Making Math Meaningful:
Strategies for Developing Academic Vocabulary

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Background Information

Classroom Instruction That Works by Robert Marzano

- "…systematic vocabulary instruction is **one of the most important instructional interventions** that teachers can use, particularly with low-achieving students."
- "…systematic vocabulary instruction is **rare** in U.S. schools."
- "…**student achievement will increase** by 33 percentile points when vocabulary instruction focuses on **specific words that are important** to what students are learning."

Building Background Knowledge for Student Achievement by Robert Marzano

- "…direct vocabulary instruction has an impressive track record of improving students' **background knowledge** and the **comprehension of academic content**."
- "…when people first learn words, they understand [word definitions] more as **descriptions** of words as opposed to definitions."
- "…Stahl and Fairbanks demonstrated the effectiveness of both **language-based strategies**…and **nonlinguistically based strategies**."

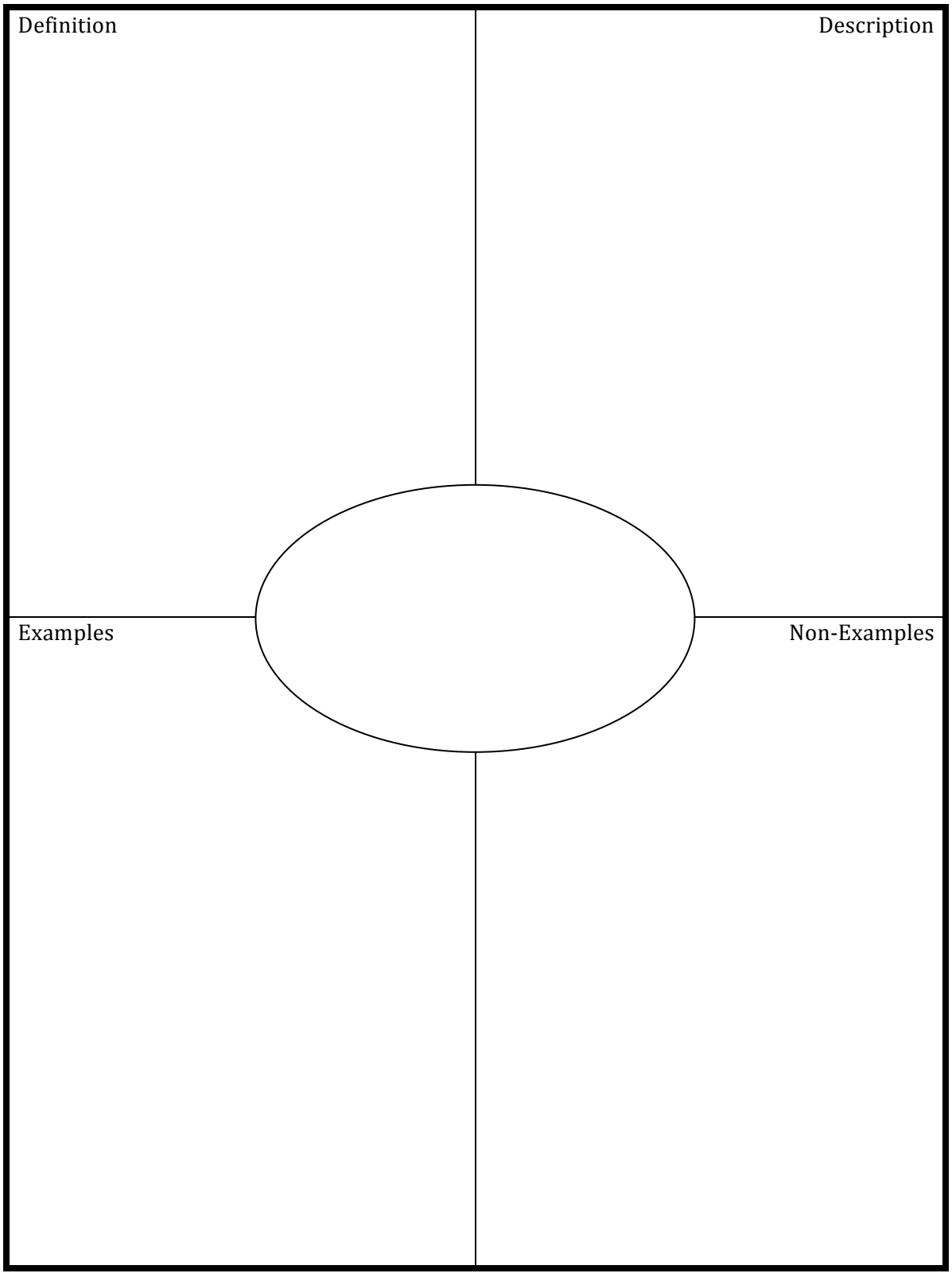
Bringing Words to Life: Robust Vocabulary Instruction by Isabel Beck, Margaret McKeown, Linda Kucan

- "…it is **precarious to believe that naturally occurring contexts are sufficient**, or even generally helpful, in providing clues to promote initial acquisition of a word's meaning."
- "…students become interested and enthusiastic about words when instruction is **rich and lively**…"

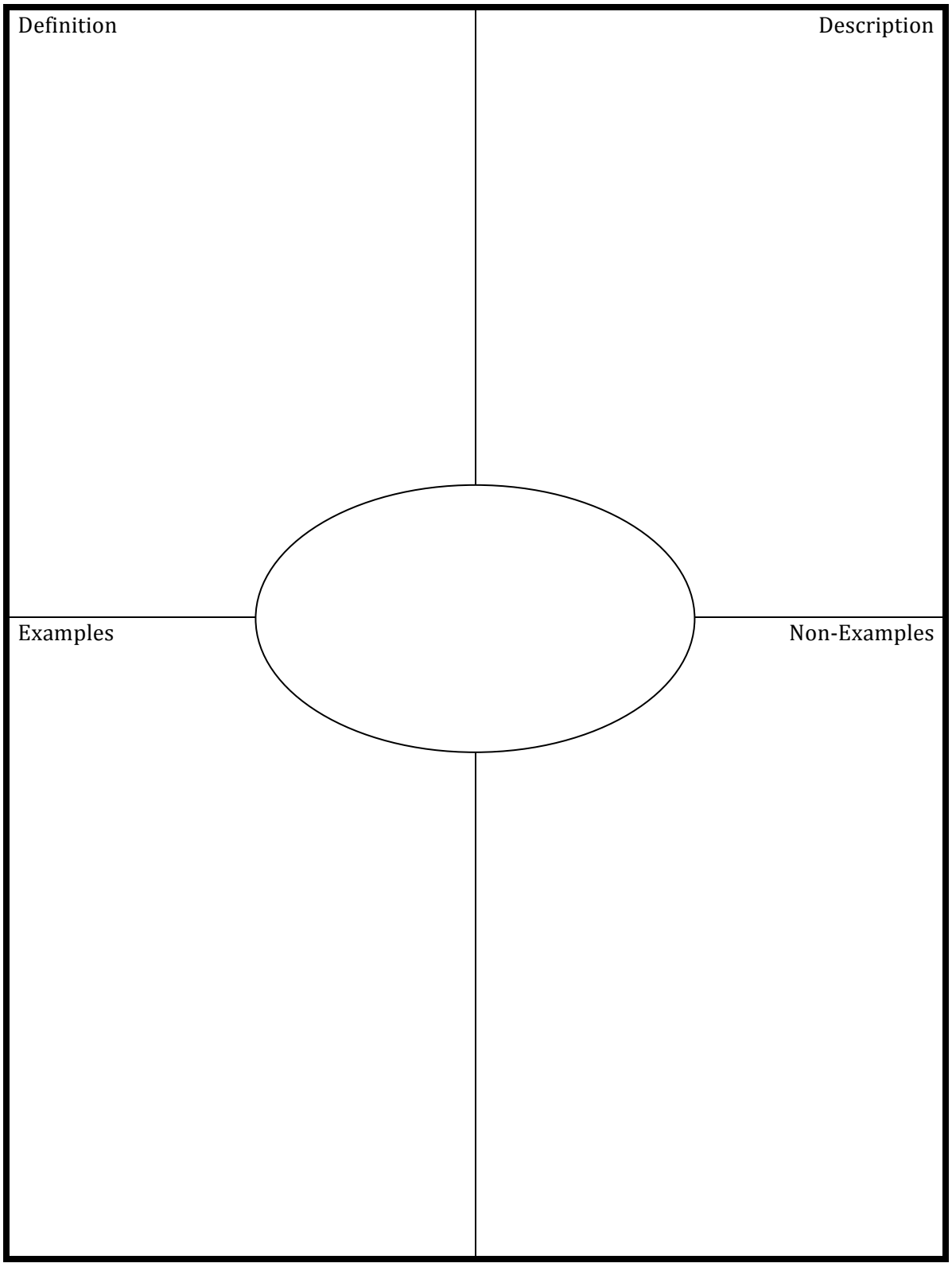
Developing Math Vocabulary

- Read, write, speak, listen
- Language vs. math vocabulary development
- First lesson - 4-6 different uses
- Within a few days - 30 uses
- Pictorial examples!!! - 80% of people are visual learners
- Graphic Organizers

Frayer Model



Frayer Model



Background Information & Suggestions

Classroom Instruction That Works by Robert Marzano

- Strong relationship between vocabulary…
  - and intelligence
  - and one's ability to comprehend new information
  - and one's level of income
- Systematic vocabulary instruction -
  - One of most important interventions
  - Especially with low-achieving students
  - Rare in U.S. schools

Generalizations

- Students must encounter words in context more than once to learn them.
- Instruction of new words enhances learning those words in context.
- One of the best ways to learn a new word is to associate an image with it.
- Direct vocabulary instruction works.
- Direct instruction on words that are critical to new content produces the most powerful learning.

Suggestions from Marzano

- Limit vocabulary lists (e.g., only focus on 5-7 key words for a 3-week unit)
- Process for Teaching New Terms and Phrases:
  - Present explanation or description
  - Present nonlinguistic representation
  - Students generate explanations or descriptions
  - Students create nonlinguistic representations
  - Periodically ask students to review accuracy of their own explanations, definitions, and/or representations

Techniques from SEI

- Sing or chant words
- Use physical gesture and/or act out
  - Kids make up gestures
  - You act it out & they verbalize
  - You verbalize & they act it out
- Illustrate words
- Create posters using student representations
- Systematic review
  - Popsicle stick game - "Snap!"

Primary "SNAP!"

Cut strips apart. Place in a cup or bowl. Student draw out one strip & name the object/symbol. If correct, the student keeps the strip; if incorrect, the student puts the strip back. If the student gets the "SNAP" card (has a star on it), all strips must be put back in the cup. The cup passes from one student to the next until someone gets the "key number" or time runs out.

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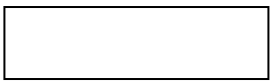
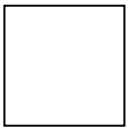
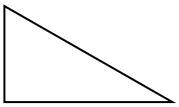
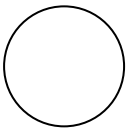
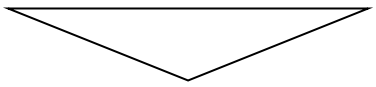
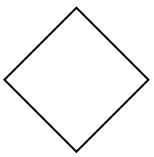
20	
13	
4	
15	
19	
7	
 SNAP! 	 SNAP! 

Geometry "SNAP!"

Cut strips apart. Place in a cup or bowl. Student draw out one strip & define, draw a picture, or make the gesture (whichever the teacher designates). If correct, the student keeps the strip; if incorrect, the student puts the strip back. If the student gets the "SNAP" card (has a star on it), all strips must be put back in the cup. The cup passes from one student to the next until someone gets the "key number" or time runs out.

parallel	pentagon
perpendicular	hexagon
translation	vertex
reflection	angle
rotation	cone
polygon	sphere
perimeter	area
 SNAP! 	 SNAP! 

Wordo

Write one word in each space. Cover the word as the teacher describes it.

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Write one word in each space. Cover the word as the teacher describes it.

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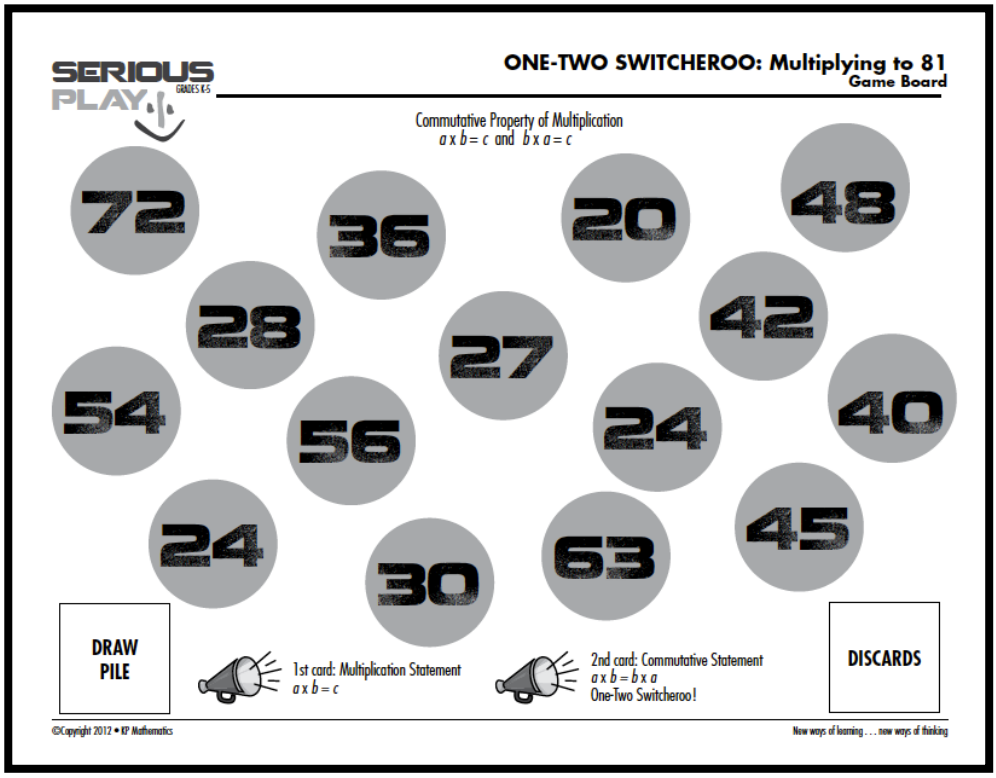
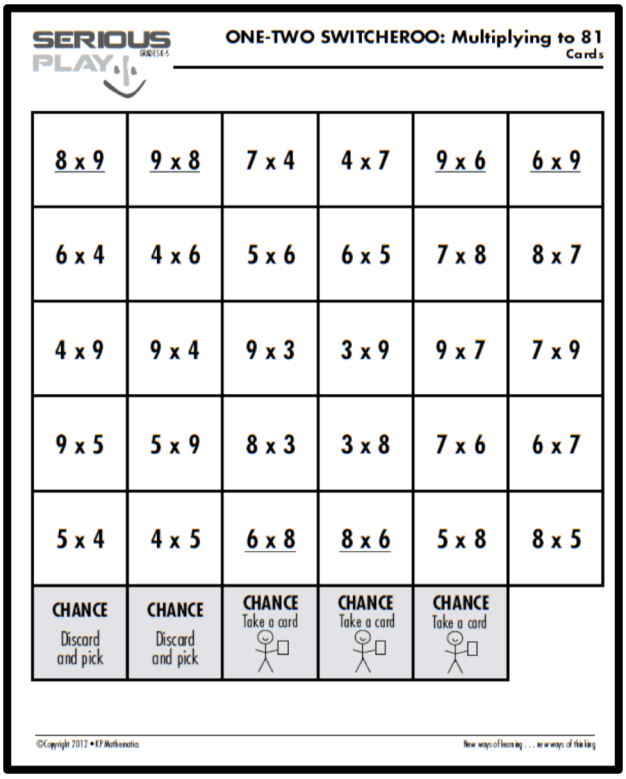
Write one word in each space. Cover the word as the teacher describes it.

From *Serious Play, K-5* – www.kpmathematics.com





Math Word Banks

Using Math Word Banks

- Student achievement in mathematics will improve since they have a better grasp of the vocabulary, both written and oral.
- Teachers will use math vocabulary more consciously
- Consistency from room to room, grade to grade, and school to school

If you wish to color code…

- Number Sense - pink
- Data Analysis, Probability, & Discrete Math - yellow
- Patterns, Algebra, & Functions - white
- Geometry - green
- Measurement - blue
- Logic – goldenrod

Types of Math Word Banks

- Bulletin boards
- Magnetic boards
- Charts

Portable Word Banks

For the convenience of the individual child, a portable word bank may be desirable. Very young children may have difficulty seeing the word wall from their seats, so table-top word banks may be helpful. Students who leave the room for special classes such as SEI classes or Special Ed. classes can take their word banks with them.

These can be personalized, illustrated, color coded, or individualized in a variety of ways. They can be listed by standard or alphabetically. The students can enter the words, or the teacher can do that.

Materials needed include file folders, colored pencils/markers, and word lists.

Vocabulary Riddles

In this activity, invite your students to be "mind readers". Choose a word from the word bank and write it down--don't let anyone see it. Have students number their scratch paper 1-5. You will give them five clues about a word you chose. They are to take a guess after each clue and write that guess down. By the fifth clue, everyone should guess your word.

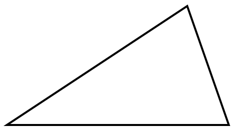
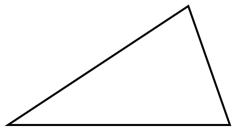
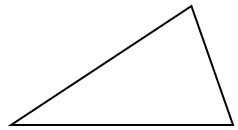
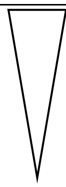
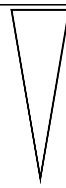
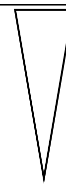
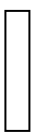
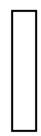
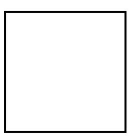
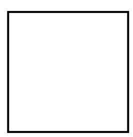
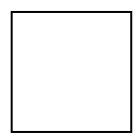
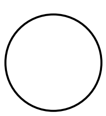
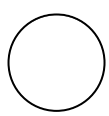
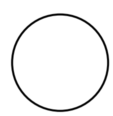
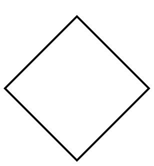
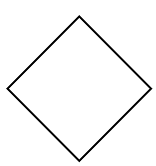
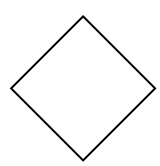
1. It's one of the words on in the math word bank.
2. It has five letters.
3. It has an "i" for a vowel.
4. It is a unit of length.
5. It completes this sentence: "Mrs. Bradley drove 7 _____ to get to the mall."

Word Sorts

Word sorts can be done in many ways. You can sort by many different characteristics including the following:

- vowels
- consonant sounds
- number of letters
- math standard
- categories

Today's word sort will have you sorting measurement vocabulary by category (length, weight, capacity).

Triangles	Triangles	Triangles
Rectangles	Rectangles	Rectangles
Circles	Circles	Circles
Squares	Squares	Squares
		
		
		
		
		
		
		

Measurement Sort

Length	Length	Length	Length
Weight/Mass	Weight/Mass	Weight/Mass	Weight/Mass
Capacity	Capacity	Capacity	Capacity
inch	inch	inch	inch
foot	foot	foot	foot
yard	yard	yard	yard
mile	mile	mile	mile
cm	cm	cm	cm
m	m	m	m
mm	mm	mm	mm
liter	liter	liter	liter
km	km	km	km
milliliter	milliliter	milliliter	milliliter
ounce	ounce	ounce	ounce
cup	cup	cup	cup
gallon	gallon	gallon	gallon
pint	pint	pint	pint
pound	pound	pound	pound
quart	quart	quart	quart
dm	dm	dm	dm
hm	hm	hm	hm
dkm	dkm	dkm	dkm

Vocabulary "Tests"

Vocabulary tests can take on a variety of looks. Since this is a vocabulary test rather than a spelling test, it's perfectly fine for the kids to use the word bank to assist them with spelling…in fact, I would encourage it!!! Here's a sample…

1. Number one begins with a "g" and is a measure of capacity.
2. Number two begins with a "y" and is a measure of length
3. Number three begins with an "o" and is a measure of weight.
4. Number four rhymes with "cinch" and is a measure of length.
5. Number five completes this sentence, "Mrs. Rimbey lives 15 _____ away from the school."

Vocabulary Journals

Vocabulary journals go beyond having the students simply list their math vocabulary words. They include illustrations and/or definitions as well. Below is a sample entry for a vocabulary journal.

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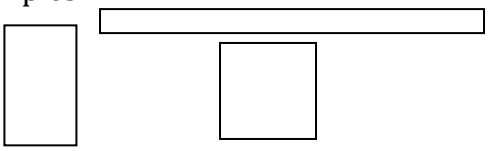
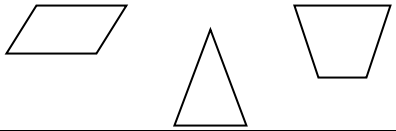
  </td><td>Non-Examples:
  </td></tr>
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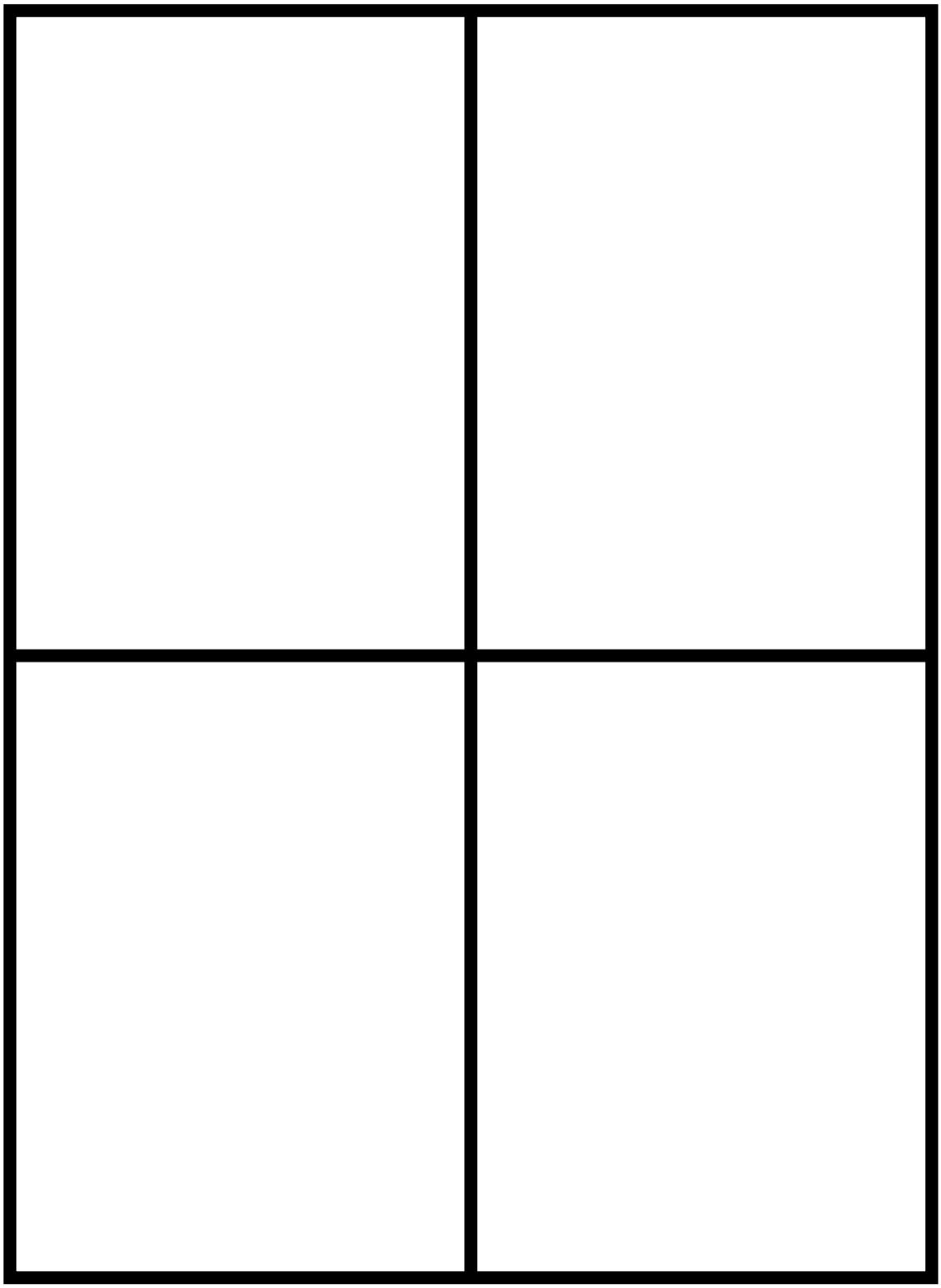
Math Vocabulary



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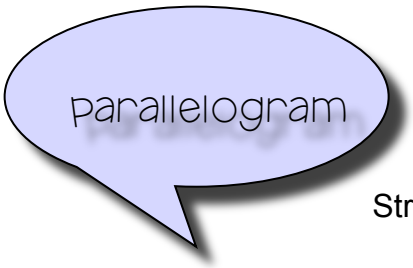

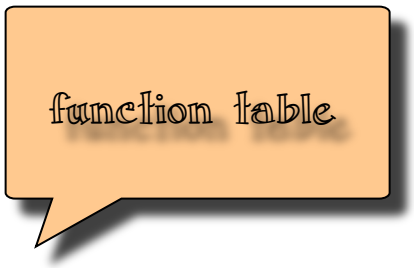

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