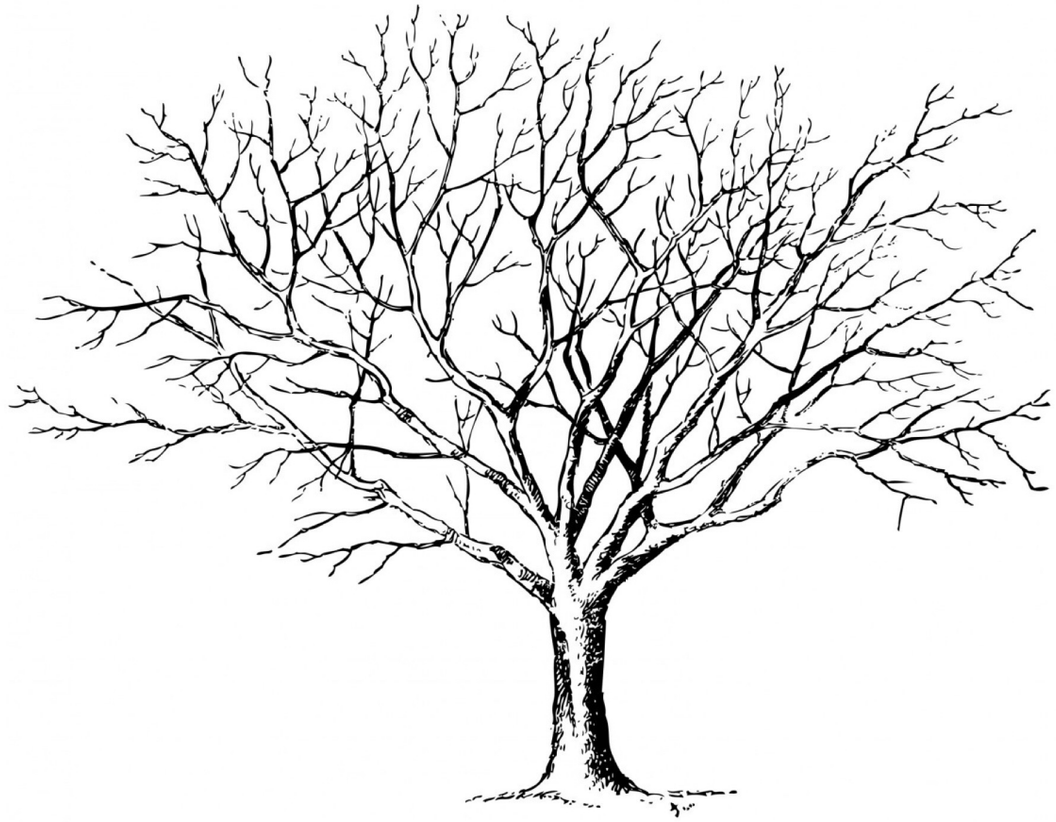
TheTutor

MATH · PHYSICS



# Live-Lecture

# Math 1201 Chapter 6

# Linear Functions

# Chapter 6 - Linear equations

slope intercept form : $y = \text{slope}\ x + \text{y-intercept}$

point slope form: $y - \text{y-value of point} = \text{slope}\ (x - \text{x-value of point})$

Note: **change sign** of **the point**

general form: $Ax + By + C = 0$

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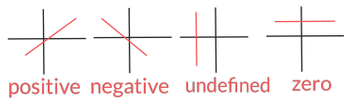
Finding the slope:




HOY
- Horizontal
- 0 slope
- y=

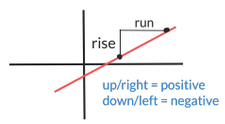
VUX
Vertical
Undefined
x=

- given
- two points are given

$\text{Slope} = \frac{y_2 - y_1}{x_2 - x_1}$

- graph is given

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




- parallel line is given

**Parallel** lines = **same slope**

- perpendicular line is given

**Perpendicular** lines = **opposite sign** and **flips of each other**

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Graphing

Graphing an equation

- Mark a point
- Use the rise over run to mark a second point
- Draw a line through the points

Finding x-intercepts: let y=0, solve for x

Finding y-intercept: let x=0, solve for y

Change slope point form to slope-intercept form:

Distribute the slope: $y + 1 = 3(x - 2)$

Bring the number to the other side: $y + 1 = 3x - 6$ (−1)

$y = 3x - 6 - 1$

$y = 3x - 7$

---

Change from general form to slope intercept form

Get the term with y by itself by moving other numbers over: $4x + 3y - 12 = 0$ (−4x, +12)

$3y = -4x + 12$

Divide to get y by itself: $\frac{3y}{3} = \frac{-4x}{3} + \frac{12}{3}$

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

---

Change to general form

Distribute the slope (if necessary): $y + 2 = \frac{1}{2}(x - 1)$

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

Multiply every term by the denominator: $y + 2 = \frac{1}{2}x - \frac{1}{2}$ (·2 ·2 ·2 ·2)

$2y + 4 = 1x - 1$ (−4)

Move everything to one side
x should be positive
x first, y second, number last = 0

$0 = 1x - 2y - 1 - 4$

$0 = 1x - 2y - 5$

# Finding the equation of a line in **slope intercept form**

$y = \text{slope}\ x + \text{y-intercept}$

In order to write slope intercept form you need **two things:**

- slope
- y-intercept

Finding the slope:

- given
- two points are given

$\text{Slope} = \frac{y_2 - y_1}{x_2 - x_1}$

- graph is given

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

- parallel line is given

**Parallel** lines = **same slope**

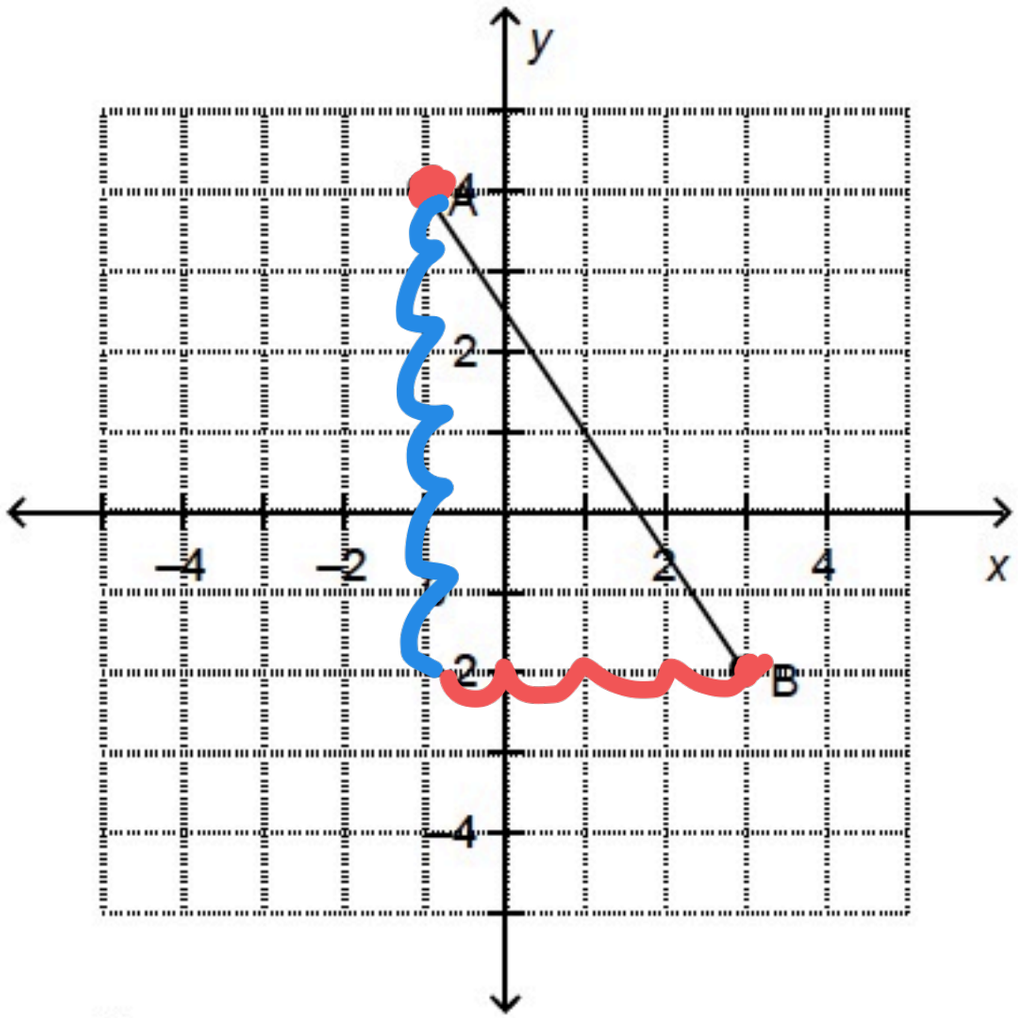
Finding the y-intercept

- plug a given point (x,y) into

$y = \text{slope}\ x + \text{y-intercept}$

- plug in the slope

1. Determine the slope of this line segment.




$\frac{-6}{+4} = -\frac{3}{2}$

a. $-\frac{2}{3}$

b. $-\frac{3}{2}$

c. $\frac{2}{3}$

d. $\frac{3}{2}$

$x_1$ $y_1$ $x_2$ $y_2$

2. Determine the slope of the line that passes through G(3, –3) and H(–5, 9).

a. $\frac{3}{2}$

b. $-\frac{2}{3}$

c. $\frac{2}{3}$

d. $-\frac{3}{2}$

$$\frac{y_2 - y_1}{x_2 - x_1} = \frac{9 - (-3)}{-5 - 3} = \frac{12}{-8}$$

$$= -\frac{3}{2}$$

4. A line has $x$-intercept 2 and $y$-intercept 6? Determine the slope of the line.

a. $\frac{1}{3}$

b. 3

c. $-3$

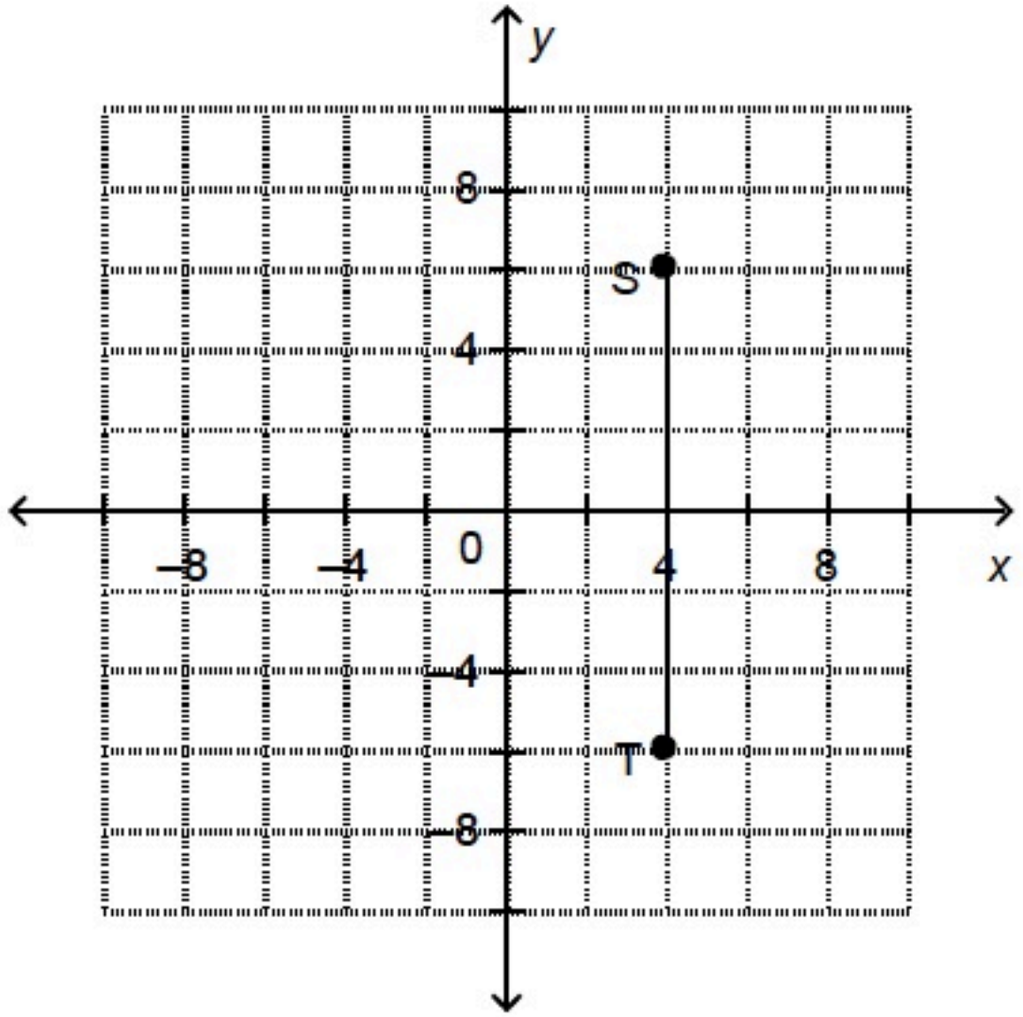
d. $-\frac{1}{3}$

$x$-intercept 2 $(2, 0)$ $x_1 \ y_1$

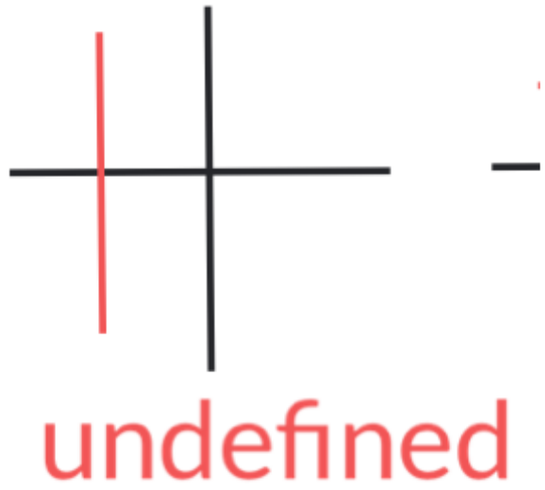
$y$-intercept 6 $(0, 6)$ $x_2 \ y_2$

$$\frac{y_2 - y_1}{x_2 - x_1} = \frac{6 - 0}{0 - 2} = \frac{6}{-2} = -3$$

3. Is the slope of this line segment positive, negative, zero, or not defined?




a. zero
b. positive




c. not defined
d. negative

Chapter 6 - Linear equations

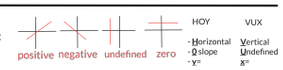
slope intercept form : y = slope x + y-intercept

point slope form: y - y-value of point = slope (x - x-value of point)

Note: change sign of the point

general form: Ax + By + C = 0

Finding the slope:




HOY
- Horizontal
- 0 slope
- $y^0$

VUX
Vertical
Undefined
$x^0$

- given
- two points are given
- graph is given
- parallel line is given
- perpendicular line is given

Slope= $\frac{y_2 - y_1}{x_2 - x_1}$

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


Parallel lines = same slope

Perpendicular lines = opposite sign and flips of each other

Graphing

Graphing an equation
- Mark a point
- Use the rise over run to mark a second point
- Draw a line through the points

Finding x-intercepts: let y=0, solve for x

Finding y-intercept: let x=0, solve for y

6. The slope of a line is $\frac{1}{7}$. What is the slope of a line that is parallel to this line?

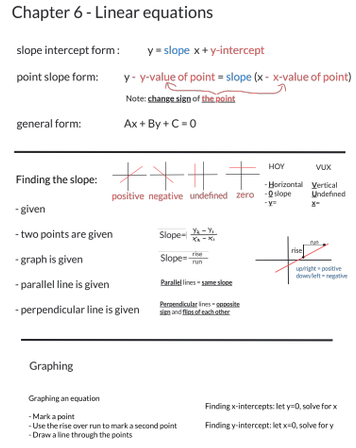
a. 7

b. $\frac{14}{2}$

c. $\frac{2}{14} = \frac{1}{7}$

d. $-7$

**Parallel** lines = **same slope**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general form: Ax + By + C = 0

Finding the slope:

positive negative undefined zero

HOY
- Horizontal
- 0 slope
- y=

VUX
- Vertical
- Undefined
- x=

- given
- two points are given
- graph is given
- parallel line is given
- perpendicular line is given

Slope= $\frac{y_2 - y_1}{x_2 - x_1}$

Slope= $\frac{rise}{run}$

Parallel lines = same slope

Perpendicular lines = opposite sign and flips of each other

rise run

up/right = positive
down/left = negative

Graphing

Graphing an equation

- Mark a point
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- Draw a line through the points

Finding x-intercepts: let y=0, solve for x

Finding y-intercept: let x=0, solve for y

$x_1$ $y_1$ $x_2$ $y_2$

5. Determine the slope of a line that is perpendicular to the line through W(–9, 7) and X(6, –10).

a. $-\frac{15}{17}$

b. $-\frac{17}{15}$

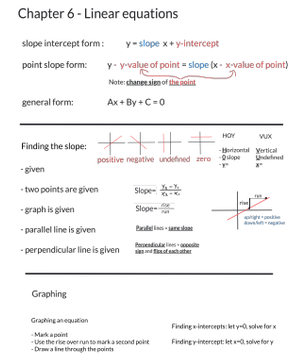
c. –15

d. $\frac{15}{17}$

$$\frac{y_2-y_1}{x_2-x_1} = \frac{-10-7}{6-(-9)} = \frac{-17}{15}$$

**Perpendicular** lines = **opposite sign** and **flips of each other**

$$= +\frac{15}{17}$$



Chapter 6 - Linear equations

slope intercept form : y = slope x + y-intercept

point slope form: y - y-value of point = slope (x - x-value of point)

Note: change sign of the point

general form: Ax + By + C = 0

Finding the slope:

positive negative undefined zero

HOY
- Horizontal
0 slope
-Y-

VUX
Vertical
undefined
-X-

- given
- two points are given — Slope= $\frac{y_2-y_1}{x_2-x_1}$
- graph is given — Slope= $\frac{rise}{run}$
- parallel line is given — Parallel lines = same slope
- perpendicular line is given — Perpendicular lines = opposite sign and flips of each other

up/right = positive
down/left = negative

Graphing

Graphing an equation
- Mark a point
- Use the rise over run to mark a second point
- Draw a line through the points

Finding x-intercepts: let y=0, solve for x

Finding y-intercept: let x=0, solve for y

positive negative undefined zero

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Graphing

Graphing an equation

- Mark a point
- Use the rise over run to mark a second point
- Draw a line through the points

Finding x-intercepts: let y=0, so

Finding y-intercept: let x=0, sol

7. Write an equation for the graph of a linear function that has slope $-\frac{1}{3}$ and $y$-intercept –3.

a. $y = -3x - \frac{1}{3}$

b. $y = -\frac{1}{3}x - 3$

c. $y = \frac{1}{3}x + 3$

d. $y = 3x - \frac{1}{3}$

slope intercept form : y = slope x + y-intercept

$y = -\frac{1}{3} \times -3.$

y-intercept

8. For a service call, a plumber charges a $95 initial fee, plus $45 for each hour he works. Write an equation to represent the total cost, $C$ dollars, for $t$ hours of work.

a. $t = 45C + 95$
b. $C = 95t + 45$
c. $C = 45t + 95$
d. $C = 45t - 95$

$45 for each hour  $95 initial fee

slope intercept form : $y = \text{slope}\ x + \text{y-intercept}$

$C = 45 \cdot t + 95$

Chapter 6 - Linear

slope intercept form :

point slope form: y -

No

general form: Ax

Finding the slope:

positiv

- given
- two points are given
- graph is given
- parallel line is given
- perpendicular line is given

Which equations represent perpendicular lines?

a. $y = 6x - 7,\ y = 6x + 7$

b. $y = -7x + 11,\ y = \frac{1}{7}x + 6$

c. $y = 11x - 7,\ y = 11x + \frac{1}{7}$

d. $y = \frac{1}{6}x + 6,\ y = 6x + 6$

**Perpendicular** lines = **opposite sign** and **flips of each other**

y = slope x + y-intercept

Chapter 6 - Linear equa

slope intercept form : y = slo

point slope form: y - y-value

Note: change

general form: Ax + By + C

Finding the slope:

Describe the graph of the linear function with this equation: $y+3=\frac{1}{3}(x-2)$

a. The graph is a line through (–2, 3) with slope $\frac{1}{3}$.

b. The graph is a line through (2, −3) with slope $\frac{1}{3}$.

c. The graph is a line through (2, −3) with slope $-\frac{1}{3}$.

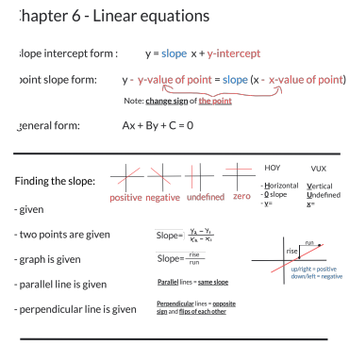
d. The graph is a line through (–2, 3) with slope $-\frac{1}{3}$.

point slope form: y - y-value of point = slope (x - x-value of point)

Note: **change sign** of **the point**

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

$(2, -3)$


Chapter 6 - Linear equations

slope intercept form : y = slope x + y-intercept

point slope form: y - y-value of point = slope (x - x-value of point)

Note: change sign of the point

general form: Ax + By + C = 0

Finding the slope: positive negative undefined zero HOY - Horizontal - 0 slope - y= VUX - Vertical - Undefined - x=

- given
- two points are given — Slope= $\frac{y_2-y_1}{x_2-x_1}$
- graph is given — Slope= $\frac{rise}{run}$ (rise, run; upright = positive, down/left = negative)
- parallel line is given — Parallel lines = same slope
- perpendicular line is given — Perpendicular lines = opposite sign and flip of each other

Write an equation for the graph of a linear function that has slope $\frac{2}{7}$ and passes through S(–4, 5).

a. $y+5=\frac{2}{7}(x-4)$

b. $y-5=-\frac{2}{7}(x+4)$

c. $y-5=-\frac{7}{2}(x+4)$

d. $y-5=\frac{2}{7}(x+4)$

S(–4, 5)

$y - 5 = \frac{2}{7}(x + 4)$

y - y-value of point = slope (x - x-value of point)

Note: **change sign** of **the point**

## Chapter 6 - Linear equations

slope intercept form: y = slope x + y-intercept

point slope form: y - y-value of point = slope (x - x-value of point)

Note: change sign of the point

general form: Ax + By + C = 0

Finding the slope:

positive negative undefined zero

HOY
- Horizontal
0 slope
- $y=$

VUX
Vertical
Undefined
$x=$

- given
- two points are given
- graph is given
- parallel line is given
- perpendicular line is given

Slope= $\frac{y_2-y_1}{x_2-x_1}$

Slope= $\frac{rise}{run}$

Parallel lines = same slope

Perpendicular lines = opposite sign and flips of each other

rise
run
up/right = positive
down/left = negative

Graphing

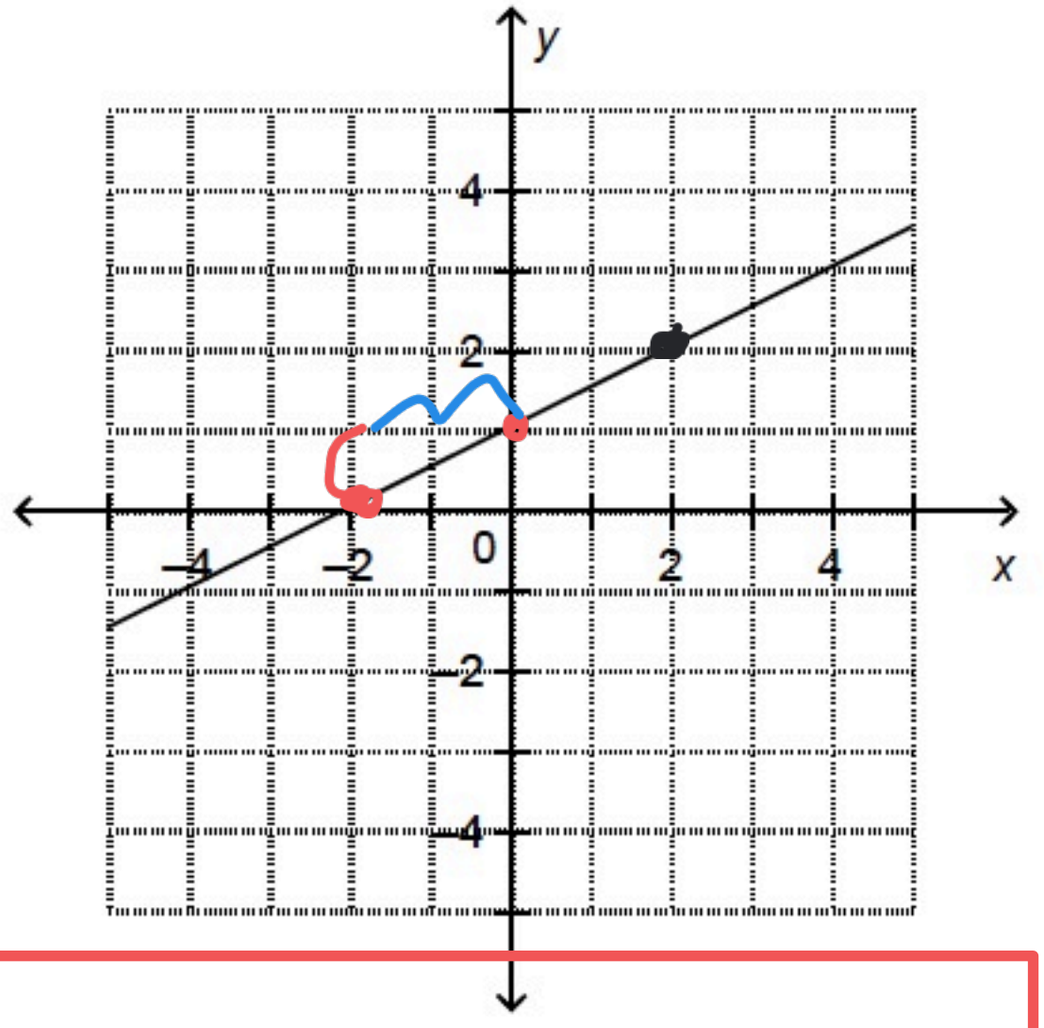
Graphing an equation

- Mark a point
- Use the rise over run to mark a second point
- Draw a line through the points

Finding x-intercepts: let y=0, solve for x

Finding y-intercept: let x=0, solve for y

Write an equation in slope-point form for this line.




$$\text{Slope} = \frac{\text{rise}}{\text{run}} = \frac{1}{2}$$

y - y-value of point = slope (x - x-value of point)

Note: **change sign** of **the point**

a. $y - 2 = \frac{1}{2}(x - 2)$ (2, 2)

b. $y + 2 = -\frac{1}{2}(x + 2)$

c. $y - 2 = -\frac{1}{2}(x - 2)$

d. $y + 2 = \frac{1}{2}(x + 2)$ (−2, −2)

Write this equation in slope-intercept form: $y-3=-\frac{2}{7}(x+10)$

a. $y=\frac{2}{7}x+\frac{1}{7}$

b. $y=-\frac{2}{7}x+\frac{1}{7}$

c. $y=-7x+1$

d. $y=-\frac{1}{7}x+\frac{2}{7}$

Distribute the slope

$y-3=-\frac{2}{7}(x+10)$

Bring the number to the other side

$y-3=-\frac{2}{7}x-\frac{20}{7}$

$+3$

$y=-\frac{2}{7}x-\frac{20}{7}+3$

$y=-\frac{2}{7}x+\frac{1}{7}$

Change slope point form to slope-intercept form:

Distribute the slope $y+1=3(x-2)$

Bring the number to the other side $y+1=3x-6$

$y=3x-6-1$

$y=3x-7$

Change from general form to slope intercept form

Get the term with y by itself by moving other numbers over $4x+3y-12=0$

$3y=-4x+12$

Divide to get y by itself $\frac{3y}{3}=\frac{-4x+12}{3}$

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

Change to general form

Write an equation in slope-point form for the line that passes through A(–2, 4) and B(–9, 6).

a. $y - 6 = -\frac{2}{7}(x + 2)$

b. $y + 4 = -\frac{2}{7}(x - 2)$

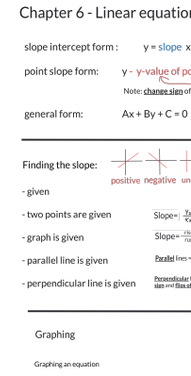
c. $y - 4 = -\frac{2}{7}(x + 2)$

d. $y + 6 = \frac{2}{7}(x - 2)$

point slope form: y - y-value of point = slope (x - x-value of point)

Note: **change sign** of the point

$$\text{Slope} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{6 - 4}{-9 - (-2)} = \frac{2}{-7} = -\frac{2}{7}$$



Determine the $y$-intercept of the graph of this equation: $y - 3 = 4(x + 5)$

a. 3

b. $-23$

c. 23

d. $-20$

Distribute the slope

$y - 3 = 4(x + 5)$

Bring the number to the other side

$y - 3 = 4x + 20$

$+ 3$

$y = 4x + 20 + 3$

$y = 4x + 23$

y = slope x + y-intercept



Chapter 6 - Linear equations

slope intercept form : y = slope x + y-intercept

point slope form: y - y-value of point = slope (x - x-value of point)

Note: change sign of the point

general form: Ax + By + C = 0

Finding the slope: positive negative undefined zero

HOY
- Horizontal
- 0 slope
- $y=$

VUX
- Vertical
- Undefined
- $x=$

- given
- two points are given — Slope= $\frac{y_2 - y_1}{x_2 - x_1}$
- graph is given — Slope= $\frac{rise}{run}$
- parallel line is given — Parallel lines = same slope
- perpendicular line is given — Perpendicular lines = opposite sign and flips of each other

rise, run

upright = positive
down/left = negative

Graphing

Graphing an equation

Write an equation for the line that passes through U(3, –7) and is perpendicular to the line $y = \frac{1}{7}x - 9$.

a. $y + 7 = -\frac{1}{7}(x + 3)$

b. $y - 7 = 7(x + 3)$

c. $y + 7 = -7(x - 3)$

d. $y + 7 = 7(x - 3)$

**Perpendicular** lines = **opposite sign** and **flips of each other**

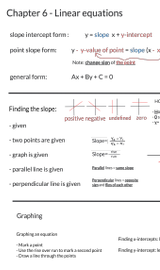
$$y = \frac{1}{7}x - 9.$$

our slope = − 7

y + 7 = 7 ( x − 3 )

y - y-value of point = slope (x - x-value of point)

Note: **change sign** of **the point**


Chapter 6 - Linear equations

slope intercept form : y = slope x + y-intercept

point slope form: y - y-value of point = slope (x - x

Note: change sign of the point

general form: Ax + By + C = 0

Finding the slope:

positive negative undefined zero

- given
- two points are given
- graph is given
- parallel line is given
- perpendicular line is given

Parallel lines = same slope

Perpendicular lines = opposite sign and flips of each other

Graphing

Graphing an equation

-Mark a point
-Use the rise over run to mark a second point
-Draw a line through the points

In which form is the equation $5x + 6y - 8 = 0$ written?

a. Standard form
b. Slope-intercept form
c. General form
d. Slope-point form

general form: $Ax + By + C = 0$

## Chapter 6 - Linear equations

slope intercept form : y = slope x + y-

point slope form: y - y-value of point

Note: change sign of the

general form: Ax + By + C = 0

---

Finding the slope: positive negative undefin

- given
- two points are given Slope= $\frac{y_2 - y_1}{x_2 - x_1}$

Write this equation in general form: $y = -\frac{3}{2}x + 8$

a. $3x + 2y - 16 = 0$

b. $3x - 2y + 8 = 0$

c. $3x + 2y - 8 = 0$

d. $-3x - 2y - 16 = 0$

Distribute the slope (if necessary)

Multiply every term
by the denominator

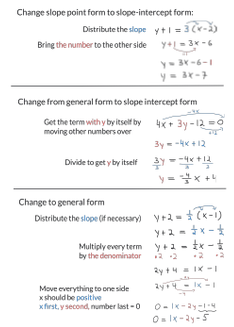
$$y = -\frac{3}{2}x + 8$$

$\cdot 2 \quad \cdot 2 \quad \cdot 2$

$2y = -3x + 16$

Move everything to one side
x should be positive
x first, y second, number last = 0

$3x + 2y - 16 = 0$



Write this equation in general form: $y + 5 = \frac{5}{3}(x - 3)$

a. $5x - 3y = -8$

b. $5x - 3y - 8 = 0$

c. $5x - 3y - 30 = 0$

d. $5x + 3y - 30 = 0$

Distribute the slope (if necessary)

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

Multiply every term
by the denominator

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

$\cdot 3 \quad \cdot 3 \quad \cdot 3 \quad \cdot 3$

$3y + 15 = 5x - 15$

Move everything to one side
x should be positive
x first, y second, number last = 0

$0 = 5x - 3y - 15 - 15$

$0 = 5x - 3y - 30$

Change slope point form to sl

Distribute th

Bring the number to the oth

Determine the $x$-intercept and the $y$-intercept for the graph of this equation: $2x - 3y + 36 = 0$

a. $x$-intercept: 18; $y$-intercept: 12
b. $x$-intercept: $-18$; $y$-intercept: $-12$
c. $x$-intercept: 18; $y$-intercept: $-12$
d. $x$-intercept: $-18$; $y$-intercept: 12

Finding x-intercepts: let y=0, solve for x

$$2x + 36 = 0$$

$$\frac{2x}{2} = \frac{-36}{2}$$

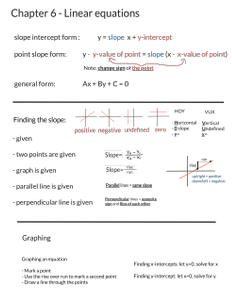
$$x = -18$$

Finding y-intercept: let x=0, solve for y

$$-3y + 36 = 0$$

$$\frac{-3y}{-3} = \frac{-36}{-3}$$

$$y = 12$$



Chapter 6 - Linear equations

slope intercept form: $y = \text{slope}\ x + y\text{-intercept}$

point slope form: $y - y\text{-value of point} = \text{slope}(x - x\text{-value of point})$

Note: changes sign of the point

general form: $Ax + By + C = 0$

Finding the slope:
- given
- two points are given
- graph is given
- parallel line is given
- perpendicular line is given

HOY: positive, negative, undefined, zero

VUX: Horizontal $0=$ Rise $y=$; Vertical Undefined $x=$

Slope= $\frac{y_2-y_1}{x_2-x_1}$

Slope= $\frac{rise}{run}$

Parallel lines = same slope

Perpendicular lines = opposite sign and flip of each other

Graphing

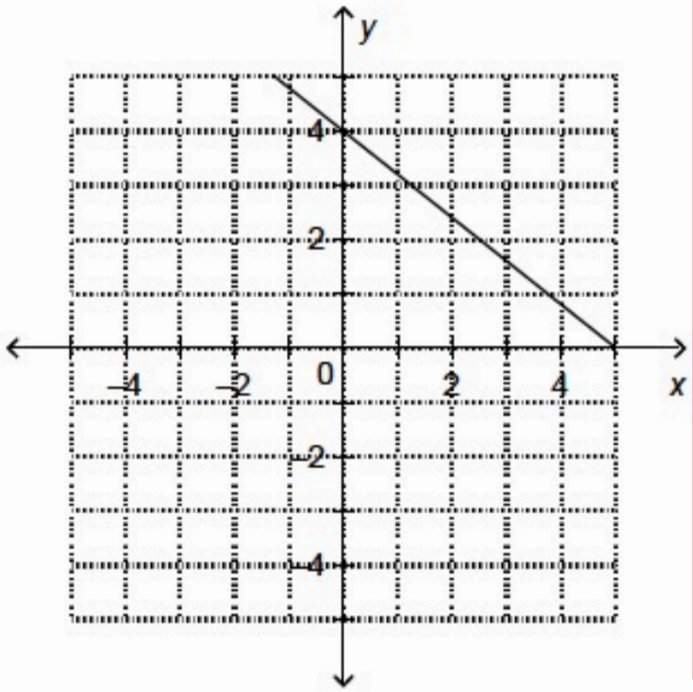
Graphing an equation:
- Mark a point
- Use the rise over run to mark a second point
- Draw a line through the points

Finding x-intercepts: let y=0, solve for x

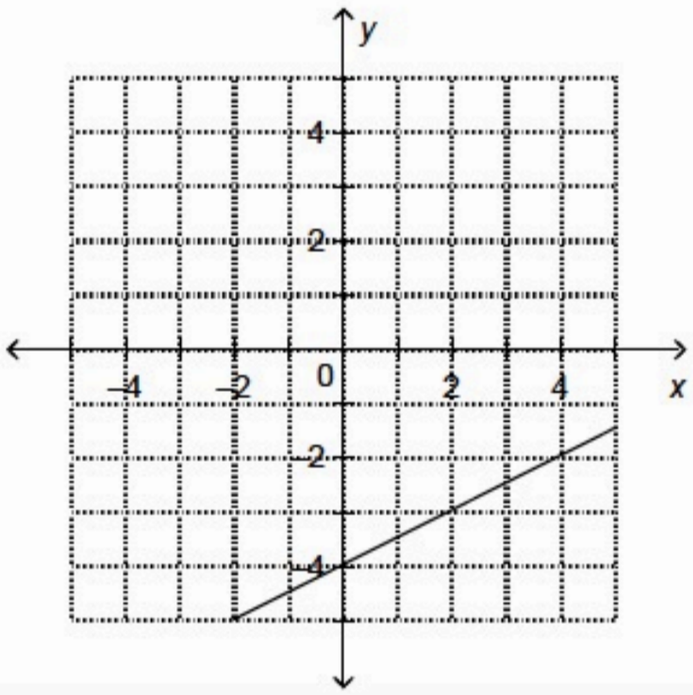
Finding y-intercept: let x=0, solve for y

Which graph represents the equation $4x - 5y - 20 = 0$?

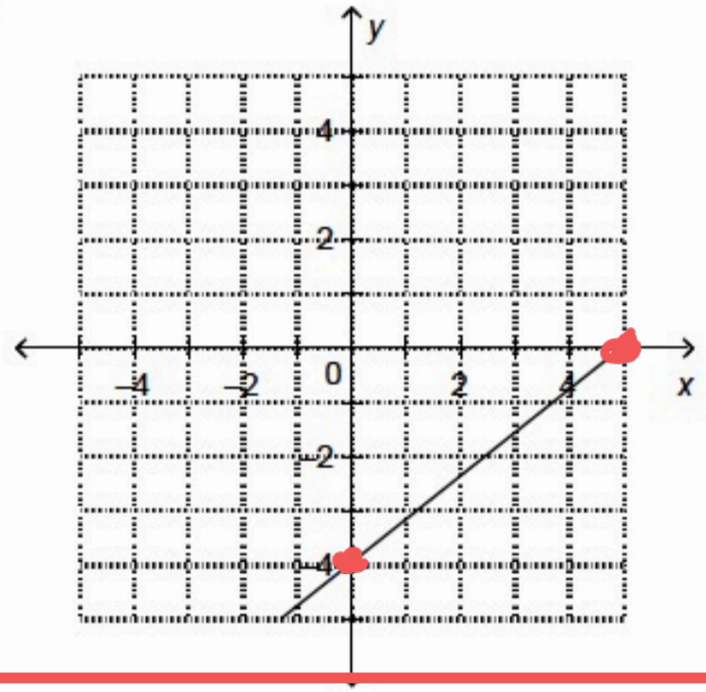
a.



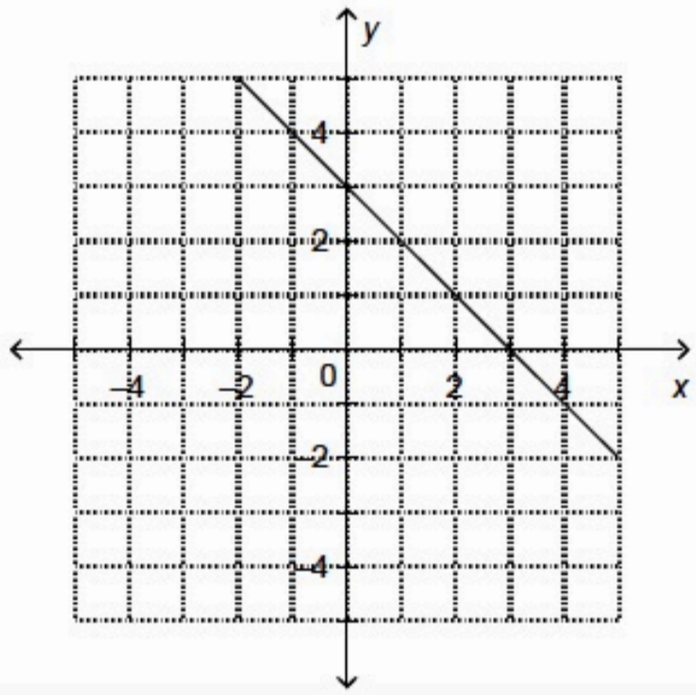

b.




c.




d.




$4x - 20 = 0$

$\frac{4x}{4} = \frac{20}{4}$

$x = 5$

$-5y - 20 = 0$

$\frac{-5y}{-5} = \frac{20}{-5}$

$y = -4$