

Algebra 1 Activities

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Files can be downloaded from: <http://wsfcs.k12.nc.us/Page/51682>

SLOPE AEROBICS

X-line undefined, y line 0

X-line undefined, y line 0

Positive Negative Zero Undefined

Positive Negative Zero Undefined

Parallel same, perpendicular negative flip

Parallel same, perpendicular negative flip

Rise over Run

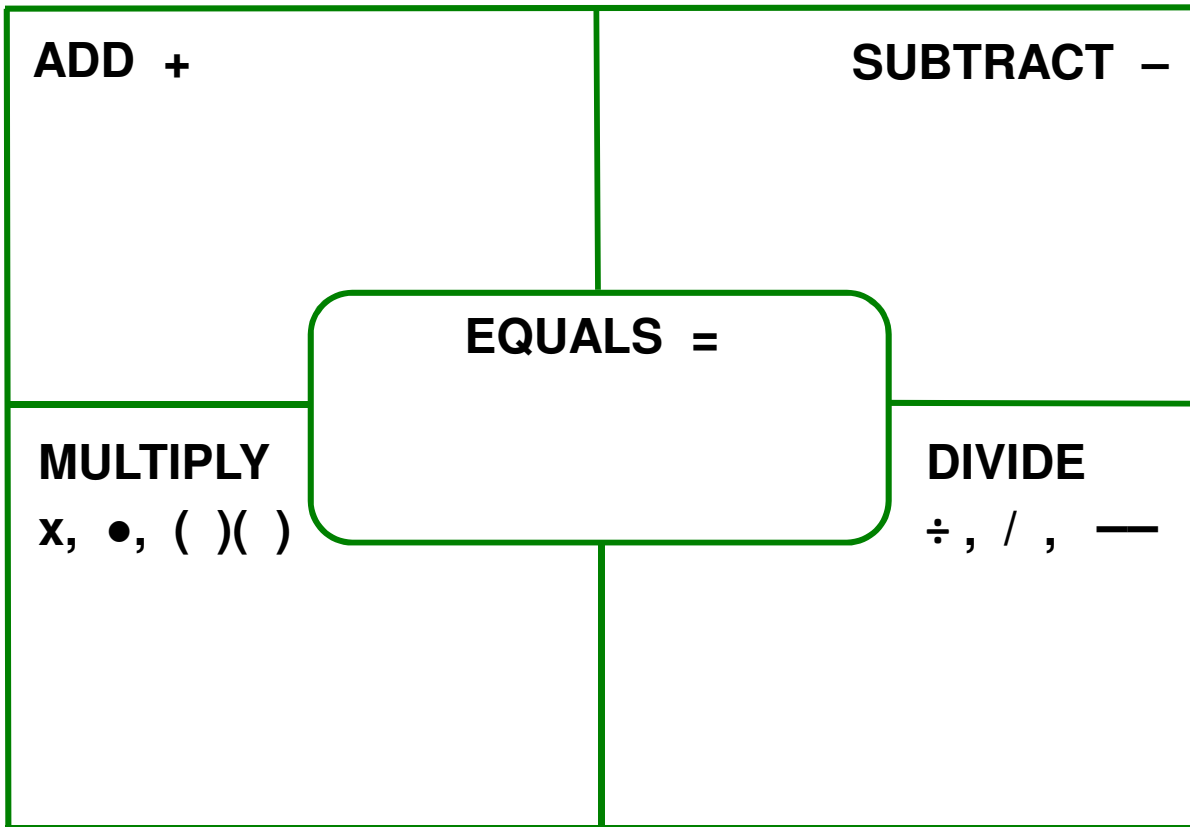
Rise over Run

$Y - y$ over $x - x$

$Y - y$ over $x - x$

$Y = \text{Slope } x + B$

$Y = \text{slope } x + B$



TRANSLATION TERMS
SORT ACTIVITY

- Terms are on individual slips of paper.
- Sort terms into categories.
- Can be done with a partner or alone.
- Used for future reference in decoding word problems.

less than (<)	greater than (>)
less than or equal to (≤)	greater than or equal to (≥)

1. Begin by exploring the effects of multiplying both sides by a negative number.

a. Consider the following true statements. $3 < 7$ $-2 < 1$ $-8 < -4$

For each statement multiply the number on each side by -1 . Then indicate the relationship between the resulting numbers using $<$ or $>$.

b. Based on your observations, complete the statement: *If $a < b$, then $(-1)a$ ___ $(-1)b$.*

c. Next, consider relations of the form $c > d$ and multiplication by -1 .

Test several examples and make a conjecture: *If $c > d$, then $(-1)c$ ___ $(-1)d$.*

2. Pairs of numbers are listed below. For each pair, describe how it can be obtained from the pair above it. Then indicate whether the direction of the inequality stays the same or reverses. The first two examples have been done for you.

	<u>Inequality Operation</u>	<u>Inequality Direction</u>
$9 > 4$		
$12 > 7$	add 3 to both sides	stays the same
$24 > 14$	multiply both sides by 2	stays the same
a. $20 > 10$	_____	_____
b. -4 _____ -2	_____	_____
c. -2 _____ -1	_____	_____
d. 8 _____ 4	_____	_____
e. 6 _____ 2	_____	_____
f. -18 _____ -6	_____	_____
g. 3 _____ 1	_____	_____
h. 21 _____ 7	_____	_____

SOURCE: Core Plus Course 1 2nd Edition, 2008 Unit 3, Lesson 2, Investigation 3, page 194–195

SOLVING INEQUALITIES

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c. -2 ___ -1	-----	-----
d. 8 ___ 4	-----	-----
e. 6 ___ 2	-----	-----
f. -18 ___ -6	-----	-----
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d.	$8 > 4$	<u>Multiply both sides by -4</u>	<u>Changes direction</u>
e.	$6 > 2$	<u>Subtract 2 both sides</u>	<u>Stays the same</u>
f.	$-18 < -6$	<u>Multiply both sides by -3</u>	<u>Changes direction</u>
g.	$3 > 1$	<u>Divide both sides by -6</u>	<u>Changes direction</u>
h.	$21 > 7$	<u>Multiply both sides by 7</u>	<u>Stays the same</u>

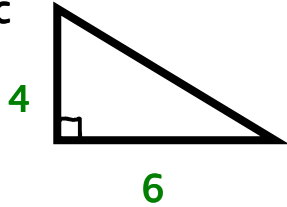
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DISTANCE FORMULA

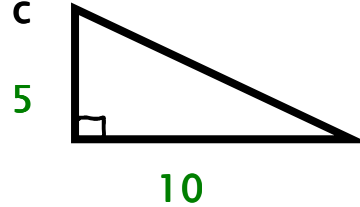
Pythagorean Theorem $c^2 = a^2 + b^2$

Find the missing side. Show your work.

1. Find c



2. Find c



3. a = 9 b = 6 c = ?

Find the length of the hypotenuse for the triangle shown.

4. 5.

Two right-angled triangles are shown on a grid. Triangle 4 has a horizontal leg of 6 units and a vertical leg of 3 units. Triangle 5 has a horizontal leg of 4 units and a vertical leg of 3 units.

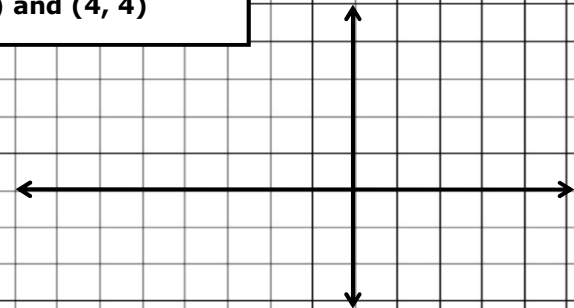
What is the length of the line segment? Assume it is the hypotenuse of a triangle and draw in the missing sides to help you determine the answer.

6. 7.

Two line segments are shown on a grid. Segment 6 connects the origin (0,0) to the point (4,3). Segment 7 connects the origin (0,0) to the point (3,4).

What's the length of the line segment connecting the two points given?

8. (-6, -2) and (4, 4)



What's the distance between the two points given?

9. (4, 10) and (6, 18)

find the "slope numbers" (these are a and b)
square each number and add these together
find the square root

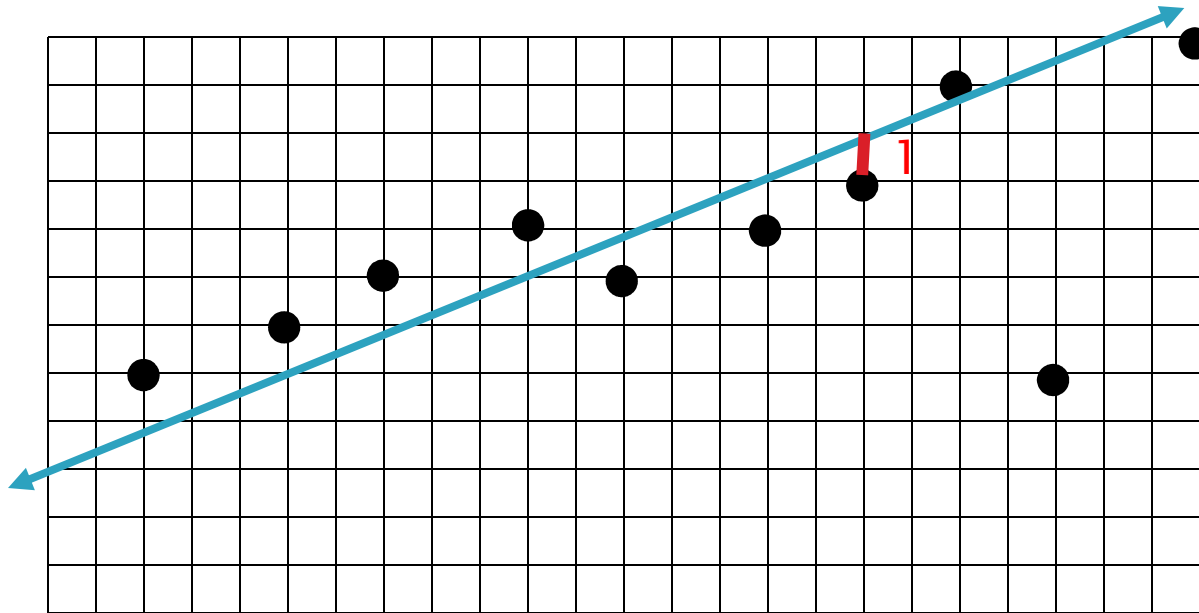
RESIDUALS

Guess the ages of the following people:

Name	Guessed Age	Actual Age	Residual Predicted-Actual
1. Leonardo DiCaprio		40	
2. Oprah Winfrey		61	
3. Jaden Smith		17	
4. Jennifer Lopez		46	
5. Morgan Freeman		77	
6. Queen of England		89	
		Total:	

There is also a regression/residual worksheet

<http://mathbits.com/MathBits/PPT/EstimateAge.htm>



Draw the line of best fit.

Calculate the vertical distance from each point to the line (positive ONLY)

Add all of the distances.

<http://www.shodor.org/interactivate/activities/Regression/>

AROUND THE WORLD (SCAVENGER HUNT)

Enlarge and place these cards around the room. Students start at different places, solve the problem at the bottom and then look for the answer on top of another card. They then look for their answer etc.. until they have gone around the room.

A (15,-7)

$$4x + 6y = -12$$

$$3x - 5y = 29$$

15

B (50,30)

$$5x - 3y = 4$$

$$2x + 3y = 52$$

18

C (3,-4)

$$y = 10x + 60$$

$$y = 8x + 52$$

8

D (2,6)

$$x + y = 80$$

$$3x + 2y = 210$$

6

E (-4,20)

$$3y = 12x - 66$$

$$8x - 3y = 26$$

3

F (12,20)

$$x + y = 8$$

$$x - y = 22$$

2

G (10,18)

$$4x + 7y = 50$$

$$y = 5x - 4$$

3.14

H (8,12)

$$.25x + .05y = 4$$

$$x + y = 32$$

28

Page 4

24 (Z)

It takes 4 eggs to make 16 cookies. How many dozen eggs will it take to make 144 cookies
(16)

14 (A)

For every four adults, one child gets in free. How many children can enter if there are 24 adults?
(20)

Double problem to prevent tailgating

EXPONENTIAL GROWTH VIDEO

The growth of Walmart and Sam's Club in the United States can be modeled by the equation:

$W(x) = 1(1.1867)^x$ where x is the number of stores in 1961.

The growth of Target can be modeled by the equation:

$T(x) = 1(1.1712)^x$ where x is the number of stores in 1961.

The growth of Ross Stores can be modeled by the equation:

$R(x) = 1(1.2588)^x$ where x is the number of stores in 1984.

How many stores did Walmart have in 1961?

How many stores did Target have in 1961?

Which company grew at the fastest rate?

By what growth did Walmart have between 1961 and 2010?

By what growth did Target have between 1961 and 2008?

How much greater of a rate did Walmart grow faster than Target?

SLAP JACK (EXPONENTIAL GROWTH)

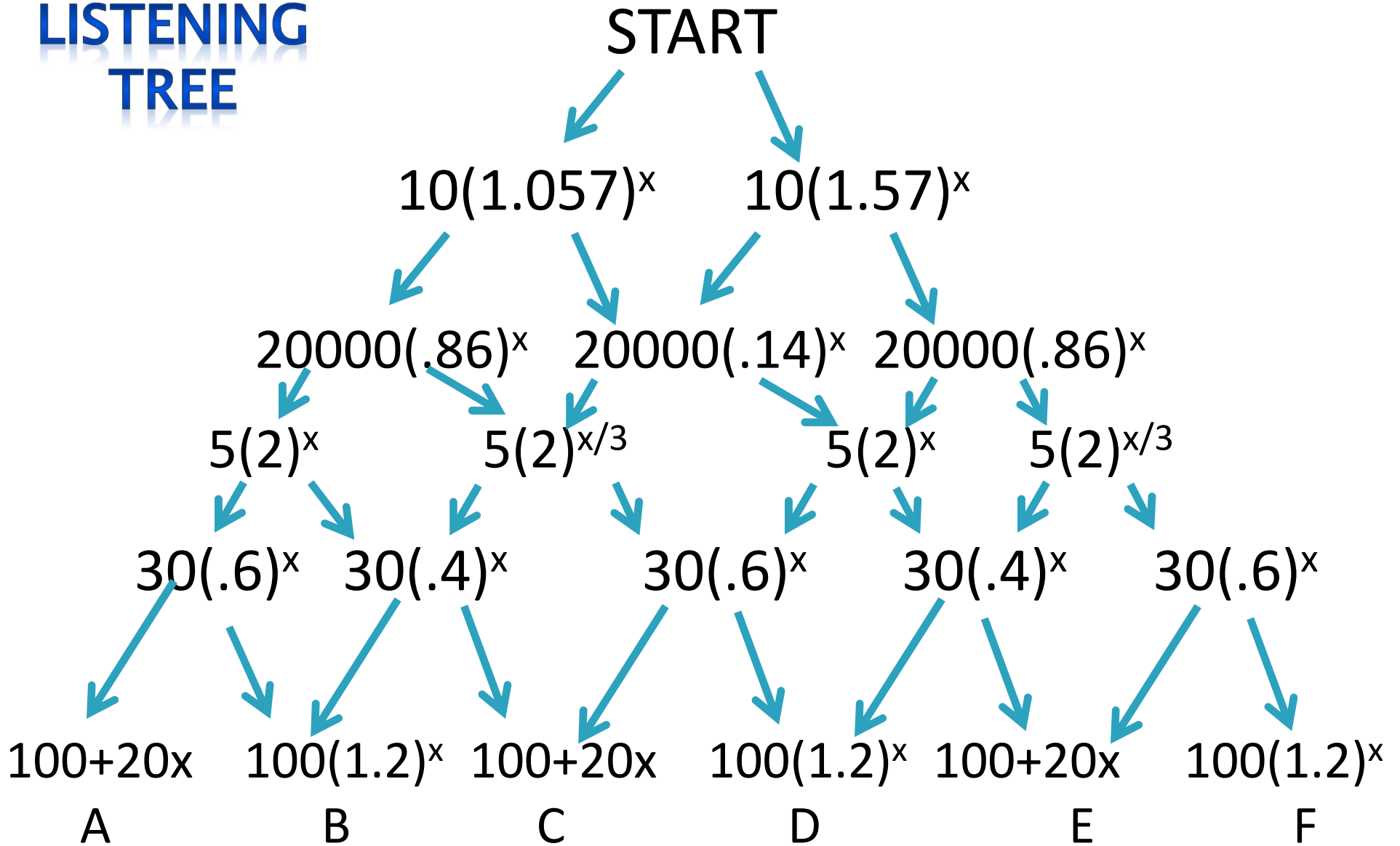
First person to touch **correct** box: +2 points

Anyone else touching **correct** box: +1 point

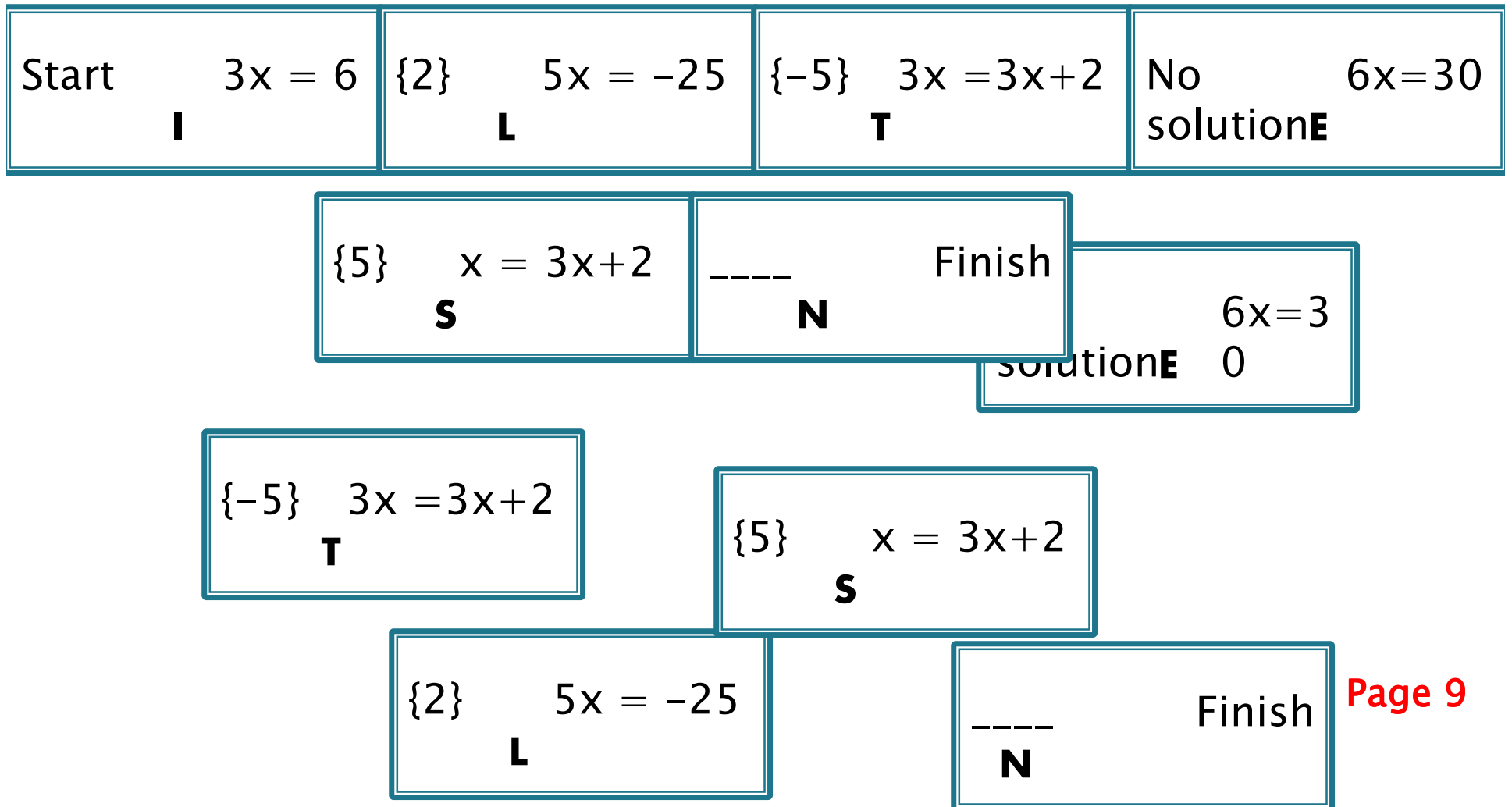
Incorrect box: -1 point

$Y = (1.056)^x$	Neither	2	5% increase	7	$Y = 6(1.4)^x$
A	B	C	D	E	F
56	50% increase	Growth	$6(1.04)^x$	Decay	30% decrease
G	H	I	J	K	L
132	37% increase	$6(.96)^x$	3% decrease	3.7% increase	$Y = (1.56)^x$
M	N	O	P	Q	R

LISTENING TREE



DOMINOES (NOT THE PIZZA)



$$3x^{\frac{5}{2}}y^{\frac{1}{2}} \quad \mathbf{A} \quad (8x^7y^2)^{\frac{1}{3}}$$

$$3x^4y^{\frac{5}{3}} \quad \mathbf{E} \quad \sqrt{64x^2y^3}$$

$$2x^{\frac{5}{2}}y^{\frac{1}{2}} \quad \mathbf{C} \quad \sqrt[3]{27x^{12}y^5}$$

$$4x^{\frac{2}{3}}y \quad \mathbf{F} \quad (9x^5y)^{\frac{1}{2}}$$

$$\text{-----} \quad \mathbf{D} \quad \sqrt[3]{64x^2y^3}$$

$$2x^{\frac{7}{3}}y^{\frac{2}{3}} \quad \mathbf{B} \quad \sqrt{4x^5y}$$

EXPONENT DOMINOES

The problem is on the right side, with simplified "answers" on the left side.
Put them in order. Fill in the blank.

$$2x^{\frac{5}{2}}y^{\frac{1}{2}} \quad \mathbf{C} \quad \sqrt[3]{27x^{12}y^5}$$

$$3x^4y^{\frac{5}{3}} \quad \mathbf{E} \quad \sqrt{64x^2y^3}$$

$$8xy^{\frac{3}{2}} \quad \mathbf{D} \quad \sqrt[3]{64x^2y^3}$$

$$4x^{\frac{2}{3}}y \quad \mathbf{F} \quad (9x^5y)^{\frac{1}{2}}$$

$$3x^{\frac{5}{2}}y^{\frac{1}{2}} \quad \mathbf{A} \quad (8x^7y^2)^{\frac{1}{3}}$$

$$2x^{\frac{7}{3}}y^{\frac{2}{3}} \quad \mathbf{B} \quad \sqrt{4x^5y}$$

FISHER SAYS

If I say “Fisher Says” then model what I say

If I don’t say “Fisher Says” then “Freeze!!!”

$$y = x$$

$$y = 3$$

$$x = 3$$

$$y = x + 1$$

$$y = 2x - 1$$

$$y = 3 - \frac{1}{2}x$$

$$y = x^2 + 1$$

$$2y + x = -4$$

$$2y + x = -4$$

Another kinesthetic activity is to give each group of four students some string and then graph equations on a tile floor with their bodies using an easy origin label.

PARTNER PAIR WORK

Left person: Solve for x : $x + 2 = 7$

Right Person: Solve for y : $2x - y = 8$

(x is what you get from your partner)

Left person: Solve for x : $3x + 4 = -11$

Right Person: Solve for y : $2x - y = 25$

(x is what you get from your partner)

Right person: Solve for x : $-3x + 4 = -20$

Left Person: Solve for y : $2x - 3y = 25$

(x is what you get from your partner)

This works great in Alg 2 with $R(x)$, $L(x)$ and $R \circ L(x)$

PARTNER ACTIVITY

Set 1A

1. $2x = 4$

2. $5x = -10$

3. $4x = 16$

4. $8x = -24$

1.2

2.-2

3.4

4.-3

1-C

2-D

3-A

4-B

Set 2A

5.

6.

7.

8.

Set 1B

A. $9x = 36$

B. $4x = -12$

C. $8x = 16$

D. $10x = -20$

A. 4

B. -3

C. 2

D. -2

Set 2B

I.

J.

K.

L.

Partner A does the left side and Partner B does the right side. After both partners have completed the first four problems, compare your answers. Each partner should have the same 4 answers (but in a different order.)

A $(5n^3)(4n^2)$ $20n^5$

B $\frac{30n^{10}}{2n}$ $15n^9$

C $\frac{4n^4}{0.25n^{-2}}$ $16n^6$

D $(3n^4)^2$ $9n^8$

1. $\frac{18n^6}{2n^{-2}}$ $9n^8$

2. $\frac{40n^8}{2n^3}$ $20n^5$

3. $(4n^3)^2$ $16n^6$

4. $(5n^8)(3n)$ $15n^9$

E. $\frac{10r^3t^5}{40r^7t^3}$ _____

F. $\left(\frac{2r}{3t^3}\right)^2$ _____

G. $\frac{6r^0 \cdot 9t^9}{t}$ _____

H. $(4r^3)^2(3rt^2)$ _____

5. $(3t^3)^2 \cdot 6t^2$ _____

6. $\left(\frac{t}{2r^2}\right)^2$ _____

7. $\frac{8r^4t}{18r^2t^7}$ _____

8. $\frac{16r^0 3r^7 t^3}{t}$ _____

PARTNER ACTIVITY

PARTNER ACTIVITY

Slope	Pair #1	Pair #2	Pair #3
5	(1, 6) and (2, 11)	(-2, -3) and (0, 7)	(4, 8) and (7, 23)
$\frac{2}{3}$	(-1, -8) and (5, -4)	(5, 6) and (8, 8)	(-4, 1) and (-13, -5)
$-\frac{1}{7}$	(0, 3) and (14, 1)	(3, -2) and (-11, 0)	(2, 4) and (9, 3)
0	(8, 12) and (4, 12)	(5, -2) and (-3, -2)	(-1, 5) and (10, 5)
Undefined	(3, 8) and (3, 0)	(-2, 6) and (-2, -2)	(0, 7) and (0, 2)
$\frac{9}{5}$	(3, 6) and (13, 24)	(-3, -8) and (2, 1)	(-7, 8) and (-2, 17)
-6	(2, -8) and (-1, 10)	(-3, -15) and (-5, -3)	(4, 9) and (6, -3)
$-\frac{7}{6}$	(5, 12) and (11, 5)	(-3, 8) and (3, 1)	(-7, -7) and (5, -21)

Pair #2: Find the Slope (Show Work)									
1. $(5, -2)$ and $(-3, -2)$									
2. $(-2, 6)$ and $(-2, -2)$									
3. $(3, -2)$ and $(-11, 0)$									
4. Rate of change from $[2, 7]$									
<table border="1"> <thead> <tr> <th>Days</th> <th>Balloons</th> </tr> </thead> <tbody> <tr> <td>2</td> <td>10</td> </tr> <tr> <td>3</td> <td>24</td> </tr> <tr> <td>7</td> <td>19</td> </tr> </tbody> </table>	Days	Balloons	2	10	3	24	7	19	
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2	10								
3	24								
7	19								
5. $(5, 6)$ and $(8, 8)$									
6. $(-3, -15)$ and $(-5, -3)$									
7. Slope									
8. $(-3, 8)$ and $(3, 1)$									

Pair #1: Find the Slope (Show Work)									
1. Rate of change from $[2, 6]$									
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2	10								
3	24								
6	30								
2. -Slope									
3. $(0, 3)$ and $(14, 1)$									
4. $(8, 12)$ and $(4, 12)$									
5. $(3, 8)$ and $(3, 0)$									
6. $(3, 6)$ and $(13, 24)$									
7. $(2, -8)$ and $(-1, -10)$									
8. $(5, 12)$ and $(11, 5)$									

PARTNER ACTIVITY

VOcabuLARY RECALL

You say your card and then someone else's card. Then that person says his card and then someone else's....

Fish

Sakana

Pig

Buta

Cat

Neko

Teacher

Sensei

VOCABULARY RECALL

3% Increase (1.03) ^x	30% Increase (1.3) ^x	3% Decrease (.97) ^x	30% decrease (.7) ^x
5.3% Increase (1.053) ^x	5.3% Decrease (.947) ^x	15% Tip (1.15) ^x	15% Discount (.85) ^x
7% Tax (1.07) ^x	7% Discount (.93) ^x		

BLUFF

Geniuses Cockroaches Euclid Pythagoras

Directions: Ask Team A a question. If a student knows the answer (or wants to bluff) then he stands up. Count the people. Choose a student. If (s)he gets it right then his team earns a point for every person who was standing. If (s)he gets it wrong then the other team can steal it for $\frac{1}{2}$ the amount of people standing. Play continues by asking Team B a new question. Continue alternating but consider letting Team B go first some of the time. The team with the highest points wins. Any student caught telling the answer to a teammate loses five points for his/her team.

Not in packet

MATCHING CARDS

5^{-2}

$1/25$

-25

-5^{-2}

$-1/25$

$1/25$

-5^2

-25

$-1/25$

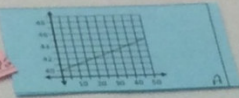
Yellow sheet

Caleb's phone company charges a \$40 flat rate and \$0.10 per minute.

slope = 0.10
y-intercept = 40

NEXT = NOW + 0.10,
starting at 40

$y = 40 + 0.10x$



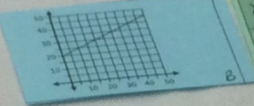
X	0	10	20	40
Y	40	41	42	

Ally's plant was 20 inches tall and grows 1 inch every 2 days.

slope = $\frac{1}{2}$
y-intercept = 20

NEXT = NOW + $\frac{1}{2}$,
starting at 20

$y = 20 + \frac{1}{2}x$



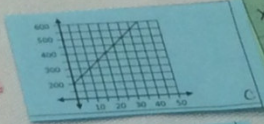
X	0	2	4	6
Y	20	21		23

Roman opened a savings account with \$200 and saves \$10 per month.

slope = 10
y-intercept = 200

NEXT = NOW + 10,
starting at 200

$y = 200 - 10x$

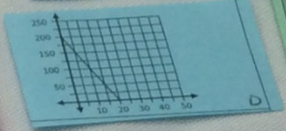


X	0	2	4	6
Y	200		240	260

Allen weighs 200 pounds but loses 10 pounds per month on his diet.

slope = -10
y-intercept = 200

$y = 200 - 10x$



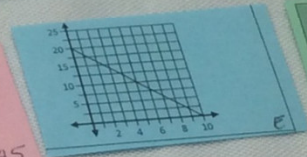
X	0	6	10	
Y	200	160	140	100

Sabrina borrowed \$20 from her mom and pays her back \$2 each week.

slope = -2
y-intercept = 20

NEXT = NOW - 2,
starting at 20

$y = 20 - 2x$



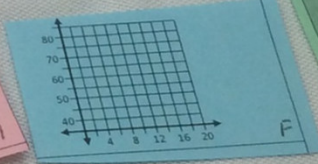
X	0	3	5	8
Y		14	10	4

Isaiah's job pays \$40 per day and \$3 for each sale that he makes.

slope = 3
y-intercept = 40

NEXT = NOW + 3,
starting at 40

$y = 40 + 3x$

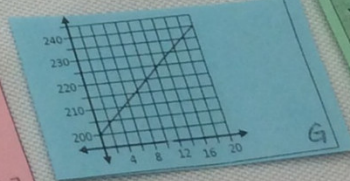


X		8	10	13
Y	55	64	70	79

slope = 2
y-intercept = 200

NEXT = NOW + 2,
starting at 200

$y = 200 + 2x$



X	3	7
Y	206	214

EXPRESSION BINGO

B	I	N	G	O

Answers for BINGO cards: **RANDOMLY FILL IN THE CARD WITH THE ANSWER LETTERS**

- A. $2y^2$ B. $\frac{y}{3}$ C. $6y$ D. $3 + y$ E. **FREE** F. $-y - 3$ G. $2y - 4$
H. $y^2 + 4$ I. $2y + 5$ J. $\frac{y}{4}$ K. $3y$ L. $y + 2$ M. $-6y$ N. $3y + 2$
O. $y - 3$ P. $y - 5$ Q. $2y + 2$ R. $\frac{y}{-3}$ S. $2y + 3$ T. $2y$ U. y^2
V. $2y + 4$ W. y^3 X. $4y - 3$ Y. $6 - y$

EXPANDING BINOMIALS

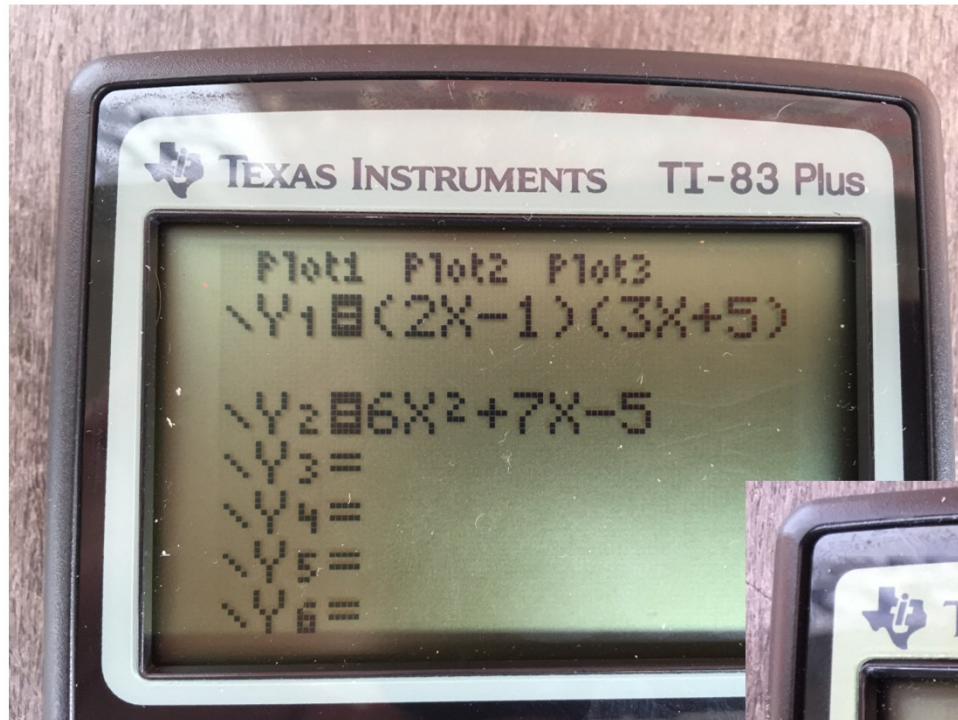
A $x + 5$	B $x - 5$	C $x + 4$	D $x - 2$
E $2x - 3$	F $3x + 8$	G $2x + 1$	H $4x - 6$

Cut up the 32 cards and distribute to the students – so they can practice the Distribution Property!

Students pair up with each other and work together to multiply the 2 binomials. Each student records the problem and shows their work. Students find another classmate and repeat the process. Some different ways for students to pair up:

- Same sign in the middle; Different sign in the middle; 1 odd and 1 even;
- “a” coefficient = 1 and “a” coefficient \neq 1
- Both constants are the same (either odd or even)

EXPANDING BINOMIALS (SELF-CHECK)



TEXAS INSTRUMENTS TI-83 Plus

X	Y1	Y2
0	-5	-5
1	8	8
2	33	33
3	70	70
4	119	119
5	180	180
6	253	253

X=0

NUMBER LINE

Place the following from least (left side) to largest (right side).
(Teachers can cut these out or just give it as a worksheet)

A: Y intercept of $y = 3x^2 + 2x - 7$

B: x coordinate of vertex of $y = 2x^2 - 8x - 2$

C: y coordinate of vertex of $y = 2x^2 - 8x - 3$

D: The larger x-intercept of: $x^2 - 9x + 8 = 0$

E: The smaller x-intercept of: $x^2 - 9x + 8 = 0$

F: The smaller x-intercept of: $x^2 + 9x - 10 = 0$

G: The larger root of: $-x^2 + 10x - 24 = 0$

H: $f(4)$ of $y = 2x^2 - 3x - 8$

I: The rate of change of $y = x^2 - 7x + 10$ on the interval of $[1, 5]$

J: The sum of the roots of: $y = -x^2 + 5x + 6$

Key: A: -7 B: 2 C: -11 D: 8 E: 1 F: -10 G: 6 H: 12 I: -1 J: 5

So: C, F, A, I, E, B, J, G, D, H

QUADRATIC FUNCTIONS

EQUATION

Axis of
Symmetry

y-intercept:

Graph

Vertex

a= b= c=

x-intercept(s)

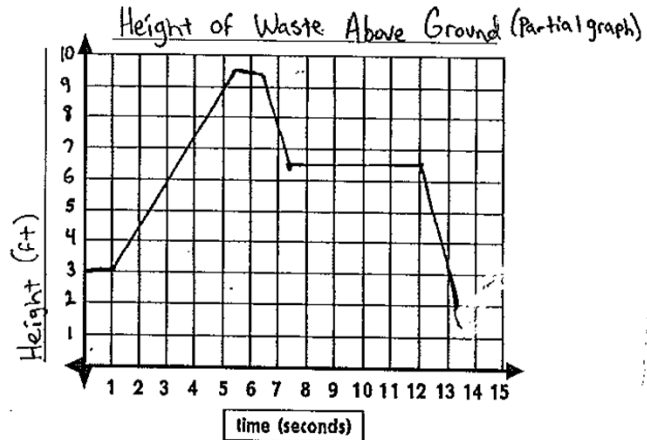
EXCELLENT FOR:

Vocabulary
“How to” steps
Calculator steps

“Find the missing value”
Factored form to Expanded form
Word Problem Clues
Project Based format

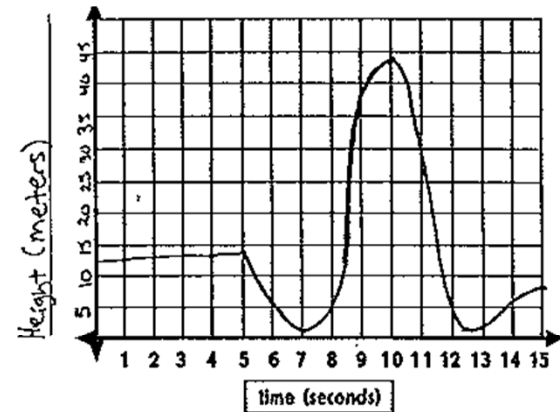
GRAPHING STORIES

www.graphingstories.com Look at the "Height of Waste Above Ground" with the slide.



- 1) What is the domain and range? _____
- 2) Is this a function? Explain. _____
- 3) Is it a 1-1 function? Explain. _____
- 4) Find and interpret $f(0.5)$. _____
- 5) Find and interpret $f(4.5)$. _____
- 6) Find and interpret $f(8.5)$. _____

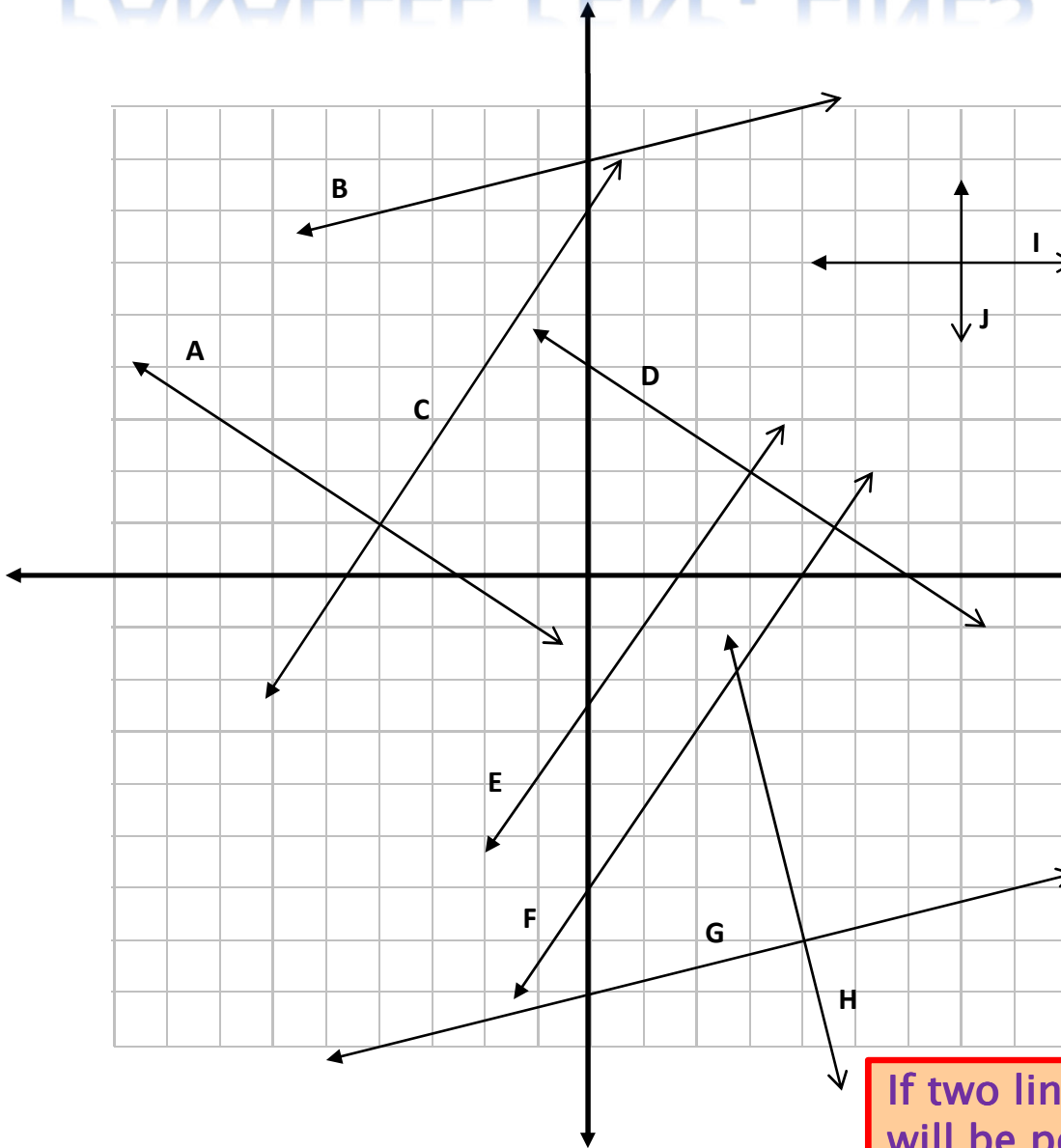
www.graphingstories.com . Look at the "Height" one with the swing.



1. What is the domain and range? _____
2. Is it a function? Is it 1-1? Explain. _____
3. Find and interpret $f(2)$ _____
4. Find and interpret $f(8)$ _____
5. Find and interpret $f(x) = 20$? _____
6. Find and interpret $f(x) = 46$? _____
7. How does your answer to #6 relate to your range? _____
8. Suppose that the swing started 10 feet higher. What would $f(3)$ become? _____
9. Explain how the answer to #8 is equivalent to $f(3) + 10$. _____

PARALLEL PERP. LINES INVESTIGATION

Find the slopes of all 10 lines.



Which line appears to be parallel to Line A? What do you notice about the slopes of these two lines?

What line appears to be parallel to Line B? What do you notice the slopes of these two lines?

What lines appear to be parallel to E and what do you notice about the slopes of these three lines?

Two Lines are parallel if they have the _____ slope.

Do Lines A and C appear to be parallel or perpendicular? What do you notice about these two slopes?

Do Lines G and H appear to be parallel or perpendicular? What do you notice about these two slopes?

If two lines are perpendicular then one slope will be positive and the other will be _____. They will be _____ of each other.

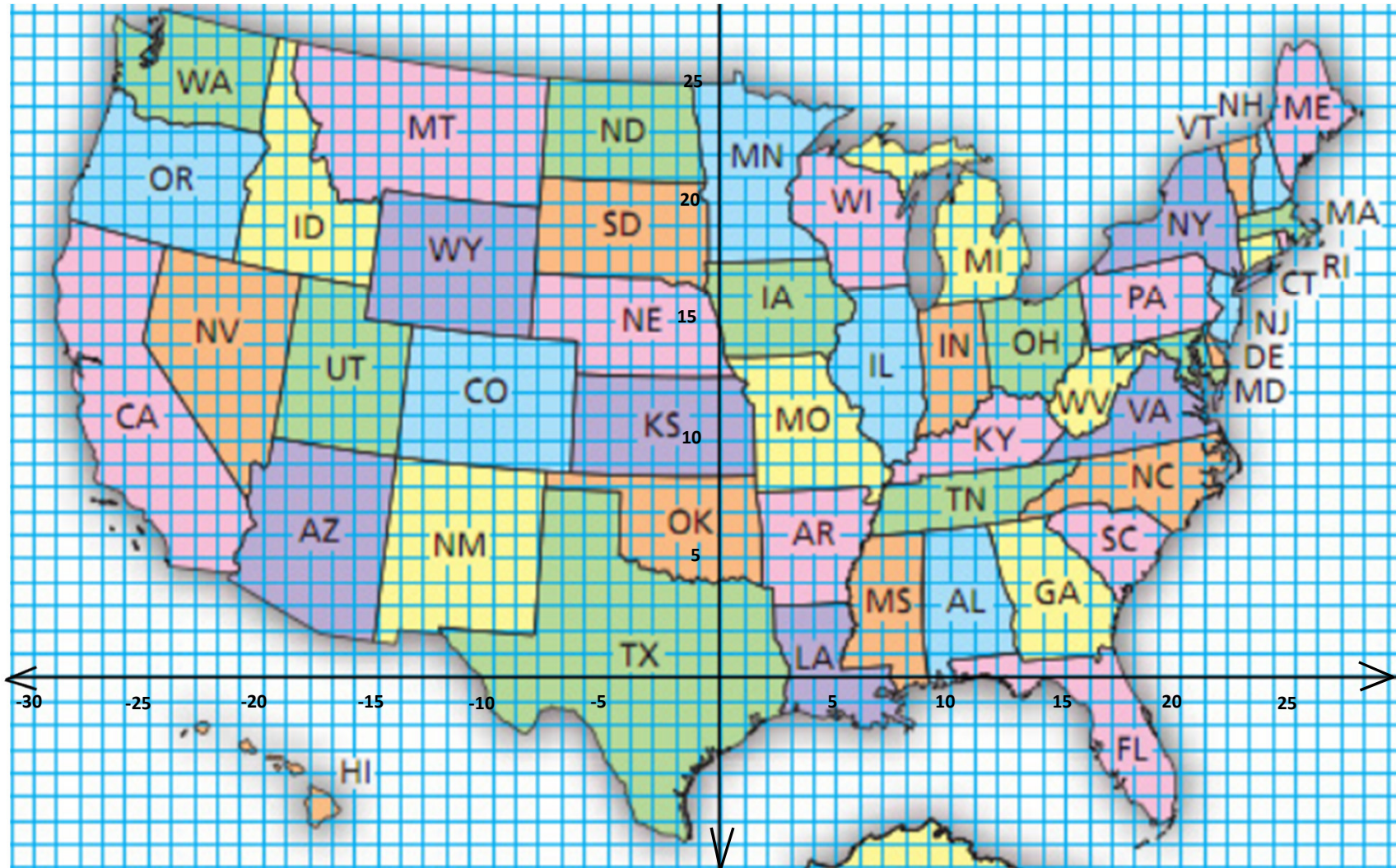
DISTANCE MIDPOINT PROJECT

You are planning a 5-day trip across the United States.

Choose a place to start and continue in a “round-trip” throughout the country.

Use the map to determine how far you travel each day (distance formula), with a pit stop along the way (midpoint).

Each block on the map equals 50 miles.



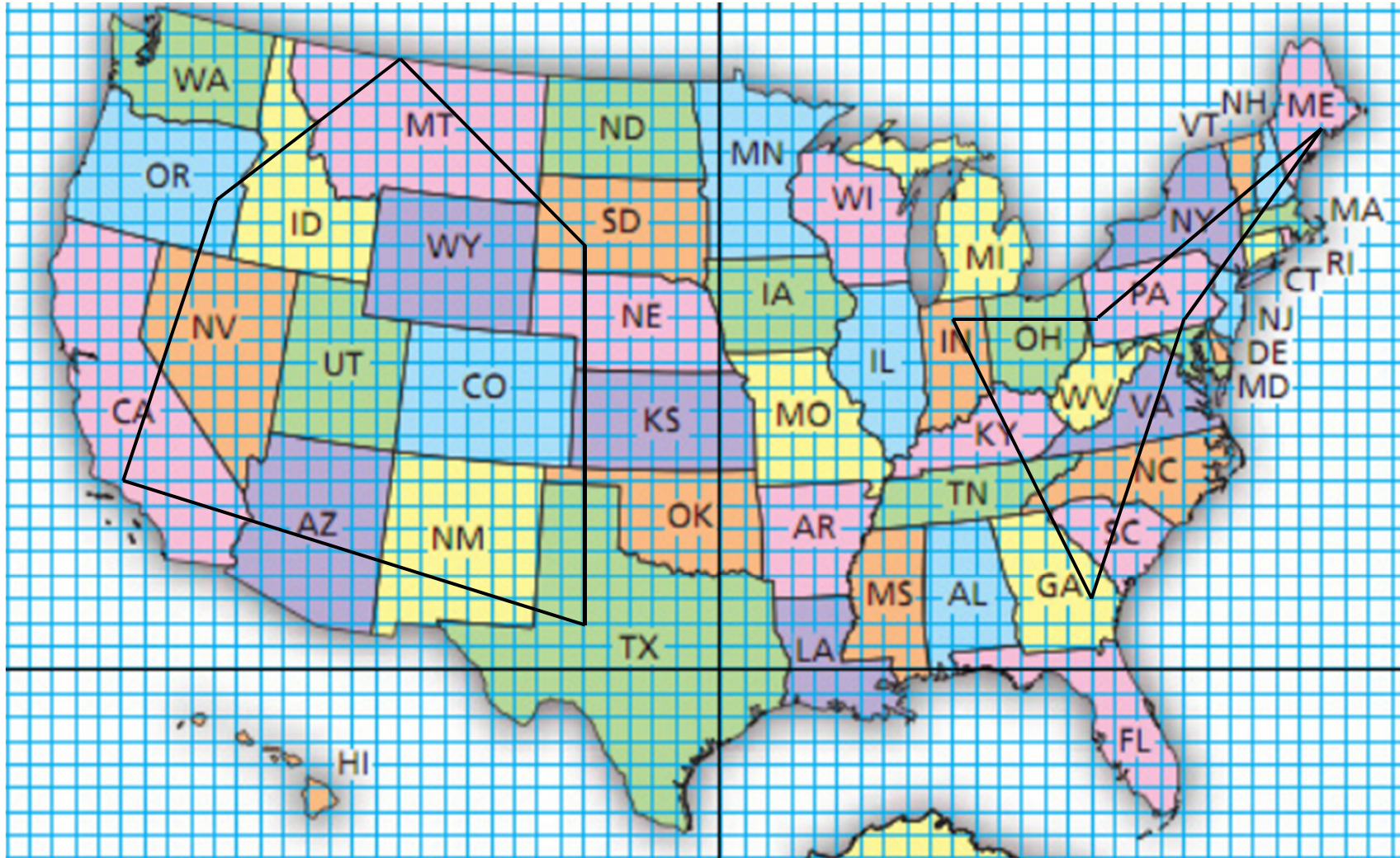
DISTANCE MIDPOINT PROJECT

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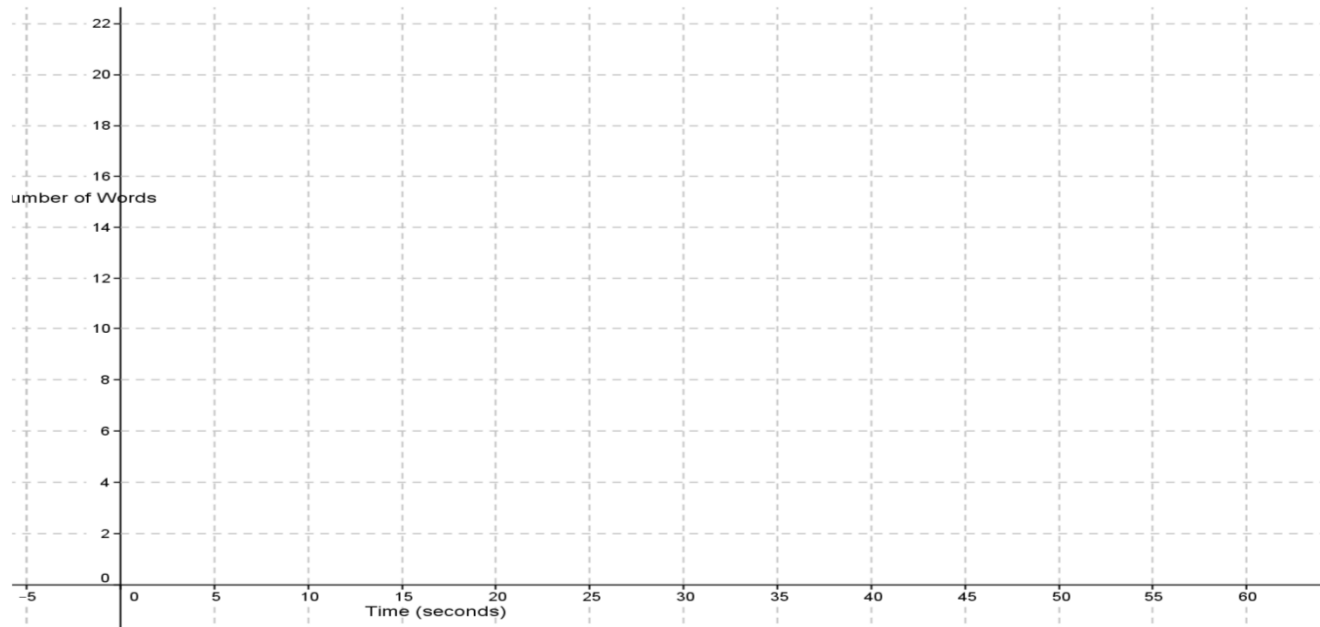
Use the map to determine how far you travel each day (distance formula), with a pit stop along the way (midpoint).

Each block on the map equals 50 miles.



RATE OF CHANGE INVESTIGATION

Time (s)	Total bubbles
0	
10	
20	
30	
40	
50	
60	



- 4) Find and interpret the y -intercept from the table: _____
- 5) How could you find the y -intercept from the plot?_
- 6 a) To find rate of change from 0-60 seconds, find out how many words did you increase by from 0-60: _____ words
- b) Then find out how much the time increased by from 0-60:
Change in time: _____ seconds
- c) Then divide your answer from a) by b)
Rate of change = _____ words/sec.

SITUATION 2 Rainfall

There are 6 inches of rain on the ground at midnight.
It keeps falling at $\frac{1}{4}$ inch per hour.

SLOPE
(rate of change) $\frac{1}{4}$

Y-intercept
(initial value) **6**

TABLE
Hours

X after midnight	y rainfall (inches)
0	6
1	6.25
2	6.50
3	6.75
4	7.00

EQUATION

$$y = \frac{1}{4}x + 6$$

SEQUENCE

Initial Value	1st	2nd	3rd	4th
6	6.25	6.50	6.75	7.00

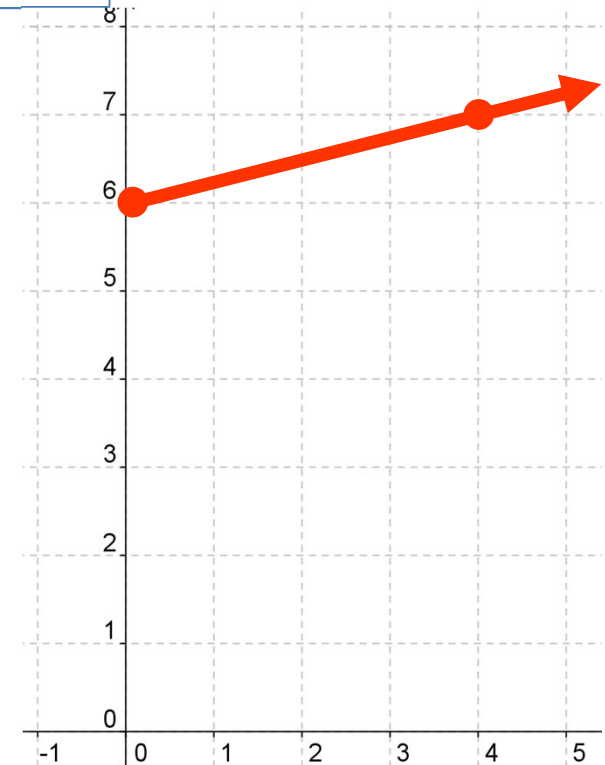
NEXT-NOW STATEMENT

NEXT = NOW + $\frac{1}{4}$; STARTING AT 6

Practical Domain $x \geq 0$

Practical Range $y \geq 6$

GRAPH



Project Ideas

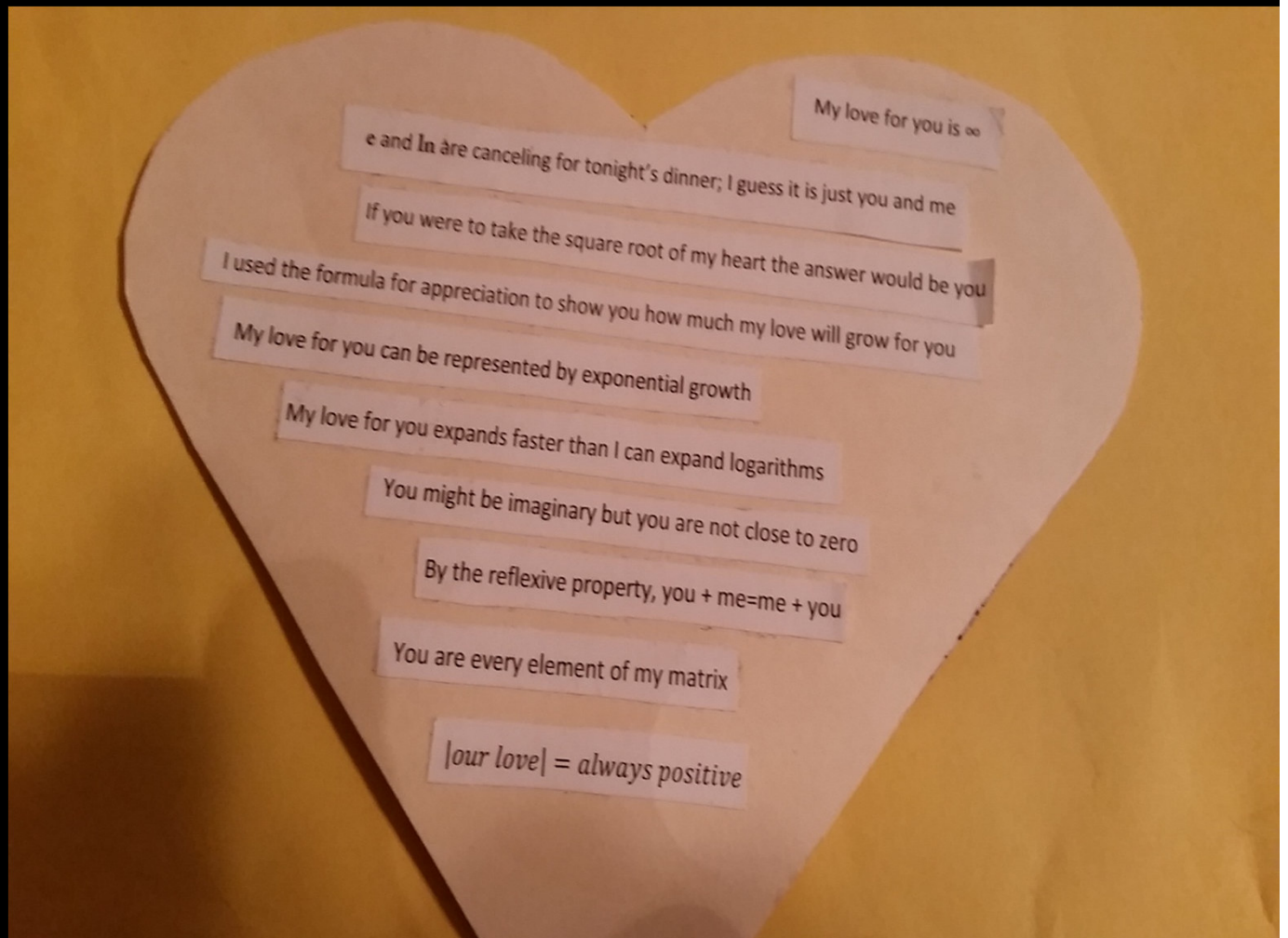
Dodecahedron Collage

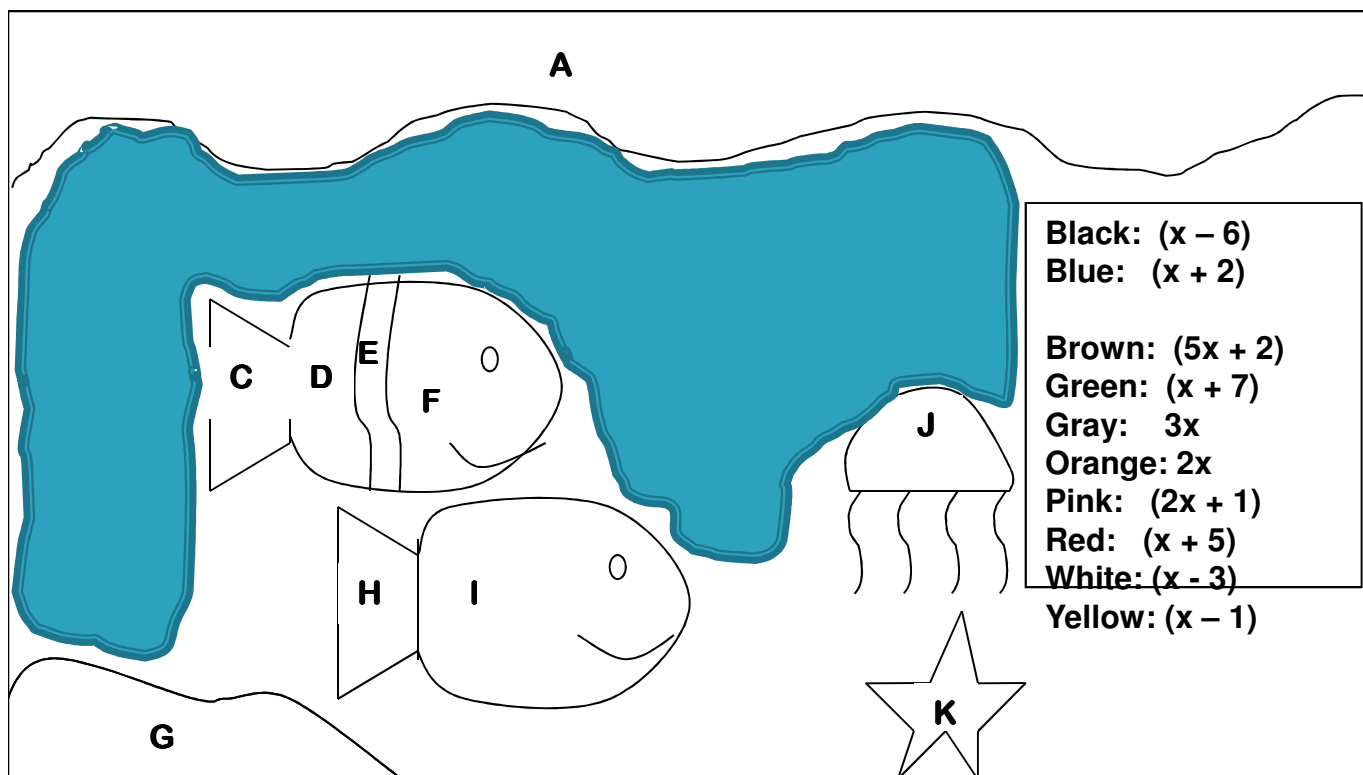
Graphing Project (using Desmos)

Water Fountain

Model Home

Valentine





B	$x^2 + 6x + 8$	$(x + 4)(x + 2)$	Blue
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Color by Number