a number less nine is equal to 15 $\rightarrow 2x - 9 = 15$
- The difference between three times a number and eight equals 12 $\rightarrow 3x - 8 = 12$
- The sum of a number and -9 is 24 $\rightarrow x + (-9) = 24$
- Three times a number less six equals twice the number plus 15 $\rightarrow 3x - 6 = 2x + 15$
- Twice the sum of $n$ and five $\rightarrow 2(n + 5)$
- The difference between four times $x$ and 15 equals twice the number $\rightarrow 4x - 15 = 2x$

Translate each of the following into an equation.

**S1.** Seven less than twice a number is 12.

**S2.** Two more than three times a number equals 30.

1. The sum of twice a number and five is 14.

2. The difference between four times a number and six is 10.

3. Twelve is five less than four times a number.

4. One-third times a number less four equals twice the number added to eight.

5. Twice the sum of a number and two equals 10.

6. The difference between five times a number and three is 17.

7. Twice a number decreased by six is 15.

8. Two less than three times a number is seven more than twice the number.

9. Four more than a number equals the sum of seven and -12.

10. A number divided by five is 25.

**Problem Solving**

If a car can travel 65 miles per hour, how far can it travel in 3.5 hours?

---

Score
Pre-Algebra Concepts

Review Exercises

1. \(x + 2 = 9\)
   \[x = \]

2. \(n - 3 = -7\)
   \[n = \]

3. \(3n = 36\)
   \[n = \]

4. \(-5n = -25\)

5. \(\frac{n}{3} = 5\)
   \[n = \]

6. \(2x + 1 = 7\)
   \[x = \]

Helpful Hints

Algebra word problems must be translated into an equation and solved.

Example:
Six times a number less two equals four times the number added to 10.
First translate and then solve.

\[
\begin{align*}
6x - 2 &= 4x + 10 \\
\quad & \quad + -4x & -4x \\
2x - 2 &= 10 \\
\quad & \quad \quad & 2x = 12 \\
\quad & \quad \quad & \quad x = 6
\end{align*}
\]
Add -4x to both sides.
Add 2 to both sides.
Divide both sides by 2.
The number is 6.

Translate each of the following into an equation and solve.

1. Six less than twice a number is 16. Find the number.

2. The difference between three times a number and 8 is 28. Find the number.

3. Five less than twice a number is 67. Find the number.

4. Four times a number decreased by five is -17. Find the number.

5. Four times a number less six is eight more than two times the number. Find the number.

6. Eight more then one-half a number is 10. Find the number.

7. The difference between four times a number and two is 10.

Problem Solving

A doctor’s annual income is $150,000. What is his average monthly income?
Review Exercises

1. Write $3.61 \times 10^{-7}$ as a conventional number.
2. Write $0.0000127$ in scientific notation.
3. Write $729,000,000$ in scientific notation.

Helpful Hints

Remember these steps when solving algebra word problems.
1. Read the problem very carefully.
2. Write an equation.
3. Solve the equation and find the answer.
4. Check your answer to be sure it makes sense.

Example: John is twice as old as Susan. The sum of their ages is 42.
What is each of their ages?

Let $x = $ Susan's age  \quad 2x = $ John's age

$x + 2x = 42$  \quad $x = 14$
$3x = 42$  \quad $2x = 28$
$x = 14$  \quad The sum is 42.

Solve the algebra word problems.

1. Amir is six years older than Kevin. The sum of their ages is 30. Find the age of each.
2. A board 44 inches long is cut into two pieces. The long piece is three times the length of the short piece. What is the length of each piece?
3. Bob and Bill together earn $66. Bill earned $6 more than twice as much as Bob. How much did each earn?
4. Steve worked Monday and Tuesday and earned a total of $212. He earned $30 more on Tuesday than he did on Monday. How much did Steve earn each day?
5. Five times Bob’s age plus six equals three times his age plus 30. What is Bob’s age?
6. Sixty dollars less than three times Susan’s weekly salary is equal to 360 dollars. What is Susan’s weekly salary?
7. Twice John’s age less 12 is 48. What is John’s age?

Problem Solving

A student has test scores of 90, 96, 84, and 86. What was his average score?
Review Exercises

Solve each equation.

1. \(2x + 7 = -15\)  
2. \(5x + 6 = 106\)  
3. \(\frac{n}{4} + 2 = 13\)

4. \(3(n + 6) = -9\)  
5. \(5x + 3 = 7x - 3\)  
6. \(3x + 2x = 55\)

Helpful Hints

*Remember: 1. Read the problem carefully.  
          2. Write an equation.  
          3. Solve the equation and find the answer.  
          4. Check your answer to be sure it makes sense.

Solve each algebra word problem.

S1. Five more than six times a number is equal to 48 less than seven. Find the number.

S2. Steve weighs 50 pounds more than Bart. Their combined weight is 270 pounds. What is each of their weights?

1. The sum of three times a number and 15 is -12. Find the number.

2. Eight more than six times a number is 20 more than four times the number. Find the number.

3. The sum of five and a number is -19. Find the number.

4. Roy is three times as old as Ellen. The sum of their ages is 44 years. What are each of their ages?

5. Six more than two times a number is six less than six times the number. Find the number.

Problem Solving

A plane travelled 2,100 miles in 3.5 hours. What was the plane’s average speed per hour?
Reviewing Equations and Algebra Word Problems

For 1 - 12, solve each equation. Be sure to show all work.

1. $x + 5 = -2$
2. $3n = 39$
3. $\frac{n}{7} = 8$
4. $5n + 2 = 17$
5. $3n - 6 = -21$
6. $\frac{n}{3} - 6 = -12$
7. $3(n + 2) = -15$
8. $5(x - 4) = 55$
9. $2x + 4 = 4x - 12$
10. $5x - 3 = 3x + 13$
11. $3x + 4x = -77$
12. $\frac{n}{3} + 2 = -5$

For 13 - 20, solve each algebra word problem

13. Twice a number less three is 21. Find the number.
14. Eight more than five times a number is -17. Find the number.

15. The difference between five times a number and six is 24. Find the number.
16. Seven more than twice a number is five less than four times the number. Find the number.

17. Ann has twice as much money as Sue. Together they have $66. How much does each have?
18. Bill is eight years older than Ron. The sum of their ages is 64 years. How old is each of them?

19. Four times a number decreased by six equals -14. Find the number.
20. Four more than one-third of a number is 10. Find the number.
Review Exercises

1. List the first seven multiples of 8.
2. List all factors of 60.
3. What is the GCF of 100 and 40?
4. Write .000006 in scientific notation.
5. Write 2,100,000 in scientific notation.
6. Write $2.1 \times 10^{-3}$ as a conventional number.

**Probability** tells what chance, or how likely it is for an event to occur. Probability can be written as a fraction.

$$Probability = \frac{\text{number of ways a certain outcome can occur}}{\text{number of possible outcomes}}$$

**Examples:** If you toss a coin, what is the probability that it will show heads?

1 - heads is one outcome
2 - there are two possible outcomes, heads or tails

The probability is 1 out of 2.

There are six marbles in a jar. Three are red, two are blue, and one is green. What is the probability that you will draw a blue one without looking?

2 blue marbles
6 marbles in the jar

The probability is 2 out of 6, or simplified, 1 out of 3.

Use the information below to answer the following questions.

There are 3 red marbles, 6 blue marbles, 2 black marbles, and 1 green marble in a can. Find the probability of each of the following.

S1. A red marble.
S2. A blue or green marble.

1. A black marble.
2. A green marble.

3. A blue or red marble.
4. Not a black marble.

5. Not a red marble.
6. Not a green or blue marble.

7. A green, red, or blue marble.
8. Not a blue marble.

9. A green, red, or black marble.
10. Not a blue or black marble.

**Problem Solving**

Four times a number less five is -17. Find the number.

Score
Review Exercises

Solve each of the following equations.

1. \(3x + 2 = -28\)
2. \(\frac{x}{5} - 6 = -11\)
3. \(4(n + 3) = -28\)
4. \(2x + 10 = 4x + 2\)
5. \(3x + 2x = 75\)
6. \(7x - 3 = 60\)

Helpful Hints

Use what you have learned to solve the following questions.

**Example:** What is the probability of the spinner landing on the 1 or the 3? 2 out of 8 or, simplified, 1 out of 4.

Use the spinner to find the probability for each of the following.

Find the probability of spinning once and landing on each of the following.

1. a seven
2. not a five
3. an odd number
4. a number less than five
5. a number greater than six
6. a nine
7. a one or an eight
8. an even number or a five
9. a number greater than three
10. a number which is a factor of six

Problem Solving

If five pounds of beef cost $9, how many pounds can be bought with $36?
Review Exercises

1. Change .3 to a percent.
2. Change .03 to a percent.
3. Change $\frac{3}{5}$ to a percent.
4. Find 4% of 50.
5. Fifteen is what % of 60?
6. 4 = 20% of what?

Statistics involves gathering and recording data. Number facts about events or objects are called data. The range is the difference between the greatest number and the least number in a list of data. The mode is the number which appears the most in a list of data.

Example: Find the range and mode for the list of data.
12, 10, 1, 7, 4, 7, 5
First, list the numbers from least to greatest.
1, 4, 5, 7, 7, 10, 12
The range is 12 - 1 = 11.
The mode is 7, which appears the most.

Arrange the data in order from least to greatest, then find the range and mode.

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>S1. 7, 4, 1, 8, 2, 5, 4</td>
<td>1.</td>
<td>2.</td>
<td>3.</td>
<td>4.</td>
<td>5.</td>
<td>6.</td>
<td>7.</td>
<td>8.</td>
<td>9.</td>
</tr>
<tr>
<td>S2. 6, 2, 7, 6, 8, 2, 5, 6, 3</td>
<td>2.</td>
<td>3.</td>
<td>4.</td>
<td>5.</td>
<td>6.</td>
<td>7.</td>
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<td>10.</td>
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<tr>
<td>1. 7, 4, 8, 2, 4, 7, 7</td>
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<td>2. 25, 17, 30, 39, 16, 24, 30</td>
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<td>3. 1, 3, 6, 3, 4, 6, 11, 9</td>
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<td>4. 1, 6, 17, 8, 9, 20, 9</td>
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<td>5. 7, 3, 1, 3, 1, 3, 8, 4</td>
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<td>6. 3, 14, 8, 6, 11, 8, 14, 8</td>
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<tr>
<td>7. 1, 10, 2, 9, 3, 8, 2, 7</td>
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<tr>
<td>8. 85, 91, 90, 86, 91, 87</td>
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<tr>
<td>9. 1, 10, 2 9, 2, 7, 2, 8</td>
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<tr>
<td>10. 20, 2, 19, 1, 2, 16, 3</td>
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</tbody>
</table>

Problem Solving

If three cans of juice cost $1.14, what is the cost of one can?
Review Exercises

1. Write 16 to 10 as a fraction reduced to lowest terms.

2. Is $\frac{9}{11} = \frac{7}{8}$ a proportion? Why?

3. Solve the proportion. $\frac{4}{n} = \frac{9}{45}$

4. Write 1,280,000 in scientific notation.

5. Write .0000962 in scientific notation.

6. Write $6.2 \times 10^{-5}$ as a conventional number.

Helpful Hints

The mean of a list of data is found by adding all the items in the list and then dividing by the number of items.

The median is the middle number, when the list of data is arranged from least to greatest.

Example: Find the mean and median for the list of data.
1, 2, 5, 6, 6

\[
\text{Median} = \bar{5} \quad \text{Mean} = \frac{1+2+5+6+6}{5} = \frac{20}{5} = \bar{4}
\]

Arrange the data in order from least to greatest, then find the mean and median.

S1. 1, 5, 2, 4, 3

S2. 6, 1, 7, 4, 2, 6, 2

1. 2, 7, 1, 4, 1

2. 1, 5, 7, 1, 2, 2, 3

3. 5, 25, 10, 20, 15

4. 1, 1, 1, 3, 3, 3, 4, 1, 1

5. 8, 5, 2, 9, 3, 6, 9

6. 126, 136, 110

7. 7, 3, 4, 2, 4

8. 3, 1, 4, 7, 5

9. 2, 10, 4, 8, 1

10. 50, 70, 30

Problem Solving

In a class of 40 students, 20% of them received A’s. How many students did not receive A’s?

Score
Review Exercises

1. \(3 + 4 \times 5 - 2 = \)
2. \(3(8 + 2) - 4^2 = \)
3. \((15 - 8) + 64 + 2^3 = \)

4. \(7 \times 4 - 9 + 13 = \)
5. \(6 [(3 + 4) \times 2] = \)
6. \(3(-2 + 4) + 5 = \)

Helpful Hints

Use what you have learned to answer the following questions.

* If necessary, refer to the two previous pages.

Arrange the data in order from least to greatest, then answer the questions.

2, 8, 6, 2, 7

1. What is the mean?
2. What is the median?

1, 9, 2, 7, 2, 3, 4

3. What is the median?
4. What is the mode?

5. What is the range?
6. What is the mean?

2, 11, 8, 6, 1, 2, 5

7. What is the range?
8. What is the mode?

9. What is the mean?
10. What is the median?

Problem Solving

Light travels at a speed of \(1.86 \times 10^5\) miles per second.
Write the speed as a conventional number.
Pre-Algebra Concepts

Reviewing Probability and Statistics

There are four green marbles, three red marbles, two white marbles, and one blue marble in a can. What is the probability for each of the following?

1. a red marble
2. a green marble
3. a green or blue marble
4. not a red marble
5. a green, red, or blue marble
6. not a green marble

Use the spinner to find the probability of spinning once and landing on each of the following.

7. a five
8. an odd number
9. a number greater than three
10. a one or a three
11. a number less than five
12. a one or a six

Arrange the data in order from least to greatest, then answer the questions.

13. What is the range?
14. What is the mode?
15. What is the mean?
16. What is the median?
17. What is the mode?
18. What is the mean?
19. What is the range?
20. What is the median?
Final Review - All Pre-Algebra Concepts

For 1 - 3, use the following sets to find the answers.

\[ A = \{1,2,3,4,5\}, \quad B = \{2,3,4,6,8\}, \quad C = \{0,1,2,4,5,9\} \]

1. Find \( A \cap B \)  
2. Find \( B \cup C \)  
3. Find \( A \cap C \)

4. \(-9 + 12 = \)  
5. \(-16 - 7 = \)  
6. \(-12 \times -3 = \)

7. \(-24 \div -3 = \)  
8. \(.21 + .76 = \)  
9. \(-\frac{2}{5} + \frac{1}{2} = \)

10. \(5^3 = \)  
11. \(\sqrt{49} \)  
12. \(3^3 + \sqrt{36} = \)

13. \(6 + 7 \times 3 - 5 = \)  
14. \(3^2(3 + 4) + 5 = \)

15. \(\frac{4^2 + 12}{5 + 3(2+1)} = \)  
16. \(2[(5 + 7) \div 3 + 6] = \)

17. What property is illustrated below?  
\[ 5 + 6 = 6 + 5 \]

18. What property is illustrated below?  
\[ 7(6 + 5) = 7(6) + 7(5) \]

19. Write 1,280,000,000 in scientific notation.  
20. Write \( .00000653 \) in scientific notation.
21. Write $6.09 \times 10^7$ as a conventional number.

22. Write $7.62 \times 10^{-6}$ as a conventional number.

23. Write 18 to 10 as a fraction reduced to lowest terms.

24. Is $\frac{7}{8} = \frac{3}{4}$ a proportion? Why?

25. Solve the proportion.

\[
\frac{7}{n} = \frac{3}{9}
\]

26. The ratio of red marbles to blue marbles is five to two. If there are 15 red marbles, how many blue marbles are there?

27. Find 5% of 80.

28. Six is what percent of 24?

29. $8 = 25\%$ of what?

30. On a test with 30 questions, a student got 80% correct. How many questions did he get correct?

31. There are 35 fish in an aquarium. If 14 of them are goldfish, what percent of them are goldfish?

32. Six students get A's on a test. This is 20% of the class. How many are there in the class?

33. Find all the factors of 40.

34. Find the GCF of 60 and 40.

35. Find the first seven multiples of six.

36. Find the LCM of 8 and 12.

Use the number line to state the coordinates of the given points.

A D I N J P E B S K R F L Q C M H G

-8 -7 -6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6 7 8 9 10

37. A, E, B

38. N, H, T, D

39. I, F, P

40. H, M, S
For 41 - 50, use the coordinate system to answer each question.

For 41-45, find the ordered pair associated with each point.

41. F
42. E
43. C
44. L
45. B

For 46-52, find the point associated with each ordered pair.

46. (-6, 7)  47. (-2, 2)  48. (-4, -2)  49. (2, -5)  50. (-7, -3)

51. Find the slope of the line that passes through the points (1, 3) and (4, 5).

52. Find the slope of the line that passes through the points (-2, 5) and (6, 8).

For 53 through 54, make a table of 4 solutions and graph the points. Connect them with a line.

53. \[
\begin{array}{c|c|c}
\text{x} & \text{y} \\
\hline
-8 & 1 \\
-7 & 2 \\
-6 & 3 \\
-5 & 4 \\
-4 & 5 \\
-3 & 6 \\
-2 & 7 \\
-1 & 8 \\
0 & \\
1 & \\
2 & \\
3 & \\
4 & \\
5 & \\
6 & \\
7 & \\
8 & \\
\end{array}
\]

54. \[
\begin{array}{c|c|c}
\text{x} & \text{y} \\
\hline
-8 & 1 \\
-7 & 2 \\
-6 & 3 \\
-5 & 4 \\
-4 & 5 \\
-3 & 6 \\
-2 & 7 \\
-1 & 8 \\
0 & \\
1 & \\
2 & \\
3 & \\
4 & \\
5 & \\
6 & \\
7 & \\
8 & \\
\end{array}
\]
Final Review - All Pre-Algebra Concepts

Solve each equation and word problem.

55. \( x + 3 = 12 \)  
56. \( 3n = -45 \)  
57. \( \frac{n}{6} = 3 \)  
58. \( -5n = 15 \)  
59. \( 2x + 3 = 15 \)  
60. \( 5x - 2 = -17 \)  
61. \( \frac{n}{3} + 4 = 4 \)  
62. \( 3(x + 4) = 24 \)  
63. \( 3(x + 4) = -6 \)  
64. \( 2x + 12 = 4x + 10 \)  

65. Two more than three times a number is 29. Find the number.

66. Twice a number, less seven, is 17. Find the number.

67. A number divided by five, less six, is four. Find the number.

68. Sue has three times as much money as Jane. Together they have 64 dollars. How much does each have?

69. Al is seven years older than Maria. The sum of their ages is 51. What is each of their ages?

70. Six times Glen’s age plus two equals four times his age plus 20. Find his age.
Final Review - All Pre-Algebra Concepts

Use the following information to answer 71 - 74.

There are 6 green marbles, 5 red marbles, 4 white marbles, and 1 blue marble in a can. What is the probability for each of the following?

71. a red marble
72. a green marble
73. a green or blue marble
74. not a red marble

Use the spinner to find the probability of spinning once and landing on each of the following.

75. a seven.
76. an even number.
77. a number greater than four.
78. a one, a three, or a five.

Arrange the data in order from least to greatest, then answer the questions.

2, 7, 3, 10, 3

79. What is the range?
80. What is the mode?
81. What is the mean?
82. What is the median?

4, 10, 4, 2, 6, 14, 16

83. What is the mode?
84. What is the mean?
85. What is the range?
86. What is the median?
Solve each of the following problems.

87. \( \frac{7}{8} \) + \( \frac{3}{8} \)

88. \( 7\frac{1}{4} \) - \( 3\frac{3}{4} \)

89. \( 3\frac{3}{5} \) + \( 2\frac{1}{10} \)

90. \( \frac{5}{8} \times \frac{3}{5} = \)

91. \( 2\frac{1}{2} \times \frac{3}{2} = \)

92. \( 2\frac{1}{3} \div \frac{1}{2} = \)

93. \( 5\frac{1}{2} \div \frac{1}{2} = \)

94. \( .6 + 7.62 + 5.2 + 6 = \)

95. \( 6.3 - 1.275 = \)

96. \( 72 - 1.68 = \)

97. \( 2.19 \times 7 \)

98. \( .36 \times 1.2 \)

99. \( 5\overline{6.7} \)

100. \( .15 .0045 \)
### Solutions

**Page 4**

**Review Exercises**
1. 1,159
2. 436
3. 2,282

- S1. Members are countable
- S2. Members are uncountable
  1. No, 3 is a member of each
  2. Yes, can be paired 1-1
  3. Answers vary
  4. Answers vary
  5. \{3,5,7,9,11\}
  6. \{0,2,4,6,8,10,12\}
  7. \{3,4,5,6,7,8,9\}
  8. \{10,15,20,25,30\}
  9. \{1,3,5\}
  10. \{8,9,10,11,12\}

**Problem Solving:** 9 girls

**Page 5**

**Review Exercises**
1. Answers vary
2. Answers vary
3. Answers vary
4. Answers vary
5. No, 10 is a member of both sides
6. No, cannot be paired in a 1-1 correspondence

- S1. Yes, all members of A are members of B
- S2. \{5,6,7\}
  1. \{1,2,3,4,5,6,7,8\}
  2. No, not all members of A are members of B
  3. \{5\}, \{6\}, \{7\}, \{5,6\}, \{5,7\}, \{6,7\}, \{5,6,7\}
  4. \{1,2,4,5,7\}
  5. \{1,2,4,8\}
  6. \{1,2,3,4,5,6,7\}
  7. \{1,2,3,4,5,6,7,8,10\}
  8. \{1,2,4,6\}
  9. Yes, can be paired in a 1-1 correspondence
  10. No, 6 is common to both sets

**Problem Solving:** -20°

**Page 6**

**Review Exercises**
1. \{2\}
2. \{1,2,3,4,6,8\}
3. \{1,2,3,6\}
4. \{2\}
5. No, cannot be paired in a 1-1 correspondence
6. No, the members are countable

- S1. 3
- S2. -21
  1. 14
  2. -18
  3. -14
  4. -31
  5. 24
  6. 37
  7. -168
  8. -13
  9. -34
  10. -10

**Problem Solving:** 80 cards

**Page 7**

**Review Exercises**
1. -7
2. 13
3. -39
4. 0
5. A set is a well defined collection of objects
6. A set whose number of members is countable

- S1. -4
- S2. -7
  1. -2
  2. -7
  3. -8
  4. 14
  5. -2
  6. 10
  7. -22
  8. -13
  9. -25
  10. -84

**Problem Solving:** $55

**Page 8**

**Review Exercises**
1. \(\emptyset\)
2. \{0,1,4,5,8,9,10,12,15\}
3. \{10,15\}
4. \{1,4,8,9,11,12,15\}
5. \{1,4,8,9,12\}
6. \(\emptyset\)

- S1. -14
- S2. -3
  1. 12
  2. -3
  3. 9
  4. -28
  5. 46
  6. -48
  7. -10
  8. -11
  9. -103
  10. 15

**Problem Solving:** 27 ft.

**Page 9**

**Review Exercises**
1. -56
2. 22
3. -35
4. -9
5. -11
6. 4

- S1. 48
- S2. -126
  1. 68
  2. -64
  3. 288
  4. -368
  5. -736
  6. -24
  7. -32
  8. 72
  9. 72
  10. 330

**Problem Solving:** Floor 31

**Page 10**

**Review Exercises**
1. -11
2. -56
3. -2
4. 2
5. -35
6. 36

- S1. -4
- S2. 6
  1. -16
  2. 48
  3. 15
  4. -26
  5. -3
  6. 36
  7. 1
  8. 72
  9. 13
  10. -1

**Problem Solving:** -11°

**Page 11**

**Review Exercises**
1. -2
2. 2
3. -16
4. -1
5. -19
6. -2
7. 13
8. -12
9. 27
10. -1
11. -48
12. 76
13. 56
14. 48
15. -9
16. 42
17. 16
18. 3
19. -2
20. -20
### Solutions

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<td>3. 10</td>
<td>3. 21</td>
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<td>4. {1,2,4,5,7,8,9}</td>
<td>4. A well-defined collection of objects</td>
<td>4. 23</td>
<td>4. -90</td>
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<td>5. {1,2,4,5,6,8,10}</td>
<td>5. 60</td>
<td>5. 5</td>
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<td>6. {1,2,4,5,8}</td>
<td>6. 42</td>
<td>6. -5/6</td>
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**S1. 4**
**S2. 9**
1. 29
2. 6
3. 2
4. 32
5. 1
6. 7
7. 6
8. 12
9. 7
10. 24

**Problem Solving: $29**

**S1. commutative (addition)**
**S2. distributive**
1. inverse property
2. associative
3. identity (addition)
4. inverse (multiplication)
5. commutative (addition)
6. commutative (multiplication)
7. associative (addition)
8. identity (multiplication)
9. distributive
10. inverse (addition)

**Problem Solving: $42**

**Problem Solving:** 1.86 x 10^5 miles per second

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<td>1. 1.23 x 10^5</td>
<td>1. 1.23 x 10^5</td>
<td>1. 2.7 x 10^-4</td>
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<td>2. 5.6 x 10^-6</td>
<td>2. 2.916 x 10^6</td>
<td>2. yes (4 x 10 = 8 x 5)</td>
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<td>3. distributive</td>
<td>3. 2,760,000</td>
<td>3. 721,000</td>
<td>3. no (5 x 5 = 3 x 7)</td>
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<td>4. .0000375</td>
<td>4. .0000623</td>
<td>4. 16</td>
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<td>5. answers vary</td>
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<td>6. 35</td>
<td>6. answers vary</td>
<td>6. -1.32</td>
<td>6. 275</td>
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**S1. 7,032,000**
**S2. .000056**
1. 230,000
2. .0000000913
3. .000012362
4. 517,000,000,000
5. 1,127
6. .003012
7. 6,670,000
8. 21,000
9. .00000007
10. 8,000,000

**Problem Solving:** 93,000,000 miles

**S1. 5/3**
**S2. 9/2**
1. 7/2
2. 6/5
3. 6/5
4. 5/1
5. 6/5
6. 4/3
7. 7/3
8. 3/2
9. 1/2
10. 3/1

**Problem Solving:** 12/5

**Problem Solving: 2**

**Problem Solving: -32°**
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<td>1. .216</td>
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<td>6. .18</td>
<td>6. 512</td>
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<td>10. .-17.04</td>
<td>10. 81</td>
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Problem Solving: 50 sixth graders

Problem Solving: 118 pounds

Problem Solving: 2

Problem Solving: (-3)

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<td>6. 64</td>
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<td>15. .85</td>
<td>15. 6.27</td>
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<td>9. 144</td>
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<td>17. 8.4</td>
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<td>10. .9</td>
<td>18. .675</td>
<td>18. 9.28</td>
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Problem Solving: -41

Problem Solving: 81

Problem Solving: -1 yard
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<td>1. (3/1)</td>
<td>1. (2.1)</td>
<td>1. (.8)</td>
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<tr>
<td>2. (n = 30)</td>
<td>2. (12/5)</td>
<td>2. (3.3/5)</td>
<td>2. (.07)</td>
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<td>3. (n = 12)</td>
<td>3. (8/3)</td>
<td>3. (9)</td>
<td>3. (1/4)</td>
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<td>4. (2.34 \times 10^8)</td>
<td>4. yes, (15 \times 24 = 12 \times 30)</td>
<td>4. (18)</td>
<td>4. (109.2)</td>
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<td>5. no, (7 \times 9 \neq 8 \times 8)</td>
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<td>5. (128)</td>
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<td>6. (720,000)</td>
<td>6. yes, (5 \times 9 = 3 \times 15)</td>
<td>6. (-33)</td>
<td>6. (18)</td>
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<td>7. 4</td>
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<td>S1. 204 miles</td>
<td>S1. (.2), (1/5)</td>
<td>S1. 17.5</td>
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<td>S2. $12)</td>
<td>S2. (.09), (9/100)</td>
<td>S2. 150</td>
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<td>1. (.16), (4/25)</td>
<td>1. (.4), (32)</td>
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<td>2. $17.50</td>
<td>2. (.06), (3/50)</td>
<td>2. (.5), (51)</td>
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<td>3. 15 girls</td>
<td>3. (.75), (3/4)</td>
<td>3. (.15)</td>
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<td>4. 40 miles</td>
<td>4. (.4), (2/5)</td>
<td>4. (.112.5)</td>
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<td>5. (.01), (1/100)</td>
<td>5. (.32)</td>
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<td>6. (.80)</td>
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<td>8. (.05), (1/20)</td>
<td>8. (.216)</td>
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<td>9. (.112.5)</td>
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<td>10. (.13), (13/100)</td>
<td>10. (.13)</td>
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<td>Problem Solving: 34 correct</td>
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<td>3. (75%)</td>
<td>3. (60%)</td>
<td>3. (21.98)</td>
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<td>4. 70%</td>
<td>4. (90%)</td>
<td>4. (15)</td>
<td>4. (.01248)</td>
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<td>5. 135</td>
<td>5. (50.04)</td>
<td>5. (.021)</td>
<td>5. (.48)</td>
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<td>6. (200)</td>
<td>6. (80)</td>
<td>6. (8.1)</td>
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<td>S1. 25%</td>
<td>S1. (20)</td>
<td>S1. 20 questions</td>
<td>S1. 30</td>
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<tr>
<td>S2. 75%</td>
<td>S2. (30)</td>
<td>S2. 75%</td>
<td>S2. 30</td>
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<td>1. 25%</td>
<td>1. (48)</td>
<td>1. $25</td>
<td>1. (20%)</td>
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<td>2. 80%</td>
<td>2. (80)</td>
<td>2. $1,600</td>
<td>2. (90%)</td>
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<td>3. 50%</td>
<td>3. (25)</td>
<td>3. (30)</td>
<td>3. (30) students</td>
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<td>4. 90%</td>
<td>4. (4)</td>
<td>4. (90%)</td>
<td>4. (18) passes</td>
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<tr>
<td>5. 60%</td>
<td>5. (15)</td>
<td>5. (250) cows</td>
<td>5. (20%) are red</td>
</tr>
<tr>
<td>6. 75%</td>
<td>6. (20)</td>
<td>6. (25)</td>
<td>6. (75%)</td>
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<tr>
<td>7. 75%</td>
<td>7. (60)</td>
<td>7. $240</td>
<td>7. (250) students</td>
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<tr>
<td>8. 75%</td>
<td>8. (75)</td>
<td>8. (180) boys</td>
<td>8. $25</td>
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<tr>
<td>9. 80%</td>
<td>9. (45)</td>
<td>9. (20%)</td>
<td>9. (60%)</td>
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<tr>
<td>10. 95%</td>
<td>10. (125)</td>
<td>10. $210</td>
<td>10. $691.20</td>
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Problem Solving: 75%  Problem Solving: 25 students  Problem Solving: $57,600  Problem Solving: 97
### Review Exercises

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<tbody>
<tr>
<td>1. 13%</td>
<td>1. 70%</td>
<td>1. -18</td>
<td>1. $1.2 \times 10^{-6}$</td>
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<tr>
<td>2. 3%</td>
<td>2. 80%</td>
<td>2. 24</td>
<td>2. $4.96 \times 10^8$</td>
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<tr>
<td>3. 70%</td>
<td>3. 3/25</td>
<td>3. 0.20</td>
<td>3. 13,200,000</td>
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<td>4. 19%</td>
<td>4. 12</td>
<td>4. 7 1/2</td>
<td>4. 0.0000464</td>
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<td>5. 60%</td>
<td>5. 25%</td>
<td>5. 15</td>
<td>5. 1,60,2,30,3,10,5,6</td>
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<td>6. .08, 2/25</td>
<td>6. 25</td>
<td>6. 25%</td>
<td>6. 4</td>
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<td>7. .18, 9/50</td>
<td>S1. 1, 30, 2, 15, 3, 10, 5, 6</td>
<td>S1. 2</td>
<td>S1. 4, 6, 8, 10</td>
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<td>8. .8, 4/5</td>
<td>S2. 1, 36, 2, 18, 3, 12, 4, 9, 6</td>
<td>S2. 4</td>
<td>S2. 0, 12, 18, 30</td>
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<td>9. 2.22</td>
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<td>10. 128</td>
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<td>2. 0, 12, 15</td>
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<td>11. 80%</td>
<td>3. 14</td>
<td>4. 16</td>
<td>3. 0, 30, 40, 50</td>
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<td>12. 75%</td>
<td>3. 170, 2, 35, 5, 14, 7, 10</td>
<td>5. 20</td>
<td>4. 0, 4, 8</td>
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<td>17. 256 girls</td>
<td>8. 1, 90, 2, 45, 3, 30, 5, 18, 6, 15, 9, 10</td>
<td>10. 20</td>
<td>9. 90, 120, 150</td>
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<td>18. 26 games</td>
<td>S1. 12</td>
<td>S1. 0</td>
<td>Problem Solving: 120 pitches</td>
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<td>20. 150 students</td>
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### Problem Solving

- 5,879,000,000,000 miles
- 12,96 dollars
- 8 degrees
- 512 miles
### Page 44

**Review Exercises**

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<td>6.</td>
<td>-2</td>
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| S1.   | (2, 1) |
| S2.   | (-4, 2) |
| 1.   | (6, 3) |
| 2.   | (2, -5) |
| 3.   | (-7, -3) |
| 4.   | (-5, 1) |
| 5.   | (4, 6) |
| 6.   | (4, -3) |
| 7.   | (-3, -5) |
| 8.   | (-2, -2) |
| 9.   | (2, 1) |
| 10.  | (-6, 7) |

**Problem Solving:** $24

### Page 45

**Review Exercises**

| 1.   | -7/15 |
| 2.   | -0.68 |
| 3.   | 3/8  |
| 4.   | 1    |
| 5.   | -5   |
| 6.   | 2    |

| S1.   | B |
| S2.   | A |
| 1.   | C |
| 2.   | D |
| 3.   | F |
| 4.   | M |
| 5.   | E |
| 6.   | J |
| 7.   | H |
| 8.   | G |
| 9.   | K |
| 10.  | I |

**Problem Solving:** $95%

### Page 46

**Review Exercises**

| 1.   | -4 |
| 2.   | 22 |
| 3.   | 5  |
| 4.   | 72 |
| 5.   | $1.7 \times 10^{-4}$ |
| 6.   | $2.13 \times 10^5$ |

| S1.   | 1/3 |
| S2.   | 3/2 |
| 1.   | -3/2 |
| 2.   | 1/3 |
| 3.   | -2  |
| 4.   | 5/8 |
| 5.   | 1/2 |
| 6.   | 7/2 |
| 7.   | 6/5 |
| 8.   | 4/5 |
| 9.   | 3/2 |
| 10.  | -3/2 |

**Problem Solving:** 320 girls

### Page 47

**Review Exercises**

| 1.   | -4 |
| 2.   | 9, 0, 10 |
| 3.   | 3, 2, -7 |
| 4.   | 8, 1, -4, -8 |
| 5.   | 3 |

| S1.   | 8 |
| S2.   | 8 |
| 9.   | (5, 3) |
| 10.  | (-6, 1) |
| 11.  | (4, -4) |
| 12.  | (-6, -5) |
| 13.  | (2, 6) |
| 14.  | 5/3 |
| 15.  | B |
| 16.  | I |
| 17.  | H |
| 18.  | D |
| 19.  | A |
| 20.  | 1/8 |

### Page 48

**Review Exercises**

| 1.   | 6 |
| 2.   | -18 |
| 3.   | -24 |
| 4.   | -16 |
| 5.   | -7 |
| 6.   | -8 |

**Problem Solving:** $6.00

---

**S1.**

![Graph](image1)

**S2.**

![Graph](image2)

**1.**

![Graph](image3)

**2.**

![Graph](image4)
Review Exercises
1. 8/5
2. 3
3. 75
4. -1/2
5. -3
6. -2.1

Problem Solving: 80%

---

Review Exercises
1. 1.72 \times 10^6
2. 3.8 \times 10^{-7}
3. 196,300,000
4. .00034
5. -10
6. .19

S1. 5
S2. 32

S1. 12
S2. 3

Problem Solving: 7/3

---

Review Exercises
1. 10
2. 23
3. 102
4. -8
5. 6
6. 21

Review Exercises
1. 1
2. 72
3. 2
4. 2.1 \times 10^5
5. 3.16 \times 10^{-3}
6. 16

S1. 7
S2. 4

S1. 3
S2. 45

Problem Solving: 9/4

---

Review Exercises
1. 1/10
2. -4/5
3. -1 1/3
4. -3
5. -64
6. -1.1

Problem Solving: 200 students

---

Problem Solving: 14
### Solutions

#### Review Exercises

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<td>1. 1, 48, 2, 24, 3, 16, 12, 6, 8</td>
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<td>2. no (4 \times 5 \neq 3 \times 7)</td>
<td>2. 8</td>
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<td>3. 8/3</td>
<td>3. 30</td>
<td>3. 12</td>
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<td>4. 60</td>
<td>4. 5</td>
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<td>5. 12</td>
<td>5. 25%</td>
<td>5. 20</td>
<td>5. 15</td>
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<td>6. 158</td>
<td>6. 35</td>
<td>6. -5</td>
<td>6. 3</td>
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**S1. -2**

**S2. 3**

1. 7

2. 2

3. 4

4. 4

5. 3

6. 1

7. -1

8. 4

9. 2

10. 3

**Problem Solving: 20%**

- Problem Solving: 8 blue marbles

**Problem Solving: 227.5 miles**

---

#### Problem Solving

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<td>1. (0.000000361)</td>
<td>1. -11</td>
<td>1. -7</td>
<td>1. 0, 8, 16, 24, 32, 40, 48</td>
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<td>2. (1.27 \times 10^{-6})</td>
<td>2. 20</td>
<td>2. 13</td>
<td>2. 1, 60, 2, 30, 3, 20, 4, 15</td>
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<tr>
<td>3. (7.29 \times 10^8)</td>
<td>3. 44</td>
<td>3. 56</td>
<td>3. 5, 12, 6, 10</td>
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**S1. Kevin is 12**

**Amir is 18**

**S2. Short piece = 11 inches**

**Long piece = 33 inches**

1. Bob earned $20

2. Monday, $90

3. Tuesday, $120

**12 years old**

4. Weekly salary is $140

5. John is 30

**Problem Solving: 89**

**S1. 6**

**S2. Bert is 110 pounds**

**Bob is 160 pounds**

1. -9

2. 6

3. -24

4. Ellen is 11

5. Roy is 33

17. Sue, $22

**Ann, $44**

18. Ron is 28

19. Bill is 36

20. $2

20. 18

**Problem Solving: $12,500**

**Problem Solving: 227.5 miles**

---

#### Problem Solving

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<td>1. 2/12 = 1/6</td>
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<td>3. 9/12 = 3/4</td>
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<td>4. 10/12 = 5/6</td>
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<td>9. 6/12 = 1/2</td>
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<td>10. 4/12 = 1/3</td>
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**Problem Solving: -3**
Solutions

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Review Exercises
1. -10
2. -25
3. -10
4. 4
5. 15
6. 9

S1. 1/8
S2. 4/8 = 1/2
1. 1/8
2. 7/8
3. 4/8 = 1/2
4. 4/8 = 1/2
5. 2/8 = 1/4
6. 0/8
7. 2/8 = 1/4
8. 5/8
9. 5/8
10. 4/8 = 1/2

Problem Solving: 20 pounds

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Review Exercises
1. 30%
2. 3%
3. 60%
4. 2
5. 25%
6. 20

S1. range 7, mode 4
S2. range 6, mode 6
1. range 6, mode 7
2. range 23, mode 30
3. range 10, mode 3
4. range 19, mode 9
5. range 7, mode 3
6. range 11, mode 8
7. range 9, mode 2
8. range 6, mode 9
9. range 9, mode 2
10. range 19, mode 2

Problem Solving: $0.38

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Review Exercises
1. 8/5
2. no, 7 × 11 ≠ 8 × 9
3. 20
4. 1.28 × 10^6
5. 9.62 × 10^{-5}
6. 0.000062

S1. mean 3, median 3
S2. mean 4, median 2
1. mean 3, median 2
2. mean 3, median 2
3. mean 15, median 15
4. mean 2, median 1
5. mean 6, median 6
6. mean 124, median 126
7. mean 4, median 4
8. mean 4, median 4
9. mean 5, median 4
t. mean 50, median 50

Problem Solving: 32 students

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Review Exercises
1. 21
2. 14
3. 15
4. 25
5. 20
6. 11

S1. 6
S2. 2
1. 5
2. 6
3. 3
4. 2
5. 8
6. 4
7. 10
8. 2
9. 5
10. 5

Problem Solving: 186,000 miles per second

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1. 3/10
2. 4/10 = 2/5
3. 5/10 = 1/2
4. 7/10
5. 8/10 = 4/5
6. 6/10 = 3/5
7. 1/8
8. 4/8 = 1/2
9. 5/8
10. 2/8 = 1/4
11. 4/8 = 1/2
12. 2/8 = 1/4
13. 8
14. 4
15. 5
16. 4
17. 2
18. 4
19. 7
20. 3

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1. \{2,3,4\}
2. \{0,1,2,3,4,5,6,8,9\}
3. \{1,2,4,5\}
4. 3
5. -23
6. 36
7. 8
8. -.55
9. -9/10
10. 125
11. 7
12. 33
13. 22
14. 68
15. 2
16. 20
17. commutative (addition)
18. distributive
19. 1.28 × 10^9
20. 6.53 × 10^{-6}

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21. 60,900,000
22. .000000762
23. 9/5
24. no, 8 × 3 ≠ 4 × 7
25. 21
26. 6 blue marbles
27. 4
28. 25%
29. 32
30. 24
31. 40%
32. 30
33. 1, 40, 2, 20, 4, 10, 5, 8
34. 20
35. 0, 6, 12, 18, 24, 30, 36
36. 24
37. -8, -2, 0
38. -5, 9, -1, -7
39. -6, 4, -3
40. 9, 8, 1
41. (6, -3)
42. (-5, 1)
43. (4, -3)
44. (-4, -2)
45. (4, 6)
46. H
47. G
48. L
49. J
50. K
51. 2/3
52. 3/8

53.

54.

55. 9
56. -15
57. 18
58. -3
59. 6
60. -3
61. 24
62. 4
63. -6
64. 1
65. 9
66. 12
67. 50
68. Jane, $16
   Sue, $48
69. Maria is 22
   Al is 29
70. 9

71. 5/6
72. 6/16 = 3/8
73. 7/16
74. 11/16
75. 1/8
76. 4/8 = 1/2
77. 4/8 = 1/2
78. 3/8
79. 8
80. 3
81. 5
82. 3
83. 4
84. 8
85. 14
86. 6
87. 1/2
88. 3 1/2
89. 6 3/10
90. 2
91. 8 3/4
92. 12 2/3
93. 3 2/3
94. 19.42
95. 5.025
96. 70.32
97. 15.33
98. .432
99. 1.34
100. .03