# Make It Relevant, Make It Fun, Make It Count


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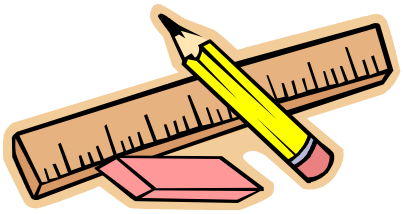
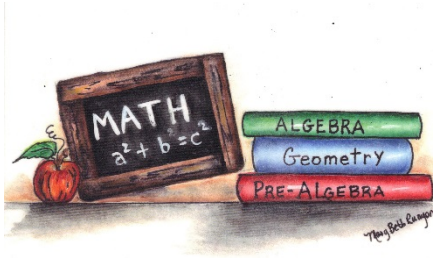


# File Contents





# Introduction

**Mary Beth Runyon – King Philip Regional Middle School, Norfolk, MA**

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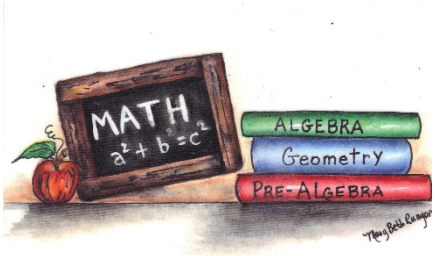

# Resources


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**Resource for Better Teaching.** Acton, MA Web site: www.rbteach.com

Texas Instruments Inc. (2005).***Judgment Day.*** Retrieved September 30, 2005, from Numbers Activity. Web site: www.weallusematheveryday.com

The National Council of Teachers of Mathematics, Inc. (2000). ***Principles and Standards for School Mathematics.*** Reston, VA: Key Curriculum Press.

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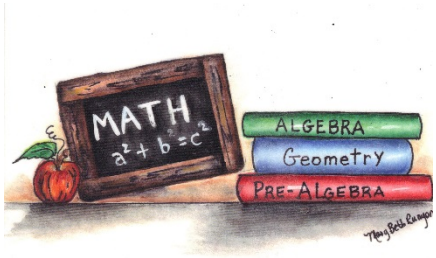


# Activity List

# Directions

**Simon Says**

Teacher directed classroom activity.
Oral instructions that can be used with a variety of concepts, i.e. multiples, factors, square roots, divisibility rules, angle measurements…
Directions: Teacher will read from the given template instructions that the students must follow – but only when Simon Says! The winner(s) will have the correct numerical answer at the end of the oral exercise.

**Push Your Luck**

Team Play – Prior to introduction of adding and subtracting integers.
Directions: Using a standard deck of cards, all face cards are designated with a value of ten, aces worth one. Black is positive, red is negative. Each team must draw at least one card, but not more than three cards, keep a running tally of their score. Team with the greatest number of positive points wins.

**Get Ten**

Individual or partner work.
Order of Operations game. Students can use addition, subtraction, multiplication, division, exponents, square root, and factorial.
Directions: Roll three dice. Students are to use all three dice and any of the above operations to create the answers one through ten. The winner is determined by the individual or group that has solved for all the numbers one through ten. A second set of numbers may be rolled if required.

**Give One – Get One**

Individual, then group.
Directions: Students will be asked "Where in the real world do you see…?" Students need to write down three real world applications with fractions in the allotted time. Then the students will work within the class, giving one real world application and getting a new one from another student until all nine squares are completed. Share the results as a class.

**A Year is…**

Individual work.
Directions: Students will extrapolate a common occurrence or activity to a year's measurement.

**War**

Partner.
Game can be played using any type of numbers, i.e. whole numbers, decimals, integers, fractions…
Directions: Split the "deck" in half. Students will turn their cards over at the same time to reveal the number. Student with higher valued card gets to collect both cards. A "war" can result if the cards have the same value. Students will lay three cards, face down, and turn over the 4th card. Higher valued card wins the war. Winner is determined by the person who has collected all/most of the cards.

**Rainbow Run**

Individual or partner work.
Can be used for any concept of questions and answers, i.e. proportions, integers, equations, slope… Using the template, the teacher can create questions, equations, vocabulary, or any variety of problems and color-code the correct responses.
Directions: Students will solve or answer the questions and "search" for the correct answer to each problem then color the rectangular box with that colored-pencil or crayon. Teachers can check student answers by just looking at the colors in that column. For more difficulty, add distractor answers.

**Indirect Measurement**

Partner or small group, sunny, outdoor activity.
Directions: Students should measure each other and their shadows using centimeters or inches and record the data. Then measure flagpole, tree or street sign's shadows to determine the actual height of the objects. Students will set up proportions to solve for the missing measurement.

**Numbers Activity**

Partner then class-wide discussion.
Directions: Follow directions on given worksheet.

**Product Game**

Partner.
Two students compete against each other and try to be the first to mark off four squares in a row.
Directions: Follow directions on activity sheet.

**Cylinder Comparison**

Teacher directed discovery activity.
Given a cone and cylinder of equal height and diameter, ask the students to estimate how many cones will fill the cylinder. Record student results. Complete hand-out and discuss the relationship between the volume of the cone and the volume of the cylinder. Introduce the formulas of the two three-dimensional figures.

**Tic-Tac-Toe**

Individual, partner or small group.
Can be used for review of variety of concepts, i.e. proportions, integers, equations, slope
Directions: Using the template, the students can choose any three products either in a row or diagonal.

**Connect Four**

Individual work in a classroom setting.
Can be used for a variety of concepts, i.e. integers, fractions, solving equations
Directions: Students randomly fill-in a Connect Four grid with numbers ranging from -10 to +10, including zero. Students will solve problems and "X" out the cell containing the correct answer, until achieving four-in-a-row!

**Scientific Notation**

Individual – web-based project.
This project uses both scientific notation and standard notation as well as comparisons
Directions: Students are asked to find interesting real-life examples of scientific notation numbers, both very large amounts (distance to the moon) and very small amounts (thickness of a feather).

**War- How much more?**

Partner or triples (using a score keeper).
Divide a deck of cards in half removing the face cards.
Students will play "war" BUT… black faced cards are positive, red faced cards are negative – and the player with the higher value card gets to keep the cards. In addition to this, the winner gets points. Start off the game with the "winner" of the pile adding the two cards into their score column. (or use a score keeper to help).
After a few minutes of play – blow the whistle and have the "winner" of the pile Subtract the cards – taking the absolute value for the points. A few more minutes – you can change the play to multiplying the cards. Set a timer! The winner is the person with the most points after a set amount of time.

Mathemagics

Individual
Students will create a book of math concepts that were discussed throughout the course, highlighting key vocabulary and concepts compiled into one document.
Example of a unit and a rubric has been given below.

**Candy Guess**

Involve faculty, students and staff members in this fun guessing game!
Directions: Display a jar of candies. Each day give a different clue so that the participants can guess the number of candies in the jar. Sample clues are given on the worksheet.

# SIMON SAYS GEOMETRY

"Simon Says" will be abbreviated "SS" throughout the exercise.

| Commands | | Correct Answer |
|---|---|---|
| "SS" Start with the number of degrees in a right angle and divide it by 3. | | 30 |
| "SS" Find the complement of that answer. | | 60 |
| "SS" Divide this answer by the number of sides that a hexagon has. | | 10 |
| Double that answer | Still | 10 |
| Add the number of sides an octagon has | Still | 10 |
| "SS" Square the number | | 100 |
| "SS" Add the square root of 25 | | 105 |
| "SS" Add this answer to the area of a square whose sides are 7 each | | 154 |
| "SS" Subtract the square root of 400 | | 134 |
| Multiply this by 10 | Still | 134 |
| "SS" Subtract 100 | | 34 |
| "SS" Stand if your number is odd | | 34 Remain seated |
| Stand if your number is even | | 34 Remain seated |
| "SS" Tell me your number when I walk around the room" | | 34 |

# Push Your Luck

Red is Negative **Black** is positive

Team 1 Team 2 Team 3

# *Get Ten*

**Using + - x ÷ √ (square root) , $e^a$ (exponents), ! (Factorial)**

**Arrange the numbers on the three die to net the following answers:**

1. _____ 2. _____

3. _____ 4. _____

5. _____ 6. _____

7. _____ 8. _____

9. _____ 10. _____

Give  Get 

| | | |
|---|---|---|
| | | |
| | | |
| | | |

# A Year Is...

| | Accuracy | Thoroughness | Complexity | Visual Aid |
|---|---|---|---|---|
| A+ | Project is free of any mathematical errors. | The explanation of the calculation is logical, complete and easy to follow for anyone to read and understand. Includes conversion factor. | The event used is a challenging example that took thought and allowed for variation throughout the year for additional calculations. | Visual aid is very creative, neat, pleasing to look at and well displayed. |
| A | Project is free of mathematical errors. | The explanation of the calculation is logical, complete and easy to follow for an "expert" to read and understand. Includes conversion factor. | The event used is a good event that allowed for variation throughout the year for additional calculations. | Visual aid is creative, neat, and organized. |
| B | Event with no more than one mathematical error that can be corrected upon questioning. | The explanations are a little incomplete, illogical or hard for an "expert", but could be understood with some questioning. Includes conversion factor. | The event is fairly basic and not much calculation is necessary. | Visual aid lacks creativity and major concept is exhibited with some organization. |
| C | Event with two - three math errors that can be corrected upon questioning. | The explanations are a little incomplete, illogical or hard for an "expert", but could be understood with some questioning. Includes conversion factor. | The event is basic and not much calculation is necessary. | Visual aid lacks creativity. |
| D | Event with four math errors that can be corrected upon questioning. | The explanations are incomplete, illogical or hard for an "expert". Includes conversion factor. | The event is basic and not much calculation is necessary. | Visual aid lacks creativity. |
| F | Event computation contains more than four errors. | Does not include conversion factor. | Event is too basic. | Visual Aid has major flaws, is messy and inaccurate. |

# War

| | | | | | |
|---|---|---|---|---|---|
| 52.1 | 3.402 | 0.00123 | 0.01 | 0.102 | 0.726 |
| 1.01 | 0.0726 | 0.4052 | 523.1 | 3.4 | 0.11123 |
| 0.0023 | 0.034 | 0.45 | 1.0456 | 0.00987 | 0.452 |
| 10.2 | 1.03 | 0.103 | 0.013 | 0.23 | 0.43 |
| 1.033 | 0.003 | 0.4501 | 11.7 | 1.73 | 0.713 |
| 0.0713 | 0.437 | 0.473 | 1.073 | 0.073 | 0.7501 |
| 10.6 | 1.63 | 0.603 | 0.063 | 0.63 | 0.46 |
| 1.063 | 0.0063 | 0.6501 | 5.21 | 0.521 | 0.0521 |


1. $-4x = 12$

2. $56 = -8x$

3. $\frac{x}{7} = -5$

4. $125 = -5x$

5. $10 = -2x$

6. $x + 6 = 11$

7. $-65 = 5x$

8. $-9x = -108$

9. $6 = -4x + 22$

10. $20 = -5x$

11. $-6 = -3x$

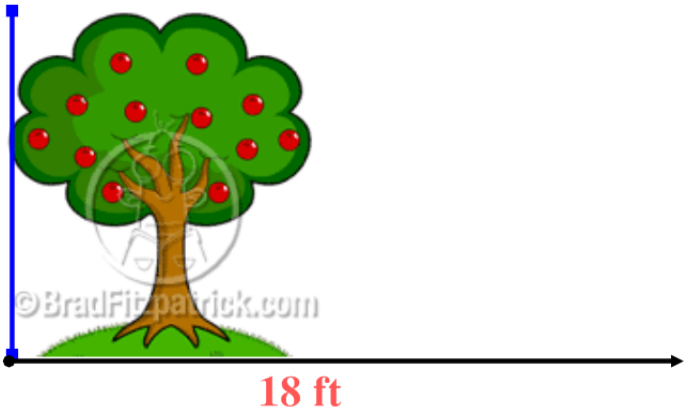
12. $\frac{x}{-10} = -7$

# Indirect Measurement

$\frac{h}{18} = \frac{6}{12}$

$12h = 108$

$h = 9$ ft




## Height in inches

## Shadow length in inches

1. Measure your height: _____What is your shadow length? _____
2. Measure your partner's height: _____What is your partner's shadow?_____
3. Measure your partner's height: _____What is your partner's shadow?_____

The shadow length of the flagpole is _____ inches.

The shadow length of the sign is _____ inches.

1. Find the actual height of the flagpole.

2. Find the actual height of the sign.

Name: _____ Date: _____

## *NUMB3RS* Activity: How tall is the criminal?

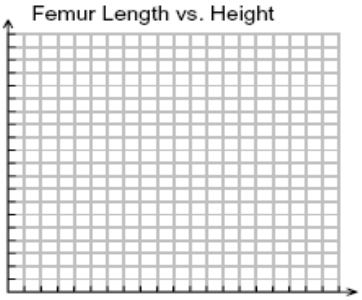
Agent Eppes is tracking an unknown criminal. As the criminal was escaping the crime scene, witnesses saw him jump out of a window and land on his side in wet grass. Much of the impression of the criminal is obscured by footprints, but the criminal's leg from knee to hip was measured to be 47 cm.

Agent Eppes has taken this information and thinks that there is a relationship between the height of a person compared to the length of his or her femur (the bone in your leg from your hip to your knee). Here is your chance to help.

**Step 1**: Measure your leg from the center of your kneecap to the bone on the outside of your hip. Record this length and your own height in the table below. Fill in the table with similar measurements from your classmates. Use the chart below to record your data.

| **Femur Length (cm)** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Height (cm)** | | | | | | | | |

**Step 2**: Plot the data on a scatterplot, using a graphing calculator or by hand. Label your axes.




**1**. Describe the pattern you see in the scatterplot. Explain the relationship.
_____

**2**. Based on the data, what is your estimate for the height of the criminal?
_____

**3**. Anthropologists have developed a formula to determine the height from femur length. In cm, a man's height is given as **2.59•(femur length) + 66.4**. Use this formula to determine the height of the escaping criminal and compare it to the height that you found in #2. _____
_____

**4**. What might explain the differences in the height that you found using the scatterplot and the height you found using the formula? _____
_____

# The Product Game

| | | | | | |
|---|---|---|---|---|---|
| -36 | -30 | -25 | -24 | -20 | -18 |
| -16 | -15 | -12 | -10 | -9 | -8 |
| -6 | -5 | -4 | -3 | -2 | -1 |
| 1 | 2 | 3 | 4 | 5 | 6 |
| 8 | 9 | 10 | 12 | 15 | 16 |
| 18 | 20 | 24 | 25 | 30 | 36 |

Factors:

-6 -5 -4 -3 - 2 -1 1 2 3 4 5 6

Product Game Rules:

1. Player A puts a paper clip on a number in the factor list. Player A does not mark a square on the product grid because only one factor has been marked.
2. Player B puts the other clip on any number in the factor list (including the number marked by player A) and then covers the product of the two factors on the product grid.
3. Player A moves his or her paper clip to another number and then covers the new product in the product grid.
4. Each player, in turn, moves a paper clip and marks a product. A product that has already been marked may not be used again.
5. A player must take a turn and the winner is the first player to mark four squares in a row - up, down, across, or diagonally.

| THE PRODUCT GAME | | | | | |
|---|---|---|---|---|---|
| $x^2 + 2x + 1$ | $x^2 - 2x + 1$ | $x^2 - 1$ | $x^2 + 3x + 2$ | $x^2 - x - 2$ | $x^2 + x - 2$ |
| $x^2 - 3x + 2$ | $x^2 + 4x + 4$ | $x^2 - 4x + 4$ | $x^2 - 4$ | $x^2 + 4x + 3$ | $x^2 - 4x + 3$ |
| $x^2 + 2x - 3$ | $x^2 - 2x - 3$ | $x^2 + 5x + 6$ | $x^2 - 5x + 6$ | $x^2 + x - 6$ | $x^2 - x - 6$ |
| $x^2 + 6x + 9$ | $x^2 - 6x + 9$ | $x^2 - 9$ | $x^2 + 5x + 4$ | $x^2 - 5x + 4$ | $x^2 + 3x - 4$ |
| $x^2 - 3x - 4$ | $x^2 + 6x + 8$ | $x^2 - 6x + 8$ | $x^2 - 2x - 8$ | $x^2 + 2x - 8$ | $x^2 + 7x + 12$ |
| $x^2 - 7x + 12$ | $x^2 + x - 12$ | $x^2 - x - 12$ | $x^2 + 8x + 16$ | $x^2 - 8x + 16$ | $x^2 - 16$ |

## Factors:

**(x + 1) (x - 1) (x + 2) (x - 2) (x + 3) (x - 3) (x + 4) (x - 4)**

**Product Game Rules:**

1. Player A puts a paper clip on a number in the factor list. Player A does not mark a square on the product grid because only one factor has been marked.

2. Player B puts the other clip on any number in the factor list (including the number marked by player A) and then covers the product of the two factors on the product grid.

3. Player A moves ***either one*** *o*f the paper clips to another number and then covers the new product in the product grid.

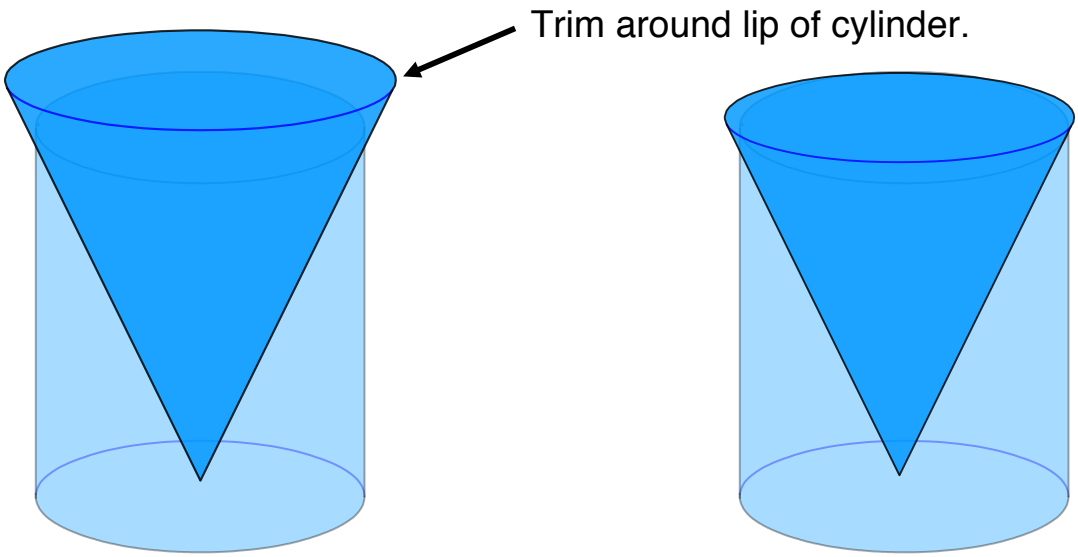
4. Each player, in turn, moves a paper clip and marks a product. A product that has already been marked may not be used again.

5. A player must take a turn and the winner is the first player to mark four squares in a row - up, down, across, or diagonally.

# *Comparing Cones and Cylinders*

- Roll a piece of paper into a cone shape so that the tip touches the bottom of your cylinder.

- Tape the cone shape along the seam and trim it to form a cone with the same height as the cylinder.




- Fill the cone to the top with rice, and empty the contents into the cylinder. Repeat this as many times as needed to completely fill the cylinder.

What is the relationship between the volume of the cone and the volume of the cylinder?

# Tic-Tac-Toe… What Do You Know?

Choose one project from each column, three projects in all. You must pick 3-in-a-row, Tic-Tac-Toe. All projects will be graded based on the following criteria:

| | |
|---|---|
| A | Exceeds standards, rich with vocabulary, great examples, very clear, creative. |
| B | Meets standards, uses word and examples to teach each topic, incorporates some unit vocabulary. |
| C | Meets standards, few or no examples to support information that is being presented |
| D | Does not meet minimum standards, little information presented |
| F | No project |

| | | |
|---|---|---|
| Poster – create a visual aid that teaches a concept learned this year. | Song- record song and hand in written lyrics | Poem – minimum 20 lines |
| Crossword – minimum of 20 problems/vocabulary | Video/movie – minimum 1 minute, maximum 5 minutes | Game – create a game that when played will teach someone the concepts learned this year. You must use relevant vocabulary words. |
| Practice Assessment – minimum 20 questions with answer key – all work shown out. | Power Point – minimum 10 slides | Story – Write a 10-page children's book (for 5-7 year olds) about a topic learned this year. |

# Connect Four

Grade 8 Domain: Expressions and Equations Standard: 3,4

# SCIENTIFIC NOTATION PROJECT

**Task**

1. Choose 6 facts that interest you.

- Two facts must have a number of 1,000 or greater associated with them.

For example:

a. The Earth weighs 6,588,000,000,000,000,000,000,000 tons.

b. More than 15,000,000,000 prizes have been given away in Cracker Jack's boxes.

- Two facts must have a number 0.1 or less associated with them.

For example:

c. The length of a hemoglobin molecule is 0.000006.8

d. The mass of the hydrogen atom in grams is 0.00000000000000000000000166

- Two facts must be similar in nature

For example:

e. 256,000,000 is the preliminary estimate of turkeys raised in the United States in 2005.

f. 89,300,000 cows is the estimate in the United States in 2013.

2. Convert the number from your fact into scientific notation. For example:

a. The Earth weighs $6.588 \times 10^{24}$ tons.

b. More than $1.5 \times 10^{10}$ prizes have been given away in Cracker Jack's boxes.

c. The length of a hemoglobin molecule is $6.8 \times 10^{-6}$

d. The mass of the hydrogen atom is $1.66 \times 10^{-24}$

e. There are approximately $2.56 \times 10^{8}$ turkey raised in the US

f. There are approximately $8.93 \times 10^{7}$ cows in the US in 2013

3. Then, compile all of your data onto one sheet (see example) or you can make a booklet out of construction paper.

a. Make a cover page titling it "Interesting Facts in Scientific Notation" and decorate the cover.

b. Write each fact with the number in standard form.

c. Write each fact with the number in scientific notation.

d. Compare your last two scientific numbers stating the facts as one is "how many more times larger" than the other.

e. Place some graphic or clipart next to each fact.

DUE DATE:

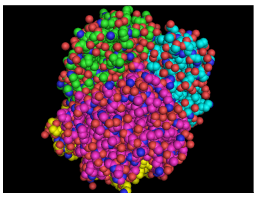
**An Example of what should be in your finished project:**

Fact 1: The Earth weighs 6,588,000,000,000,000,000,000,000 tons.

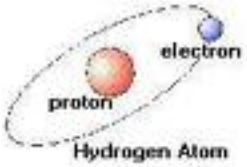
The Earth weighs $6.588 \times 10^{24}$ tons.

Fact 2: More than 15,000,000,000 prizes have been given away in Cracker Jack's boxes. More than $1.5 \times 10^{10}$ prizes have been given away in Cracker Jack's boxes.

Fact 3: The length of a hemoglobin molecule is 0.000006.8 The length of a hemoglobin molecule is $6.8 \times 10^{-6}$



Fact 4: The mass of the hydrogen atom in grams is 0.00000000000000000000000166 The mass of the hydrogen atom in grams is $1.66 \times 10^{-24}$




Fact 5: 256,000,000 is the preliminary estimate of turkeys raised in the United States in 2005. $2.56 \times 10^{8}$ is the preliminary estimate of turkeys raised in the United States in 2005.

Fact 6: 89,300,000 is the estimated amount of cows in the United States in 2013. $8.93 \times 10^{7}$ is the estimated amount of cows in the United States in 2013.

Comparing fact 5 & 6: $25.6 \times 10^{7}$ and $8.93 \times 10^{7}$ There are approximately 3 times as many turkeys raised in the United States in 2005 than cows in 2013.

# War – How much more?

Red is Negative

**Black** is positive

| Team 1 | Team 2 |
| --- | --- |

# Mathemagics

Slope

* Use 8 ½ X 11 inch paper
* One-inch margins
* Title on right-hand side
* Number each section

Title: Slope

1. Visual representation for the four types of slope on a coordinate plane - labeled

2. Slope Formula
   a. Write the slope formula for using two coordinate sets of points
   a. Find the slope of (-3, 5); (2,10)
   b. Find the slope of (2, 7); (2, 9)

3. Slope intercept form
   a. Slope intercept formula
   b. Identify the parts of the formula
   c. Solve the following problems by putting the answers in slope intercept form
      1. m = 3; b = -5
      2. m = -1; (2, -4)
      3. (7,2); (-2,6)

4. Point-Slope Form
   a. Formula for Point slope form
   b. Write and equation in point slope form of the line passing through the given points: (4,-5), (-2,-7)

5. Standard Form
   a. Standard form equation (include what the coefficients should be)
   b. Convert y = - ½ x + 8 into Standard form

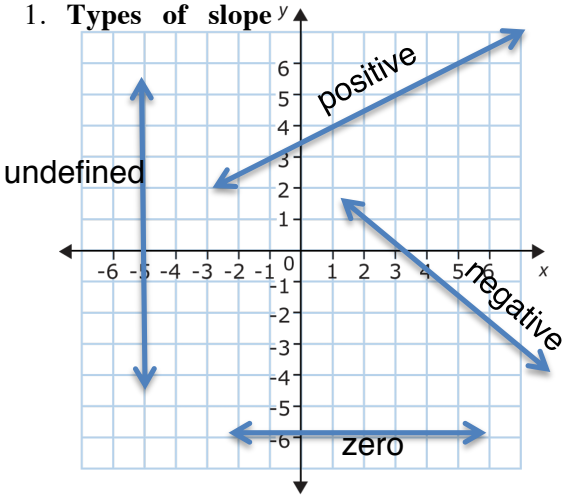
# Mathemagics Rubric – Slope

Name: _____ Date: _____ Section: _____

| | | | | | | |
|---|---|---|---|---|---|---|
| Use 8 ½ X 11 paper | 1 | 0 | | | | |
| One inch margins | 1 | 0 | | | | |
| Title on right-hand side | 1 | 0 | | | | |
| Number each part | 1 | 0 | | | | |
| 1. Four types of slope | 4 | 3 | 2 | 1 | 0 | |
| 2. Slope | 3 | 2 | 1 | 0 | | |
| 3. Slope intercept | 5 | 4 | 3 | 2 | 1 | 0 |
| 4. Point Slope | 2 | 1 | 0 | | | |
| 5. Standard | 2 | 1 | 0 | | | |

Total points: _____ / 20

1. **Types of slope**




2. **Slope** $m = \frac{y_2 - y_1}{x_2 - x_1}$

a. (-3,5) (2,10) $m = \frac{5 - 10}{-3 - 2} = \frac{-5}{-5} = 1$

b. (2,7) (2,9) $m = \frac{7 - 9}{2 - 2} = \frac{-2}{0} =$ undefined

3. **Slope Intercept**

a. $y = mx + b$

b. Where "m" represents the slope and "b" represents the y-intercept

c. solving:

1. m = 3, b = -5
   $y = 3x - 5$
2. m = -1 , (2, -4)
   $y = mx + b$
   $-4 = (-1)(2) + b$
   $-4 = -2 + b$
   $-2 = b$
   $y = -1x - 2$
3. (7,2) (-2,6)
   $m = \frac{2 - 6}{7 - (-2)} = \frac{-4}{9}$
   $y = mx + b$
   $2 = (-4/9)(7) + b$
   $2 = -28/9 + b$
   $46/9 = b$
   $y = -4/9\ x + 46/9$

4. **Point Slope Form**

a. $y - y_1 = m(x - x_1)$

b. (4, -5) (-2,-7)
$m = \frac{-5 - (-7)}{4 - (-2)} = \frac{2}{6} = \frac{1}{3}$
$y + 5 = 1/3\ (x - 4)$

5. **Standard Form**

a. Ax + By = C where A, B, and C represent real numbers and A and B are not both zero.

b. $y = -\frac{1}{2}x + 8$ into standard form with integer coefficients
$\frac{1}{2}x + y = 8$
$2(\frac{1}{2}x + y = 8)$
$x + 2y = 16$

Slope

# Candy Guess

1. It is a 4-digit number.
2. It is less than 1400.
3. The number is divisible by 3.
4. It is not an even number.
5. It is not divisible by 10.
6. It has exactly 8 factors.
7. When divided by 5, the remainder is 3.
8. All the digits are odd.
9. This number is the product of three prime numbers.
10. The sum of the thousands digit and hundreds digit is half that of the sum of the tens digit and ones digit.