Homework Qs

Note Title 10/5/2015

3.4 #25 Graph the line with $m=1$, $b=0$

Note: Equation is: $y=1x+0$

Simplified: $y=x$

Slope: $m=+\frac{1}{1}$

Similar Example:

Graph the equation.

$$y=2x$$

$x=0 \Rightarrow y=2(0)=0$

$(0,0)$

Slope-intercept form: $y=mx+b$

$y=2x+0$

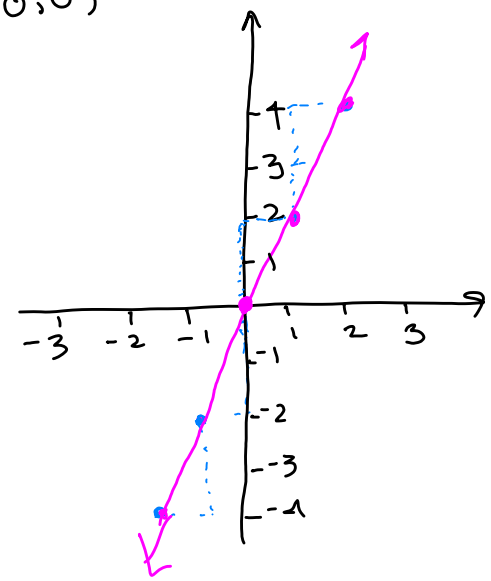
Slope: $m=+\frac{2}{1}$

y-intercept: $b=0$

Slope: ↗ +

vertical change: 2

horizontal change: 1



What if I had to graph $-3x=5y$?

Write in slope-intercept form $y=mx+b$: $5y=-3x$

$$y=-\frac{3}{5}x$$

$$y=-\frac{3}{5}x+0$$

3.5 #13 Graph $3x+2y=6$

write as $y=mx+b$:

$3x+2y=6$

$-3x \quad -3x$

$2y=-3x+6$

$\frac{2y}{2}=-\frac{3}{2}x+\frac{6}{2}$

$y=-\frac{3}{2}x+3$

y-intercept: 3

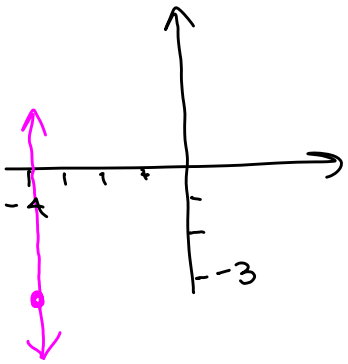
$m=-\frac{3}{2}$ ↘

3.5 #31) write the eqn of the line

$(-4, -3)$, m is undefined

undefined slope $\Rightarrow$ vertical line

Equation of line: $x = -4$



Recall:

Horizontal lines:

Eqn has the form $y = k$ (k is a number)

Slope is 0

Vertical lines:

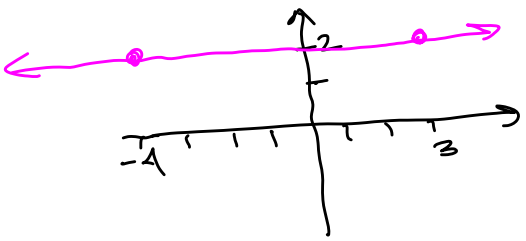
Eqn has form $x = k$ (k is a number)

Slope is undefined.

3.5 #41) write eqn of line through $(-4, 2), (3, 2)$

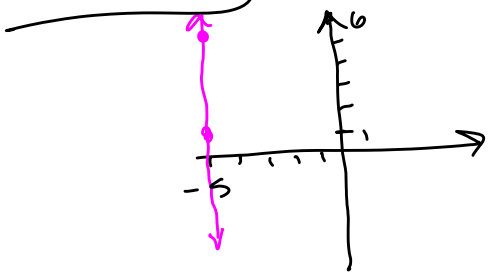
Note: $m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{2-2}{3-(-4)} = \frac{0}{3+4} = \frac{0}{7} = 0$

horizontal line



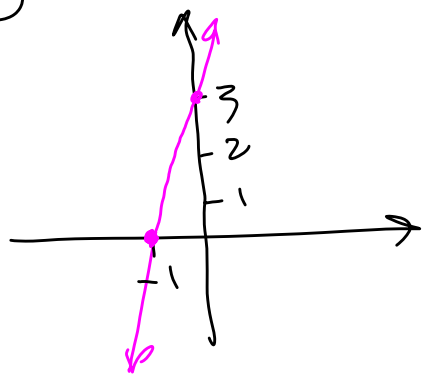
Eqn of line: **$y = 2$**

3.5 #43) write eqn of line through $(-5, 1), (-5, 6)$



Eqn of line: **$x = -5$**

3.5 #45) Find the eqn of the line shown:



y-intercept: $b = 3$

Slope: Is it (+) or (−)?

+

$m = +\frac{\text{Rise}}{\text{run}} = +\frac{3}{1} = 3$

$y = mx + b$ form with $m = 3$, $b = 3$ $\Rightarrow$ Eqn: $\boxed{y = 3x + 3}$

Ex: Find the eqn of line with x-intercept -3 and y-intercept -7.

Write the ordered pairs: $(-3, 0)$ and $(0, -7)$

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-7 - 0}{0 - (-3)} = \frac{-7}{0+3} = -\frac{7}{3}$$

$b = -7$

So eqn is $\boxed{y = -\frac{7}{3}x - 7}$

Review sheet #37) Find the eqn of line through $(-2, \frac{1}{3})$ and perpendicular to $x + 3y = 2$

Write eqn of given line in $y = mx + b$ form:

$$x + 3y = 2$$
$$3y = -x + 2$$
$$y = -\frac{1}{3}x + \frac{2}{3}$$

Slope of given line: $m_1 = -\frac{1}{3}$

Slope of desired line: $m = +\frac{3}{1} = 3$

See next page

#37 from review contd $(x_1, y_1) = (-2, \frac{1}{3})$

$m = 3$

Put $x=-2$, $y=\frac{1}{3}$, $m=3$ into $y = mx+b$

$m=3 \Rightarrow y = 3x+b$

$x=-2,\ y=\frac{1}{3} \Rightarrow \frac{1}{3} = 3(-2)+b$

$\frac{1}{3} = -6+b$

$\frac{1}{3}+6 = b$

$\frac{1}{3}+\frac{18}{3} = b$

$\frac{19}{3} = b$

Eqn of desired line: $\boxed{y = 3x+\frac{19}{3}}$

4.1: Multiplication with Exponents

Properties (Laws) of Exponents:

1) $x^a x^b = x^{a+b}$ Ex: $x^2x^3 = (xx)(xxx) = x^5$

2) $(x^a)^b = x^{ab}$ Ex: $(x^2)^3 = x^2x^2x^2 = (xx)(xx)(xx) = x^6$

3) $\frac{x^a}{x^b} = x^{a-b}$ as long as $x \neq 0$

Ex: $\frac{x^6}{x^4} = \frac{\cancel{x}\cancel{x}\cancel{x}\cancel{x}xx}{\cancel{x}\cancel{x}\cancel{x}\cancel{x}} = \frac{xx}{1} = x^2$

using $\frac{x}{x}=1$ For $x \neq 0$

4) $(xy)^a = x^a y^a$ Ex: $(xy)^3 = (xy)(xy)(xy) = xyxyxy = xxxyyy = x^3y^3$

5) $\left(\frac{x}{y}\right)^a = \frac{x^a}{y^a}$ Ex: $\left(\frac{x}{y}\right)^3 = \left(\frac{x}{y}\right)\left(\frac{x}{y}\right)\left(\frac{x}{y}\right) = \frac{x^3}{y^3}$

6) $x^0 = 1$ as long as $x \neq 0$

why? $\frac{2^3}{2^3} = \frac{8}{8} = 1$ must be equal!

From property #3, $\frac{2^3}{2^3} = 2^{3-3} = 2^0$ So, $2^0 = 1$

Know these Powers:

$2^2 = 4$	$3^2 = 9$	
$2^3 = 8$	$3^3 = 27$	
$2^4 = 16$	$3^4 = 81$	
$2^5 = 32$	$3^5 = 243$	
$2^6 = 64$	$3^6 = 729$	
$2^7 = 128$	$4^2 = 16$	
$2^8 = 256$	$4^3 = 64$	
$2^9 = 512$	$4^4 = 256$	
$2^{10} = 1024$	$5^2 = 25$	
	$5^3 = 125$	
	$5^4 = 625$	
$9^2 = 81$	$7^2 = 49$	$6^2 = 36$
$9^3 = 729$	$7^3 = 343$	$6^3 = 216$
$10^2 = 100$	$8^2 = 64$	
$10^3 = 1000$	$8^3 = 512$	
$10^4 = 10000$		

$10^7 = 10{,}000{,}000$

6 49 / 7 / 343

4 64 / 8 / 512

Note: $2^8 = 4^4$

$4^4 = (2^2)^4 = 2^8$

Signs of Powers

$$(-3)^2 = (-3)(-3) = \boxed{9}$$

$$-3^2 = -(3)(3) = \boxed{-9}$$

Ex: $(-2)^6 = (-2)(-2)(-2)(-2)(-2)(-2) = \boxed{64}$

(+) (+) (+)

$(-2)^5 = (-2)(-2)(-2)(-2)(-2) = \boxed{-32}$

(+) (+) (−)

Important:

* If you raise a negative number to an <u>even</u> power, you get a <u>positive</u> answer

* If you raise a negative number to an <u>odd</u> power, you get a <u>negative</u> answer.

Ex: $(-3)^4 = \boxed{81}$

$(-5)^3 = \boxed{-125}$

$-(-2)^4 = -(16) = \boxed{-16}$

$-(-1)^{13} = -(-1) = \boxed{1}$

Ex: $\left(\frac{3}{4}\right)^2 = \boxed{\frac{9}{16}}$

Ex: $\left(-\frac{2}{3}\right)^4 = +\frac{2^4}{3^4} = \boxed{\frac{16}{81}}$

$\left(-\frac{2}{3}\right)^5 = -\frac{2^5}{3^5} = \boxed{-\frac{32}{243}}$

Ex: $\frac{5^{11}}{5^9} = 5^{11-9} = 5^2 = \boxed{25}$

Ex: $3x^3x^5 = \boxed{3x^8}$ ← Prop. #1

Ex: $(3a^4)(-5a^6) = \boxed{-15a^{10}}$ ← Prop #1

Ex: $(x^3y^4)^5 = (x^3)^5(y^4)^5$ ← Prop # 4

$= \boxed{x^{15}y^{20}}$ ← Prop. # 2

Ex: $\left(\frac{z^4}{y}\right)^3 = \frac{(z^4)^3}{(y)^3} = \boxed{\frac{z^{12}}{y^3}}$

Ex: $(-2x^2)^5 = (-2)^5(x^2)^5$

$= \boxed{-32x^{10}}$

Ex: $(-3x^2)^3(-2x^4y)^4$

$= (-3)^3 x^6 \cdot (-2)^4 x^{16} y^4$

$= -27x^6 \cdot 16x^{16}y^4$

$= -27 \cdot 16 x^6 x^{16} y^4$

$= \boxed{-432x^{22}y^4}$

$4 \quad 27 \quad 16 \quad 16 \quad 2 \quad 27 \quad 4 \quad 3^2$

Ex: $\dfrac{(2x^2yz)(-x^4y^2z^3)^4}{(3xy)^2}$

$= \dfrac{2x^2yz\,(-1)^4 x^{16} y^8 z^{12}}{(3)^2 x^2 y^2}$

$= \dfrac{2(1)x^{18}y^9z^{13}}{9x^2y^2} = \boxed{\dfrac{2x^{16}y^7z^{13}}{9}} = \boxed{\dfrac{2}{9}x^{16}y^7z^{13}}$