To find the equation of a line, you need to have one point that the line passes through and the slope of the line. Once you have the slope of the line and one point that the line passes through, you can use point-slope form \( (y - y_1 = m(x - x_1)) \) to find the equation of the line.

**Example 1:** Given the following graphs, identify one point that each line passes through, and then use that point and the slope of the line to find the equation of the line. Write your answer in slope-intercept form \( (y = mx + b) \).

Identify any point that the line is passing through, then use that point and the given slope to find the equation of the line.

\[
\begin{align*}
\text{(2, -4)} & \quad \text{(1, 0)} \\
\end{align*}
\]

\[
\begin{align*}
m &= -\frac{13}{6} & m &= \frac{3}{5} \\
y - y_1 &= m(x - x_1) & y - y_1 &= m(x - x_1) \\
y - (-4) &= -\frac{13}{6}(x - 2) & y - 0 &= \frac{3}{5}(x - 1) \\
y + 4 &= -\frac{13}{6}x + \frac{26}{6} & y &= \frac{3}{5}x - \frac{3}{5} \\
y &= -\frac{13}{6}x + \frac{1}{3} \\
\end{align*}
\]
In each of the previous examples the slope of the line was provided with the graphs. In the upcoming examples, the slope will not be provided, so we’ll have to find it first. Once again, after we have the slope of the line, and at least one point that the line passes through, we can use point-slope form \((y - y_1 = m(x - x_1))\) to find the equation of the line.

**Example 2:** Given the following graphs, identify two points that each graph passes through and use those two points to find the slope of each line. Then use that slope, along with any point that the line passes through, to find the equation of the line using point-slope form \((y - y_1 = m(x - x_1))\). Write your answer in slope-intercept form \((y = mx + b)\), if possible.

![Graph a](image1)

![Graph b](image2)

Identify any two points that the line is passing through, then use those two points to find the slope of the line. Then use the slope, and either of the two points, to find the equation of the line.

\((-4, 4), (0, 1)\)  \((2, -6), (5, -4)\)

\[m = \frac{-3}{4}\]  \[m = \frac{2}{3}\]

\[y - 1 = -\frac{3}{4}(x - 0)\]  \[y - (-4) = \frac{2}{3}(x - 5)\]

\[y - 1 = -\frac{3}{4}x\]  \[y + 4 = \frac{2}{3}x - \frac{10}{3}\]

\[y = -\frac{3}{4}x + 1\]  \[y = \frac{2}{3}x - \frac{22}{3}\]
Finding the equation of a line graphically

16-week Lesson 16 (8-week Lesson 12)

c.

d.
Answers to Examples:

1a. $y = \frac{-13}{6}x + \frac{1}{3}$; 1b. $y = \frac{3}{5}x - \frac{3}{5}$;
2a. $m = \frac{-3}{4}$, $y = -\frac{3}{4}x + 1$; 2b. $m = \frac{2}{3}$, $y = \frac{2}{3}x - \frac{22}{3}$;
2c. $m = 0$, $y = -4$; 2d. $m$ is UNDEFINED, $x = -1$;
2e. $m = \frac{-3}{2}$, $y = -\frac{3}{2}x + \frac{7}{2}$; 2f. $m = \frac{5}{3}$, $y = \frac{5}{3}x + \frac{2}{3}$;