Chapter 6 Review

1. (a) \[ m = \frac{y_2 - y_1}{x_2 - x_1} \]
   \[ y\text{-int} = (0,6) = \frac{0 - 6}{3 - 0} = \frac{-6}{3} = -2 \]

   (b) \[ m = \frac{y_2 - y_1}{x_2 - x_1} \]
   \[ y\text{-int} (0,-3) = \frac{-3 - 0}{0 - (-2)} = \frac{-3}{2} \]

2. \[ y = mx + b \]
   \[ \text{slope} \quad \text{y-intercept} \]
   (a) slope = 4
   \[ y\text{-int} = (0,5) \]
   (b) slope = \(-\frac{1}{6}\)
   \[ y\text{-int} = (0,2) \]

3. \[ m = \text{slope} \]
   \[ b = \text{y-intercept} \]
   (a) \[ y = -1x + 0 \]
   \[ y = -x \]
   (b) \[ y = \frac{2}{3}x + 5 \]

4. (a) \[ 6x - y = 4 \]
   \[ 6x = 4 + y \]
   \[ 6x - 4 = y \]
   \[ y = 6x - 4 \]

   (b) \[ x + 4y = 28 \]
   \[ 4y = -x + 28 \]
   \[ y = \frac{-x + 28}{4} \]
   \[ y = \frac{-1}{4}x + 7 \]

5. (a) \[ 8x + y = 4 \]
   \[ y = -8x + 4 \]
   \[ \text{slope} = -8, \quad y\text{-int} = (0,4) \]

   (b) \[ -3x + 2y = 8 \]
   \[ 2y = \frac{3x + 8}{2} \]
   \[ y = \frac{3}{2}x + 4 \]

6. \[ x\text{-int when } y = 0 \]
   \[ y\text{-int when } x = 0 \]
   (a) \[ 4x - 2y = 8 \]
   \[ 4x - 2(0) = 8 \]
   \[ 4x = \frac{8}{4} \]
   \[ x = 2 \]
   \[ y = -4 \]
   \[ \Rightarrow (2,0) \text{ and } (0,-4) \]

   (b) \[ x + 3y = 6 \]
   \[ x + 3(0) = 6 \]
   \[ x = 6 \]
   \[ \frac{3y}{3} = \frac{6}{3} \]
   \[ y = 2 \]
   \[ \Rightarrow (6,0) \text{ and } (0,2) \]
6. (c) \[2x - y = 4\]  
\[2x = (0) = 4\]  
\[\frac{2x}{2} = \frac{4}{2}\]  
\[x = 2\]  
\[\Rightarrow (2, 0) \text{ and } (0, -4)\]

(d) \[5x + 3y - 15 = 0\]  
\[5x + 3(0) - 15 = 0\]  
\[5x = 15\]  
\[\frac{5x}{5} = \frac{15}{5}\]  
\[x = 3\]  
\[\Rightarrow (3, 0) \text{ and } (0, 5)\]

7. Parallel lines have the same slope. Change to slope-intercept form.

(a) \[2x - 3y + 12 = 0\]  
\[\frac{2x + 12}{3} = \frac{3y}{3}\]  
\[\frac{2}{3}x + 4 = y\]

(b) \[3y = 2x + 6\]  
\[\frac{3y}{3} = \frac{2x}{3}\]  
\[y = \frac{2}{3}x + 2\]

(c) \[3x - 2y = 0\]  
\[\frac{3x}{2} = \frac{2y}{2}\]  
\[\frac{3}{2}x = y\]

(d) \[3x + 2y = -4\]  
\[\frac{2y}{2} = \frac{-3x - 4}{2}\]  
\[y = -\frac{3}{2}x - 2\]  
\[\Rightarrow (a) \text{ and } (b) \text{ are parallel.}\]

8. Perpendicular lines have slopes that are the negative reciprocal of each other.

\[\Rightarrow (a) \text{ and } (d)\]  
\[\Rightarrow (b) \text{ and } (d) \text{ are perpendicular.}\]

9. Find slope of the line.

Find the negative reciprocal.

\[3 - x + 4y = 0\]  
\[4y = x - 3\]  
\[\frac{4y}{4} = \frac{x - 3}{4}\]  
\[y = \frac{1}{4}x - \frac{3}{4}\]  
\[m = \frac{1}{4} \Rightarrow m' = -\frac{4}{1}\]  
\[\Rightarrow \text{New slope } = -4\]

10. \[y = mx + b\]

\[m = -3, \ (x, y) = (2, -5)\]  
\[\Rightarrow -5 = -3(2) + b\]  
\[-5 = -6 + b\]  
\[-6 + b = b = 1\]  
\[\Rightarrow y = -3x + 1\]

11. Find slope of first line and y-intercept of second line.

\[2x + 5y = 1\]  
\[x - 4y = 8\]  
\[5y = -2x + 1\]  
\[x - 8 = 4y\]  
\[\frac{5y}{5} = \frac{-2x + 1}{5}\]  
\[\frac{x - 8}{4} = \frac{4}{4}\]  
\[y = \frac{2}{5}x + \frac{1}{5}\]  
\[4x - 2 = y\]

New equation is \[y = -\frac{2}{5}x - 2\]
12. Find the slope of the line. Substitute the points and solve for \( b \). Write the equation.

\[ P_1 = (3, -4) \quad P_2 = (2, 5) \]

\[ m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{5 - (-4)}{2 - 3} = \frac{9}{-1} = -9 \]

\[ y = mx + b \]

using \( P_2 (2, 5) \)

\[ 5 = -9(2) + b \]
\[ 5 = -18 + b \]
\[ 5 + 18 = b \]
\[ 23 = b \]

\[ \Rightarrow y = -9x + 23 \]

13. Express \( d \) as a function of \( t \), coordinates \( (t, d) \)

\[ \Rightarrow (1, 3.9) \text{ and } (3, 1.7) \]

(a) \[ m = \frac{d_2 - d_1}{t_2 - t_1} = \frac{1.7 - 3.9}{3 - 1} = \frac{-2.2}{2} = -1.1 \]

(b) Using \( (1, 3.9) \)

\[ d = mt + b \]
\[ 3.9 = -1.1(1) + b \]
\[ 3.9 = -1.1 + b \]
\[ 3.9 + 1.1 = b \]
\[ 5 = b \]

\[ \Rightarrow d = -1.1t + 5 \]

13. (c) \[ \text{Distance } l = 0 \]

\[ d = -1.1t + 5 \]
\[ 0 = -1.1t + 5 \]
\[ 0 - 5 = -1.1t \]
\[ -5 = -1.1t \]
\[ -5 \div -1.1 = t \]

\[ 4.54 \text{ seconds} = t \]

\[ \Rightarrow \text{After about } 4.5 \text{ seconds} \]

14. Solution is where the lines cross

\[ \Rightarrow (1, 1) \]

15. Graph the lines and find where they intersect (cross)

\[ x + y = 6 \quad y - 2x = 0 \]
\[ y = -x + 6 \quad \]

\[ y = 2x \]

\[ \Rightarrow \text{Intersect at } (2, 4) \]