8th Hour

Slope-Intercept Form

What You'll Learn

Scan the lesson. Predict two things you will learn about the slope-intercept form of a linear equation.

· _____

· _____

Essential Question

WHY are graphs helpful?

Vocab **Vocabulary**

y-intercept
slope-intercept form

CCSS **Common Core State Standards**

Content Standards
8.EE.6, 8.F.3, 8.F.4

Mathematical Practices
1, 3, 4

Real-World Link

Watch ▷

Football An interception in football is when a defensive player catches a pass made by an offensive player.

In a nonproportional linear relationship, the graph passes through the point (0, b) or the y-intercept. The y-intercept of a line is the y-coordinate of the point where the line crosses the y-axis.

Complete the steps to derive the equation for a nonproportional linear relationship by using the slope formula.
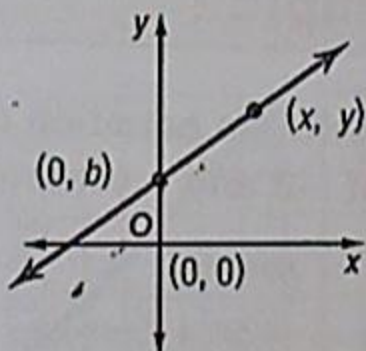
$$\frac{\boxed{y_2 - y_1}}{\boxed{x_2 - x_1}} = \boxed{m}$$ Slope formula

$(x_1, y_1) = (0, b)$

$$\frac{y - b}{x - 0} = m$$

$(x_2, y_2) = (x, y)$

$$\frac{\boxed{y - b}}{\boxed{x}} = m$$ Simplify.

$y - b = \boxed{m} \cdot \boxed{x}$ Multiplication Property of Equality

$y = \boxed{mx} + \boxed{b}$ Addition Property of Equality

↳ slope   y-intercept
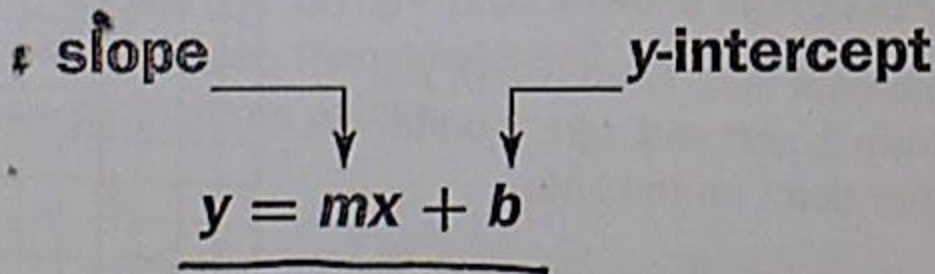
$$y = mx + b$$

How can knowing about an interception in football help you remember the definition of y-intercept?

_____

_____

I got it!
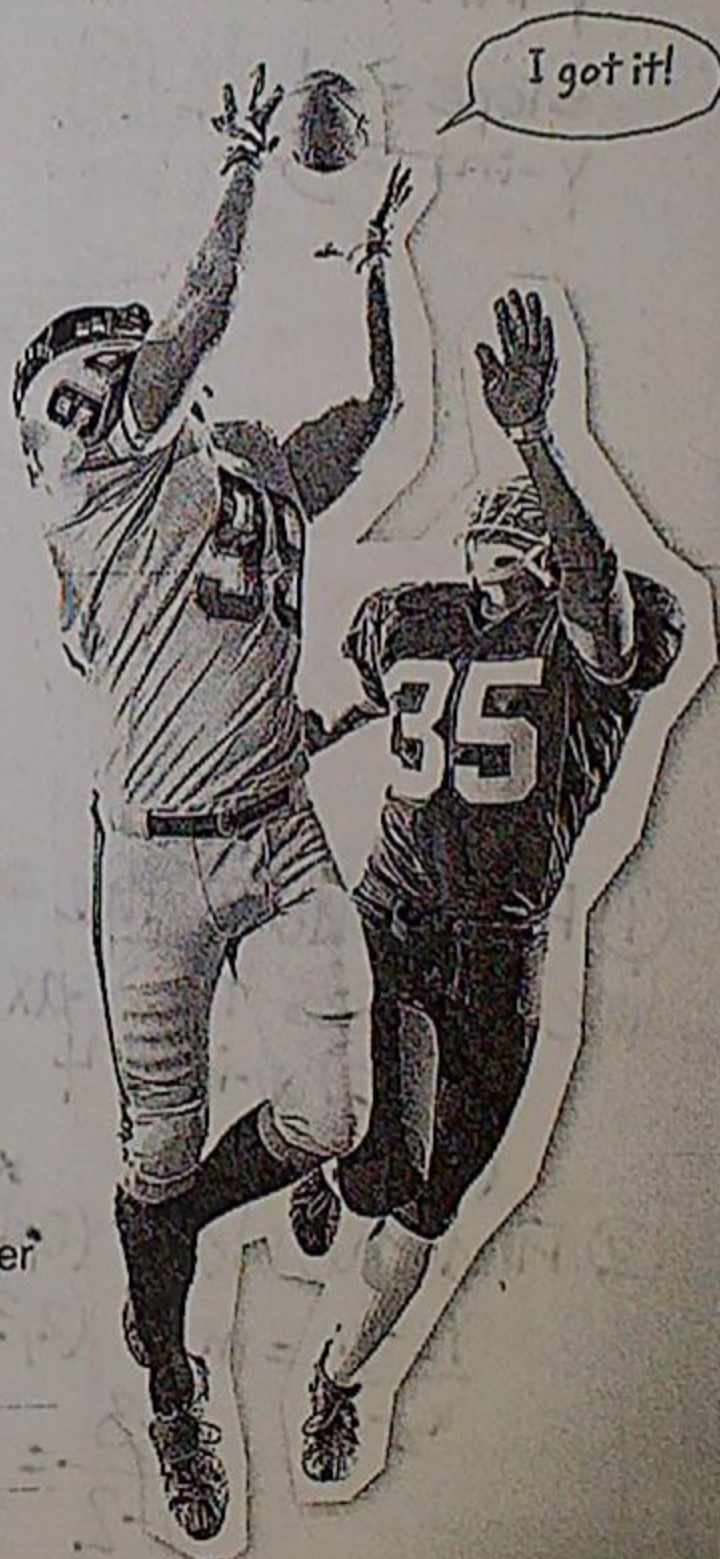
Slope-Intercept Form of a Line

Nonproportional linear relationships can be written in the form $y = mx + b$. This is called the **slope-intercept form**. When an equation is written in this form, m is the slope and b is the y-intercept.

Examples

1. State the slope and the y-intercept of the graph of the equation $y = \frac{2}{3}x - 4$.

$$y = \frac{2}{3}x + (-4) \quad \text{Write the equation in the form } y = mx + b.$$
$$y = mx + b \quad\quad m = \frac{2}{3}, b = -4$$

The slope of the graph is $\frac{2}{3}$, and the y-intercept is -4.

Handwritten:
$$y = mx + b$$
$$y = \frac{2}{3}x + (-4)$$
slope $= \frac{2}{3}$ y-int $= -4$

Got It? Do these problems to find out.

a. $y = -5x + 3$ b. $y = \frac{1}{4}x - 6$ c. $y = -x + 5$

Handwritten: $y = \frac{1}{4}x + (-6)$

Handwritten left margin:
a. slope $= -5$
   y-int $= 3$
b. slope $= \frac{1}{4}$
   y-int $= -6$
c. slope $= -1$
   y-int $= 5$

Examples

2. Write an equation of a line in slope-intercept form with a slope of -3 and a y-intercept of -4.

$$y = mx + b \quad\quad \text{Slope-intercept form}$$
$$y = -3x + (-4) \quad \text{Replace } m \text{ with } -3 \text{ and } b \text{ with } -4.$$
$$y = -3x - 4 \quad\quad \text{Simplify.}$$

Handwritten:
$$y = mx + b$$
$$y = -3x + (-4)$$
$$y = -3x - 4$$

3. Write an equation in slope-intercept form for the graph shown.

The y-intercept is 4. From (0, 4), you move down 1 unit and right 2 units to another point on the line.
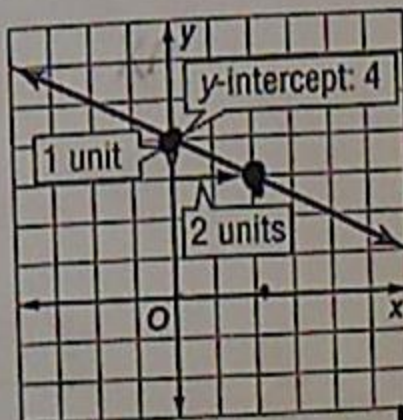
So, the slope is $-\frac{1}{2}$.

$$y = mx + b \quad\quad \text{Slope-intercept form}$$
$$y = -\frac{1}{2}x + 4 \quad \text{Replace } m \text{ with } -\frac{1}{2} \text{ and } b \text{ with 4.}$$

Graph labels: y-intercept: 4, 1 unit, 2 units

Handwritten right: $y = -\frac{1}{2}x + 4$

Handwritten bottom left:
① Find where the line crosses the y-axis
$(0, b)$ y-int $= 4$
$(0, 4)$
② Find the slope $(0, 4)$ $(2, 3)$
$$\frac{y_2 - y_1}{x_2 - x_1} = m$$
$$\frac{4-3}{0-2} = \frac{1}{-2} = -\frac{1}{2} = m$$