Parallel Lines

1. A line has the equation $y = \frac{3}{4}x - 5$.
   a) Identify the slope and y-intercept.
   b) Sketch the line using its slope and y-intercept.
   c) Draw a parallel line passing through $(0,3)$.
   d) Determine the slope of the **parallel** line.
   e) Determine the equation of the parallel line in the form $y = mx + b$.

2. A line with slope $m = \frac{3}{5}$ passes through (5, -1).
   a) Sketch the line using the coordinate and slope provided.
   b) Build the formula $y - y_1 = m(x - x_1)$.
   c) Algebraically find the equation $y = mx + b$.
   d) Identify the slope and y-intercept.
   e) Draw a **parallel** line that passes through (0, 3).
   f) What is the slope of this parallel line?
   g) Determine the equation of this line in the form $y = mx + b$.

3. Using the two lines you graphed in #8, explain how you can tell that they have the same slope but different y-intercepts.

4. A line passes through $(-3,-1)$ and $(3,3)$.
   a) Sketch the line using the two coordinates provided.
   b) Calculate the slope using rise and run.
   c) Write the equation in point-slope form, $y - y_1 = m(x - x_1)$.
   d) Algebraically rearrange the equation into $y = mx + b$.
   e) Draw a parallel line passing through $(0,-3)$.
   f) Determine the equation of the parallel line in the form $y = mx + b$.

5. A line has the equation $y = -\frac{2}{3}x + 1$.
   a) Sketch the original line.
   b) Determine the slope of a parallel line.
   c) Draw a parallel line passing through $(3,4)$.
   d) Write the parallel line's equation in point-slope form $y - y_1 = m(x - x_1)$.
   e) Algebraically rearrange the equation into $y = mx + b$.

6. A line has slope $m = -\frac{7}{4}$ and travels through (2, –3).
   a) Sketch the line using the coordinate and slope provided.
   b) Build the formula $y - y_1 = m(x - x_1)$.
   c) Algebraically find the equation $y = mx + b$.
   d) Identify the slope and y-intercept.
   e) Draw a **parallel** line that passes through (–2, 6).
   f) What is the slope of this parallel line?

g) Determine the equation of this line in the form $y - y_1 = m(x - x_1)$.

7. A function travels through (-3, 7) and (3, -3).
   a) Sketch the line using the two coordinates provided.
   b) Find the slope m using the rise and run.
   c) Build the formula $y - y_1 = m(x - x_1)$.
   d) Draw a line parallel to the original that passes through (0, –4).
   e) Write the equation for this function in the form $y = mx + b$.

8. A line has the equation $3x + 2y = 8$.
   a) Sketch the line by finding the x-intercept and the y-intercept.
   b) Identify the slope and y-intercept.
   c) Draw a parallel line passing through $(2, -4)$.
   d) Determine the equation of the parallel line in $y = mx + b$ form.

9. A function travels through (–3, –6) and (5, 4).
   a) Sketch the line using the two coordinates provided.
   b) Find the slope m using the rise and run.
   c) Build the formula $y - y_1 = m(x - x_1)$.
   d) Draw a line parallel to the original that passes through (0, 3).
   e) Write the equation for this function in the form $y = mx + b$.

10. Consider the three equations:

$$\text{A: } y = -\frac{2}{3}x + 4$$

$$\text{B: } 2x + 3y = 12$$

$$\text{C: } 2x + 3y = 6$$

   a) Rewrite equations B and C in slope-intercept form.
   b) Determine which two equations represent the same line.
   c) Determine which equations represent distinct parallel lines.
   d) Explain your conclusions using slopes and y-intercepts.