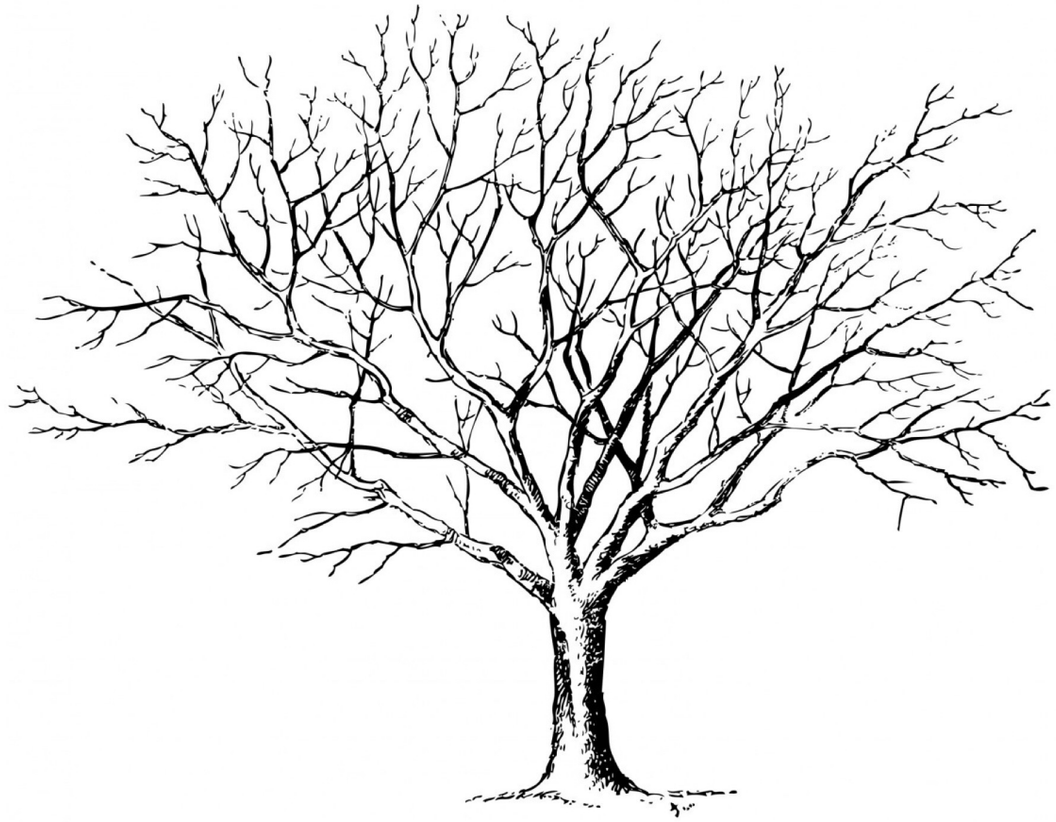
TheTutor

MATH · PHYSICS



Live-Lecture

Math 1201 Chapter 6

Linear Functions

Sample test

Chapter 6 - Linear equations

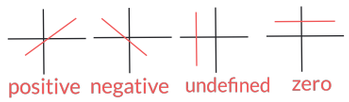
slope intercept form : $y = \text{slope}\ x + \text{y-intercept}$

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: $Ax + By + C = 0$

Finding the slope:



HOY
- Horizontal
- 0 slope
- y=

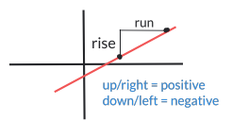
VUX
Vertical
Undefined
x=

- 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**

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

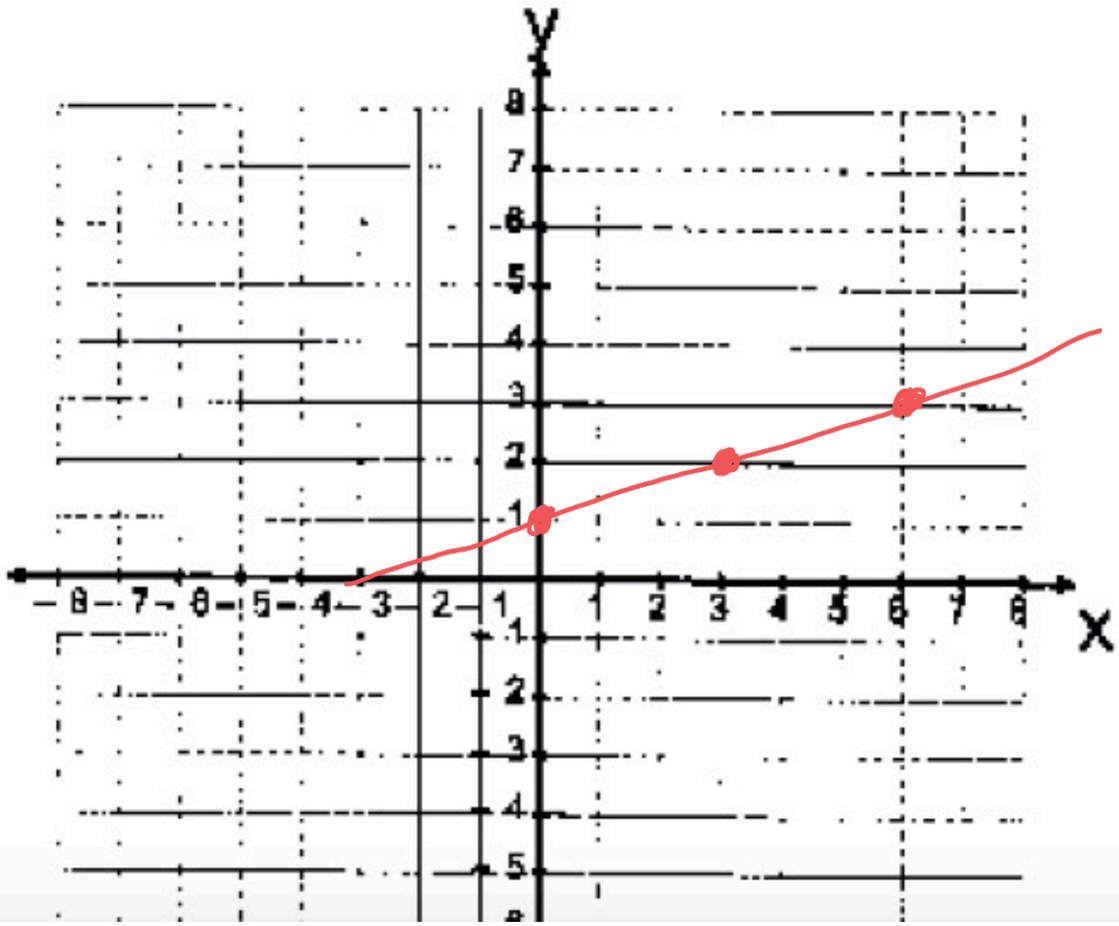
1. The points $(0, 1)$, $(3, 2)$, and $(6, 3)$, when graphed, lie on a line. What is the equation of the line containing these points?

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

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

C. $y = \frac{1}{3}x$

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



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

$+\ \frac{1}{3}\ x\ +\ 1$

th

s

Chapter 6 - Linear eq

slope intercept form : y

point slope form: y - y-v

Note: ch

general form: Ax + B

Finding the slope:

positive re

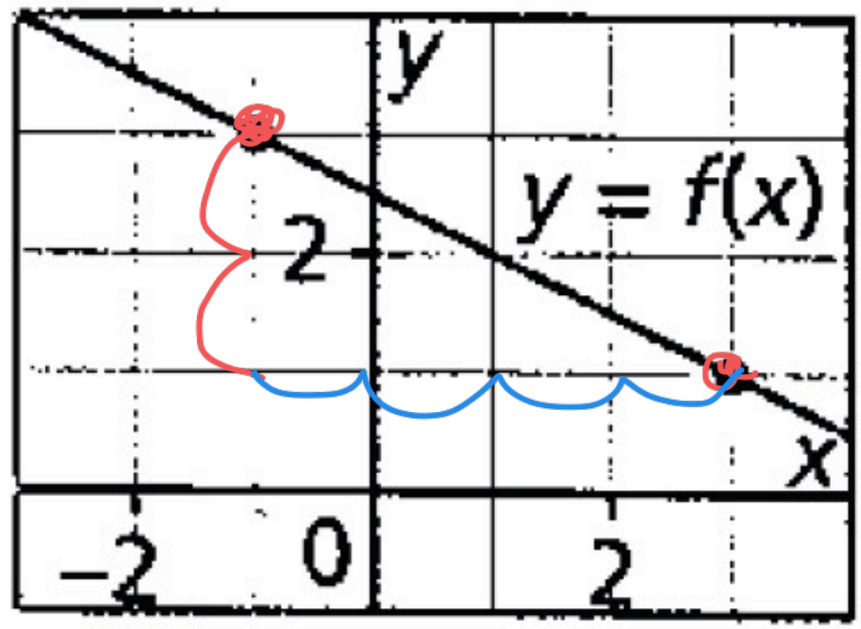
2. What is the slope of this line?

A. -2

B. $-\frac{1}{2}$

C. $\frac{1}{2}$

D. 2



-2

4

- graph is given

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

$$= \frac{-2}{4}$$

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

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

run, rise; 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

4. What is the slope of the line containing points A(-5, 2) and B(7,4)?

A. $-\frac{1}{6}$

B. -6

C. $\frac{1}{6}$

D. 1

- two points are given

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

x_1 y_1 x_2 y_2

A(-5, 2) and B(7,4)

$$= \frac{4-2}{7-(-5)} = \frac{2}{12} = \frac{1}{6}$$

Chapter 6 - Linear equations

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

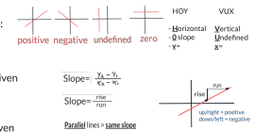
point slope form: y - y-value of point = slope (x - x-value of point)

Note: change sign of the point

general form: Ax + By + C = 0

Finding the slope:

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



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

5. What is the y-intercept of $3x + 6y - 12 = 0$?

A. -4

B. 4

C. -2

D. 2

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

$$3x + 6y - 12 = 0$$

$$3(0) \quad 6y - 12 = 0$$

$$\frac{6y}{6} = \frac{12}{6}$$

$$y = 2$$

Change slope point form to slope-intercept fo

slope intercept form : y = slop

point slope form: y - y-value o

Note: change si

6. What is the equation in slope-intercept form? $4x - 3y - 9 = 0$

A. $y = \frac{4}{3}x - 3$

B. $y = -\frac{4}{3}x - 3$

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

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

Get the term with y by itself by moving other numbers over

Divide to get y by itself

$4x - 3y - 9 = 0$

$\frac{-3y}{-3} = \frac{-4x}{-3} + \frac{9}{-3}$

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

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: $\frac{3y}{3} = \frac{-4x}{3} + \frac{12}{3}$

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

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

$2y + 4 = 1x - 1$

Move everything to one side; x should be positive; x first, y second, number last = 0: $2y + 4 = 1x - 1$

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

$0 = 1x - 2y - 5$

7. What is the slope of line: $y + 2 = -4(x - 3)$?

A. -4

B. -2

C. 3

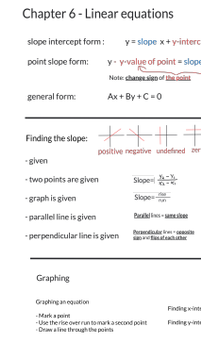
D. 4

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

Note: change sign of the point

point slope form: 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-interc

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

Note: change sign of the point

general form: Ax + By + C = 0

Finding the slope:

positive negative undefined zer

- 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 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-inte

Finding y-int

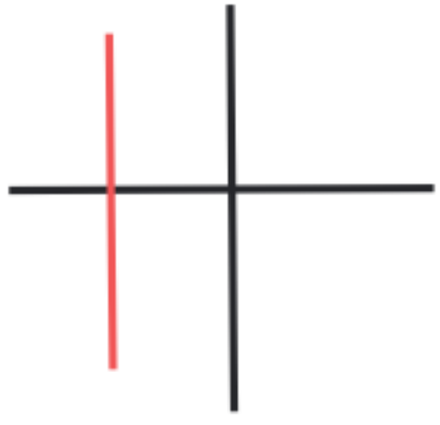
8. What is the slope of a vertical line?

A. 0

B. 1

C. -1

D. undefined



undefined

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 undefi

- given

9. Write the following equation in general form: $y = -3x + 5$

A. $y - 3x = 5$

B. $3x + y + 5 = 0$

C. $3x + y - 5 = 0$

D. $-3x + y - 5 = 0$

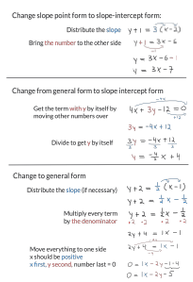
$y = -3x + 5$

$3x + y - 5 = 0$

Distribute the slope (if necessary)

Multiply every term
by the denominator

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



10. Write an equation for the line with slope 4 and y-intercept -10?

A. $y = 4x - 10$

B. $y = -10x - 4$

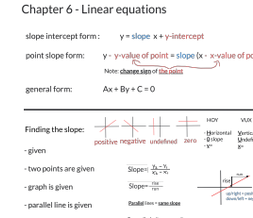
C. $y = -4x + 10$

D. $y = 10x + 4$

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

slope 4 and y-intercept -10

$y = 4x - 10$


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=

VOX
Vertical
Undefined
x=

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

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

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

Parallel lines = same slope

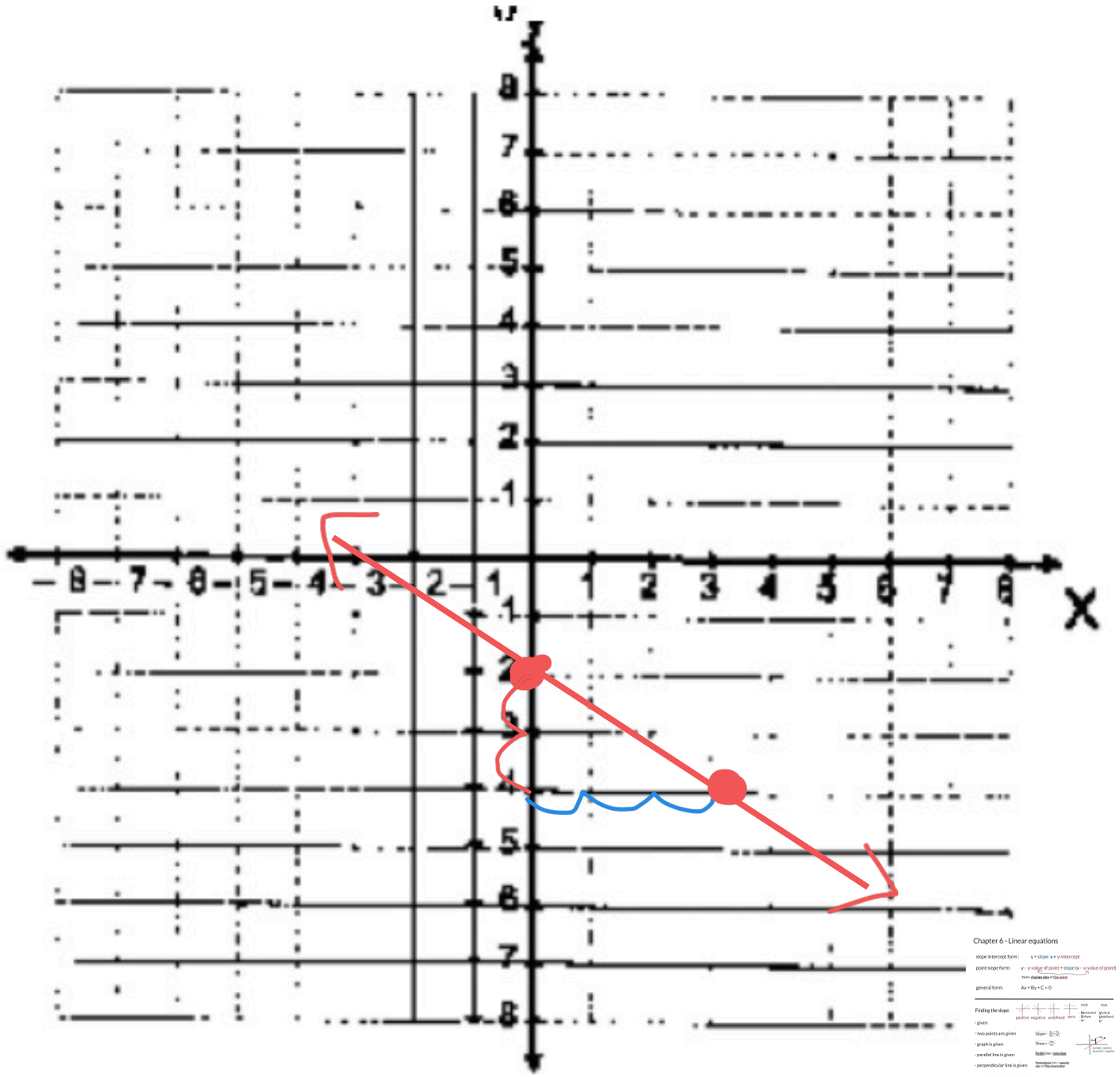
1. Using the axes provided, graph the line having slope $\frac{-2}{3}$ and y-intercept -2.

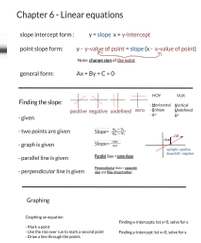
[2pts]

Graphing an equation

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

slope $\frac{-2}{3}$ → 2 down, ← 3 right





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)

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

positive negative undefined zero HOY Horizontal y=num VUX Vertical x=num

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

Chapter 6 - Linear equations

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 $4x + 3y - 12 = 0$ $-4x \quad +12$

$3y = -4x + 12$

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

$2y + 4 = 1x - 1$

Move everything to one side x should be positive x first, y second, number last = 0 $2y + 4 = 1x - 1$ $-1x \quad -1$

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

$0 = 1x - 2y - 5$

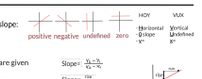
slope intercept form : $y = \text{slope}\ x + \text{y-intercept}$

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: $Ax + By + C = 0$

Finding the slope:



- 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

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

2. a) Determine the slope of each line.

i) a line that passes through A(–2, 7) and B(6, 3)

$x_1 \quad y_1 \qquad x_2 \quad y_2$

- two points are given

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

[2pts]

$\frac{3 - 7}{6 - (-2)} = \frac{-4}{8} = -\frac{1}{2}$

ii) a line described by the equation $2x - y + 11 = 0$

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

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

Get the term with y by itself by moving other numbers over

[2pts]

$2x - y + 11 = 0$

$\frac{-y}{-1} = \frac{-2x}{-1} \frac{-11}{-1}$

$slope = 2$

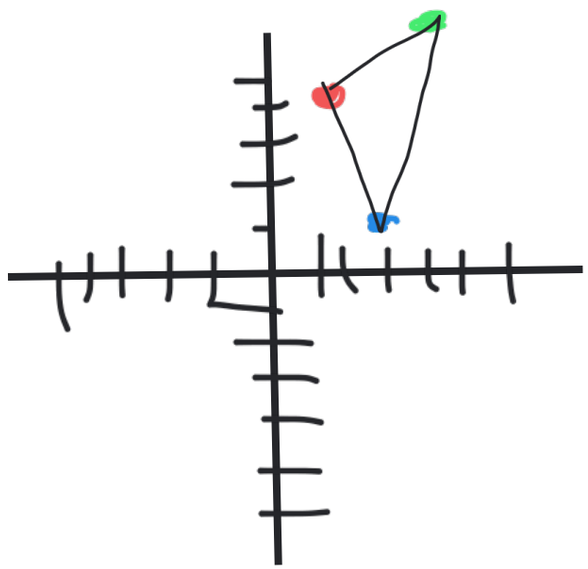
Divide to get y by itself $y = 2x + 11$

b) Are the lines in part a parallel, perpendicular, or neither? Justify your answer

$= -\frac{1}{2}$ $slope = \frac{2}{1}$ **perpendicular**

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

3. The coordinates of the vertices of ΔABC are A(1, 4), B(3, 1) and C(4, 6). Is ΔABC a right triangle? Justify your answer.



right triangle

Perpendicular lines = opposite sign and flips of each other

Slope AB A(1, 4), B(3, 1) $\frac{1-4}{3-1} = \frac{-3}{2}$

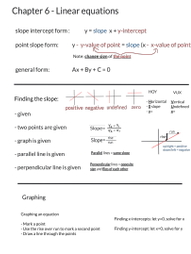
Slope AC A(1, 4) C(4, 6) $\frac{6-4}{4-1} = \frac{2}{3}$

Slope BC B(3, 1) C(4, 6) $\frac{6-1}{4-3} = \frac{5}{1}$

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

Perpendicular lines = opposite sign and flips of each other

∴ right triangle


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: choose one of the points

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

positive negative undefined zero

HOY: Horizontal Other Year

VLR: Vertical Lifeboard Rescue

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

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

Parallel lines = same slope

Perpendicular lines = opposite sign and flipped 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-intercept: let y=0, solve for x

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

4. **Find the x and y intercepts of the following equation and draw the graph.** $2x - 5y + 10 = 0$

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

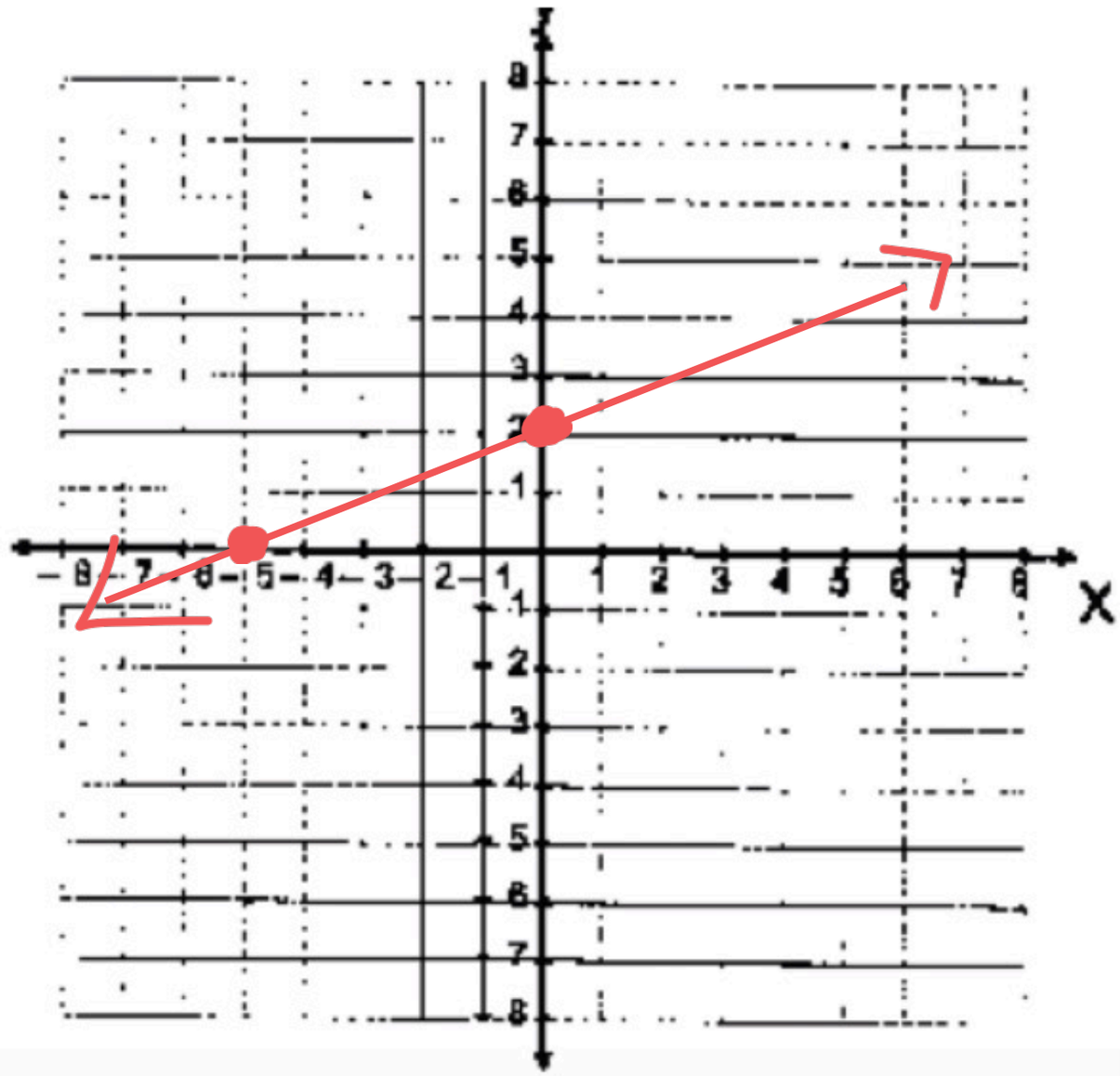
$$2x - \cancel{5y}\,0 + 10 = 0$$

$$2x + 10 = 0$$

$$\frac{2x}{2} = \frac{-10}{2}$$

$$x = -5$$

[4pts]



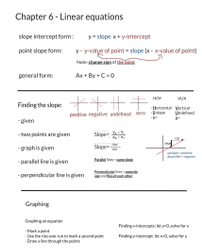
Finding y-intercept: let x=0, solve for y

$$\cancel{2x}\,0 - 5y + 10 = 0$$

$$-5y + 10 = 0$$

$$\frac{-5y}{-5} = \frac{-10}{-5}$$

$$y = 2$$



Chapter 6 - Linear equations

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

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

Here: shares signs of the above

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

Finding the slope:

- given — positive, negative, undefined, zero, Horizontal $y=$, Vertical $x=$
- 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 reciprocal of each other

Graphing

Graphing an equation:

- Mark a point
- Use slope or another x or y to mark a second point.
- Draw a line through the points

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

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

5. Write an equation for the line that passes through E(4, –3) and is parallel to the line $y + 1 = \frac{5}{7}(x - 4)$. **Write the equation in general form.**

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

Note: **change sign** of the point

E(4, –3) slope $= \frac{5}{7}$

$y + 3 = \frac{5}{7}(x - 4)$

Distribute the slope (if necessary) $y + 3 = \frac{5}{7}(x - 4)$

Multiply every term by the denominator $y + 3 = \frac{5}{7}x - \frac{20}{7}$

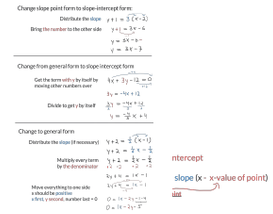
$\cdot 7 \quad \cdot 7 \quad \cdot 7 \quad \cdot 7$

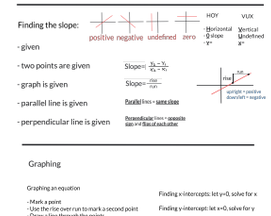
$7y + 21 = 5x - 20$

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

$0 = 5x - 7y - 20 - 21$

$0 = 5x - 7y - 41$





6. Mr. Hann offers acting lessons to students at CBRH interested in musical theatre. At a recent parent meeting he was promoting his business and provided the following data to the parents.

Number of students (n)	Cost (C)
20	375
50	750

a) Write an equation to describe this relation. Write your equation in slope-intercept form.

[3pts]

b) How much money will Mr. Hann make if 35 students take his class?

[1pt]

c) How many students would need to register for his class if he were to make $1175?