

EQUATIONS OF LINES IN THE COORDINATE PLANE

take note

Key Concept Slope

Definition

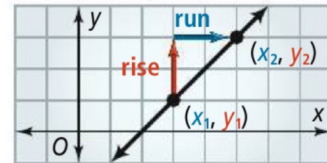
The **slope** m of a line is the ratio of the vertical change (**rise**) to the horizontal change (**run**) between any two points.

Symbols

A line contains the points (x_1, y_1) and (x_2, y_2) .

$$m = \frac{\text{rise}}{\text{run}} = \frac{y_2 - y_1}{x_2 - x_1}$$

Diagram

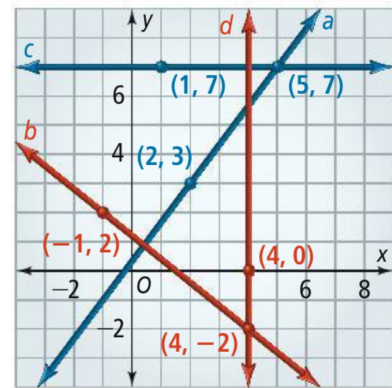


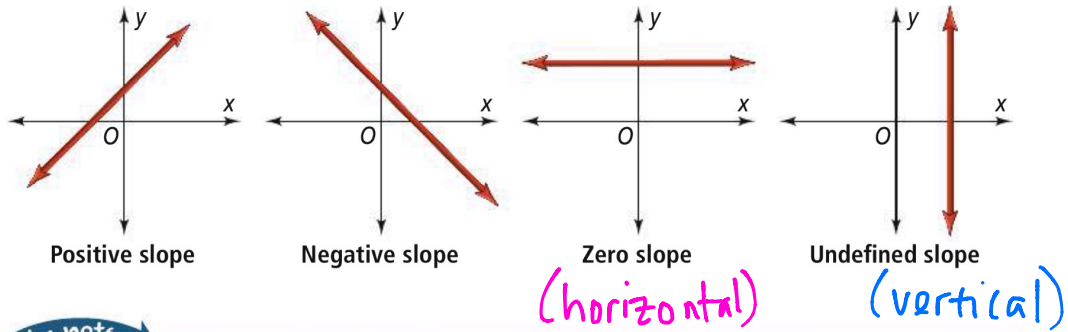
Ex (a) What is the slope of line b?

Ex (b) What is the slope of line d?

Ex (c) What is the slope of line a?

Ex (d) What is the slope of line c?



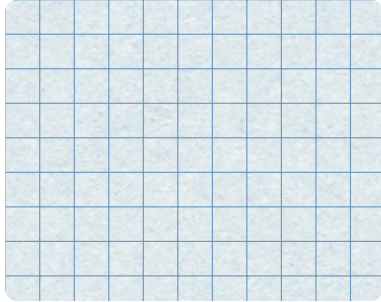


Take note

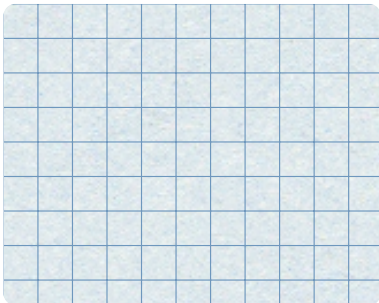
Key Concept Forms of Linear Equations

<p>Definition The slope-intercept form of an equation of a nonvertical line is $y = mx + b$, where m is the slope and b is the y-intercept.</p>	<p>Symbols $y = mx + b$ ↑ ↑ slope y-intercept</p>
<p>The point-slope form of an equation of a nonvertical line is $y - y_1 = m(x - x_1)$, where m is the slope and (x_1, y_1) is a point on the line.</p>	<p>$y - y_1 = m(x - x_1)$ ↑ ↑ ↑ y-coordinate slope x-coordinate</p>

Ex 2a) What is the graph of $y = \frac{2}{3}x + 1$?



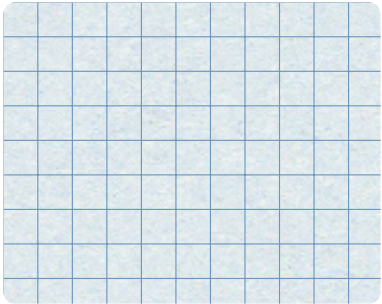
Ex 2b) What is the graph of $y - 3 = -2(x + 3)$?



Ex 2c) What is the graph of $y = 3x - 4$?



Ex 2d) What is the graph of $y + 2 = -\frac{1}{3}(x - 4)$?



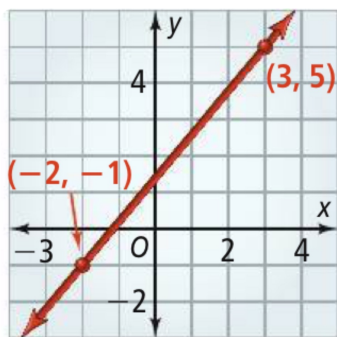
Ex 3a) What is the equation of the line with slope 3 and y-intercept -5?

Ex 3b) What is the equation of the line through $(-1, 5)$ with slope 2?

Ex 3c) What is an equation of the line with slope $-\frac{1}{2}$ and y-intercept 2?

Ex 3d) What is an equation of the line through $(-1, 4)$ with slope -3 ?

Ex 4a) What is the equation of the line shown?



* Use point-slope form when you cannot clearly identify a y-intercept.

Step 1) Find the slope!

Step 2) Use the slope and one point on the line to write the equation in point-slope form.

Ex 4b) What is the equation of the line that passes through the points $(1,4)$ and $(3,8)$?

Step 1) Find the slope!

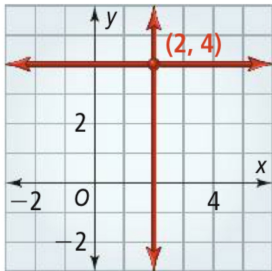
Step 2) Use the slope and one point on the line to write the equation in point-slope form.

Ex 4c) Can you find the equation of the line for example 4b using the slope-intercept formula instead of the point-slope formula? If so, demonstrate.

Find equation w/o using point-slope form:

Find slope-intercept equation by changing forms at the end of the point-slope problem:

Ex 5a) What are the equations for the horizontal and vertical lines through (2, 4)?



Vertical Lines: $x = \#$

Horizontal Lines: $y = \#$

Ex 5b) What are the equations for the horizontal and vertical lines through (4, -3)?

Vertical Line:

Horizontal Line:

LESSON CHECK

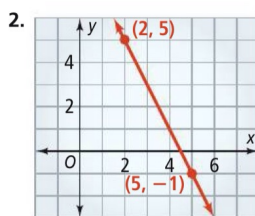


Lesson Check

Do you know HOW?

For Exercises 1 and 2, find the slope of the line passing through the given points.

1. (4, 5) and (6, 15)



3. What is an equation of a line with slope 8 and y-intercept 10?

4. What is an equation of a line passing through (3, 3) and (4, 7)?

Do you UNDERSTAND?



5. **Vocabulary** Explain why you think *slope-intercept form* makes sense as a name for $y = mx + b$. Explain why you think *point-slope form* make sense as a name for $y - y_1 = m(x - x_1)$.

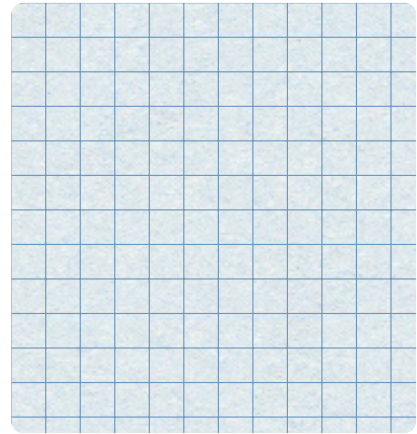
6. **Compare and Contrast** Graph $y = 2x + 5$ and $y = -\frac{1}{3}x + 5$. Describe how these lines are alike and how they are different.

7. **Error Analysis** A classmate found the slope of the line passing through (8, -2) and (8, 10), as shown at the right. Describe your classmate's error. Then find the correct slope of the line passing through the given points.

$$m = \frac{8 - 8}{10 - (-2)}$$

$$m = \frac{0}{12}$$

$$m = 0$$



HOMEWORK:
LESSON 3-7 WORKSHEET

