Warm-up

Do now

The equation \( T = \frac{1}{4}n + 40 \) is used to estimate the temperature in degrees Fahrenheit, \( T \), based on the number of cricket chirps, \( n \), in one minute.

1. Estimate the temperature when there are no chirps. \( \frac{1}{4} \times 0 + 40 = 40 \) °F
2. Estimate the temperature when the number of chirps in one minute is 100.
   \[ \frac{1}{4}(100) + 40 = 65 \] °F
3. Interpret the slope and \( T \)-intercept of the equation.

At 40 °F there are no chirps

Every degree increase in °F the number of chirps will increase by 4.

\[ \frac{3}{12} \]

\[ \frac{1}{10} \]

\[ \frac{5}{20} \]
Parallel Lines

Lines in the same plane that never intersect have the same slope.

Use slopes and y-intercepts to determine if the lines $3x - 2y = 6$ and $y = \frac{3}{2}x + 1$ are parallel? $m = \frac{-3}{-2} = \frac{3}{2}$

$\text{Parallel}$

Use slopes and y-intercepts to determine if the lines $2x + 5y = 5$ and $y = -\frac{2}{5}x - 4$ are parallel? $m = -\frac{2}{5}$

$\text{Parallel}$

Use slopes and y-intercepts to determine if the lines $y = -\frac{1}{2}x - 1$ and $3x - 2y = 6$ are parallel? $m = \frac{3}{2}$

$\text{Not Parallel}$

Perpendicular Lines

Lines that intersect to form right angles. Slopes are opposite reciprocals. $\left(\frac{1}{m}\right) \left(\frac{-m}{l}\right) = -1$

Use the slopes to determine if the lines, $y = -5x - 4$ and $x - 5y = 5$ are perpendicular. $m = \frac{1}{5}$

$\perp$

Use the slopes to determine if the lines, $y = -3x + 2$ and $x + 3y = 4$ are perpendicular. $m = -\frac{1}{3}$

$\text{Not } \perp$

Use the slopes to determine if the lines, $y = 2x - 5$ and $x + 2y = -6$ are perpendicular. $m = -\frac{1}{2}$

$\perp$ $m = 2$
What you will learn about:
Writing the Equation of a Line

Equation of a line:
\[ y = mx + b \]

Find an equation of a line with slope \(-1\) and y-intercept \((0, -3)\):
\[ m = -1 \]
\[ b = -3 \]
\[ y = -x - 3 \]

Find the equation of the line shown:
\[ y = \frac{2}{3}x - 4 \]

Find an equation of a line given 2 points and a slope:
Point-Slope Form:
\[ y - y_1 = m(x - x_1) \]
\[ m = \text{slope} \]
\[ (x_1, y_1) \Rightarrow \text{Given point} \]

Find an equation of a line with slope \(m = \frac{2}{3}\) that contains the point \((10, 3)\).
Write the equation in slope-intercept form.
\[ y = \frac{2}{3}x + b \]
\[ y = \frac{2}{3}(x - 10) \]
\[ y = \frac{2}{3}x - \frac{20}{3} \]
\[ y = \frac{2}{3}x - 1 \]
\[ \Rightarrow \text{Slope-Inter} \]
\[ y = \frac{2}{3}(x - 10) + b \]
\[ 3 = \frac{2}{3}(10) + b \]
\[ 3 = \frac{20}{3} + b \]
\[ b = -1 \]

Find an equation of a line with slope \(m = \frac{5}{6}\) that contains the point \((6, 3)\).
Write the equation in slope-intercept form.
\[ y = \frac{5}{6}x - 5 \]
\[ y = \frac{5}{6}x - 2 \]
\[ y = \frac{5}{6}x - 2 \]
HOW TO

Find an equation of a line given the slope and a point.
Step 1. Identify the slope.
Step 2. Identify the point.
Step 3. Substitute the values into the point-slope form, \( y - y_1 = m(x - x_1) \).
Step 4. Write the equation in slope-intercept form.

Find an equation of a line with slope \( m = -\frac{1}{3} \) that contains the point (6, -4). Write the equation in slope-intercept form.
\[
\begin{align*}
    y + 4 &= -\frac{1}{3}(x - 6) \\
    y &= -\frac{1}{3}x - 2 \\
\end{align*}
\]
\[
\begin{align*}
    y + 4 &= -\frac{1}{3}x + 2 \\
\end{align*}
\]

Find an equation of a line with slope \( m = -\frac{2}{5} \) that contains the point (10, -5). Write the equation in slope-intercept form.
\[
\begin{align*}
    y + 5 &= -\frac{2}{5}(x - 10) \\
    y &= -\frac{2}{5}x - 1 \\
\end{align*}
\]
\[
\begin{align*}
    y + 5 &= -\frac{2}{5}x + 4 \\
\end{align*}
\]

Find the equation of a horizontal line that contains the point (-1, 2). Write the equation in slope-intercept form.
\[
\begin{align*}
    y - 2 &= 0(x + 1) \\
    y - 2 &= 0 \\
    y &= 2 \\
\end{align*}
\]

Find the equation of a horizontal line that contains the point (-3, 8). Write the equation in slope-intercept form.
\[
\begin{align*}
    y - 8 &= 0(x + 3) \\
    y - 8 &= 0 \\
    y &= 8 \\
\end{align*}
\]

Find an equation of a line that contains the points (5, 4) and (3, 6). Write the equation in slope intercept form.