Concept: Equation of a Straight Line

Name:

➢ You should have completed Graphing – Section 8 Part A: Equation of a Straight Line before beginning this handout.

PART B: COMPUTER COMPONENT

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

Graphing > **Equation of a Straight Line**

NOTE: *Use the **Menu** button in order to get to the lesson where you left off.*

    ⌨   Work through all Sub Lessons of the following Lessons **in order**:

- Slope-Point Form of the Equation
- *Special Cases*
- *Example to Summarize*
- *Word Problems/Applications*
- *Point of Intersection of Two Lines*
- *Match- Equation, Graph, Points, Words*

Additional Required Materials: Graph Paper

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

NOTES

1. **Slope-Point Form of the Equation**

▷ Copy out the question and both solutions to Example 1.

Example 1: **The Question**: Write the equation of a line that passes through the point (-2, 3), has a slope of 3.

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Solution 1	Solution 2
Express the equation in slope y-Intercept form *y =mx + b* *We know x= -2, y= 3 and m=3* *We can substitute the values in to the* *Equation: y = mx + b* *3 =(3)(-2) + b* *b = 9* *Equation y= 3x + 9*	**Express the equation in slope point form** **We know that we are given (x1, y1) and (x2, y2)** *then m=* $\dfrac{y2 - y1}{x2 - x1}$ *We know that one point is (-2,3)* *We let the other point be (x, y) any point on this line* $3 = \dfrac{y-3}{x-(-2)} = \dfrac{y-3}{x+2}$ *, multiply each side by* *3(x + 2) = y-3* *3x + 6 = y-3* *y= 3x + 9*

2. **Example to Summarize**

Question: *Write the equation of a line, which passes through the point (2, 3) and is perpendicular to the line 2x + 3y + 4 = 0*

The Solution:

*Step 1:* Write the equation given to us in the form *y =**mx + b**.*

Step 2: Sketch the line from *Step 1* (we called it l_1).

Step 3: Then, the slope of l_2 (which is perpendicular to l_1) is $\dfrac{3}{2}$

Step 4: There are two ways to approach this problem from this point on.
Provide your own copy of the two solutions below.

Solution 1 [Slope-y-intercept]	*Solution 2 [Slope-point form]*
3y = -2x -4 $y = \dfrac{-2}{3} \times \dfrac{-4}{3}$ *y = mx + b* $3 = (\dfrac{3}{2})(2) + b$ *b = 0* $y = \dfrac{3}{2}x$	*Let P (x, y) be on L2* $\dfrac{3}{2} = \dfrac{y-3}{x-2}$ *Multiply each side by…* *(x-2): y-3 =* $\dfrac{3}{2}(x-2)$ *Then y =* $\dfrac{3}{2}x$

Step 5: Sketch l_2 using the same axis used in Step 2.
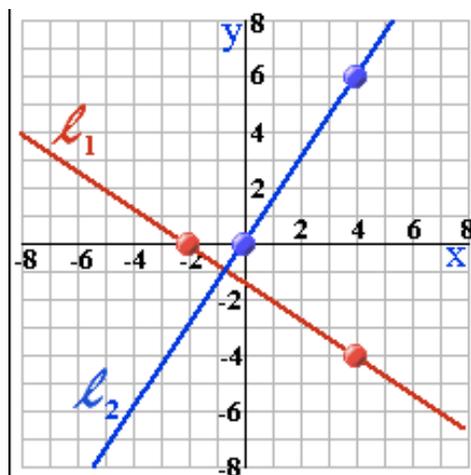
3. **Word Problems**

▷Record one of the problems, *from the computer exercises*, below. Then note and summarize the
Steps involved. ***(Answers/ Responses will vary)***

Question:

The Solution:

Step 1:

4. **Point of Intersection of Two Lines**

▷The point of intersection of two lines is also called the *Solution* of the system.

OFF COMPUTER EXERCISES

1. Write the equation of the line that,

   (a) passes through the point (3,4) and has slope ⁻3.

     <u>Equation:</u>   *y= mx + b*
                    x= 3, y= 4, m=-3
                    4 = (-3)(3) + b
                    b = 13
                    y= -3x +13

   (b) passes through the point (⁻1,⁻4) and has slope ½ .

Equation: $y = mx + b$
$x = -1, y = -4, m = \frac{1}{2}$
$-4 = (\frac{1}{2})(-1) + b$
$b = -3.5$
$y = \frac{1}{2}x - 3.5$

2. The baseball team went for ice cream after their game. Cones cost $2 each and sundaes cost $3 each. Let x be the number of cones bought and y be the number of sundaes bought.

   (a) If the coach spent $40 in total, write the equation that represents the above situation.

   Equation: **2x + 3y = 40**

   (b) *What are the different combinations of purchases of number of cones (x) and number of sundaes (y) that could occur?*

   (Record all possible answers in the table below.)

x	20	17	14	11	8	5	2
y	0	2	4	6	8	10	12

   (c) Record the above information on a graph. Each point on the graph should represent another combination possibility.

   NOTE: Do not join the points since only some points on the line represent possible combinations.

3. A car is expected to decrease in value according to the equation $y = {}^-2000x + 40000$

   (a) Find the slope and interpret its meaning. ***The slope is -2000, which represents the value the car depreciates from year to year. x= number of years.***

   (b) Find the y-intercept and interpret its meaning. ***The y-intercept is 40000, which represents the purchase price of the vehicle.***

4. Graph the following lines on grid paper $x + y = 4$ *and* $2y = x - 1$.

What is the solution to this system?

$y = mx + b$

$y = -x + 4 :$ _____

$y = y = \dfrac{1}{2}x - \dfrac{1}{2} :$ _____

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