Stacey Best owns a weight loss clinic. She charges her clients a one-time membership fee. She also charges per pound of weight lost. Therefore, the more successful she is at helping clients lose weight, the more income she will receive. The graph on the right shows a client’s cost for losing weight.

\[ m = \frac{180 - 780}{20 - 0} = \frac{80}{20} = 4 \]

**Section 2.4 (18)**

a) Find the equation that represents the cost for a client who loses \( x \) pounds.

- **A** \( y = 0.3x + 33 \)
- **C** \( y = 4x + 110 \)
- **B** \( y = -4x + 110 \)
- **D** \( y = 0.3x + 110 \)
The graph shows a line passing through points (0, 3) and (5, 7). The slope of the line is calculated as $m = \frac{4}{5}$.

The equation of the line is derived from the slope and a point on the line:

$$y = mx + b$$

Using the point (0, 3), we find the y-intercept $b = 3$.

The equation of the line is:

$$y = \frac{4}{5}x + 3$$
Given Point: (-3, 2)

\[ m = -\frac{y}{5} \]

Point slope:

\[ y - y_1 = m(x - x_1) \]

\[ y - 2 = -\frac{4}{5}(x + 4) \]

\[ y - 2 = -\frac{4}{5}x - \frac{12}{5} \]

\[ +2 \]

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

Slope Intercept Form

Standard Form:

\[ ax + by = c \]

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

\[ 5y = -4x - 2 \]

\[ +4x \]

\[ 4x + 5y = -2 \]

Standard Form.
Equation
\[ \text{Slope} = m = \frac{5 - (-8)}{2 - (-3)} \]
\[ m = \frac{13}{5} \]

\[ y - y_1 = m(x - x_1) \]
\[ y - 5 = \frac{13}{5}(x - 2) \]
\[ y = \frac{13}{5}x - \frac{26}{5} + 5 \]
\[ y = \frac{13}{5}x - \frac{1}{5} \]

\[ \frac{5}{1} \left[ y = \frac{13}{5}x - \frac{1}{5} \right] \]
5y = 13x - 1
-1 - 5y

1 = 13x - 5y

13x - 5y > 1
7.5 Graphing Linear Inequalities

**Graph Linear Inequalities in Two Variables**

A linear inequality occurs when the equal sign in a linear equation is replaced with an inequality sign.

**Examples of Linear Inequalities in Two Variables**

\[
\begin{align*}
3x + 2y &> 4 \\
-x + 3y &< -2 \\
-x + 4y &\geq 3 \\
4x - y &\leq 4
\end{align*}
\]

**To Graph a Linear Inequality in Two Variables**

1. Replace the inequality symbol with an equal sign.
2. Draw the graph of the equation in step 1. If the original inequality contained the symbol $\leq$ or $\geq$, draw the graph using a solid line. If the original inequality contained the symbol $>$ or $<$, draw the graph using a dashed line.
3. Select any point not on the line and determine whether this point is a solution to the original inequality. If the selected point is a solution, shade the region on the side of the line containing this point. If the selected point does not satisfy the inequality, shade the region on the side of the line not containing this point.
16. \( y > -\frac{1}{2}x + 2 \)

Shade Above

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

\[ m = -\frac{1}{2} \quad (0, 2) \]

Test Point

\( (0, 0) \)

\[ 0 > -\frac{0}{2} + 2 \]

\[ 0 > 2 \]

False
24. $4x - 2y \leq 6$

$4x - 2y \leq 6$

$-4x\quad -4x$

Divided by -2

$-2y = -4x + 6$

$y = \frac{-4x + 6}{-2}$

$y = 2x - 3$

$(0, -3)\quad m = \frac{2}{1}$

Shade above $y \geq 2x - 3$

Test Point $(0, 0)$

$0 \geq 0 - 3$

$0 \geq -3$

True
26. Determine whether \((-3, 7)\) is a solution to each inequality.

a) \(-2x + 3y < 9\)

b) \(-2x + 3y > 9\)

c) \(-2x + 3y \geq 9\)

d) \(-2x + 3y \leq 9\)
$3x - 2y \leq -12$