METHOD 3

4.5 Graph Using Slope-Intercept Form

Goal • Graph linear equations using slope-intercept form.

Your Notes

3 METHODS TO GRAPH LINES

(1) USE TABLES:
* pick 3 EASY VALUES FOR x; then find y.
* x = -1, 0, 1
* x = multiples of the denominator

(2) USE x and y INTERCEPTS

(3) USE y = mx + b
(a) plot y-intercept
(b) use slope to find additional points

EXAMPLE: $y = \frac{2}{3}x + 5$

x	-3	0	3
y			

$m = \frac{2}{1}$

VOCABULARY

Slope-intercept form LINEAR EQUATION IN FORM: → y = mx + B

Parallel lines: are lines that never intersect.
* THE SYMBOL is // lines
* // lines have the same slope

FINDING THE SLOPE AND Y-INTERCEPT OF A LINE

Words

A linear equation of the form $y = mx + b$ is written in SLOPE INTERCEPT FORM where m is the slope and b is the y-intercept of the equation's graph.

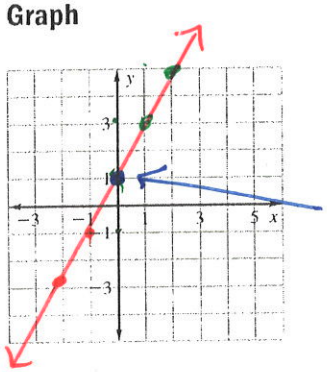
Symbols

$y = mx + b$ (slope, y intercept)

$y = 2x + 1$

m = 2/1 b = 1 or (0, 1)

Graph



yint (0, 1)

STEP I: PLOT THE y-intercept (0, b)

STEP II: USE slope to find other points

$m = \frac{\text{Rise}}{\text{Run}}$

Add $y = -x - 10 \rightarrow m = \frac{-1}{1}$, $b = -10$

Your Notes

Example 1 *Identify slope and y-intercept*

Identify the slope and y-intercept of the line with the given equation.

a. $y = x + 3$ (implied 1)

b. $-2x + y = 5$

Solution

a. The equation is in the form slope intercept. So, the slope of the line is 1, and the y-intercept is 3.

b. Rewrite the equation in slope-intercept form by solving for y. ISOLATE Y!

$-2x + y = 5$

$+2x \quad +2x$

$y = 2x + 5$

Write original equation.

ADD

Subtract $2x$ from to each side.

The line has a slope of 2 and a y-intercept of 5.

Checkpoint **Identify the slope and y-intercept of the line with the given equation.** $y = mx + b$

1. $y = 4x - 1$

$m = 4$

$b = -1$

2. $4x - 2y = 8$

$-4x \quad -4x$

$\frac{-2y}{-2} = \frac{-4x}{-2} + \frac{8}{-2}$

$y = 2x - 4$

$m = 2$ $b = -4$

3. $4y = 3x + 16$

$\frac{4y}{4} = \frac{3x}{4} + \frac{16}{4}$

$y = \frac{3}{4}x + 4$

$M = 3/4$ $B = 4$

4. $6x + 3y = -21$

$-6x \quad -6x$

$\frac{3y}{3} = \frac{-6x}{3} - \frac{21}{3}$

$y = -2x - 7$

$m = -2$ $B = -7$

Your Notes

Example 2 *Graph an equation using slope-intercept form*

Graph the equation $4x + y = 2$.

Solution

$y = mx + b$

Step 1 Rewrite the equation in slope-intercept form.

$y = -4x + 2$ (mentally subtract $4x$ from both sides)

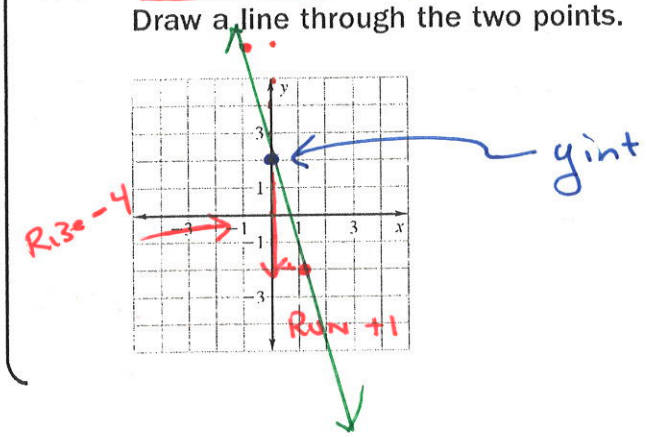
Step 2 IDENTIFY the slope and the y-intercept.

$m = \frac{-4}{1} = \frac{\text{Rise}}{\text{Run}}$ $b = 2$

Step 3 PLOT the point that corresponds to the y-intercept, (0, 2).

Step 4 Use the slope to locate a second point on the line. Draw a line through the two points.

$M = \frac{\text{Rise}}{\text{Run}} = \frac{-4}{1} = \frac{4}{-1}$



Checkpoint **Complete the following exercise.**

PUT IN $y = mx + b$

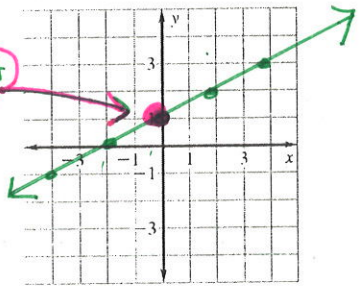
5. Graph the equation $-\frac{1}{2}x + y = 1$.

$y = \frac{1}{2}x + 1$

$m = 1/2$

$B = 1$

y int



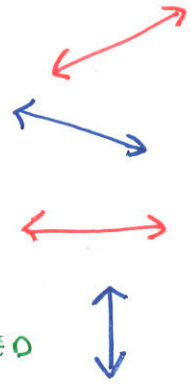
Review slope

+m

− M

M = 0

M = UNDEFINED



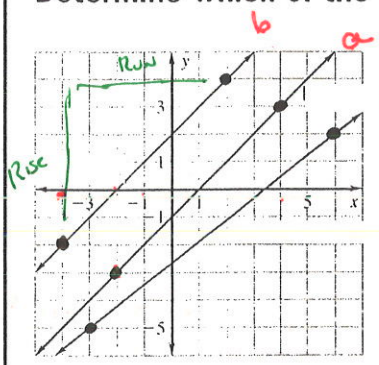
To find slope:

Given Graph $m = \frac{\text{Rise}}{\text{Run}}$

Given 2 points $m = \frac{\Delta y}{\Delta x}$

Example 3 *Identify parallel lines*

Determine which of the lines are parallel.



Line A: through (−2, −3); (4, 3)

Line B: through (−4, −2); (2, 4)

Line C: through (−3, −5); (6, 2)

Solution

Find the slope of each line. What equation will you use to find slope?

$m = \frac{\Delta y}{\Delta x}$

Line *a*: $m = \frac{\Delta y}{\Delta x} = \frac{-3-3}{-2-4} = \frac{-6}{-6}$ $m = 1$

Line *b*: $m = \frac{-2-4}{-4-2} = \frac{-6}{-6}$ $m = 1$

Line *c*: $m = \frac{-5-2}{-3-6} = \frac{-7}{-9}$ $m = 7/9$

Lines a and b have the same slope. They are parallel.

// lines are a and b

Checkpoint **Complete the following exercise.**

6. Determine which lines are parallel. EXPLAIN!

Line *a*: through (2, 5) and (−2, 2)

Line *b*: through (4, 1) and (−3, −4)

Line *c*: through (2, 3) and (−2, 0)

(a) $m = \frac{5-2}{2-(-2)} = \frac{3}{4}$ $m = 3/4$

(b) $m = \frac{1-(-4)}{4-(-3)} = \frac{5}{7}$ $m = 5/7$

(c) $m = \frac{3-0}{2-(-2)} = \frac{3}{4}$ $m = 3/4$

Lines a and c are //