Your Name

Mrs. T

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Lesson 3.4

Linear Functions

Standard Form and

Horizontal and Vertical Lines

Objective: To be able to solve for y in order to turn a function into slope-intercept form so that you can graph it. To be able to graph a line from standard form using intercepts.

Virtue/Skill: We are using our solving for a variable skills. We will be solidifying our understanding of intercepts and their usefulness.

Is it linear? | Does it have a y?

Are x and y both to the first power?

Are x and y only added or subtracted?

If so, write the equation in standard form.

$y = 5 - 2x$ *need to move x to side with y*   2$\widehat{x}$y - 5y = 6

yes

$+2x \quad +2x$

$\boxed{2x + y = 5}$

Standard form

x and y are multiplied

Not Linear

$3\left(\dfrac{1y}{3}\right) = (-1)3$ *Yes linear* $y = x^2 + 3$

y is -3
all the time
no matter the
x value

$y = -3$ *horizontal Line*   *Not Linear*

$\boxed{0x + y = -3}$

Standard Form

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standard form

$\underline{A}x + \underline{B}y = \underline{C}$ *x and y are on the same side*

x and y are on the same side

$\underline{A}$, $\underline{B}$, and $\underline{C}$ must be $\underline{\text{whole}}$ numbers   *(no decimals) no fractions*

A must be $\underline{\text{positive}}$

Turning it into Standard Form

$y = 4x - 2$

$-4x \quad -4x$

$-1(-4x + y = -2)$

$4x - y = 2$

almost standard form
multiply by -1 to make A positive

$\frac{3}{4}x = y + 8$

$-y \qquad -y$

$-1\left(\frac{3}{4}x - y = 8\right)$

$3x - 4y = 32$

multiply by denominator

$4\left(\frac{3}{4}x - \frac{1}{6}y = 8\right)$

$6\left(3x - \frac{4}{6}y = 32\right)$

$18x - 4y = 192$

$12\left(\frac{3}{4}x - \frac{1}{6}y = 8\right)$

$9x - 2y = 96$

or multiply by LCM of denominators
$4 \& 6 = 12$

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x intercept

the point at which the line crosses the x-axis

$(\underline{\quad}, 0)$

y value is 0

(-2, 0)   (5, 0)
(4, 0)   (2, 0)   x axis
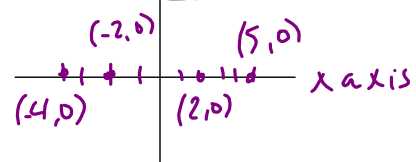
y intercept

the point at which the line crosses the y-axis

$(0, \underline{\quad})$

x value is 0

(0, 3) y axis
(0, 1)
(0, -3)

(-3, 0)
x intercept

4

y intercept
(0, 4)

-3
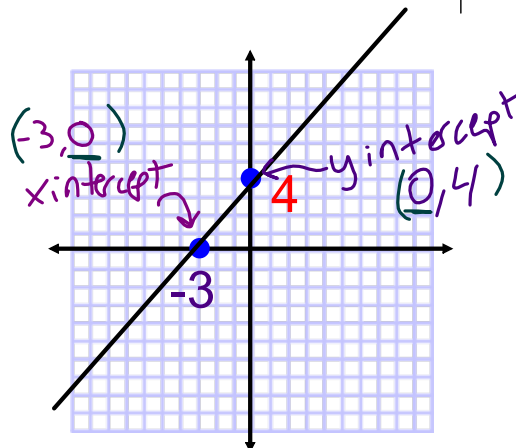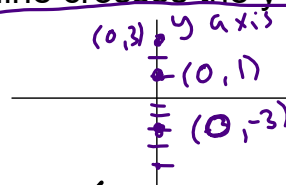
Finding the x and y intercept from an equation

x Intercept	y Intercept
(__,0)	(0, __)
Substitute in 0 for y and solve for x	Substitute in 0 for x and solve for y

$$y = -x - 5$$

x int
let $y = 0$
$0 = -x - 5$
$+x \quad +x$
$x = -5$
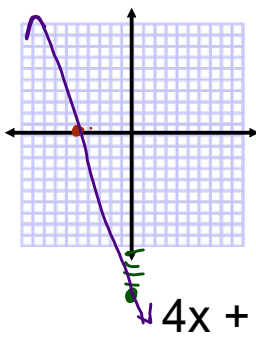x int $(-5, 0)$

y int
let $x = 0$
$y = -(0) - 5$
$y = 0 - 5$
$y = -5$
y int: $(0, -5)$

$$3x + y = -15$$
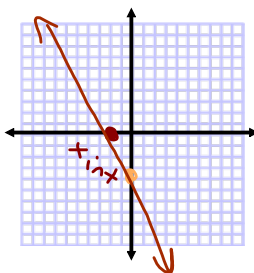

x int
$(-5, 0)$
$3x + 0 = -15$
$3x = -15$
$x = -5$

y int
$(0, -15)$
$3(0) + y = -15$
$y = -15$

$$4x + 2y = -8$$

x int
$(-2, 0)$
y will be 0
$4x + 2(0) = -8$
$\dfrac{4x}{4} = \dfrac{-8}{4}$
$x = -2$

y int
$(0, -4)$
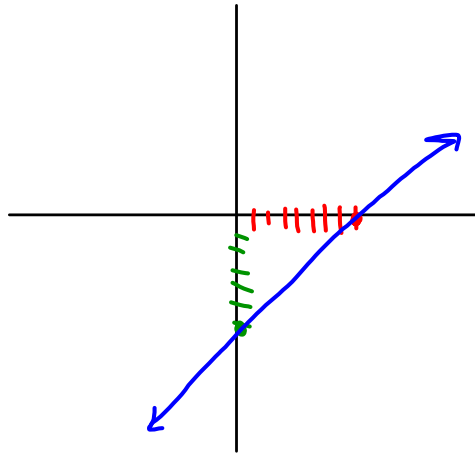x will be 0
$4(0) + 2y = -8$
$\dfrac{2y}{2} = \dfrac{-8}{2}$
$y = -4$

$$3x - 4y = 24$$

X int

let y = 0

$3x - 4(0) = 24$

$\dfrac{3x}{3} = \dfrac{24}{3}$

$x = 8$

$(8, 0)$

Y int

let x = 0

$3(0) - 4y = 24$

$\dfrac{-4y}{-4} = \dfrac{24}{-4}$

$y = -6$

x graph of negative
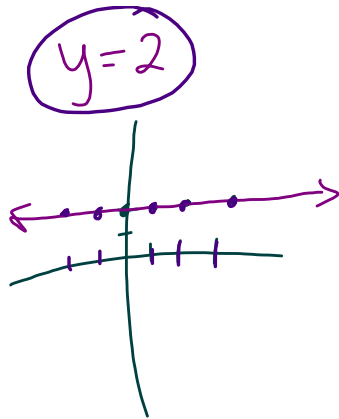
$(0, -6)$

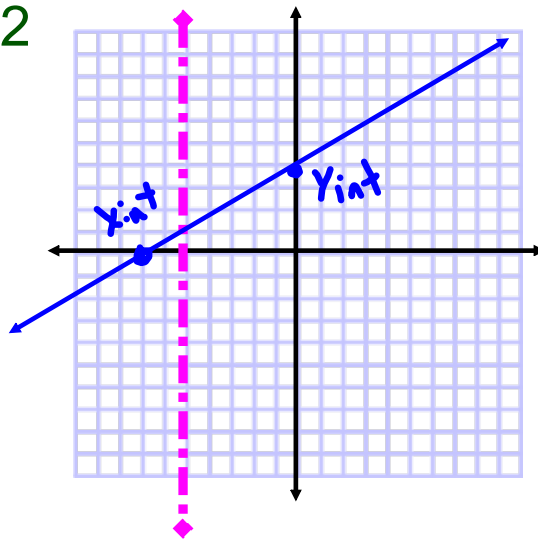|		
Horizontal Lines	$y = \#$ • slope is 0...0x • y is that output value for any x value input $y = 0x + 4$ $y = 4$	$y = 2$
Vertical Lines	$x = \#$ • slope is undefined • <u>Linear, but not a function</u> • x is that value for all y values. (x is the only input allowed, and you get every y value outputed)	$x = 2$
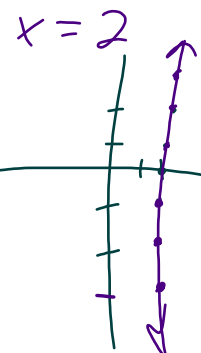
Your Turn! Graph each.

$2x - 3y = -12$

$(0, 4)$

$(-6, 0)$

x-int

y-int

x= -5

x	y
-3	-2
-5	-1
-5	0

Summary

Objective: To be able to solve for y in order to turn a function into slope-intercept form so that you can graph it. To be able to graph a line from standard form using intercepts.

Virtue/Skill: We are using our solving for a variable skills from 1.5. We will be solidifying our understanding of intercepts and their usefulness.
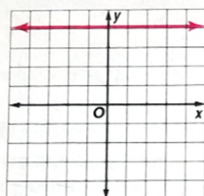
Assignment: Worksheet

Assignment: Textbook pg. 133 # 3-11 odd only, and 13,17,19, 21, and 25 and 26
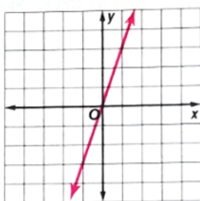
Homework Answers 3-3

1. no   2. yes; 3x = y =2   3. yes; 5x - y = -4   4. yes; 2x - y = -5

5. yes; 6x - y = 7   6. no   7. yes; y = 4   8. yes; x = 3y = 1

9. yes; y = 2

10. x int: (2,0)   y int: (0,-2)   11. x int: (4,0)   y int: (0,4)   12. x int: (2,0)   y int: (0,4)
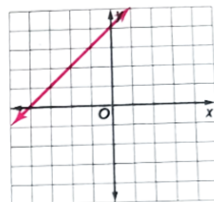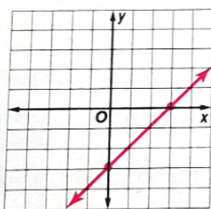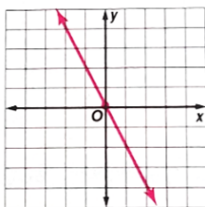
13.

13. $y = 4$

14. $y = 3x$

15. $y = x + 4$

Graph each equation by using the x-intercept and y-intercept.

16. $x - y = 3$

17. $10x = -5y$

18. $4x = 2y + 6$