MATH 90 – CHAPTER 3 Name: .

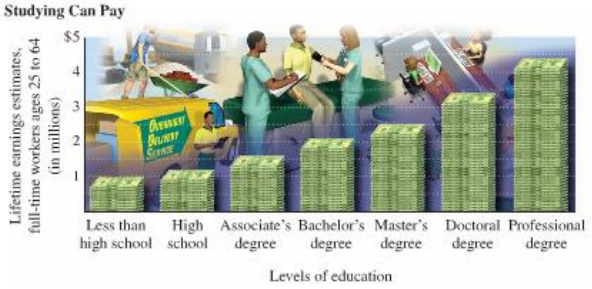
3.1 Reading Graphs & Plotting Points

Need to Know

- Reading Graphs and Charts (Bar, Pie, Line)
- Plotting Points and Ordered Pairs and the Coordinate System

Bar Graphs

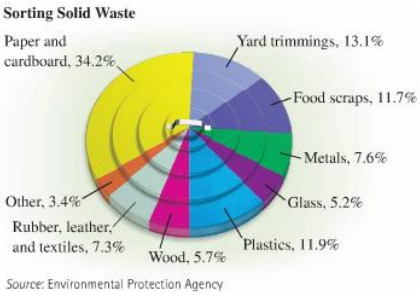
Data Source: U.S Census Bureau



Kim plans to get an associate's degree.
How much can she expect to make over her life time?

Sam desires to make 3 million dollars in his life time.
What level of education should he pursue?

Pie Charts



In 2005, the average American generated 4.5 lb of waste per day. How much of that was paper and cardboard?

The Coordinate System

Vocabulary

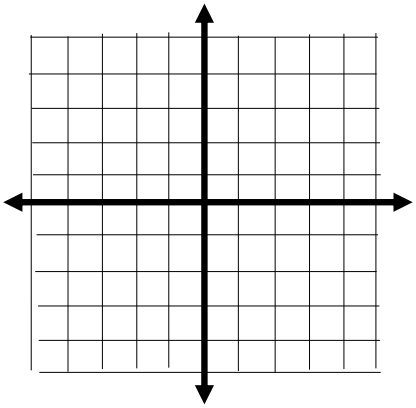
X-axis

Y-axis

Ordered Pair (x, y)

Origin (0,0)

Quadrants I, II, III, IV



Graphing Ordered Pairs

Ordered Pairs

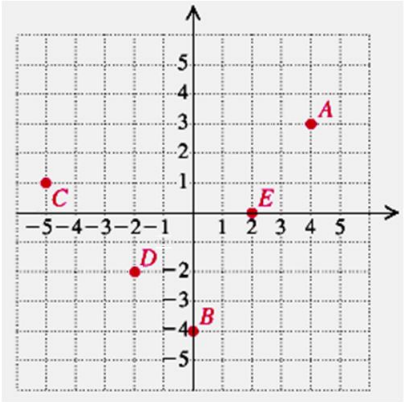
A _____

B _____

C _____

D _____

E _____



Plot Each

P is (-3, 4)

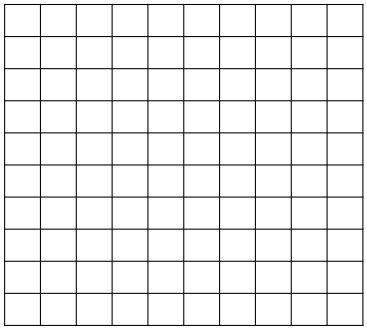
Q is (0, 4)

R is $\left(\frac{7}{2}, -5\right)$

Line Graphs

Make a line graph for the date in the table on a 10 x 10 grid.

Year	Tree Height (in.)
2002	74
2003	77
2005	84
2006	85
2008	92
2012	99
2013	103



3.2 Graphing Linear Equations

Need to Know

- Idea of solutions to linear equation in 2 variables
- Checking a solution to a linear equation in 2 variables
- How to find solutions to linear equation in 2 variables

The Main Idea -
Solutions to 2 Variables Equations

One Variable Equation
$x + 2 = 8$

Two Variable Equation
$x + 2y = 8$

Variables	One
Solution(s)	One
Dimensions	1-Dim
Graph	1 point

Variables	
Solution(s)	
Dimensions	
Graph	

Linear Equations in 2 Variables

- Definition of a **linear equation**, is any equations that can be written in the form of

  _____

  where m, b, A, B and C are constants.

- It's graph is always a _____.

Checking a Solutions

Are the points solutions to the equation $2x - 3y = 12$?

(-3, -6) (8, -2) (6, 0)

How to Find Solutions

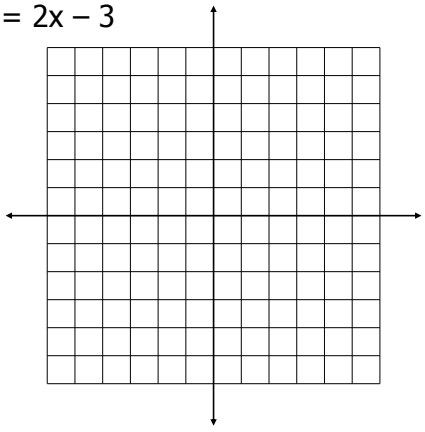
Find a solutions to $3x + y = 10$

Think about the mental steps

1. _____
   (anything, either one doesn't matter)
2. _____
3. _____
   _____

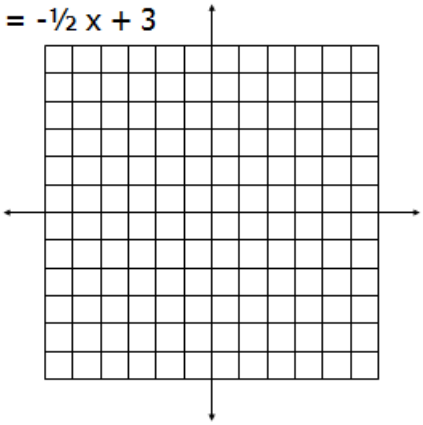
Graphing Linear Equations

Graph the equation $y = 2x - 3$



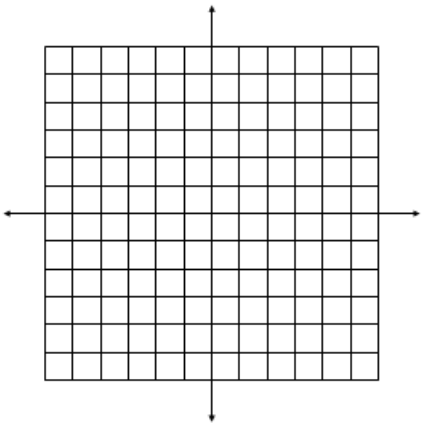
Graphing Linear Equations

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



Graphing Linear Equations

Graph $5x + 2y = 6$

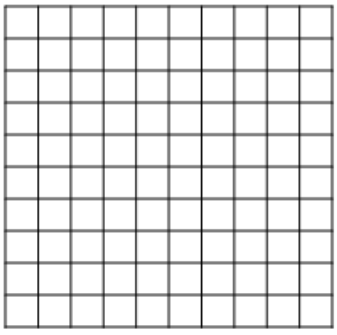


Application

The number of gallons of bottled water consumed by the average American in one year is given by

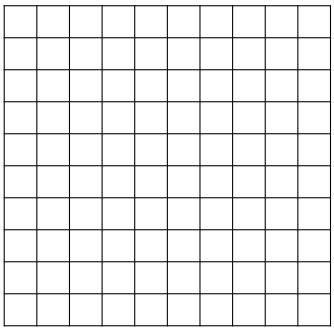
$$w = 1.6(t) + 16.7$$

where t is the number of years since 2010. Graph the equation and use the graph to predict the number of gallons consumed by the average American in 2019.



Application

A smoker is 15 times more likely to die of lung cancer.
An ex-smoker who stopped ***t*** years ago is ***w*** times more likely to die than a nonsmoker, where $w = 15 - t$.
Graph the equation.
Sandy quit 2.5 years ago.
Use the graph to predict Sandy's likelihood of dying from lung cancer compared to Sue who never smoked.



end

3.3 More Graphing: Intercepts

<u>Need To Know</u>

- What are the intercepts
- How to find intercepts
- How to graph with intercepts
- Graphing Special Equations

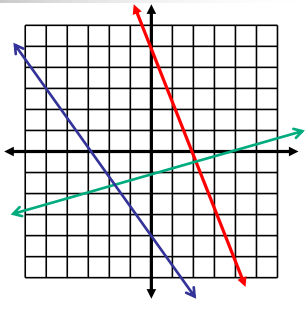
Intercepts – Define and Find

<u>Intercepts</u>
The **x-intercept point** is the point where the line crosses the x-axis.

- _____
- _____

The **y-intercept point** is the point where the line crosses the y-axis.

- _____
- _____



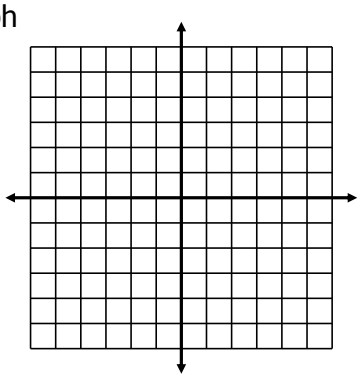
<u>How do you find them?</u>
Plug in zero for x and zero for y.

<u>Find the intercepts for:</u>
$3x - 4y = -12$

Practice Graphing w/ Intercepts

Find the intercepts and graph

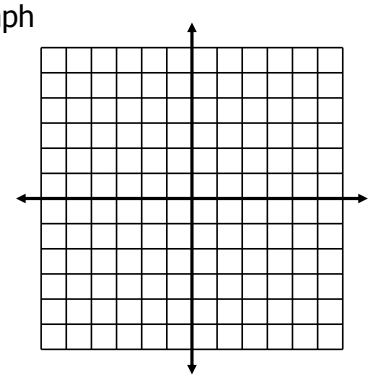
$-2x - y = -6$



Practice Graphing w/ Intercepts

Find the intercepts and graph

$y = \frac{1}{4}x$

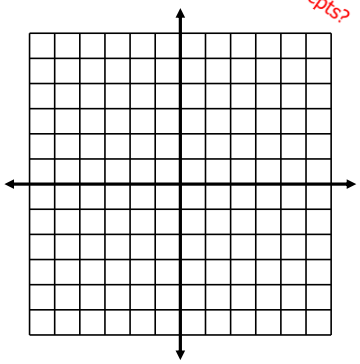


Graphing Special Equations

Intercepts?

Graph the equation y = -2

X	Y

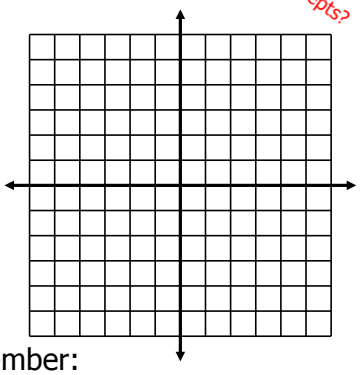


Graphing Special Equations

Intercepts?

Graph the equation x = 4

X	Y



SUMMERIZE - Always Remember:

x = number is a _____

y = number is a _____

3.4 Rates

Need To Know

- Understanding Rate of Change
- Visualizing Rate of Change

Rate of Change

Definition:

A rate is a ratio that indicates how two quantities change with respect to each other.

Examples: Find the rate -

1. The virus is growing 2000 cells in 15 minutes.
2. My car went 160 miles and used 7 gallon of gas.
3. Lauren took 18 hours to read 6 chapters.

Calculating Rates

The company car you took on a business trip read 25,398 miles at the start and 25,719 miles at the end of the trip. You paid $41.60 for 13 gallons to fill the car back up. What is the rate of gas consumption in miles per gallon?

Visualizing Rates

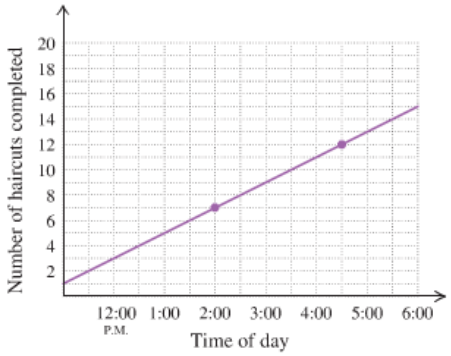
In 2009, there were sales of $7 billion for a cancer drug. The sales are increasing at about 2.1 billion per year.

1) Label the axis
2) Select the scale
3) Plot some points

Reading Rates from Graphs

Use the graph to find the rate.

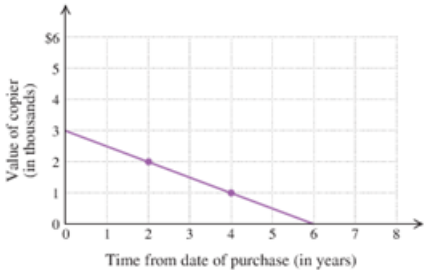
At what rate does Eve cut hair?



Reading Rates from Graphs

Use the graph to find the rate.

Color copiers lose value with time. At what rate is the value dropping?



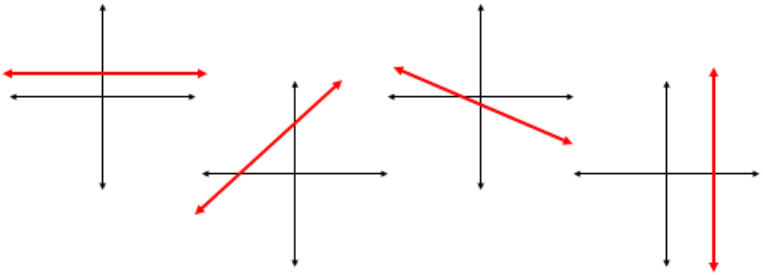
3.5 The Slope of a Line

Need to Know

- The idea of slope
- Slope characteristics
- 3 ways to find slope

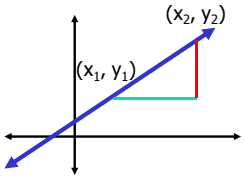
Summarize – Slope Basics

Slope is the measure of the steepness of a line.



The Idea of Slope

We can measure slope by comparing vertical change to horizontal change .



Slope = ___ = ratio of change

=

= $\frac{\text{change in y}}{\text{change in x}}$

=

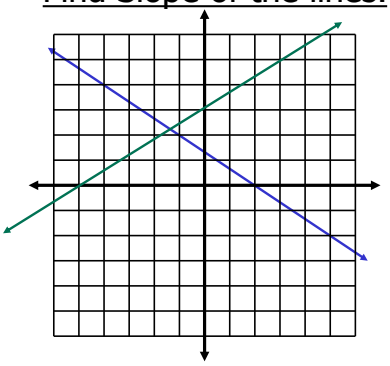
Practice – 3 Ways to Find Slope

Find Slope

1. From a picture

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

Find Slope of the lines.



Practice – 3 Ways to Find Slope

Find Slope

1. From a picture

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

2. From the points

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

3. From an equation

Find Slope of the line through (-5,1) and (4,-6)

Practice – 3 Ways to Find Slope

Find Slope

1. From a picture
   $\frac{\text{rise}}{\text{run}}$
2. From the points
   $\frac{y_2 - y_1}{x_2 - x_1}$
3. From an equation

Find Slope of the line through (-2,-3) and (4,-4)

You try it!

Practice – 3 Ways to Find Slope

Find Slope

1. From a picture
   $\frac{\text{rise}}{\text{run}}$
2. From the points
   $\frac{y_2 - y_1}{x_2 - x_1}$
3. From an equation
   Special Lines (Vertical or Horizontal)

A) Find the slope of the line: $y = -4$

B) Find the slope of the line: $x = 5$

3.6 The Equation of a Line

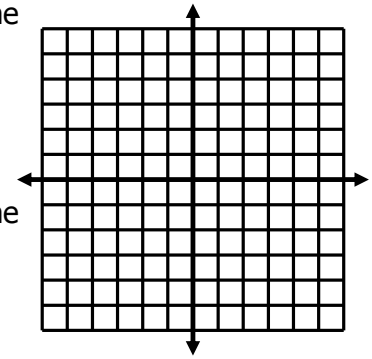
Need To Know

- Graphing with a slope and intercept point
- Idea of the slope-intercept form of the equation of a line
- Working with parallel and perpendicular
- How to write equations of lines

Graphing Slope and Intercepts

1) Graph the line with the slope of –2/5 and a y-intercept of 4.

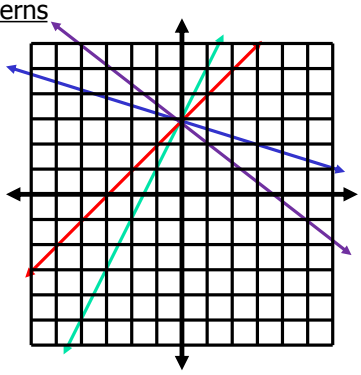
2) Graph the line with the slope of 3 and a y-intercept of -2.



Equations of lines

Graph and observe patterns

- y = 2x + 3
- y = -1/3x + 3
- y = x + 3
- y = -4/5x + 3
- y =



Slope-Intercept Form for the Equation of a Line

<u>Slope-Intercept Form for the Equation of a Line</u>

_____

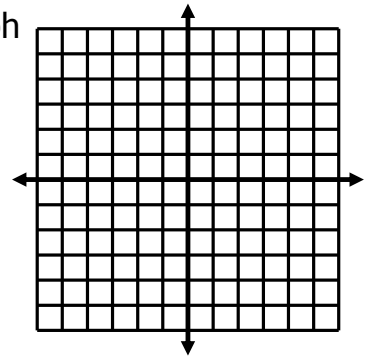
- m = _____of the line
- b = _____of the y-intercept point
- (0, b) is the _____

Graphing y = mx + b

Find the slope and the y-intercept and graph

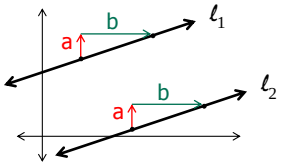
$y = \frac{2}{3}x - 4$

3x + 2y = 12

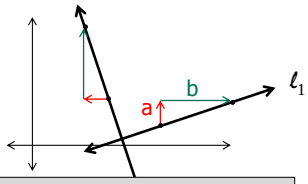


Parallel and Perpendicular

1) Exit view mode
2) Select graphic
3) Grab green dot and rotate 90
4) Don't save



If lines are parallel, then the slopes are _____



If lines are perpendicular, then the slopes are _____

Are these line parallel?
y = -3x + 5
4y = 12x – 8

Are these line perpendicular?
y = -3x + 5
12y = 4x – 36

Finding an Equation for a Line

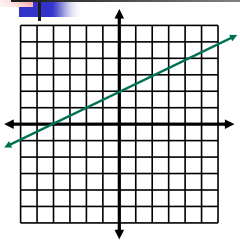
To fiind an equation of a line you …

Need:
1. A slope
2. A point
3. A formula

Find the equation of the line with a slope of –3 and a y-intercept through the point (0, 5).

Find the equation of the line with a slope of 2/3 and a y-intercept through the point (0,-11).

Finding an Equation for a Line



1) Find the equation of the line that is parallel to the given line and has a y-intercept through the point (0, 5).

Need:
1. A slope
2. A point
3. A formula

2) Write a slope-intercept equation of a line whose graph is perpendicular to y = -2x + 6 and has a y-intercept of (0, -3).

end

3.7 Point-Slope Form

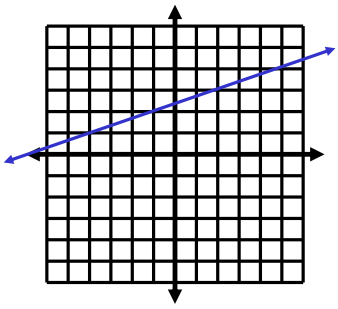
Need To Know

- Idea of the point-slope form of the equation of a line
- How to write equations of lines
- Graphing with a point and a slope

Writing an Equation for a Line

y = mx + b is **not** always the best way to write an equation for a line.

Write the equation of the line through the points (-4, 1) and (2, 3).



To Write Line Equations

Need:
1. A _____
2. A _____
3. A _____

Point-Slope Form for the Equation of a Line

Point-Slope Form
for the Equation of a Line

The equation of a line through (x_1, y_1) with slope m is given by

---

Practice

a) Don't simplify
b) Simplify with Slope-Intercept form

Need:
1. A slope
2. A point
3. A formula:

1) Write the equation of the line that passes through (-1, 6) and the slope is 3/2.

2) Write the equation of the line that passes through (-5, 0) and (-2, 6).

Practice

Need:
1. A slope
2. A point
3. A formula:

Find an equation of a line:
Through (-2, -3)
and parallel to $6x + 5y = 11$

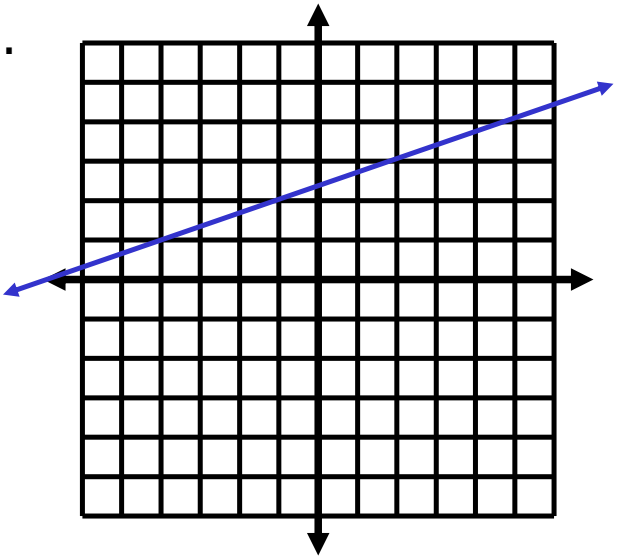
Find and equation of a line:
Through (6, -8)
and perpendicular to $x + y = 3$

Practice

Need:

1. A slope
2. A point
3. A formula:

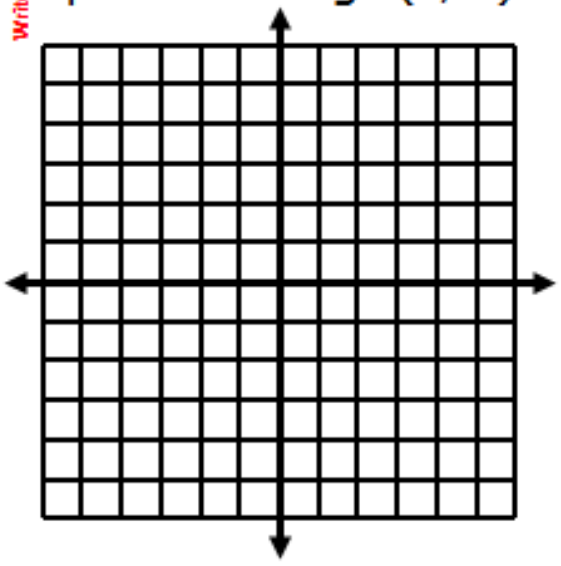
Write the equation of the line below in slope-intercept form.



Graphing

Write equation first

Graph the line with m=7/3 and that passes through (2,-4)



Graph the line from the equation:

$$y - 1 = -\frac{2}{3}(x+4)$$