BRING JOY BACK TO THE CLASSROOM WITH GAMES AND CARD SORTS

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MathLinks

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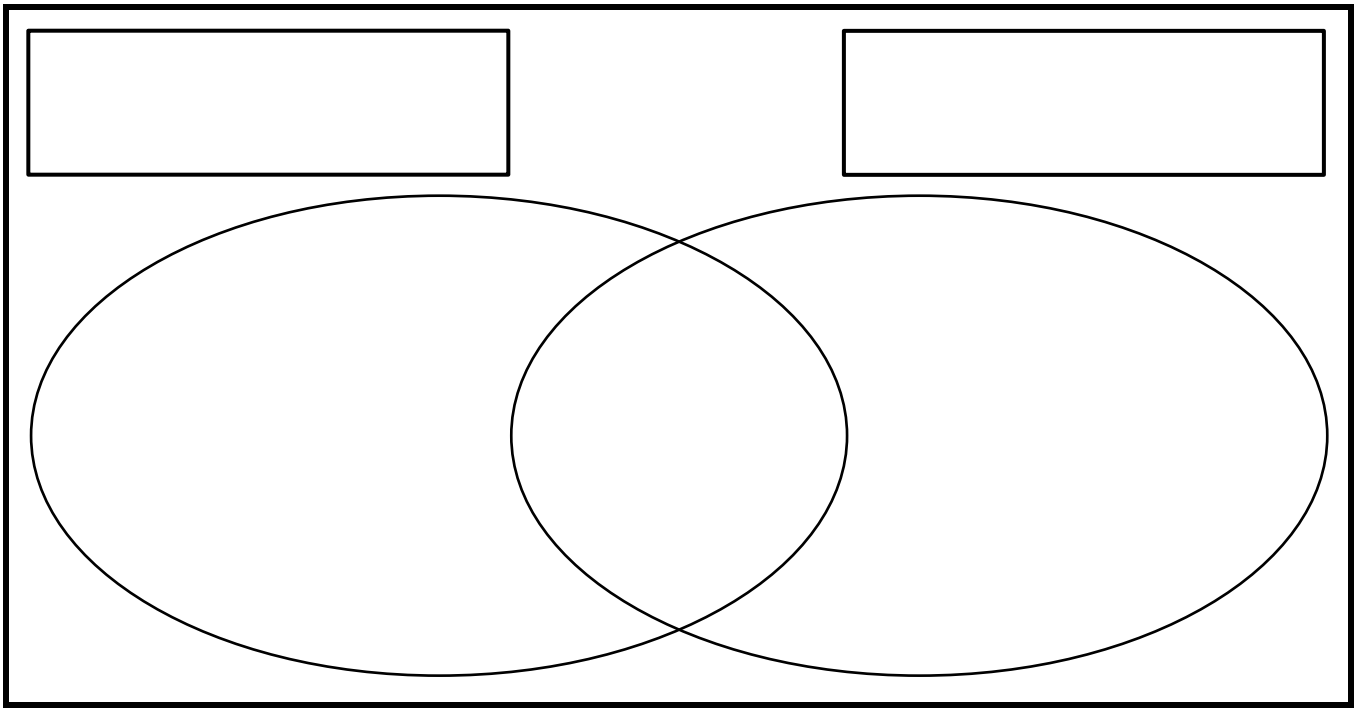
MATCH AND COMPARE SORT: EXPRESSIONS

1. Individually, match words with descriptions. Record results.

Card set △			Card set ◯		
Card number	**word**	**Card letter**	**Card number**	**word**	**Card letter**
I			**I**		
II			**II**		
III			**III**		
IV			**IV**		

2. Partners, choose a pair of numbered matched cards and record the attributes that are the same and those that are different.

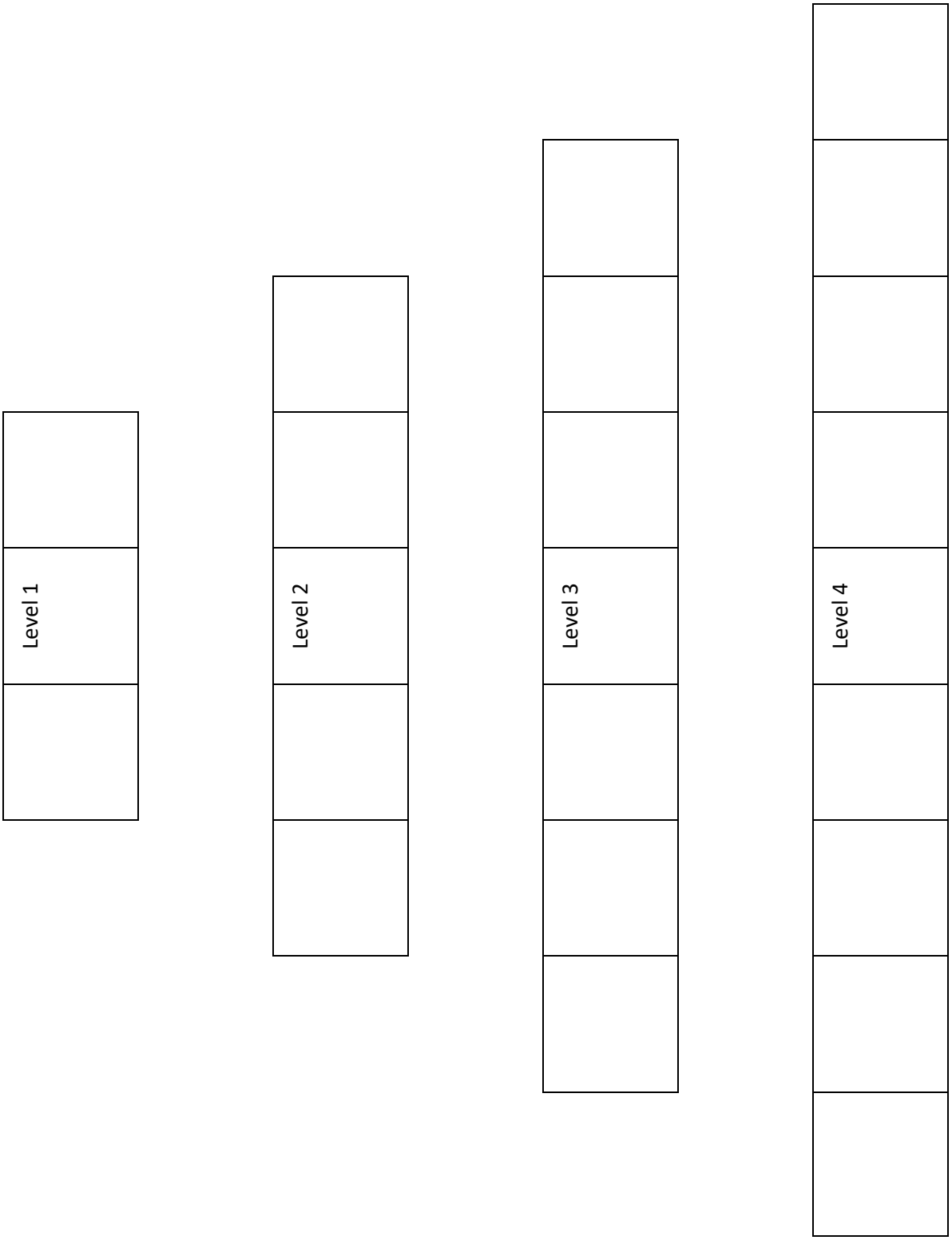


3. Partners, choose another pair of numbered matched cards and discuss the attributes that are the same and those that are different.

MATCH AND COMPARE SORT CARDS: EXPRESSIONS

I △ EXPRESSION	I ◯ EQUATION
II △ CONSTANT	II ◯ COEFFICIENT
III △ VARIABLE	III ◯ TERM
IV △ BASE	IV ◯ EXPONENT
A △ ✓ for 5^3, it's the 5 ✓ for $6 \cdot 6 \cdot 6 \cdot 6$ we would use a ___ of 6 ✓ for b^n, it's the b	A ◯ ✓ a quantity being added or subtracted in an expression ✓ the expression $3x + 4$ has two of them, namely $3x$ and 4
B △ ✓ A quantity whose value has not been specified ✓ in the expression $10m + 1$, it is the m ✓ in the equation $n + 3 = 7$, it is the n	B ◯ ✓ for 5^3, it's the 3 ✓ also known as a "power" ✓ "squared" means a(n) ____ of 2
C △ ✓ a combination of numbers, variables, and operation symbols ✓ can be a simple number ✓ does not have an equal sign	C ◯ ✓ It is commonly "next to" the variable ✓ in the expression $2v + 4$, the ____ of the variable is 2
D △ ✓ A fixed numerical value ✓ in the expression $2v + 4$, it is the 4 ✓ in the expression $3w + 4 + 7$, it is both the 4 and the 7	D ◯ ✓ shows two expressions equal to one another ✓ an example of one is $4 + 4 = 10 - 2$

SLIDES AND JUMPS BOARD



SLIDES AND JUMPS

Follow your teacher's directions for (1) – (2).

(1)

Level #	
1	
2	
3	
4	
5	

(2)

3. Record the missing values in the table below. Show your work on this page as needed.

Level #	**# of Slides**	**# of Jumps**	**Total # of Moves**
10			
	40		
25			
	100		
		10,000	
1,000			
			$n^2 + 2n$

SLIDES AND JUMPS

[SMP1, 2, 4, 5, 8]

Follow your teacher's directions for (1) – (2).

(3) *Record slides and jumps for Level 1 through Level 5.*

Level #	Slides and Jumps
1	S J S
2	S J S JJ S J S
3	S J S JJ S JJJ S JJ S J S
4	S J S JJ S JJJ S JJJJ S JJJ S JJ S J S
5	S J S JJ S JJJ S JJJJ S JJJJJ S JJJJ S JJJ S JJ S J S

(4) *Record moves for Level 1 through Level 5, and generalize for Level x.*

Level #	# of Slides	# of Jumps	Total # of Moves
1	2	1	3
2	4	4	8
3	6	9	15
4	8	16	24
5	10	25	35
x	$2x$	x^2	$2x + x^2$

4. Record the missing values in the table below. Show your work on this page as needed.

Level #	# of Slides	# of Jumps	Total # of Moves
10	20	100	120
20	40	400	440
25	50	625	675
50	100	2,500	2,600
100	200	10,000	10,200
1,000	2,000	1,000,000	1,002,000
n	$2n$	n^2	$n^2 + 2n$

FOUR IN A ROW: DISTRIBUTIVE PROPERTY I

Players: 2+

Objective: Be the first player to claim 4 spaces in a row, column, or diagonal to win the game.

Materials: Board game, 2 sets of colored counters (for the game board), 2 objects (e.g. cubes, paperclips, cut up paper) that will cover numbers in Box A and Box B

Rules: Two players alternate finding the product by choosing a constant from Box A and a variable expression from Box B. Players check the product and, if successful, place their colored counter on a space with the appropriate product.

BOX A: CONSTANT		
2	3	4
5	6	8

BOX B: EXPRESSION		
$x + 2$	$2x + 4$	$2x + 1$
$3x + 5$	$5x + 3$	$4x + 2$

GAME BOARD: DISTRIBUTIVE PROPERTY $A(B)$					
$2x + 4$	$6x + 12$	$5x + 10$	$24x + 12$	$12x + 24$	$12x + 6$
$6x + 12$	$8x + 16$	$16x + 8$	$20x + 10$	$8x + 4$	$9x + 15$
$4x + 8$	$25x + 15$	$10x + 6$	$18x + 30$	$12x + 20$	$20x + 12$
$30x + 18$	$6x + 3$	$3x + 6$	$15x + 25$	$6x + 10$	$40x + 24$
$8x + 16$	$4x + 2$	$32x + 16$	$16x + 32$	$12x + 6$	$4x + 8$
$10x + 20$	$24x + 40$	$15x + 9$	$8x + 4$	$10x + 5$	$16x + 8$

FOUR IN A ROW: DISTRIBUTIVE PROPERTY I

		BOX B					
	A(B)	$x + 2$	$2x + 4$	$2x + 1$	$3x + 5$	$5x + 3$	$4x + 2$
BOX A	2	$2x + 4$	$4x + 8$	$4x + 2$	$6x + 10$	$10x + 6$	$8x + 4$
	3	$3x + 6$	$6x + 12$	$6x + 3$	$9x + 15$	$15x + 9$	$12x + 6$
	4	$4x + 8$	$8x + 16$	$8x + 4$	$12x + 20$	$20x + 12$	$16x + 8$
	5	$5x + 10$	$10x + 20$	$10x + 5$	$15x + 25$	$25x + 15$	$20x + 10$
	6	$6x + 12$	$12x + 24$	$12x + 6$	$18x + 30$	$30x + 18$	$24x + 12$
	8	$8x + 16$	$16x + 32$	$16x + 8$	$24x + 40$	$40x + 24$	$32x + 16$

FOUR IN A ROW: DISTRIBUTIVE PROPERTY II

Players: 2+

Objective: Be the first player to claim 4 spaces in a row, column, or diagonal to win the game.

Materials: Board game, 2 sets of colored counters (for the game board), 2 objects (e.g. cubes, paperclips, cut up paper) that will cover numbers in Box A and Box B

Rules: Two players alternate finding the product by choosing a constant from Box A and a variable expression from Box B. Players check the product and, if successful, place their colored counter on a space with the appropriate product. (Note: All products are in simplest form.

BOX A: CONSTANT		
-2	3	-4
-6	2	-1

BOX B: EXPRESSION		
$(x-2)$	$(-2x+4)$	$\left(2x-\frac{1}{3}\right)$
$\left(\frac{1}{2}x-1\right)$	$(-0.4x+3)$	$(-x-2)$

GAME BOARD: DISTRIBUTIVE PROPERTY II $(A(B))$					
$0.8x-6$	$-6x+12$	$x-2$	$3x-6$	$-4x+8$	$-2x-4$
$6x+12$	$-3x-6$	$-2x+4$	$2x-4$	$-3x+6$	$-4x+\frac{2}{3}$
$2x-4$	$12x-24$	$-\frac{1}{2}x+1$	$8x-16$	$-4x+8$	$0.4x-3$
$-2x+4$	$-x+2$	$-6x+12$	$-12x+2$	$-x+2$	$-1.2x+9$
$6x-1$	$2x+4$	$1.6x-12$	$-2x+\frac{1}{3}$	$-0.8x+6$	$-8x+1\frac{1}{3}$
$4x-\frac{2}{3}$	$2.4x-18$	$\frac{3}{2}x-3$	$4x+8$	$x+2$	$4x-8$

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FOUR IN A ROW: DISTRIBUTIVE PROPERTY II

		BOX B					
	A(B)	$(x - 2)$	$(-2x + 4)$	$2x - \frac{1}{3}$	$\frac{1}{2}x - 1$	$(-0.4x + 3)$	$(-x - 2)$
BOX A	-2	$-2x + 4$	$4x - 8$	$-4x + \frac{2}{3}$	$-x + 2$	$0.8x - 6$	$2x + 4$
	3	$3x - 6$	$-6x + 12$	$6x - 1$	$\frac{3}{2}x - 3$	$-1.2x + 9$	$-3x - 6$
	-4	$-4x + 8$	$8x - 16$	$-8x + 1\frac{1}{3}$	$-2x + 4$	$1.6x - 12$	$4x + 8$
	-6	$-6x + 12$	$12x - 24$	$-12x + 2$	$-3x + 6$	$2.4x - 18$	$6x + 12$
	2	$2x - 4$	$-4x + 8$	$4x - \frac{2}{3}$	$x - 2$	$-0.8x + 6$	$-2x - 4$
	-1	$-x + 2$	$2x - 4$	$-2x + \frac{1}{3}$	$-\frac{1}{2}x + 1$	$0.4x - 3$	$x + 2$

WHY DOESN'T IT BELONG?: INTRODUCTION TO FUNCTIONS

A. **Table:**

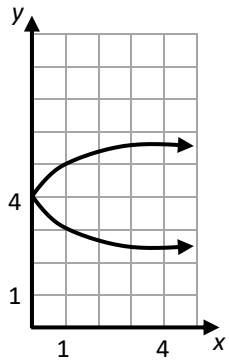
Input (x)	Output (y)
0	0
1	1
2	4
3	9
4	16

B. **Equation:** $y = -2x + 1$

C. **Context:**

Sal skateboards to and from work every day at an average rate of 6 miles per hour. He uses this information to keep track of how far he travels after any number of hours.

D. **Graph**

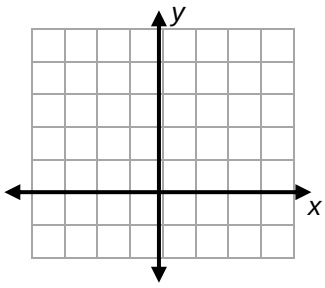


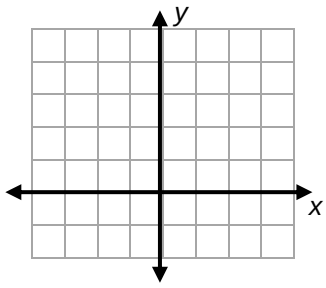
Avoid the obvious differences, such as "It's a graph."

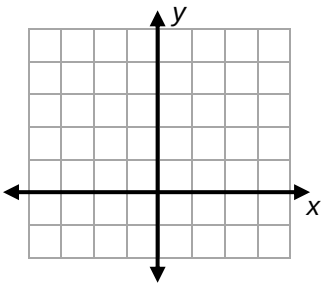
1. Choose one representation A – D above and explain why it does not belong with the others.	2. Now choose a different representation and explain why it does not belong.

Graph each of the described situations below, answer the questions, and explain.

3. I am a linear function. Two of my points are located at (-2, 0) and (2, 4). My y-intercept is: 2 Am I increasing or ecreasing? Explain.	4. I am a line. Two of my points are (-3, 4) and (-3, -1). Am I a function? Explain.	5. Graph and connect my three points in this order: (-3, 4), (1, 2), and (-3, 0). Am I a function? Explain.







WHY DOESN'T IT BELONG?: INTRODUCTION TO FUNCTIONS

[SMP1, 2]

E. **Table:**

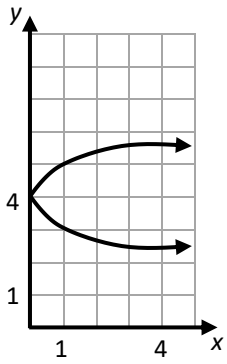
Input (x)	Output (y)
0	0
1	1
2	4
3	9
4	16

F. **Equation:** $y = -2x + 1$

G. **Context:**

Sal skateboards to and from work every day at an average rate of 6 miles per hour. He uses this information to keep track of how far he travels after any number of hours.

H. **Graph**



Avoid the obvious differences, such as "It's a graph."

Explanations will vary. Some possible explanations:

3. Choose one representation A – D above and explain why it does not belong with the others.

   A does not belong because it's an increasing nonlinear function

   B does not belong because it's a decreasing linear function

4. Now choose a different representation and explain why it does not belong.

   C does not belong because it's an increasing linear function

   D does not belong because it's a nonlinear non-function

Graph each of the described situations below, answer the questions, and explain.

6. I am a linear function. Two of my points are located at (-2, 0) and (2, 4).

   My y-intercept is: 2

   Am I increasing or decreasing? Explain.

   Increasing; as the x-values increase from left to right, the y-values do as well.

7. I am a line. Two of my points are (-3, 4) and (-3, -1).

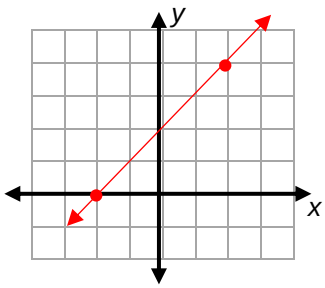
   Am I a function? Explain.

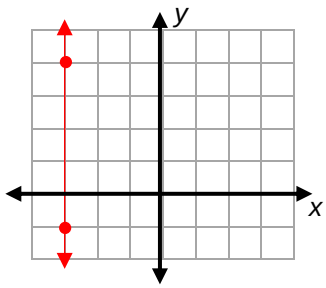
   No; for the input given, -3, there are more than one output.

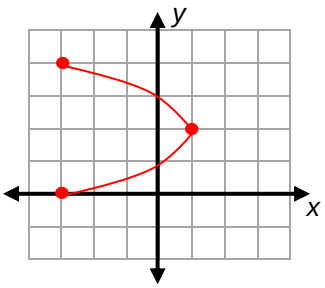
8. Graph and connect my three points in this order: (-3, 4), (1, 2), and (-3, 0).

   Am I a function? Explain.

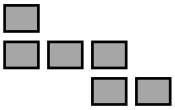
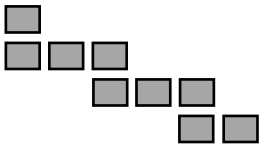
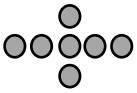
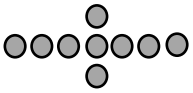
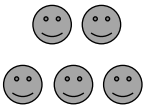
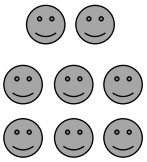
   No; curves are depicted below, but could be straight segments/rays too; regardless, multiple inputs each have two outputs.







PICTURE TALKS

	Step 1	Step 2	Step 3
A			
B			
C			
D			

There are many different ways to see a pattern grow and to represent it in equivalent symbolic expressions. Show students one set per day.

Use the sentence frame, “Start with ___ and add ___ each time” to help as needed.

How is the pattern growing? Explain using words or with an equation.

What would the next picture look like in the pattern?

How many ___ would be in the 5th step? The 12th step?

A: Start with 3 rectangles and add 3 each time. Step 5: 15; Step 12: 36
B: Start with 5 circles and add 2 each time. Step 5: 13; Step 12: 27
C: Start with 1 star and add 4 each time. Step 5: 17; Step 12: 45
D: Start with 2 happy faces and add 3 each time. Step 5: 14; Step 12: 35

More to find at:
www.visualpatterns.org