

3-7

Equations of Lines in the Coordinate Plane

Content Standard
Prepares for G.GPE.5 Prove the slope criteria for parallel and perpendicular lines ...

Objective To graph and write linear equations

Take note

Key Concept Slope

Definition

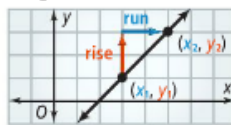
The **slope** m of a line is the ratio of the vertical change (**rise**) to the horizontal change (**run**) between any two points.

Symbols

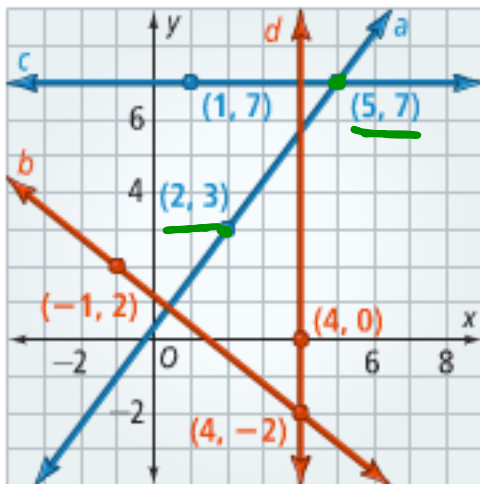
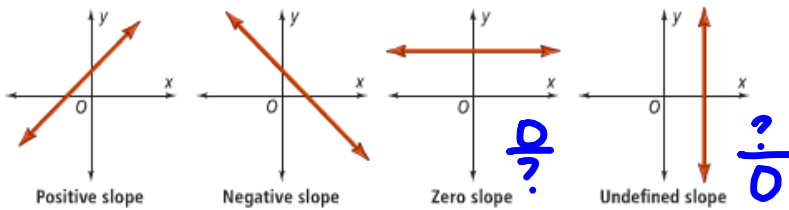
A line contains the points (x_1, y_1) and (x_2, y_2) .

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

Diagram



$$m = \frac{\text{rise}}{\text{run}}$$



- a. What is the slope of line a ?
- b. What is the slope of line c ?

$$a. m = \frac{7-3}{5-2} = \frac{4}{3}$$

$$\frac{3-7}{2-5} = \frac{-4}{-3}$$

$$b. m = 0$$

fake note

Key Concept Forms of Linear Equations

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.

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.

Symbols

$$y = mx + b$$

↑ ↑
slope y-intercept

$$y - y_1 = m(x - x_1)$$

↑ ↑ ↑
y-coordinate slope x-coordinate

Standard form $Ax + By = C$

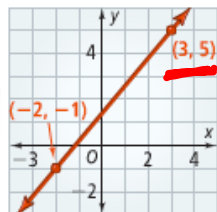
cannot contain
fractions or
decimals

Write equations for all of the following situations:

3. a. What is an equation of the line with slope $-\frac{1}{2}$ and y-intercept 2?
b. What is an equation of the line through $(-1, 4)$ with slope -3 ?

a. $y = -\frac{1}{2}x + 2$

b. $y - 4 = -3(x + 1)$



$$m = \frac{5 - (-1)}{3 - (-2)} = \frac{6}{5}$$

$$y - 5 = \frac{6}{5}(x - 3)$$

5. a. What are the equations for the horizontal and vertical lines through $(4, -3)$?

$$x = 4 \quad y = -3$$

Rewrite all the equations on the previous slide in an alternate form.

$$2(y = -\frac{1}{2}x + 2) \text{ to standard form } Ax + By = C$$

$$2y = -x + 4$$

$$x + 2y = 4$$

$$y - 4 = -3(x + 1) \text{ to slope-intercept } y = mx + b$$

$$y - 4 = -3x - 3$$

$$y = -3x + 1$$

$$y - 5 = \frac{6}{5}(x - 3) \text{ to standard } Ax + By = C$$

$$5(y - 5 = \frac{6}{5}x - \frac{18}{5})$$

$$5y - 25 = 6x - 18$$

$$5y = 6x + 7$$

$$-6x + 5y = 7$$

2. a. Graph $y = 3x - 4$.

b. Graph $y - 2 = -\frac{1}{3}(x - 4)$.

c. $x = 3$ vertical

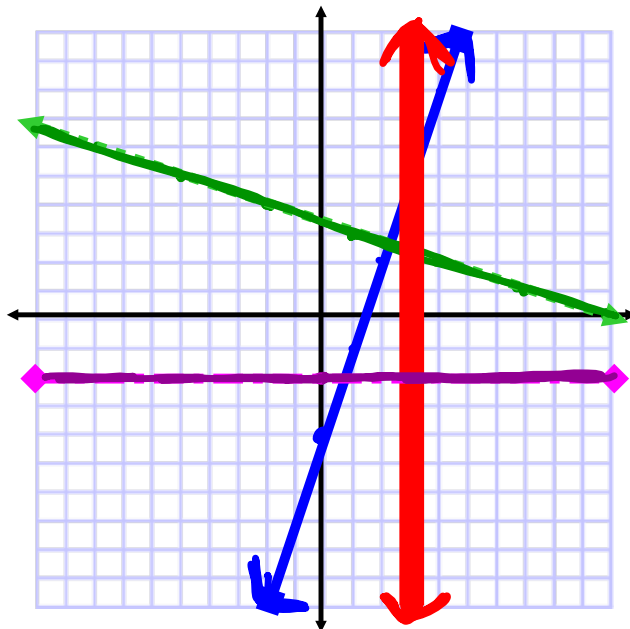
d. $y = -2$ horizontal

a. slope-intercept

$$\begin{array}{cc} \textcircled{2} & \textcircled{1} \\ \frac{3}{1} & -4 \end{array}$$

b. point-slope

$$\begin{array}{cc} \textcircled{1} & \textcircled{2} \\ (4, 2) & -\frac{1}{3} \end{array}$$



Name

3.7

pg. 194-195 # 8-40 even

44-52 even

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Notes 3.8

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