1. Write the equation of the lines in slope-intercept form.
2. The plane travels 408 miles in 3 hours with the wind and 128 miles in 2 hours against the wind. Find the speed of the wind and the speed of the plane in still air. **Complete the table, set up an equation, then solve the problem.**

<table>
<thead>
<tr>
<th></th>
<th>Rate</th>
<th>Time</th>
<th>Distance</th>
</tr>
</thead>
<tbody>
<tr>
<td>With</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Against</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\[ x = R_{\text{plane}} \]
\[ y = R_{\text{wind}} \]

3. Write the equation of the line in slope intercept form using the given information.

a) \( m = \frac{-3}{2}, \left( \frac{-5}{2}, 2 \right) \)

b) \((3, -2), (-5, -3)\)
4. A pharmacist has in stock a 30% alcohol solution and a 80% alcohol solution. How many liters of each are required to be mixed together to get 100 liters of a 50% alcohol solution? Fill in the table, get the two equations and solve. **Complete the table and set up an equation to solve this problem.**

<table>
<thead>
<tr>
<th>Amount of Solution</th>
<th>% Alcohol</th>
<th>Amount of Alcohol</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sol 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sol 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Final</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

5. Solve each system by elimination.

   a) \[ x + y = 2 \]
   \[ x - 2y = 4 \]

   b) \[ 2x - 3y = 3 \]
   \[ 3x + 4y = -1 \]
6. At the end of the day a cashier has 103 $1 and $5 bills. The total value of the money is $415. How many bills of each denomination does the cashier have? **Complete the table, set up an equation, then solve the problem.**

<table>
<thead>
<tr>
<th>Number of bills</th>
<th>Bill value</th>
<th>Total value</th>
</tr>
</thead>
<tbody>
<tr>
<td>$1’s</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$5’s</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

7. Graph the solution set of each system of linear inequalities. (This means, find the shaded region.)

\[ x + 2y \geq 5 \]
\[ x - y > 3 \]
8. Line A and Line B are two perpendicular lines. Line B passes through the point (3,6).
   Line A has equation \(-2x + 3y = 12\). Find the coordinates of the y-intercept for Line B.

9. A mini-mart store manager wishes to blend candy selling at $1.20 per lb with candy that sells at $1.50 per lb. How many pounds of each should be mixed to get 10 lbs of the blended candy mixture that costs $1.35 per lb? **Complete the table, set up an equation, then solve the problem.**

<table>
<thead>
<tr>
<th>Amount of candy</th>
<th>Cost per Pound</th>
<th>Total Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
10. Solve the system of equations by graphing. **You must find at least three points for each line!** Once you have drawn each line find the intersection of your two lines.

\[ x - y = -2 \]
\[ x + y = -6 \]
1. Write the equation of the line in slope-intercept form.

\begin{align*}
\text{Line A} \\
M_A &= \frac{y_2 - y_1}{x_2 - x_1} = \frac{3 - (-3)}{-5 - 0} = -\frac{6}{11} \\
\text{Using the slope } &\text{ of } (-5, 3), \\
y &= mx + b \\
3 &= -\frac{6}{11}(-5) + b \\
3 &= \frac{30}{11} + b \\
11 &= 30 + 11b \\
0 &= 30 + 11b \\
-\frac{30}{11} &= b \\
\frac{3}{11} &= b \\
\text{Solution: } y &= -\frac{6}{11}x + \frac{3}{11}
\end{align*}

\begin{align*}
\text{Line B} \\
M_B &= \frac{y_2 - y_1}{x_2 - x_1} = \frac{1 - (-4)}{6 - (-2)} = \frac{5}{8} \\
\text{Using the slope } &\text{ of } (6, 1), \\
0 &= m(0) + b \\
1 &= \frac{5}{8}(6) + b \\
1 &= \frac{15}{8} + b \\
8 &= 30 + 8b \\
-22 &= -8b \\
-\frac{22}{8} &= b \\
-\frac{11}{4} &= b \\
\text{Solution: } y &= \frac{5}{8}x - \frac{11}{4}
\end{align*}
2. The plane travels 408 miles in 3 hours with the wind and 128 miles in 2 hours against the wind. Find the speed of the wind and the speed of the plane in still air. **Complete the table and set up an equation to solve this problem.**

<table>
<thead>
<tr>
<th></th>
<th>Rate</th>
<th>Time</th>
<th>Distance</th>
</tr>
</thead>
<tbody>
<tr>
<td>With the Wind</td>
<td>$x + y$</td>
<td>3</td>
<td>408</td>
</tr>
<tr>
<td>Against the Wind</td>
<td>$x - y$</td>
<td>2</td>
<td>128</td>
</tr>
</tbody>
</table>

\[
x = R_{\text{Plane}}
\]
\[
y = R_{\text{Wind}}
\]

\[
(x + y) \cdot 3 = 408
\]

\[
\frac{(x + y) \cdot 3}{3} = \frac{408}{3}
\]

\[
x + y = 136
\]

\[
\frac{(x - y) \cdot 2}{2} = \frac{128}{2}
\]

\[
x - y = 64
\]

\[
\frac{x + y}{136} \cdot 4 = \frac{x - y}{64} \cdot 2
\]

\[
\frac{2x}{2} = \frac{200}{2}
\]

\[
x = 100 \text{ m/s}
\]

\[
y = \frac{72}{8} \text{ m/s}
\]

3. Write the equation of the line in slope intercept form using the given information.

a) \( m = \frac{3}{2} \left( \frac{5}{2}, 2 \right) \)

\[
y = mx + b
\]

\[
2 = \left( \frac{-3}{2} \right) \left( -\frac{5}{2} \right) + b
\]

\[
2 = \frac{15}{4} + b
\]

\[
4[2] = 4 \left[ \frac{15}{4} + b \right]
\]

\[
8 = 15 + 4b
\]

\[
-15 = -15
\]

\[
-7 = 4b
\]

\[
-2 = b
\]

\[
y = -\frac{3}{2}x - \frac{7}{4}
\]

b) \((3, -2), (-5, -3)\)

\[
m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-3 - (-2)}{-5 - 3} = \frac{-1}{-8} = \frac{1}{8}
\]

Using \((3, -2)\): \( m = \frac{1}{8} \)

\[
y = mx + b
\]

\[
-2 = \frac{1}{8}(3) + b
\]

\[
8[-2] = 8 \left[ \frac{1}{8}(3) + b \right]
\]

\[-16 = 3 + 8b
\]

\[-16 = 3 + 8b
\]

\[-19 = \frac{8b}{8}
\]

\[-\frac{19}{8} = b
\]

\[
y = \frac{1}{8}x - \frac{19}{8}
\]
4. A pharmacist has in stock a 30% alcohol solution and a 80% alcohol solution. How many liters of each are required to be mixed together to get 100 liters of a 50% alcohol solution? Fill in the table, get the two equations and solve. **Complete the table and set up an equation to solve this problem.**

<table>
<thead>
<tr>
<th></th>
<th>Amount of solution</th>
<th>% alcohol</th>
<th>Amount of alcohol</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sol 1</td>
<td>X</td>
<td>0.3</td>
<td>0.3X</td>
</tr>
<tr>
<td>Sol 2</td>
<td>Y</td>
<td>0.8</td>
<td>0.8Y</td>
</tr>
<tr>
<td>Final</td>
<td>100</td>
<td>0.5</td>
<td>50</td>
</tr>
</tbody>
</table>

\[
\begin{align*}
X + Y &= 100 \quad \text{(1)} \\
0.3X + 0.8Y &= 50 \quad \text{(2)}
\end{align*}
\]

\[
3(X + Y) = 3[100] \quad \Rightarrow \quad 3X + 3Y = 300
\]

By inspection

\[
X = 60 \text{ L}
\]

Note: \( X + Y = 100 \)

5. Solve each system by elimination.

a) \[
\begin{align*}
x + y &= 2 \\
x - 2y &= 4
\end{align*}
\]

Multiply top equation by 2

\[
2[X + Y] = 2[2] \quad \Rightarrow \quad 2X + 2Y = 4
\]

Multiply bottom equation by 4

\[
\begin{align*}
3X &= 8 \\
x &= \frac{8}{3}
\end{align*}
\]

Solution \( \left( \frac{8}{3}, -\frac{2}{3} \right) \)

b) \[
\begin{align*}
2x - 3y &= 3 \\
3x + 4y &= -1
\end{align*}
\]

Multiply top equation by 3

\[
3[2x - 3y] = 3[3] \quad \Rightarrow \quad 6x - 9y = 9
\]

Multiply bottom equation by 2

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

\[
\begin{align*}
-17y &= 11 \\
y &= -\frac{11}{17}
\end{align*}
\]

Solution \( \left( \frac{9}{11}, -\frac{11}{17} \right) \)
6. At the end of the day a cashier has a total of 103 $1 and $5 bills. The total value of
the money is $415. How many bills of each denomination does the cashier have?

**Complete the table and set up an equation to solve this problem.**

<table>
<thead>
<tr>
<th>Number of bills</th>
<th>Bill value</th>
<th>Total value</th>
</tr>
</thead>
<tbody>
<tr>
<td>$1's</td>
<td>x</td>
<td>1</td>
</tr>
<tr>
<td>$5's</td>
<td>y</td>
<td>5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>103</td>
<td>415</td>
</tr>
</tbody>
</table>

\[
x + 5y = 415
\]
\[
-x + y = 103
\]
\[
\frac{4y = \frac{312}{4}}{y = 78 \text{ $5's}}
\]
\[
x + y = 103
\]
\[
x + 78 = 103
\]
\[
-78 -78
\]
\[
x = 25 \text{ $1's}
\]

7. Graph the inequality.

\[
x + 2y \leq 5\]
\[
x - y > 3
\]

<table>
<thead>
<tr>
<th>x</th>
<th>y</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

Graph the lines and shade the appropriate region.
8. Line A and Line B are two perpendicular lines that intersect at the point \((3,6)\). Line A has equation \(-2x + 3y = 12\). Find the coordinates of the y-intercept for Line B.

\[\text{Line A: Solve for } y = mx + b\]
\[-2x + 3y = 12\]
\[+2x\quad +2x\]
\[\frac{3y}{3} = \frac{2x + 12}{3}\]
\[y = \frac{2}{3}x + 4\]

Slope of Line A is \(m_A = \frac{2}{3}\)

Since Line A & Line B are perpendicular, and \(m_A = \frac{2}{3} \Rightarrow m_B = -\frac{3}{2}\)

To find the equation for Line B, use \(\langle 3,6 \rangle \& m_B = -\frac{3}{2}: y = mx + b\)
\(6 = -\frac{3}{2}(3) + b\)
\(2[6] = 2[-\frac{3}{2}(3) + b]\)
\(12 = -9 + 2b\)
\[\frac{21}{2} = 2b\]
\[b = \frac{21}{2}\]

\[y = -\frac{3}{2}x + \frac{21}{2}\]

9. A mini-mart store manager wishes to blend candy selling at $1.20 per lb with candy that sells at $1.50 per lb to get a mixture that will sell for $1.35. How many pounds of the $1.20 and the $1.50 candies should be used to get 10 lbs of the blended candy mixture. Complete the table and set up an equation to solve this problem.

<table>
<thead>
<tr>
<th>Amount of candy</th>
<th>Cost per Pound</th>
<th>Total Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Candy 1</td>
<td>X</td>
<td>1.20X</td>
</tr>
<tr>
<td>Candy 2</td>
<td>Y</td>
<td>1.50Y</td>
</tr>
<tr>
<td>Blended Candy</td>
<td>10</td>
<td>1.35</td>
</tr>
</tbody>
</table>

\[x + y = 10\]
\[1.20x + 1.50y = 13.5\]
\[10[1.20x + 1.50y] = 10[13.5]\]
\[12x + 15y = 135\]

\(12(x+y) = 12(10)\)
\[12x + 12y = 120\]

\[12x + 15y = 135\]
\[+12x + 12y = 120\]
\[\boxed{3x = 15}\]
\[x = 5\text{ lbs of Candy 1}\]

\[\boxed{y = 5\text{ lbs of Candy 2}}\]

\[\therefore \boxed{x + y = 10}\]
10. Solve the system of equations by graphing. Plot at least three points for each line.

\[
\begin{align*}
\text{For } x - y &= -2: \\
\begin{array}{c|c}
0 & 2 \\
-2 & 0 \\
-4 & -2
\end{array}
\end{align*}
\]

\[
\begin{align*}
\text{For } x + y &= -6: \\
\begin{array}{c|c}
0 & -6 \\
-3 & 3 \\
-7 & 1
\end{array}
\end{align*}
\]

This point is not on the given grid.

Solution is \((-4, -2)\). The intersection of the two lines.