ST. JEAN DE BREBEUF MATHEMATICS

CHAPTER 3.5

GRAPH LINEAR RELATIONS BY HAND

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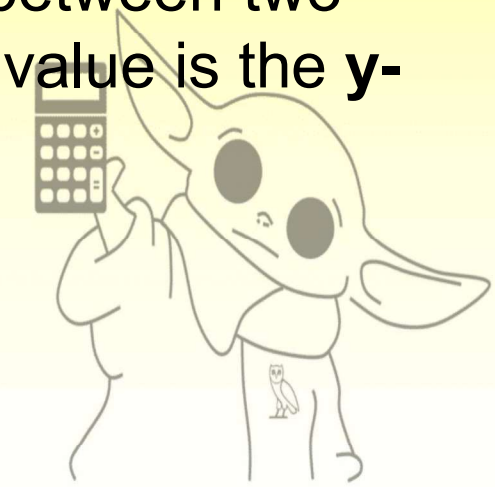
KEY CONCEPTS

A linear relation can be graphed by **plotting a series of points**, or by **plotting the *y*-intercept** and then **applying the slope** to locate other points.

Some situations can be represented by linear relations.

If there is a constant rate of changes between two variables, this is the **slope**. The *initial* value is the **y-intercept**.



CHAPTER 3.5 GRAPH LINEAR RELATIONS BY HAND

EXAMPLE 1 *Graph a Line using the y-Intercept and Slope*

For each line, identify the **slope** and **y-intercept**. Use these to graph the line.

$y = mx + b$

(a) $y = 2x - 4$

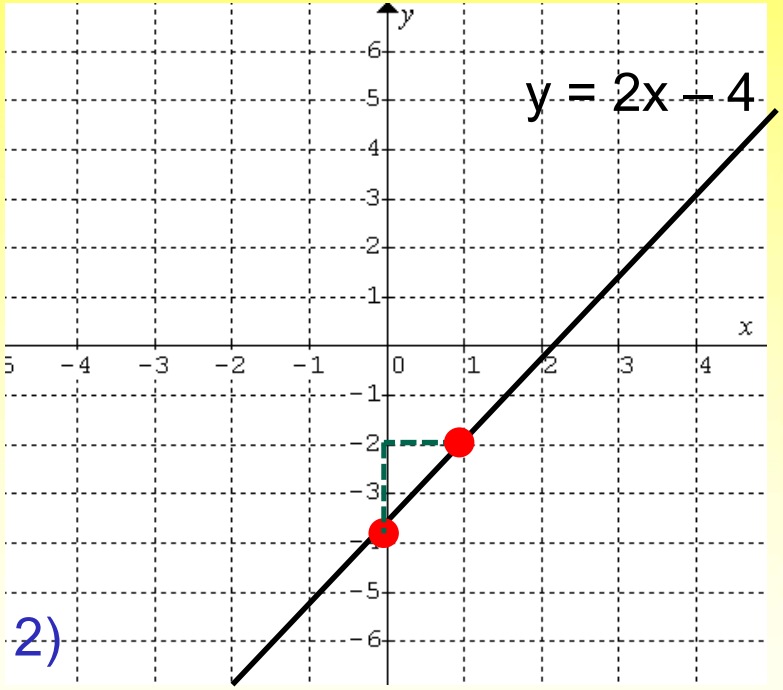
m = **2**

b = **– 4**

Express slope as a *fraction*

$\frac{2}{1}$ ← RISE (up 2)

← RUN (right 1)



GRAPHING USING Y-INTERCEPT and SLOPE

1. Plot the **y-intercept**
2. From the y-intercept:

(i) Perform rise

(ii) Perform run

(iii) Plot

3. Draw a line through the points

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EXAMPLE 1 *Graph a Line using the y-Intercept and Slope*

For each line, identify the **slope** and **y-intercept**. Use these to graph the line.

$y = mx + b$

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

$m = \underline{-3}$

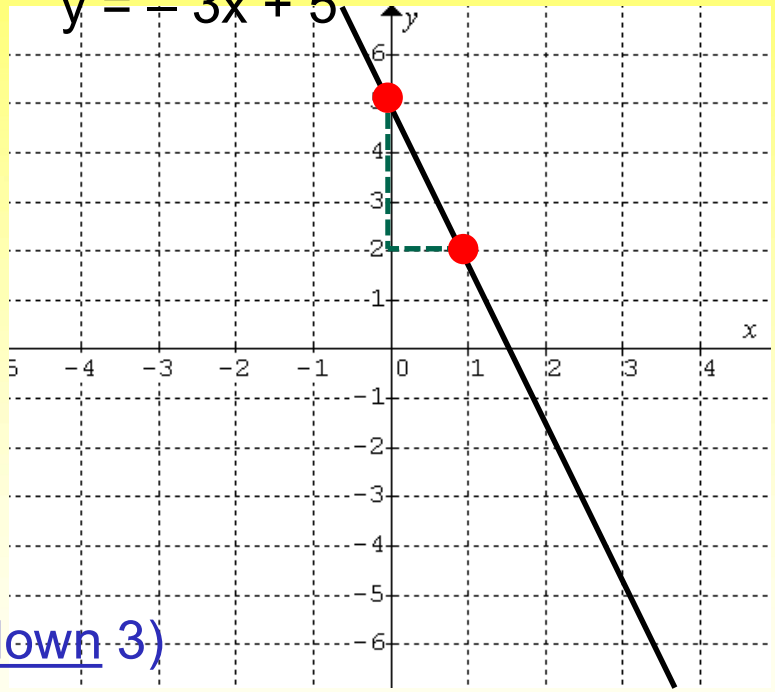
$b = \underline{5}$

Express slope as a *fraction*

$\frac{-3}{1}$ ← RISE (down 3)

$\frac{-3}{1}$ ← RUN (right 1)

$y = -3x + 5$



GRAPHING USING Y-INTERCEPT and SLOPE

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EXAMPLE 2 *Graph a Line When the Slope is a Fraction*

For each line, identify the **slope** and **y-intercept**. Use these to graph the line.

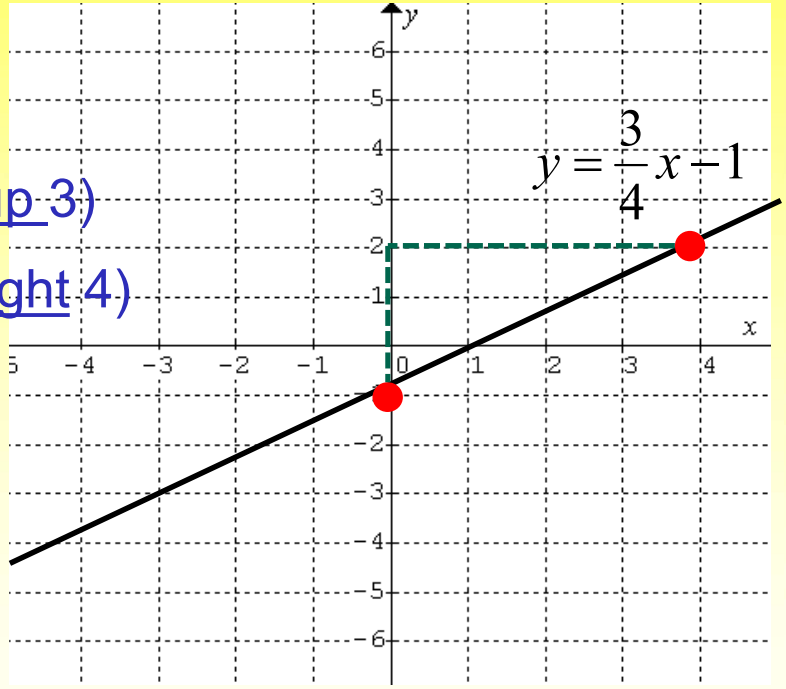
y = mx + b

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

$\frac{3}{4}$ ← RISE (up 3) / RUN (right 4)

m = $\frac{3}{4}$

b = **– 1**



GRAPHING USING Y-INTERCEPT and SLOPE

1. Plot the **y-intercept**
2. From the y-intercept:
   (i) Perform rise
   (ii) Perform run
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3. Draw a line through the points

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EXAMPLE 2 *Graph a Line When the Slope is a Fraction*

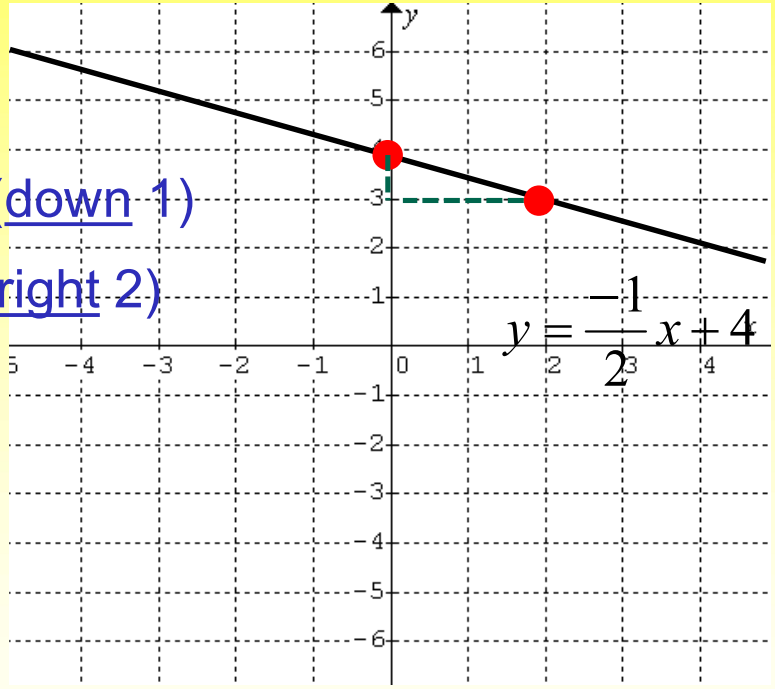
For each line, identify the **slope** and **y-intercept**. Use these to graph the line.

y = mx + b

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

$m = \frac{-1}{2}$ ← RISE (down 1)
← RUN (right 2)

b = 4



GRAPHING USING Y-INTERCEPT and SLOPE

1. Plot the **y-intercept**
2. From the y-intercept:
   (i) Perform rise
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3. Draw a line through the points

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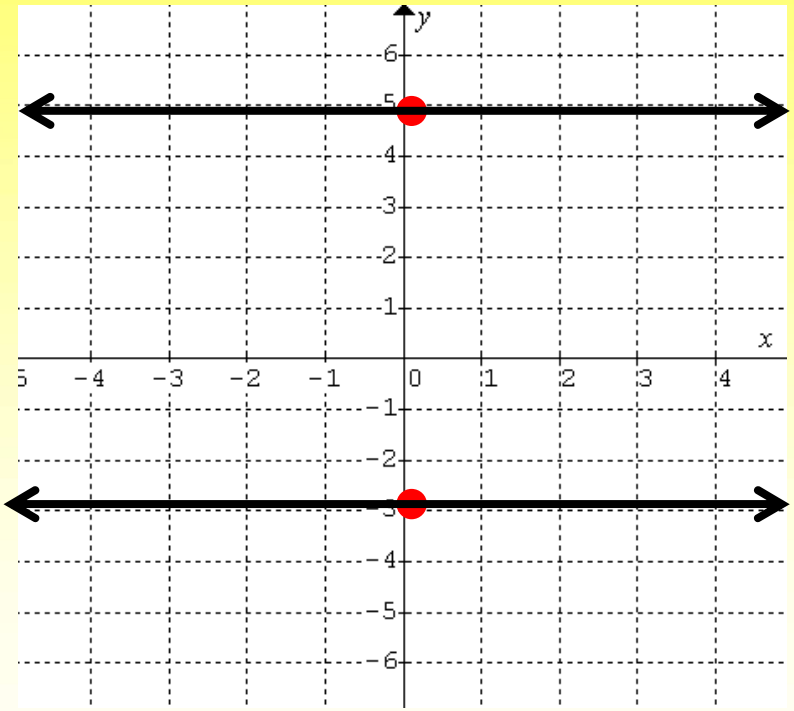
EXAMPLE 3 *Graphing Horizontal Lines*

Any equation in the for **y = b** (where **b** is the y-intercept) will <u>always</u> be a **horizontal line**

Graph the equations below on the same grid:

(a) y = 5

(b) y = – 3



GRAPHING USING Y-INTERCEPT and SLOPE

1. Plot the **y-intercept**
2. From the y-intercept:

(i) Perform rise

(ii) Perform run

(iii) Plot

3. Draw a line through the points

END OF DAY 1

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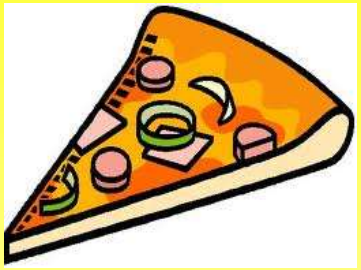
EXAMPLE 4 *Model the Cost of Pizza*



Giovanni's pizza parlour charges **$8** for a pizza plus **$2** for each topping.

Graph the linear relation that models the cost.

Write an equation relating *C*, the cost in dollars, to *t*, the number of toppings.

$$C = 8 + 2t$$

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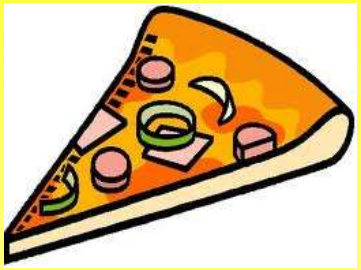
EXAMPLE 4 *Model the Cost of Pizza*



$C = 8 + 2t$

Method 1:
Use a table of values

Complete the table given for up to 4 toppings

# of toppings	Total cost
0	8
1	10
2	12
3	14
4	16

$C = 8 + 2t$
$= 8 + 2(0)$
$= \mathbf{8}$

$C = 8 + 2t$
$= 8 + 2(1)$
$= \mathbf{10}$

$C = 8 + 2t$
$= 8 + 2(2)$
$= \mathbf{12}$

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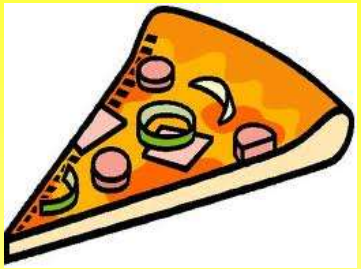
EXAMPLE 4 *Model the Cost of Pizza*



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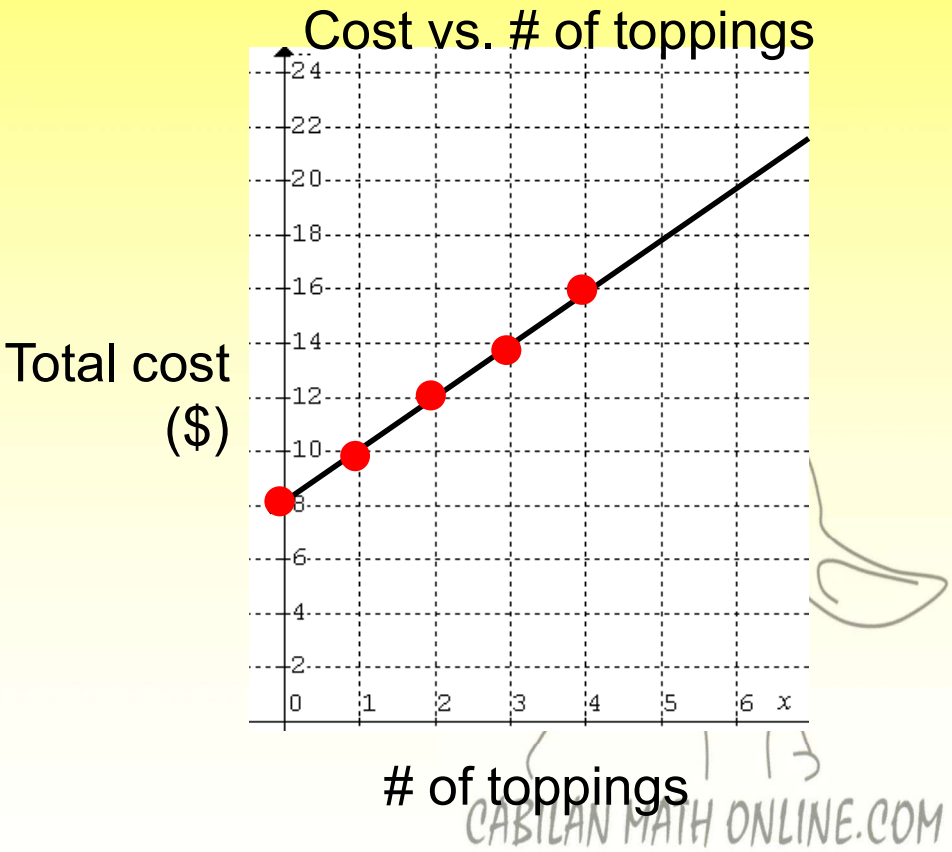

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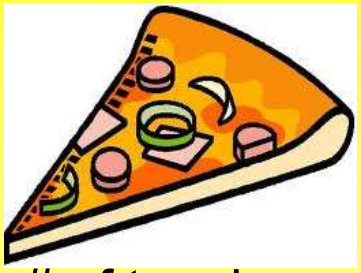
EXAMPLE 4 *Model the Cost of Pizza*

$C = 8 + 2t$



Method 2: Using the y-intercept and slope

First, re-arrange the equation into the form $y = mx + b$

$C = 8 + 2t \rightarrow C = 2t + 8$

m = 2

b = 8

Express slope as *fraction*

$\frac{2}{1}$ ← RISE (up 2)

← RUN (right 1)

GRAPHING USING Y-INTERCEPT and SLOPE

1. Plot the **y-intercept**
2. From the y-intercept:

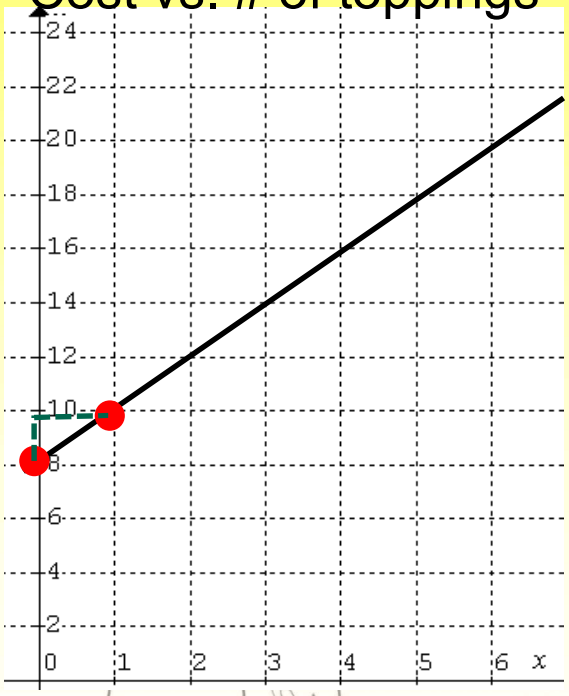
(i) Perform rise

(ii) Perform run

(iii) Plot

3. Draw a line through the points

Cost vs. # of toppings



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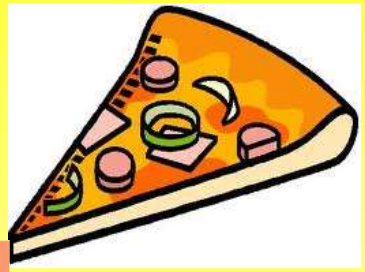

Homework:

(Day 1) In class: Do puzzle "Whom Should You See at the Bank If You Need to Borrow Money"
Extra practice: Page 143 – 144 #1 – 4

Homework:
(Day 2) #5 – 9