\[ 2 - 2x + 6x = -2(-4x + 5) \]

\[ 2 - 2x + 6x = 8x - 10 \]

\[ 2 + 4x = 8x - 10 \]

\[ -4x - 4x \]

\[ 2 = 4x - 10 \]

\[ \frac{2}{1} = \frac{4x}{1} \]

\[ 2 = 4x - 10 \]

\[ 2 + 10 = 4x \]

\[ 12 = 4x \]

\[ \frac{12}{4} = \frac{4x}{4} \]

\[ 3 = x \]
\[ \frac{12}{1} \left[ \frac{3}{4} (x-5) = \frac{2}{3} (3x-4) \right] \]

\[ \frac{3(3)(x-5)}{9} = \frac{2(3x-4)}{3} \]

\[ \frac{9x-45}{-9x} = \frac{24x-32}{-9x} \]

\[ \frac{-45}{-9x} = \frac{15x - 32}{-9x} \]

\[ \frac{-13}{15} = \frac{15x}{15} \]

\[ \frac{-13}{15} = x \]
\[
\frac{3}{4} (x - 5) = \frac{2}{3} (3x - 4)
\]

Distribute first:

\[
\frac{3}{4} (x - 5) = \frac{2}{3} (3x - 4)
\]

Clean fraction:

\[
\frac{\frac{3}{4}x - \frac{15}{4}}{1} = \frac{\frac{2}{3}x - \frac{8}{3}}{1}
\]

Combine fractions:

\[
3(3x) - 3(15) = 24x - 8(4)
\]

\[
9x - 45 = 24x - 32
\]
2.6 Formulas

1. Use the simple interest formula and the distance formula.
2. Use geometric formulas.
3. Solve for a variable in a formula.

A formula is an equation commonly used to express a specific relationship mathematically. For example, the formula for the area of a rectangle is

\[ \text{area} = \text{length} \cdot \text{width} \quad \text{or} \quad A = lw \]

To evaluate a formula, substitute the appropriate numerical values for the variables and perform the indicated operations.

**Simple Interest Formula**

| interest = principal \cdot rate \cdot time | or \quad i = ptr |

This formula is used to determine the simple interest, \( i \), earned on some savings accounts, or the simple interest an individual must pay on certain loans. In the simple interest formula \( i = ptr \), \( p \) is the principal (the amount invested or borrowed), \( r \) is the interest rate in decimal form, and \( t \) is the amount of time of the investment or loan.

90. **Simple Interest Loan** Holly Broesamle lent her brother $4000 for a period of 2 years. At the end of the 2 years, her brother repaid the $4000 plus $640 interest. What simple interest rate did her brother pay?

\[
\begin{align*}
I &= P \cdot R \cdot T \\
640 &= 4000 \cdot R \cdot 2 \\
R &= \frac{640}{8000} \\
R &= 0.08 \\
R &= 8\% 
\end{align*}
\]
Example 3 illustrates the use of the distance formula.

**EXAMPLE 3 ▶ Auto Race** At a NASCAR auto race, Dale Earnhart Jr., completed the race in 3.2 hours at an average speed of 156.25 miles per hour. Determine the distance of the race.

**Solution: Understand and Translate** We are given the rate, 156.25 miles per hour, and the time is 3.2 hours. We are asked to find the distance.

\[ \text{distance} = \text{rate} \cdot \text{time} \]

**Carry Out**

\[ \text{distance} = (156.25)(3.2) = 500 \]

**Answer** Thus, the distance of the race was 500 miles.

96. **Fastest Plane** The fastest aircraft is the Lockheed SR-71 Blackbird. If, during the trial run, the plane covered a distance of 660 miles in 0.3 hours, determine the plane's average speed.
Use Geometric Formulas

The perimeter, $P$, is the sum of the lengths of the sides of a figure. Perimeters are measured in the same common unit as the sides. For example, perimeter may be measured in centimeters, inches, or feet. The area, $A$, is the total surface within the figure's boundaries. Areas are measured in square units. For example, area may be measured in square centimeters, square inches, or square feet. Table 2.1 on page 142 gives the formulas for finding the areas and perimeters of triangles and quadrilaterals. Quadrilateral is a general name for a four-sided figure.

In Table 2.1, the letter $h$ is used to represent the height of the figure. In the figure of the trapezoid, the sides $b$ and $d$ are called the bases of the trapezoid. In the triangle, the side labeled $b$ is called the base of the triangle.

### Table 2.1 Formulas for Areas and Perimeters of Quadrilaterals and Triangles*

<table>
<thead>
<tr>
<th>Figure</th>
<th>Sketch</th>
<th>Area</th>
<th>Perimeter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Square</td>
<td><img src="image" alt="Square" /></td>
<td>$A = s^2$</td>
<td>$P = 4s$</td>
</tr>
<tr>
<td>Rectangle</td>
<td><img src="image" alt="Rectangle" /></td>
<td>$A = lw$</td>
<td>$P = 2l + 2w$</td>
</tr>
<tr>
<td>Parallelogram</td>
<td><img src="image" alt="Parallelogram" /></td>
<td>$A = lh$</td>
<td>$P = 2l + 2w$</td>
</tr>
<tr>
<td>Trapezoid</td>
<td><img src="image" alt="Trapezoid" /></td>
<td>$A = \frac{1}{2}h(b + d)$</td>
<td>$P = a + b + c + d$</td>
</tr>
<tr>
<td>Triangle</td>
<td><img src="image" alt="Triangle" /></td>
<td>$A = \frac{1}{2}bh$</td>
<td>$P = a + b + c$</td>
</tr>
</tbody>
</table>

99. **Yield Sign** A yield traffic sign is triangular with a base of 36 inches and a height of 31 inches. Find the area of the sign.

100. **Fencing** Milt McGowen has a rectangular lot that measures 100 feet by 60 feet. If Milt wants to fence his lot, how much fencing will he need?
Write Equations in \( y = mx + b \) Form

When discussing graphing later in this book, we will need to solve many equations for the variable \( y \), and write the equation in the form \( y = mx + b \), where \( m \) and \( b \) represent real numbers. Examples of equations in this form are \( y = 2x + 4 \), \( y = -\frac{1}{2}x - 3 \), and \( y = \frac{4}{3}x + \frac{1}{3} \). The procedure to write equations in \( y = mx + b \) form is illustrated in Examples 12 and 13.

78. \( 4x + 3y = 20 \)

\[
\begin{align*}
\underline{4x} + 3y &= 20 \\
-4x &
\end{align*}
\]

\[
\begin{align*}
3y &= -4x + 20 \\
\frac{3y}{3} &= \frac{-4x + 20}{3} \\
y &= \frac{-4x + 20}{3}
\end{align*}
\]

82. \( y + 5 = \frac{3}{4}(x + \frac{1}{2}) \)

\[
\begin{align*}
\underline{y} + 5 &= \frac{3}{4}(x + \frac{1}{2}) \\
\frac{4y + 20}{4} &= \frac{3x + \frac{3}{2}}{4} \\
y &= \frac{3x + \frac{3}{2}}{4} - 5
\end{align*}
\]

\[
\begin{align*}
\underline{5x - 3y} &= 15 \\
+5x &
\end{align*}
\]

\[
\begin{align*}
-3y &= -5x + 15 \\
\frac{-3y}{-3} &= \frac{-5x + 15}{-3} \\
y &= \frac{-5x + 15}{-3}
\end{align*}
\]
3 Solve for a Variable in a Formula

Often in this course and in other mathematics and science courses, you will be given an equation or formula solved for one variable and have to solve it for a different variable. We will now learn how to do this. This material will reinforce what you learned about solving equations earlier in this chapter. We will use the procedures learned here to solve problems in many other sections of the text.

To solve for a variable in a formula, treat each of the quantities, except the one for which you are solving, as if they were constants. Then solve for the desired variable by isolating it on one side of the equation.

50. \( V = L \cdot w \cdot h \), for \( l \)

\[
\frac{V}{w \cdot h} = L
\]

64. \( A = \frac{m + 2d}{3} \), for \( d \)

\[
\begin{align*}
\frac{3A}{1} &= \frac{m + 2d}{3} \\
3A &= m + 2d \\
3A - m &= 2d \\
\frac{3A - m}{2} &= d
\end{align*}
\]

58. \( y = mx + b \), for \( x \)

\[
x = \frac{y - b}{m}
\]
\[ \begin{align*}
\frac{3}{1} \left\{ V = \frac{1}{3} \pi r^2 h \right\}^{\frac{3}{1}} \\
3V = \frac{\pi r^3 h}{\pi r^2} \\
\frac{3V}{\pi r^2} = h \\
\end{align*} \]

Solve for \( b \)

\[ \begin{align*}
\frac{A}{1} & = \frac{a + 2b}{5} \\
5A & = a + 2b \\
-9 & = -9 \\
5A - 9 & = 2b \\
\frac{5A - 9}{2} & = b \\
\end{align*} \]