Section 3.2

41. Salaries  Brooke Mills is being recruited by a number of high-tech companies. Data Technology Corporation has offered her an annual salary of $40,000 per year plus a $2400 increase per year. Nuteck has offered her an annual salary of $49,600 per year plus an $800 increase per year. In how many years will the salaries from the companies be the same?

Find how many yrs. for salaries to be the same.

\[ y = \text{years to be the same} \]

Equation  

**Company 1**  

\[
40,000 + 2400y = 49600 + 800y
\]

**Company 2**

\[
2400y = 9600 + 800y
\]

\[
2400y = 1600y
\]

\[
1600 = \frac{7600}{16y}
\]

\[
y = 6 \text{ yrs.}
\]
57. **Earnings and Education** The U.S. Census Bureau reported that in 2005, graduates with an associate’s degree earned an average of 24.6% less than graduates with a bachelor’s degree. If, in 2005, the average graduate with an associate’s degree earned $37,600, determine the average salary of a graduate with a bachelor’s degree.

\[
\begin{align*}
\text{Find the Average Salary of BA Degree Graduate} \\
\gamma &= \text{Average Salary of A Graduate With A BA Degree} \\
\frac{\text{Associates}}{\text{BA}} &= \frac{37,600}{?} \\
\text{BA Salary Less 24.6\%} \\
\gamma - 0.246\gamma &= 37,600 \\
0.754\gamma &= 37,600 \\
\gamma &= \frac{37,600}{0.754} \\
\gamma &= 49,867.32
\end{align*}
\]
63. **Salary Plans** Becky Schwartz, a saleswoman, is offered two salary plans. Plan 1 is $400 per week salary plus a 2% commission of sales. Plan 2 is a $250 per week salary plus a 16% commission of sales. How much would Becky need to make in sales for the salary to be the same from both plans?

Find Sales Necessary for 2 Plans To Be Equal

Sales = S

\[
\begin{align*}
\text{Plan 1} & = \text{Plan 2} \\
400 + 0.02S & = 250 + 0.16S \\
-0.02S & = -0.12S \\
400 & = 250 + 0.14S \\
-250 & = -250 \\
150 & = 0.14S \\
\frac{150}{0.14} & = \frac{0.14S}{0.14} \\
1071.43 & = S
\end{align*}
\]

Both Plans The Same
37. **Fenced-In Area** A rectangular area is to be fenced in along a straight river bank as illustrated. The length of the fenced-in area is to be 5 feet greater than the width, and the total amount of fencing to be used is 71 feet. Find the width and length of the fenced-in area.

\[ L = \text{Length} = W + 5 \]

\[ W = \text{width} \]

\[ 5 \times 11 = 55 \]

\[ L = W + 5 = 16 \]

\[ 5W + (W + 5) = 71 \]

\[ 5W + W + 5 = 71 \]

\[ 6W = 66 \]

\[ W = 11 \]
21. Unknown Angles One angle of a triangle is $10^\circ$ greater than the smallest angle, and the third angle is $30^\circ$ less than twice the smallest angle. Find the measures of the three angles.

\[ \text{Sum of } \angle s \text{ of Any } \triangle \text{ Add To } 180^\circ \]

1st \[ \angle = x \text{ smallest} \]

2nd \[ \angle = x + 10 \]

3rd \[ \angle = 2x - 30 \]

\[ x + (x + 10) + (2x - 30) = 180^\circ \]

\[ 4x - 20 = 180 \]

\[ 4x = 200 \]

\[ x = 50 \]
Worksheet

3. Gary worked a 60-hour week. We need to find his hourly rate if he is paid 1\frac{1}{2} times his regular pay rate for all hours over 40-hour week. Last week his Gross Pay was $591.50. Find his Pay rate.

What are we trying to find? Find Regular Pay Rate

How will we represent the unknown? \( x = \text{Regular Pay Rate} \)

Equation

\[
\text{Regular Pay} + \text{Overtime} = \text{Gross Pay}
\]

\[
40x + 20(1.5x) = 591.50
\]

\[
40x + 30x = 591.50 \quad \text{Regular Pay}
\]

\[
\frac{70x}{70} = \frac{591.50}{70} \quad x = 8.50
\]
Understanding Algebra

Motion problems involve rates. Units of rates include miles per hour (mph), feet per second (ft/s) and meters per second (m/s).

The formula we use in motion problems is:

distance = rate × time
or \( d = r \times t \).

Worksheet

2. Joggers

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Sonya</td>
<td>8 mph</td>
<td></td>
</tr>
<tr>
<td>Javi</td>
<td>11 mph</td>
<td></td>
</tr>
</tbody>
</table>

\[ D = R \times T \]

\[
\begin{array}{ccc}
\text{Sonya} & d & 8 \\
\text{Javi} & d+9 & 11 \\
\end{array}
\]

Substitution

\[ d = 8t \]
\[ d+9 = 11t \]

\[
\begin{align*}
\text{Substitute } & 8t + 9 = 11t \\
\text{Subtract } & 8t \\
\frac{9}{3} & = \frac{3t}{3} \\
3 & = t
\end{align*}
\]

\( t = 3 \text{ hr.} \)
2 Sailboats

\[ D = R \cdot T \]

<table>
<thead>
<tr>
<th></th>
<th>Lurelei</th>
<th></th>
<th></th>
<th>Brown Alone</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.8 - d</td>
<td>r + 4</td>
<td>.7 hr</td>
<td>9x.7 = 6.3</td>
<td>5x.7 = 3.5</td>
</tr>
<tr>
<td>d</td>
<td>r - 5</td>
<td>.7 hr</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\[ 9.8 - d = (r + 9)(.7) \]
\[ d = .2r \]

Substitute: \[ 9.8 - d = .7(r + 4) \]
\[ 9.8 - .7r = .7(r + 4) \]
\[ 9.8 - .7r = .7r + 2.8 \]
\[ +.7r \quad +.7r \]
\[ 9.8 = 1.4r + 2.8 \]
\[ -2.8 \quad -2.8 \]
\[ 7 = 1.4r \]
\[ \frac{7}{1.4} = \frac{1.4}{1.4} \]
\[ r = 5 = v \]
Mum 7 mph  \[ d_1 \]
Son 6 mph  \[ d_2 \]
\[ d_1 + d_2 = 11 \]
\[ d_1 = 11 - d_2 \]

\[
\begin{array}{ccc}
\text{Mom} & \text{Son} \\
11 - d & 4 & t = 1.1 \\
\hline
d & 6 & t = 1.1 \\
\end{array}
\]

\[ D = R \cdot T \]

Check
8 \times 1.1 = 8.8
6 \times 1.1 = 6.6

Substitution

\[
\begin{align*}
11 - d &= 4t \\
11 - 6t &= 4t \\
11 &= 10t \\
1.1t &= \frac{11}{10} = t
\end{align*}
\]

System of 2 equations & 2 unknowns
John = \frac{20.4 \text{ miles}}{6 \text{ hr.}} = 3.4 \text{ mi/hr.}

\begin{array}{|c|c|c|}
\hline
\text{John} & d & 3.4 \frac{\text{mi}}{\text{hr.}} \\
\hline
\text{Brina} & 20.4 - d & 2.6 \frac{\text{mi}}{\text{hr.}} \\
\hline
\end{array}

\text{System:}
\begin{align*}
20.4 - d &= 2.6(t - 1) \\
20.4 - 3.4t &= 2.6t - 2.6 \\
20.4 &= 6t - 2.6 \\
23 &= 6t \\
3.8 \frac{\text{mi}}{\text{hr.}} &= t
\end{align*}

3.8 \frac{\text{mi}}{\text{hr.}} = \boxed{3.8 \text{ hr.}}