# Concept: Slope of a Line

Name:

Warm Up

The following suggested activities would serve as a review to consolidate previous learning. While promoting rich mathematical dialog, they will also provide students with the background necessary to be successful in this section.

NOTE: You will need graph paper and graphing calculators for some of these activities.

1. The Elastic Example *(from Section 6)*

    ➢ We let N be the # of washers *(we also included parts of washers).*

    ➢ Let S be the length of the stretch of the elastic.

    ➢ We calculated the ordered pairs. *(We noticed a pattern in these ordered pairs).*

    ➢ From the pattern we were able to write an equation, which was_____.

    ➢ We should graph _____ points so that we can "see" a _____.
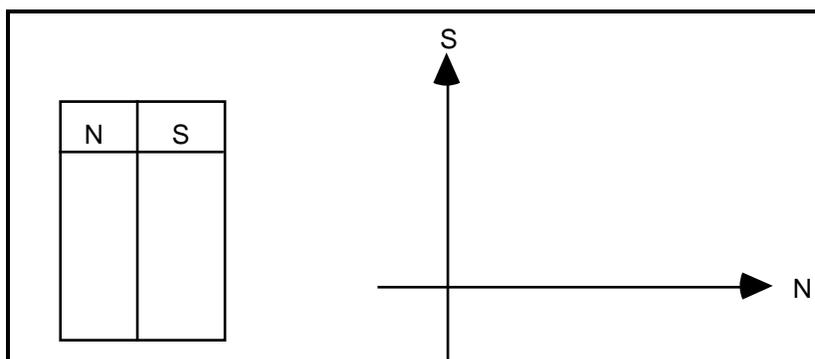
    NOTE: *Because we can attach _____ of washers, we can _____ the points with a _____ line or a _____ curve.*

2. Patterns in Special Relations

    Objective: Investigate the roles of $\#_1$ and $\#_2$ in relations of the form **$y = \#_1 x + \#_2$.**

    Investigation 1:

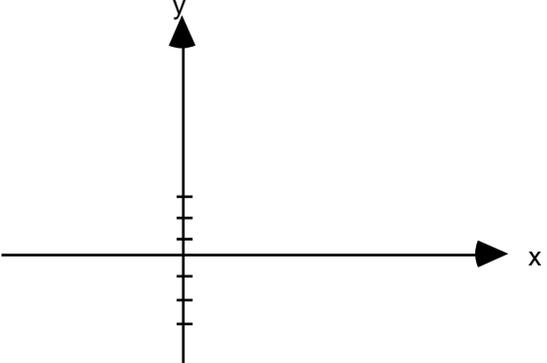   (a) Investigate the role of $\#_1$ by keeping _____ constant and varying _____.

        Graph each of the following on the same axis below:

        Clearly identify each line by using different colored pencils or pens.

UMATH X

y = -2x - 3		y = 2x - 3		y =3x - 3	
x	y	x	y	x	y

(b) *How are the 3 lines above the same?* _____

_____

(c) *How are the 3 lines different?* _____

_____

(d) *What seems to be the role of #1 in an equation of the form* **y = #1x + #2** *?*

_____

_____

Investigation 2:

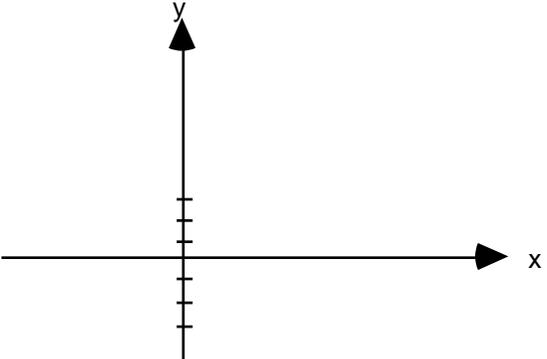(a) Investigate the role of #2 by keeping _____constant and varying

_____.

Graph each of the following on the same axis below:

Clearly identify each line by using different colored pencils or pens.

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

(b) *How are the 3 lines above the same?* _____

_____

(c) *How are the 3 lines different?* _____

_____

(d) *What seems to be the role of* $\#_2$ *in an equation of the form* $y = \#_1 x + \#_2$ *?*
   Discuss your findings with a classmate.

_____

_____

3. <u>Graph and Interpret *Bungee Jumping*</u>

   You are *Bungee Jumping…*

   The equation, which enables you to find your height above ground level at any time from 0 to 8 seconds after the cord first stretches, is ... $y = x^2 - 6x + 8$

   Let x represent … *time in seconds after the cord first begins to stretch.*

   Let y represent… *the person's height (in bungee lengths) above the ground.*

   Instructions:

   ➢ Choose enough values for x between 0 and 8 inclusive to give you enough of a Pattern, so you can draw the graph as smoothly as possible.
   ➢ Complete the chart.
   ➢ Draw the graph as accurately as possible.

   We can join the points because _____.

x	y
0	
.5	
1	
2	
3	
4	
5	
6	
7	
8	

height
 in
bungi
 lengths

y

x

time in seconds

UMATH X
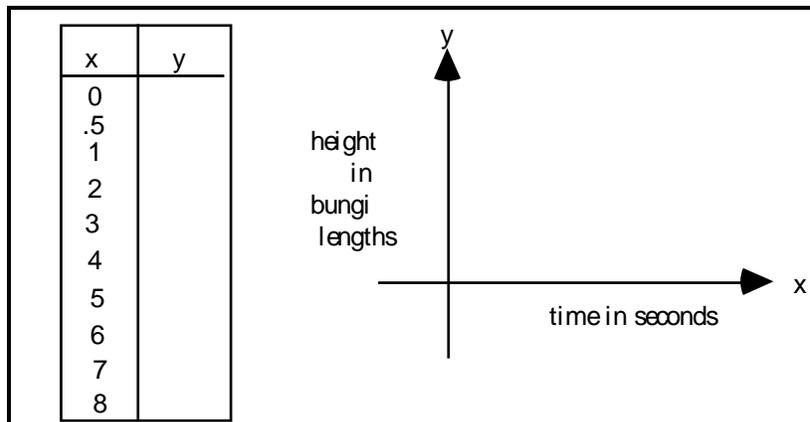
Interpret the Graph:

(a) *How far above ground are you when the cord begins to stretch?*

_____

(b) *Will we need to dig a hole in the ground below you? If so, how deep must the hole be?*

_____

_____

(c) You will be at the same height at .5 seconds and at _____ seconds.

When done, discuss results with a classmate.

4. **An Investigation Activity using a Graphing Calculator**

Your teacher may need to introduce you to a graphing calculator.

NOTE: This will enable you to extend some of the investigations, which you may have done earlier.

In each case, command the graphing calculator to graph each of the following equations. Note and record any patterns that you observe.

Investigation 1: $y = -2x - 3$
$y = 2x - 3$
$y = 3x - 3$

Observations: _____

_____

_____

Now, use the calculator to graph the equations, which you graphed earlier on this worksheet. Try your own equations like the ones above. *Do you notice patterns? Role of #1, #2?*
Observations: _____

_____

_____

Now, (if your calculator permits)…
Graph equations of the form **y = nx - 3** where **n** ranges from -8 to 8

Observations: _____

_____

_____

Investigation 2:   y = 2x + 1
                         y = 2x + 3
                         y = 2x – 4

Now, try your own equations like the ones above. *Do you notice patterns? Role of #1, #2 ?*

Observations: _____

_____

_____

Now, (if your calculator permits) …
Graph equations of the form **y = 2x + n** where **n** ranges from -8 to 8.

Observations: _____

_____

_____

Investigation 3: **y = x^2 - 6x + 8** (*the Bungee Jumping example, which you did on paper before)*

Now, try more equations like the one above.

Observations: _____

_____

_____

Now (if your calculator permits) …
Replace each of the constants with **n** and vary **n** as you wish.

Observations: _____

_____

UMATH X

5. **Graph and Interpret (A)**

The cost C, in dollars of replicating CDs is given by the equation **C = 2n + 4** where $4 is the fixed   setup cost for replicating *(includes setup of the replicator.. a fixed cost)* and **n** is the number of CDs replicated. *The equation only applies if 1 to 10 CDs are replicated.*

(a) Choose values of the variables and draw a graph of Cost vs. Number of CDs. *(Use Graph Paper)*

(b) What would it cost to replicate 8 CDs? (Use both the equation and your accurate graph to give you the answer)

_____

(c) How many CDs can you replicate with $12? *(Use both the equation and your accurate graph to give you the answer)*

_____

6. **Graph and Interpret (B)**

➢ Graph the equation **x + y = 8** where **x** and **y** both represent real numbers.

➢ Show a table of values *(pick enough points to see a pattern).*

➢ Graph the ordered pairs which satisfy x + **y = 8** in an accurate graph.

➢ *Interpret the graph.*
   Any point on the graph is such that the _____ of _____
   numbers is always _____. As x increases, then _____.

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PART A: COMPUTER COMPONENT

In order for you to do the following work, your teacher may need to discuss a way of finding the length of a third side of a right triangle when the lengths of 2 of the sides are given. (Pythagorean Theorem)

Instructions: In **UMATH X** follow the **Content Menu** path:

Graphing > **Slope of a Line**

⌨   Work through all Sub Lessons of the following Lessons **in order:**
- *Introduction to Slope*
- *Slope*
- *Introductory Examples*

NOTE*:* You will not be finishing the entire section before stopping to complete some **OFF COMPUTER EXERCISES**.

✎   As you work through the computer exercises, you will be prompted to make notes in your notebook/math journal.

When you reach the end of the lesson *Introductory Examples* on the computer, move on to the **OFF COMPUTER EXERCISES** below.
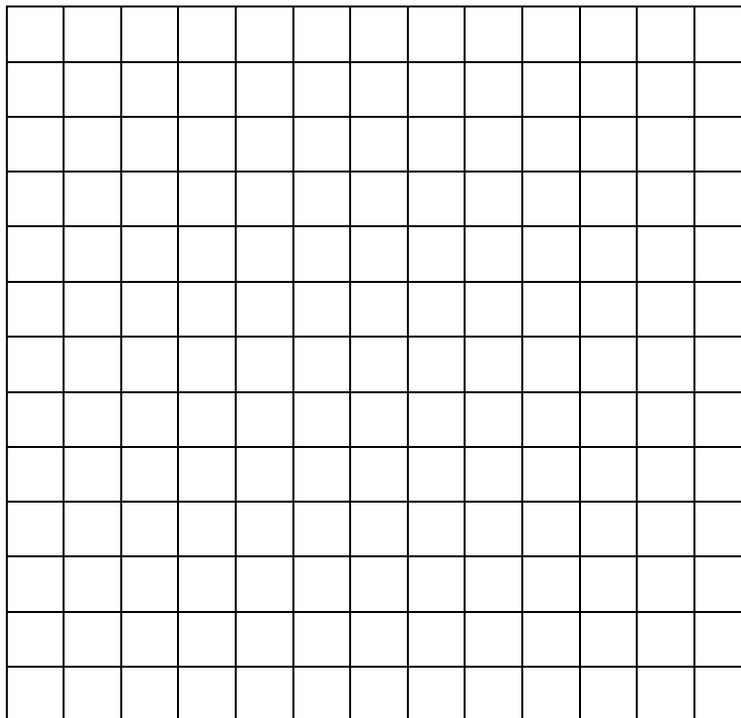

NOTES

1. Fill in the following using information from the section *Slope*

(a) Draw a right triangle and label **rise** and **run** on the triangle.

Slope = _____

(b) Record ***Example 4 of the Introductory Examples*** below.

Place your x axis and your y axis in a convenient place. *Label them.*

Any _____points on a _____ line can be used to find the _____ of that line.

OFF COMPUTER EXERCISES

1. Use your ruler to choose any 3 points with integer coordinates on the graph above. Label the points A, B, C. The points must be in a straight line. The line should be non-horizontal and also non-vertical.

    (a) I chose the points A (,   ) B (,   ) and C (,   )

    (b) Calculate the slope of line segment AB =

    (c) Calculate the slope of line segment BC =

    Conclusion: _____

2. For each of the following equations of relations *(all of the equations result in graphs which are lines)*

> ➢ Present a chart to show your ordered pairs which satisfy the equation.
>
> ➢ Use grid paper to graph the points on a xy coordinate grid.
>
> ➢ Use any 2 points on the graph of the line to find its slope.
>
> ➢ Enter the requested information in the chart below.

Equation of line	Points A and B	Slope of Line AB
$y = 2x - 4$		
$y = 3x + 2$		
$y = {}^-2x + 3$		
$y = {}^-3x + 1$		
$y = .5x + 2$		

*I noticed the following pattern...*_____

_____