The Learning Wall
M - O

The 3 – 5 MATH Concept Learning Bricks packet is organized alphabetically, with each concept explanation (concept, question, answer, gesture, and examples) listed first and the Concept Learning Brick visual listed behind the explanation. This section contains **29** Concept Learning Bricks from the M - O sections. Please refer to The Learning Wall Introduction and Explanation at www.PEPnonprofit.org for details on how to implement these items in your classroom.

Mm

mean, median, meter, mile, minute, mixed fraction, mode, month, multiple, multiplying fractions, multiplication sentence, multiply

Nn

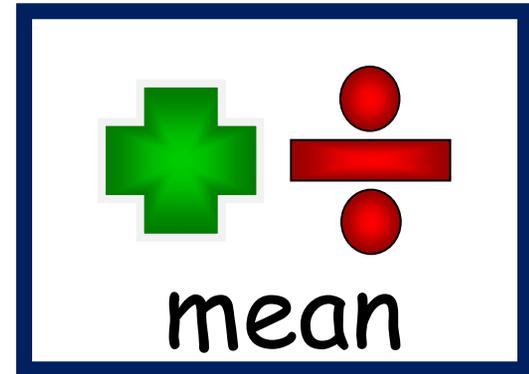negative number, net, nickel, non standard unit, number sentence, numerator

Oo

obtuse angle, obtuse triangle, octagon, odd number, order of operations, ordered pairs, ordinal number, origin, ounce, outcome, outlier

Mean

Question: What is mean?

Answer: Mean is the average of a set of data. First add, then divide.

Gesture: Hold one hand up higher than the other and then bring them together in the middle to represent an average of the two. Then, make an addition symbol by crossing your arms like a Red Cross sign when saying "First add." Finally, hold your hands together. With one hand, pretend to pull from the other hand and distribute equal shares in front of you while saying, "then divide."

Examples: Buy a big bag of M&M's and six small, clear cups. Put a small amount of M&M's into each cup with each color getting its own cup. Show the students how to find averages by choosing cups to be used as the set of data. For instance, have the students add together the number of M&M's in the cups with blue, green, and red M&M's. The cups help students to remember to divide by three (the number of cups used). *The number of M&M's used will determine the difficulty level of the activity so you can level the activity according to the class's ability.* To reinforce this skill, play the game *M&M&M's* found in *Acing Math* (www.pepnonprofit.org).
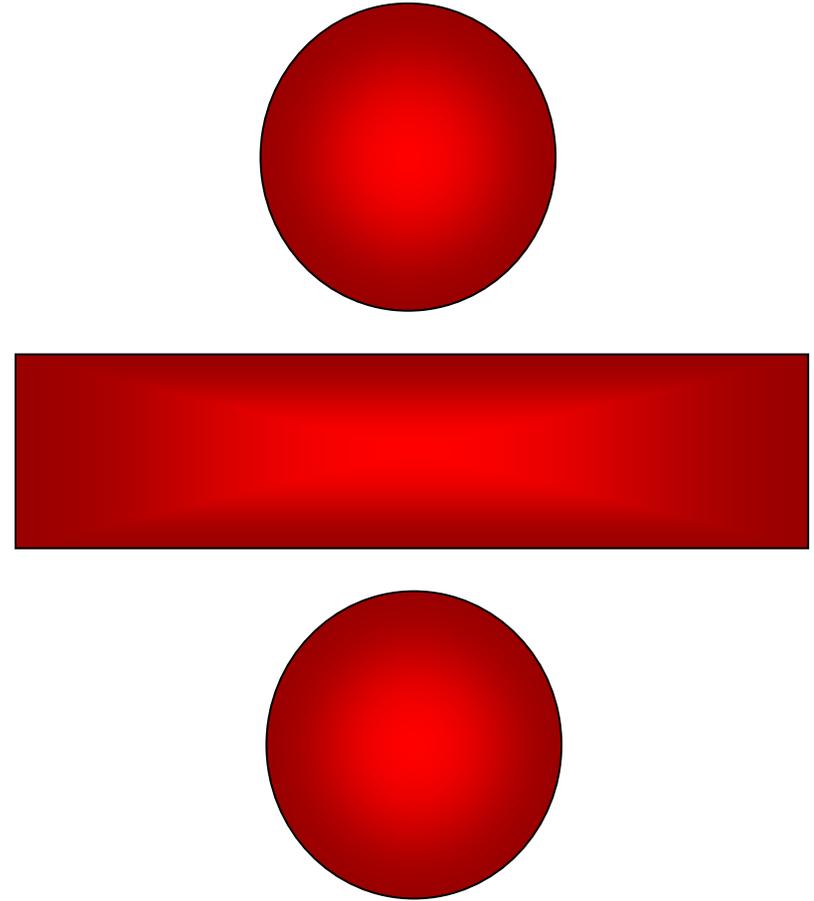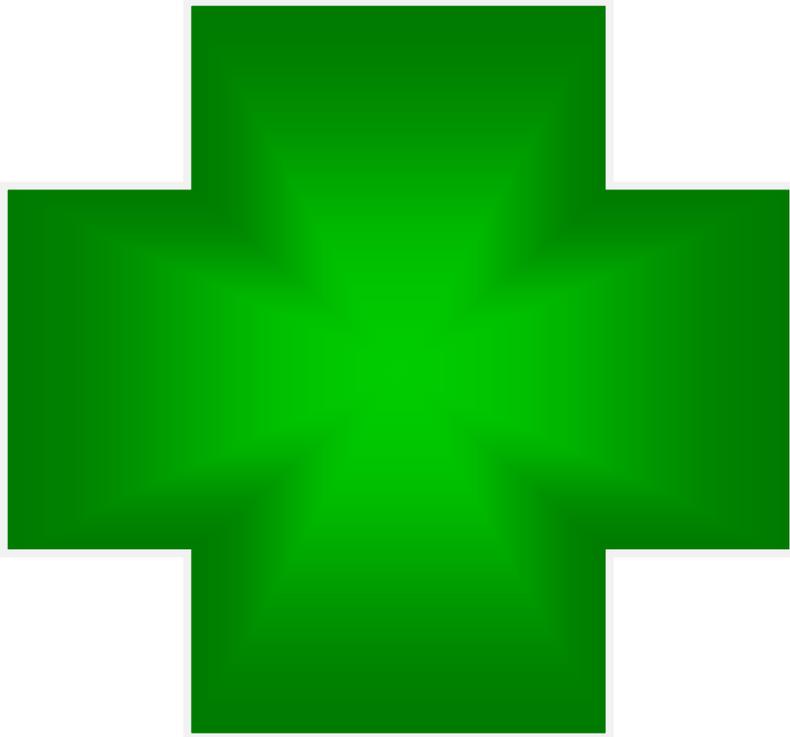
mean

Median

median

Question: What is median?

Answer: Median means middle unit in a set of data.

Gesture: Hold your hands out in front of you about shoulder width apart. Then, leaving only your index finger extended, bring your hands together as though pointing to something directly in the middle of the original space between your hands.

Examples: Use sets of items in the class or brought in the demonstrate looking for the median in the middle. For instance, use 7 pencils, line them up from shortest to longest and have students pick out the pencil in the middle. Repeat the same exercise using books, colored counting blocks, M&M's, etc. This may seem simple but it is a great way of showing the simplicity of median. To reinforce this skill, play the game *M&M&M's* found in *Acing Math* (www.pepnonprofit.org).

median

Meter

Question: What is a meter?

Answer: A meter is 100 centimeters long and is about the same length as 100 dimes.

Gesture: Hold hands approximately 1 meter apart and then make a 1 with your index finger on one hand and hold your other hand in the shape of a zero and pretend to "stamp" two zeroes after the one on the other hand. Then, hold your thumb and index finger approximately 1 centimeter apart on one hand and bring it up to one eye to represent looking closely at something very small. Finally, return to original position with hands approximately 1 meter apart.

Examples: Bring in 100 dimes, lay them across a desk(s) and tell students that those dimes represent approximately 1 meter. Then start lining them up in a straight line. When finished, line up a piece of yarn and cut it to the same length as the 100 dimes. You now use this as a meter stick. Hold the yard vertically and demonstrate your height compared to 1 meter. Ask students to pick someone in class they believe is the closest to being exactly 1 meter tall. Then ask students to write down as many items in the class they believe are 1 meter long in 60 seconds. Then have students share out their lists as you double check their responses using the piece of yarn.

100

meter

Mile

mile

Question: What is a mile?

Answer: A mile is exactly 5,280 feet, which would take about thirty minutes if I was walking. Miles are used to measure long distances.

Gesture: Move hands rapidly in front of yourself as if taking steps while walking. Then, when saying, "Miles are used to measure long distances." pretend to steer a car and then spread arms to represent flying in a plane.

Examples: Make a list of things on the board that would be measured using inches, feet, and miles. The students will have to determine the proper unit of measurement to use in order to measure each and explain why the other two choices are wrong.

pencil	length of a wall	paper size
LA to San Diego	cell phone	width of New York
football field	marathon	person's height
trip to Sea World	walking at Disneyland	desk width

mile

Minute

Question: What is a minute?

Answer: A minute is exactly 60 seconds long.

Gesture: Hold up one index finger in front of you to represent "a minute." Then, while saying, "sixty seconds long," use your index finger on your other hand to draw a large circle around the one to represent a second hand going around a clock exactly *one* time in *one* minute.

Examples: Have a list of activities prewritten on the board of activities that can and cannot be done in one minute. The students need to determine if each activity you select from the list in any order is something that can be done in one minute. As each question is answered, put a red dot just before it if it cannot be done in one minute or a green dot if it can be done in one minute. Some example sentences are:

Fold and put away one shirt.	Give your parents a hug before coming to school.
Watch your favorite TV show.	Turn on a cell phone.
Build a sand castle at the beach.	Take empty glasses back to the kitchen.

minute

minute

Mixed Fraction

5 4/7

mixed fraction

Question: What is a mixed fraction?

Answer: A mixed fraction is a whole number and a fraction combined to make a mixed number.

Gesture: When saying "whole number," stand up straight and motion your arms straight up and down each side of your body to represent the whole of your body. When saying "fraction," hold out one arm and touch your wrist and then touch your should using your other hand to represent a part of your body. Interlace the fingers on each hand in front of you to represent the concept of "mixed number."

Examples: As a teacher led whole class activity, cut out or draw pictographs representing a mixed fraction and corresponding mixed fractions and mix them together. Students need to match the pictographs with the mixed fractions, explaining why they chose each match as they complete them.
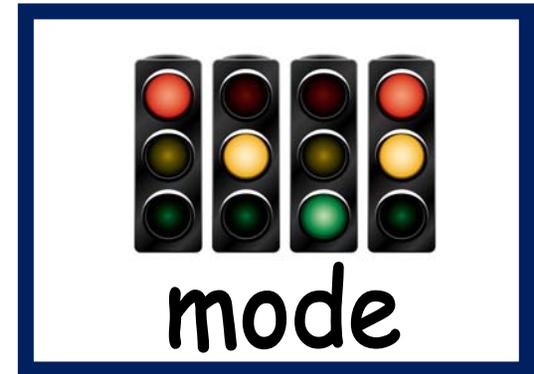
$$5\frac{4}{7}$$

mixed fraction

Mode

Question: What is mode?

Answer: Mode means the most.

Gesture: Pretend to pick out three of the same number from an imaginary number line in front of you and bring them together and hold in the palm of your open hands.

Examples: Write several sets of data, out of order, on the board. Rearrange the data from least to greatest and have students identify what the mode of each set of data would be. Be sure to have examples which have more than one mode. To reinforce this skill, play the game *M&M&M's* found in *Acing Math* (www.pepnonprofit.org).

mode

Month

Question: What is a month?

Answer: A month is 1/12 of a year and is usually grouped in 30 or 31 days.

month

Gesture: Hold up one finger in front of yourself like a numerator and pretend to draw a line underneath the one and "write" a twelve underneath the line like a denominator.

Examples: Give a few examples of what would take a month to do. For example, jog East to West across California, Write a 50 page report, etc. Then, have several examples of tasks written on the board and have students try to identify which ones would take approximately one month to complete. Here are some examples:

Finish all levels of a video game	Walk to school	Watch a basketball game
Learn how to spell 100 new words	Lose 10 pounds	Grow 12 inches taller

CALENDAR

| MON	TUE	WED	THU	FRI	SAT	SUN
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

month

Multiple

multiple

Question: What is a multiple?

**Answer:** A multiple is the result of multiplying a number by another number.

Gesture: Make a multiplication sign by crossing your arms when saying, "A multiple is the result of multiplying." Then, while saying "a number by another number," wiggle five fingers on one hand to one side, make a multiplication sign again by crossing your arms in front of yourself, and then wiggle five fingers on the other hand to the other side.

Examples: Put (or write) a number line on the board and ask students to identify the first 4 multiples of numbers you give them. For instance, have students determine the first four multiples of 3, then the first four multiples of 5, and so on. Have students double check all answers using a multiplication chart. Then extend this by asking questions like, "Is 15 a multiple of 2? Is 18 a multiple of 6," and so on.
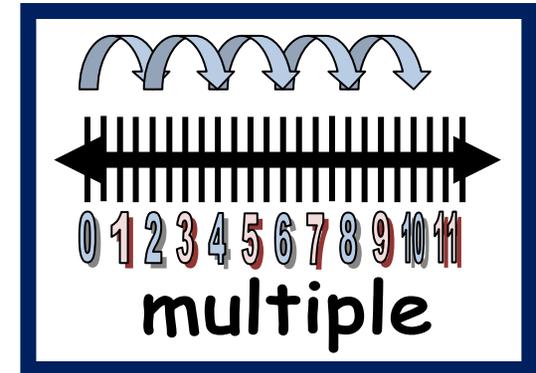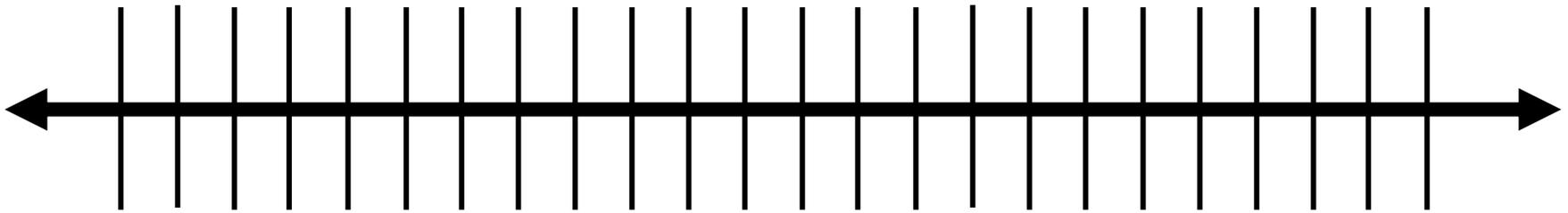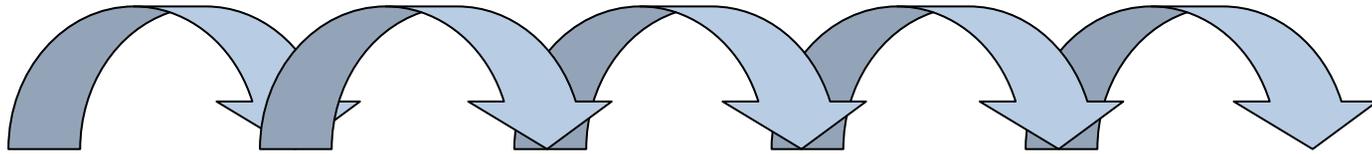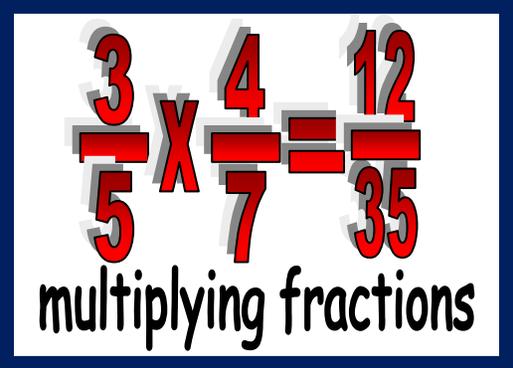
0 1 2 3 4 5 6 7 8 9 10 11

multiple

Multiplying Fractions

multiplying fractions

Question: What is multiplication of fractions?

Answer: To multiply fractions, multiply the numerators together and the denominators together to find the product.

Gesture: First, put your arms in the shape of an "X" to represent multiplying. Then, point straight to your right with both arms parallel approximately 12 inches apart (right arm on top) while still facing forward to represent multiplying straight across the numerators and the denominators. Finally, bend your right arm at your elbow to make an equal sign directly in front of you to represent the answer, or product.

Examples: Put two columns on the board. One column will consist of fractions being multiplied while the second column will have a list of products. Students must match the products with the problems and explain why each product belongs with each problem.

$$\frac{3}{5} \times \frac{4}{7} = \frac{12}{35}$$

multiplying fractions
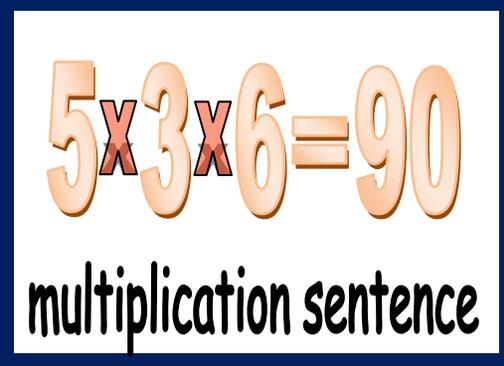
Multiplication Sentence

Question: What is a multiplication sentence?

Answer: A multiplication sentence is a math problem consisting of only multiplication operations.

Gesture: Wiggle five fingers on one hand to one side, then cross your arms in a multiplication sign slightly inward and repeat this all the way across in front of yourself.

Examples: Have several problems written on the board. Students need to recite the definition of multiplication sentence as the for each problem to determine which ones fit the definition properly to be considered a multiplication sentence. It is important for students to continually recite the definition to "prove" each answer according to the definition. This type of "attribute check" is also used in other lessons to determine shapes and so forth.

5 x 3 x 6 = 90

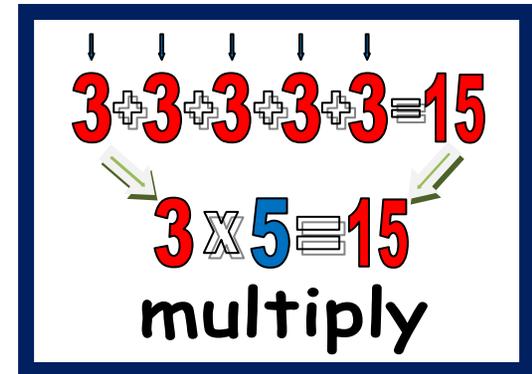multiplication sentence

5 x 3 x 6 = 90

multiplication sentence

Multiply

Question: What is multiply?

Answer: Multiply means to add a number to itself repeatedly.

Gesture: Hold your arms in the shape of a multiplication sign when saying, "Multiply means to . . ." with your hands in a fist. Then shift your arms over into an addition sign (showing the connection between multiplying and adding) while saying, "add a number to itself. . . ." Finally, open both hands (flashing fives) as you slowly return your arms back to a multiplication symbol while saying, "repeatedly."

Examples: Put two columns on the board. One column will consist of addition sentences with the same number repeated while the second column will have a list of multiplication expressions. Students must match the addition sentences with the multiplication expressions and explain why each addition sentence belongs with each multiplication expression. Use this to show the relationship between the number and the number of times it is being added to itself.
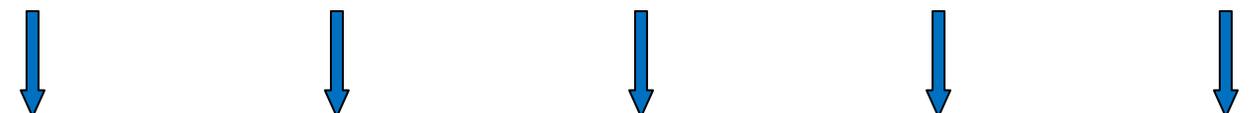
$$3 + 3 + 3 + 3 + 3 = 15$$

$$3 \times 5 = 15$$

multiply

Negative Number

Question: What is a negative number?

Answer: A negative number represents a value less than zero.

Gesture: Hold one arm horizontally in front of you (sea level representing "zero") and use your other hand to point down showing less than zero.

Examples: Take the students outside to the sandbox or an area with soft dirt. Take a shovel, a ruler, and a few items to measure with the ruler. Flatten out a small section of sand and stand up the ruler to represent the sand level being zero. Measure a few items from the sand up using the ruler (i.e.: whiteboard marker, pencil, piece of paper, cell phone, etc.). Then ask a student to hold the ruler in place, standing straight up from the sand, and dig a shallow hole directly next to it. This will demonstrate to the students that it is possible to have a value less than zero because the sand level was zero and the hole is lower than that point. You can do the same type of demonstration in class using a cup of water (representing sea level being at zero) and an item that will initially float on the water but will sink when pushed down into the water, again representing a value of less than zero.
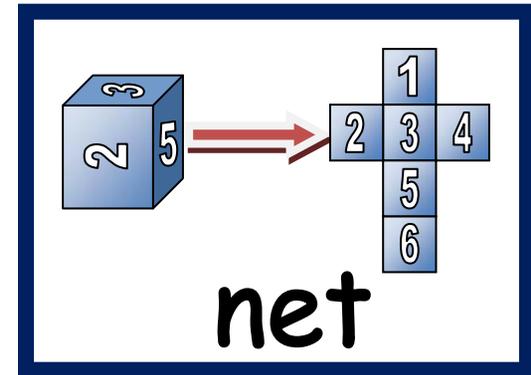
negative number

Net

net

Question: What is a net?

Answer: A net is the flattened out pattern of a 3 dimensional shape.

Gesture: Slap the palm of one hand down onto the other open hand when saying, "A net is the flattened out pattern." Then, while saying the remainder of the answer, make an open cube shape using both hands and then pretend to "drop" all the sides to flatten it out.

Examples: Find several examples of 3 dimensional shapes and the net and draw or project them all mixed up and have students match the net with the geometric shape.

net
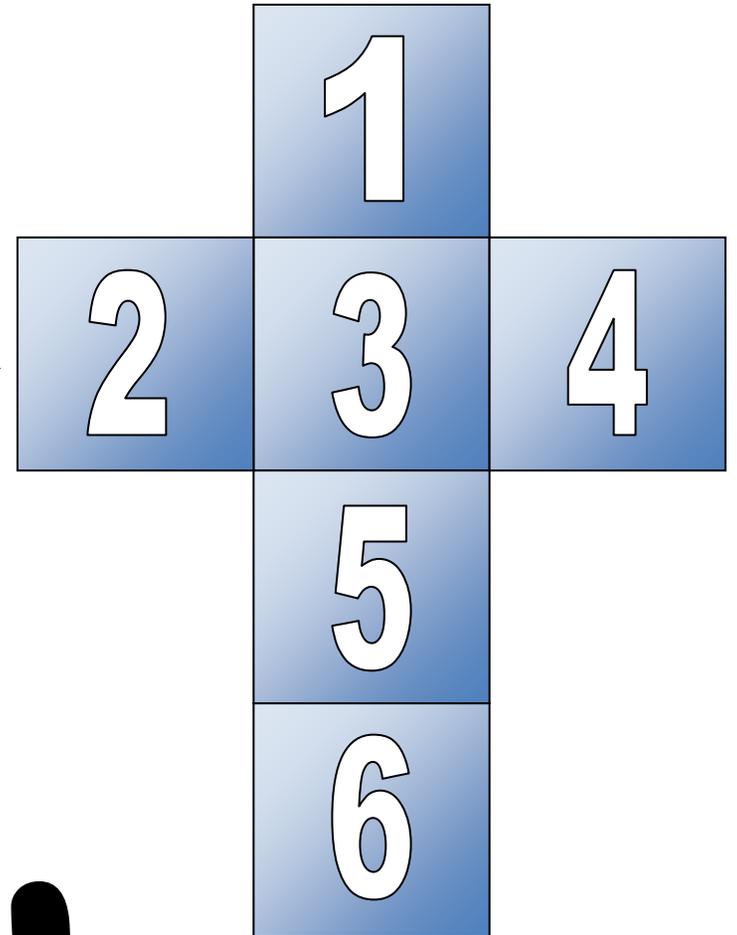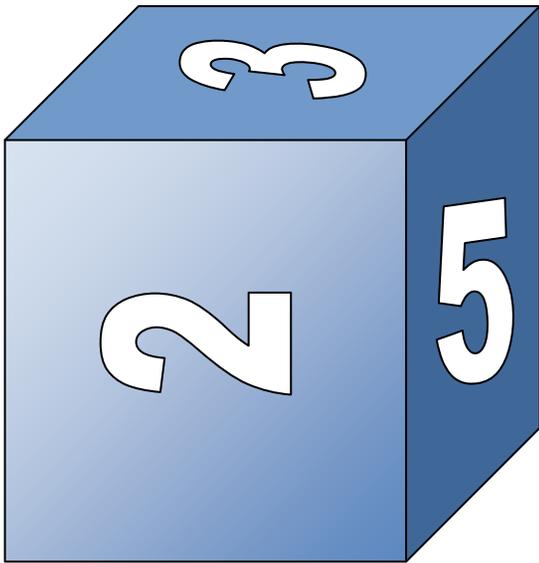
Nickel

nickel

Question: What is a nickel?

Answer: A nickel is worth five cents. There are twenty nickels in a dollar.

Gesture: Pinch your thumb and finger together, as if holding a nickel, then hold up five fingers to show it's worth five cents.

Examples: Show how one nickel can be written 5¢ or $0.10. Put students in groups of two or three. Give each group a cup with an assortment of coins (preferably real coins). Have the groups create money puzzle problems with their coins. For example, I have 5 coins. The total is $0.18. What are my coins? Since we are working on nickels, you must include at least one nickel in every money puzzle problem.

nickel

Non Standard Unit

Question: What is a non standard unit?

non standard unit

Answer: A non standard unit is an item that is difficult to measure and is not consistent, like paper clips.

Gesture: Using your hands, move them straight out in front of you in the same manner as a person would step off the distance across a room and then, with one hand held out open and palm down, wiggle it to represent a "more or less" concept.

Examples: Have several items available in class and have students determine if each one is a standard or non standard unit of measurement.

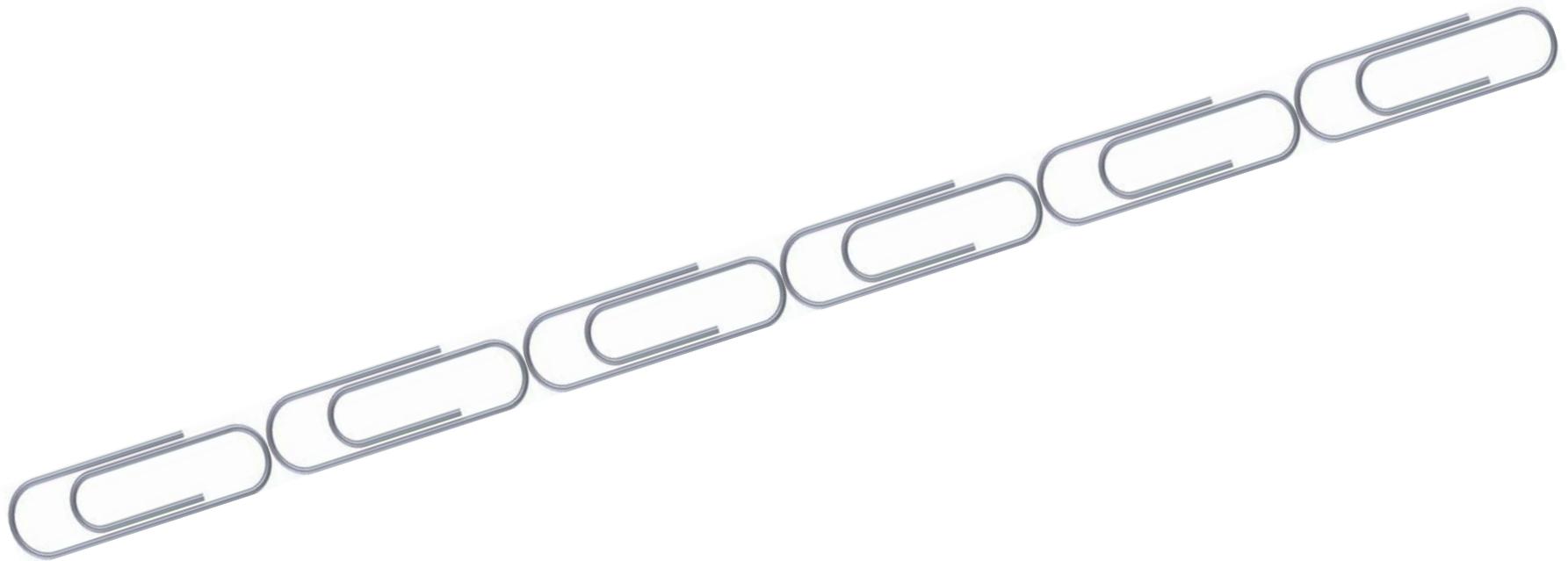|				
pencils	rulers	yardsticks	erasers	paper clips
index cards	napkins	meter stick	sticks of gum	measuring cup
water bottles	spoon	scissors	protractor	stepping off distance
	thumb tip to fingertip		thermometer	

non standard unit

Number Sentence

Question: What is a number sentence?

Answer: A number sentence shows the relationship between the known facts and the potentially unknown.

Gesture: When saying, "A number sentence" spread your hands apart in front of yourself as if laying out a number sentence. Then, interlace your fingers from both hands together when saying, "shows the relationship" to represent the connection. Finally, hold up one hand with fingers spread to show a five while saying, "the known facts" and then make a fist and wiggle it while saying, "and the potentially unknown."

Examples: Put several number sentences on the board and have students determine which number sentences are true and which ones are not true.

6+7=13	5×2=7	10+5=15	8-5=3	6×5=65
20-10=30	4+10=40	7-5=2	12-12=0	15+5=25
11-3=14	14×1=1	100-0=0	3+3=6	3×3=6

7+5=n

number sentence

Numerator
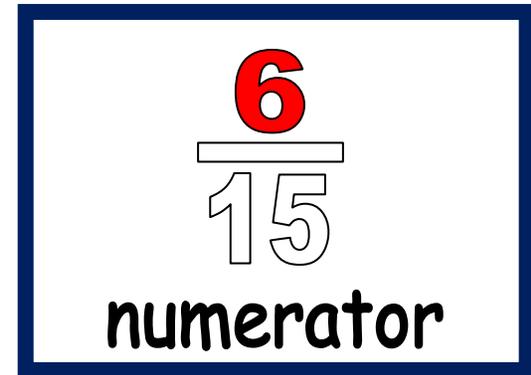
$$\frac{6}{15}$$ **numerator**

Question: What is a numerator?

Answer: A numerator represents how many parts of a whole and is at the top of the fraction.

Gesture: Point straight up with your index finger on one hand while saying, "numerator," and then grab and hold one finger at a time (just two the second or third finger) while saying, "parts." Then draw an imaginary circle around that hand as you extend all five fingers out as you say, "of a whole." Finally return to the original position of pointing up as you say, "at the top of the fraction."

Examples: Place the contents of one small bag of M&M's on an overhead projector and count how many pieces were in one whole bag of M&M's. This number is the denominator as it represents how many pieces it takes to make one whole. Then, ask students how many green M&M's there are. This number will now be the numerator because that is how many pieces out of one whole bag are green. The green M&M's are only a fraction of the total as there are still other colors which have not been used. Repeat this for all the colors and then add them all together to show how together they all make one whole bag.
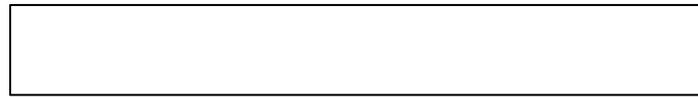
$$\frac{6}{15}$$

numerator

Obtuse Angle

obtuse angle

Question: What is an obtuse angle?

Answer: An obtuse angle has more than 90 degrees but less than 180 degrees.

Gesture: Hold one arm out to your side and bend at the elbow to make an obtuse angle.

Examples: Using a clear protractor, measure some predrawn angles, or angles from a book, and determine, by definition, if each angle is an obtuse angle or not. If the other types of angles have been taught, have students identify each angle. If they have not already been taught, students will give yes or no responses based on the definition and what they see. Use the corner of a piece of paper 90 degrees) to "prove" each answer. Then, using a small clock manipulative, put the hands at different times and have them identify if the hands of the clock form an obtuse angle. Also, give key times throughout the day (i.e. start of the day, lunchtime, recess, end of day) and have students determine which of those are obtuse angles.
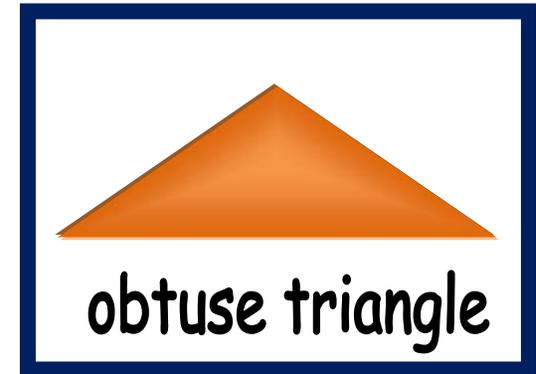
obtuse angle

Obtuse Triangle

Question: What is an obtuse triangle?

Answer: An obtuse triangle is a triangle with an obtuse angle.

Gesture: While saying, "An obtuse triangle is a triangle," position each arm so your elbows are pointing straight out to the sides but bring your finger tips from each hand together high up in front of you in front of your chest. This will represent a triangle with your elbows representing vertices and your chin representing the third vertex. Your chin would then be the vertex of the obtuse angle in the triangle. Then, while saying, "with an obtuse angle," hold one arm out to your side and bend at the elbow to make an obtuse angle and hold the other arm in front of you, holding up one finger. This is a reminder that a triangle can never have more than one obtuse angle.

Examples: Have several triangles available on an overhead or transparency and a clear protractor if possible. Using the protractor and having the students continually repeating the definition (answer), measure each angle to determine if a triangle is or is not an obtuse triangle.

obtuse triangle
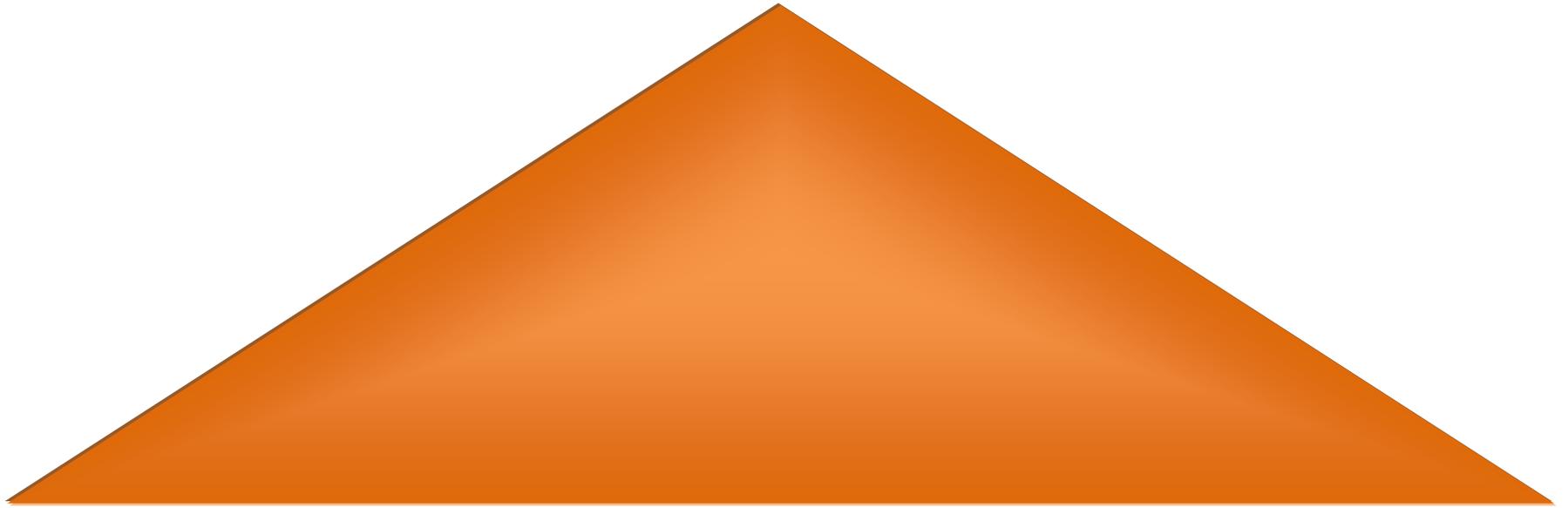
obtuse triangle

Octagon

octagon

Question: What is an octagon?

Answer: An octagon is a polygon which is flat, has eight straight sides, and is closed.

Gesture: Hold one hand flat in front of yourself and bring the other flattened hand down on it to represent flat (making a single clap sound). Then hold up 8 fingers when saying "eight" and immediately make a "karate chop" motion straight out in front of yourself with one arm to represent straight sides. Finally, with both arms in a straightened position (including your fingers), bring your fingertips together to represent the sides being closed.

Examples: Make a checklist of the attributes of an octagon on the board and have several shapes on the board. For each shape, go one by one down the checklist and determine which shapes meet all parts of the definition.

octagon

Odd Number

Question: What is an odd number?

Answer: An odd number ends in a one, three, five, seven, or nine and is NOT evenly divisible by two.

Gesture: Hold up one finger, then three fingers, and so on for each of the odd numbers. Then, waggle a single finger while shaking your head no and finish by holding up two fingers next to the waggling finger while still shaking your head no to represent not being divisible by two.

Examples: Use real objects from around/in the room and ask students if there is an odd number of objects or not for each set. Examples include:

whiteboard markers	students in the room	letters in the alphabet
fingers on one hand	inches on a ruler	cents in a nickel
cents in a dime	hands on a clock	years in a decade

1 3 5 7 9

odd number
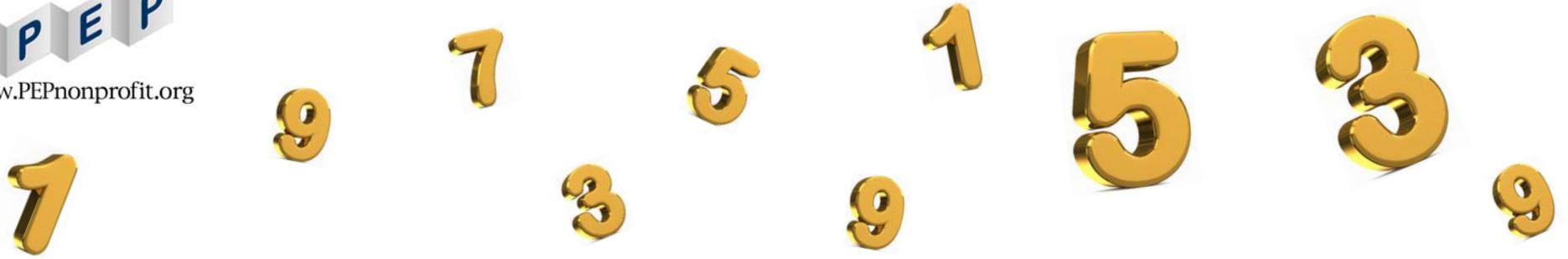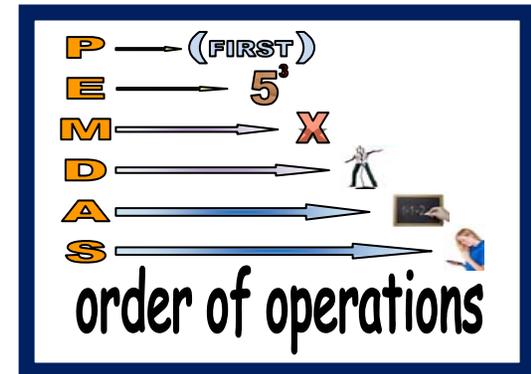
Order of Operations

order of operations

Question: What is order of operations?

Answer: Order of operations, also called PEMDAS, tells what order to complete operations in a problem.
It is PARENTHESIS, EXPONENTS, MULTIPLICATION, DIVISION, ADDITION, and SUBTRACTION.

Gesture: Pretend you are counting off, or listing off items by using one finger on one hand to tap each finger as if counting on the other hand. Then use the following gestures while stating each step of PEMDAS. PARENTHESIS (cup both of your hands to look like parenthesis), EXPONENTS (hold up 5 fingers on one hand and three fingers on the other hand in the exponent position relative to the five), MULTIPLICATION (cross your arms in a multiplication sign), DIVISION (hold your hands together and with one hand, pretend to pull from the other hand and distribute equal shares in front of you) ADDITION (cross your arms in the shape of an addition sign), and SUBTRACTION (hold one arm across in front of you in the shape of a subtraction sign).

Examples: Put some simple problems on the board and solve using the order of operations. Also, there are really good songs available online to go with this concept.
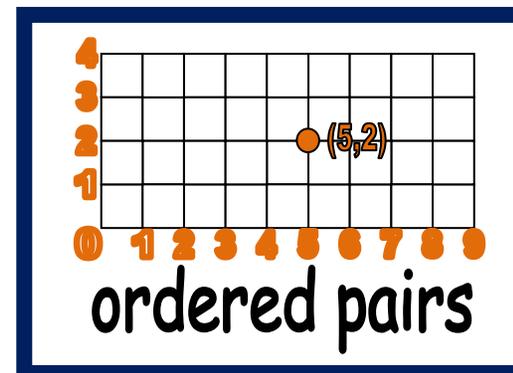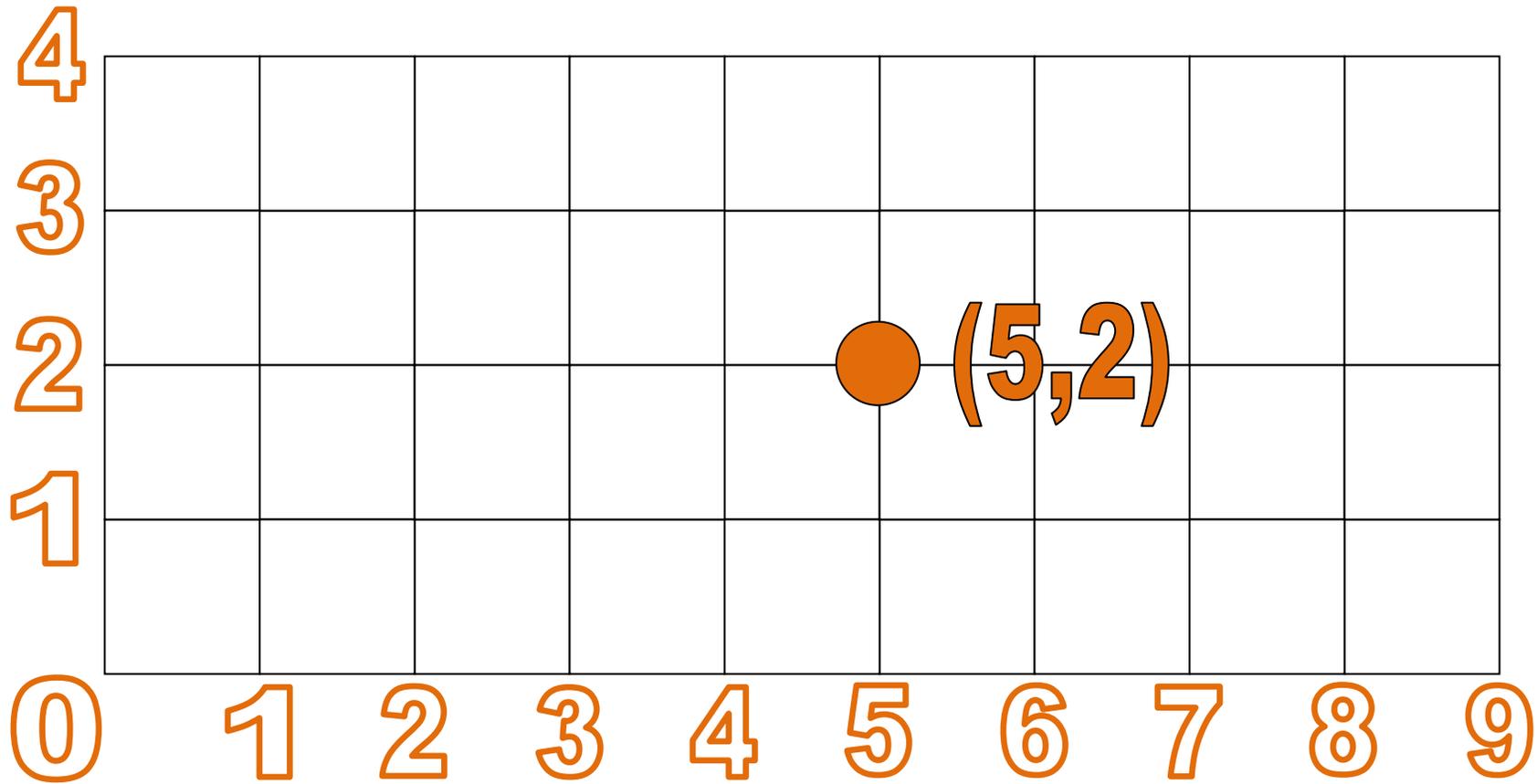
Ordered Pairs

ordered pairs

Question: What are ordered pairs?

Answer: Ordered pairs are two numbers written to show a specific location on a graph and are surrounded by parenthesis.

Gesture: Hold each hand in the shape of a parenthesis. Then, hold out fingers on each hand "inside" the imaginary parenthesis to show the two points in the ordered pair. Then pretend to move to the right the given amount and then up the given amount and place a dot on that exact spot. Return your hands to the parenthesis position when saying the end of the answer.

Examples: Play the game *Coordinate Fours* which is found on the Positive Engagement Project website at www.pepnonprofit.org under *Free Downloads*.

ordered pairs

Ordinal Numbers

Question: What are ordinal numbers?

Answer: Ordinal numbers are numbers which tell you the ORDER in which things are arranged, and are stated as first, second, third, fourth, fifth , sixth, and so on.

Gesture: Holding your arm out in front of you straight from the elbow to your fingertips, make soft "karate chop" motions from your elbow crease to your finger tips for the first part of the answer statement. Then, using your fingers to represent each ordinal number, count off the ordinals as you state them.

Examples: Write several sentence frames on the board with the ordinal number portion left blank (CLOZE) and have students fill in the missing ordinal according to the context clues of the sentence frames.

He was declared the winner because he came in _____ place in the race.
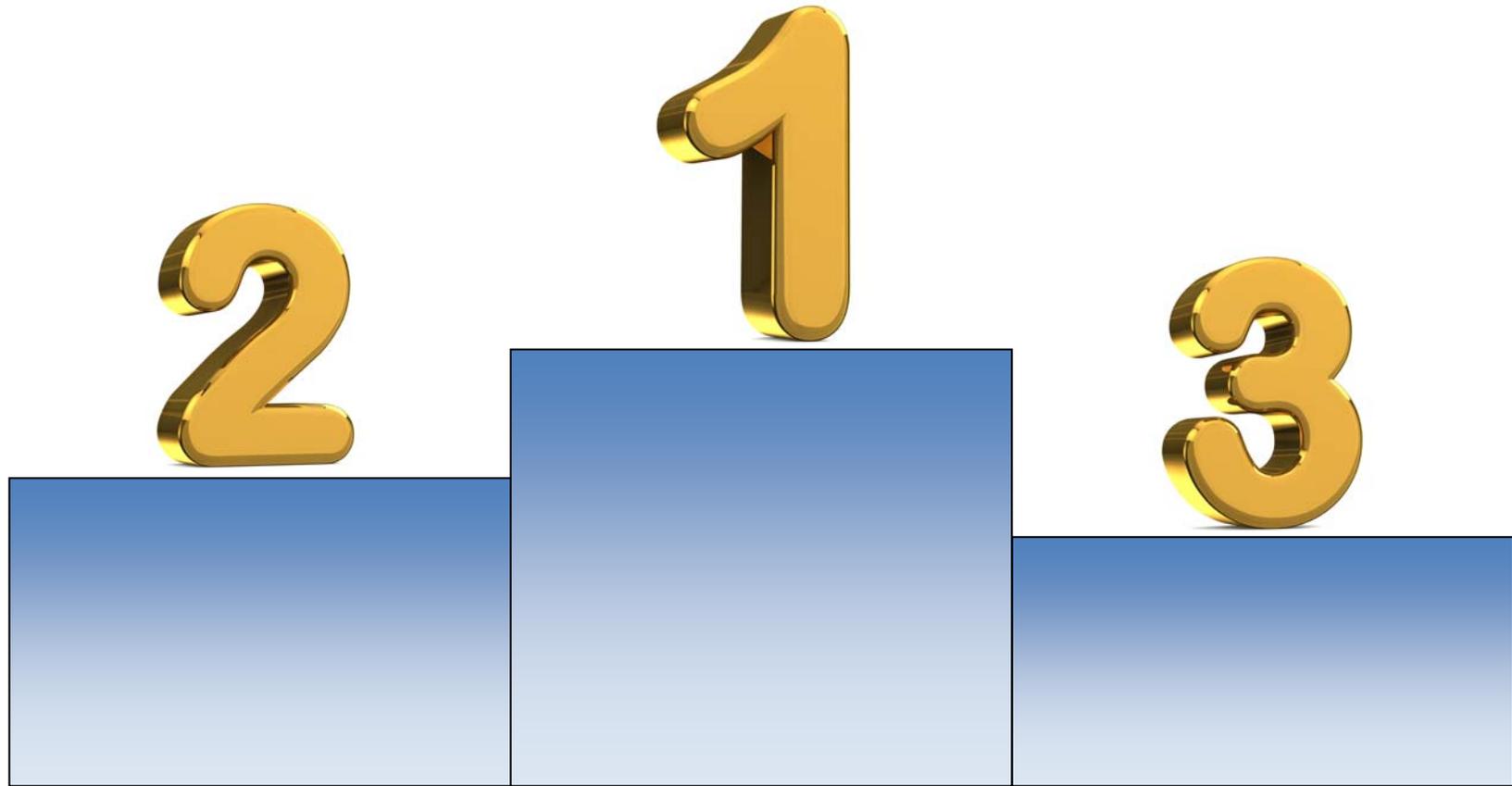The _____ thing you should do is gather everything together before doing anything else.
If only one person finishes ahead of you in a contest, that means you got _____ place.
She took _____ place and received a bronze medal.
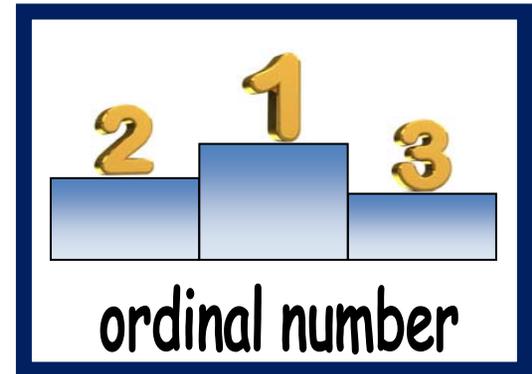
ordinal numbers

Origin

origin

Question: What is an origin?

Answer: An origin is the very beginning.

Gesture: Hold your index finger and thumb apart on one hand as if holding an egg.

Examples: Find related pictures and put them in sets of three or four (each set should be mixed out of order) and have students determine which picture in each set best represents the origin in the set. For example, show pictures of a sapling, a seed, a fallen tree, and a healthy tree. They must decide which best represents the origin.

      2X4 piece of wood, completed house, tree, framed house
      loaf of bread, dough, raw wheat stalks, sandwich
      mallard duck, chick, egg
      fancy entree, raw ingredients, skillet on stove
      salad, packaged head of lettuce, mixing bowl with salad ingredients, farm
      oven, seed, corn stalk, cornbread
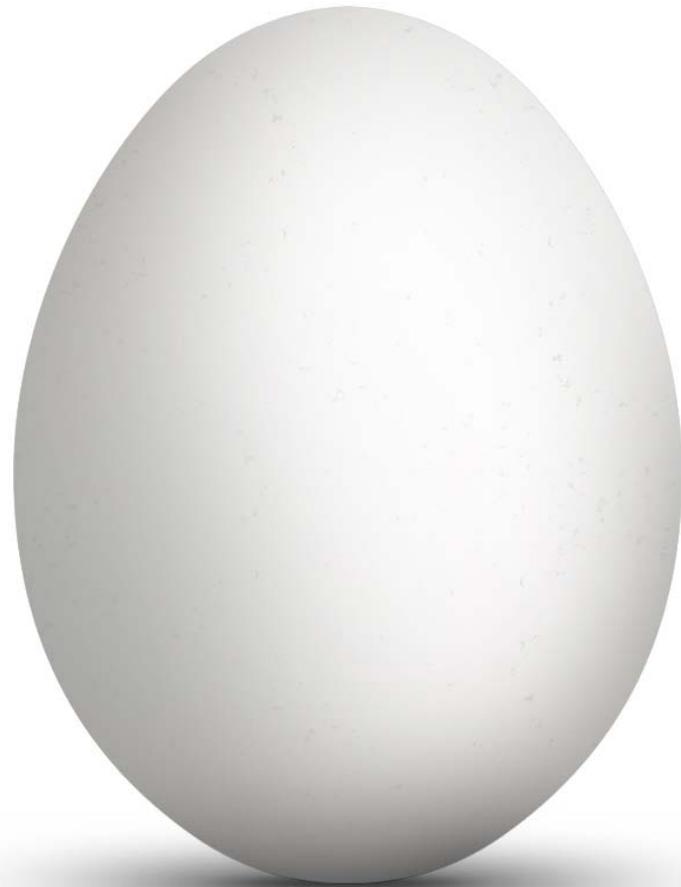
origin

Ounce

ounce

Question: What is an ounce?

Answer: An ounce is a unit of measure. In this case it is weight.

Gesture: Pretend to place something light with one hand into your open palm on the other hand, moving your hand down slightly to show feeling the weight but it is not very heavy.

Examples: Have a variety of items that can be measured using differing units of weight measurement and have students determine which ones would most likely be measured using ounces.

classroom	math book	small ream of paper
CD	student	small cup of water
desk	telephone	teacher

ounce

Outcome

outcome

Question: What is an outcome?

Answer: An outcome is the result of using given items.

Gesture: Pretend to spread peanut butter and jelly on two pieces of bread, put them together, and hold in front of your mouth and pretend to take a bite.

Examples: Ask students several types of questions using the sentence frame, "What is the outcome if I _____?

"What is the outcome if I combine two molecules of hydrogen with one molecule of oxygen?"

"What is the outcome if I add two and two together?"

"What is the outcome if I hit a baseball with a bat?"

"What is the outcome if I study hard and focus in class?"

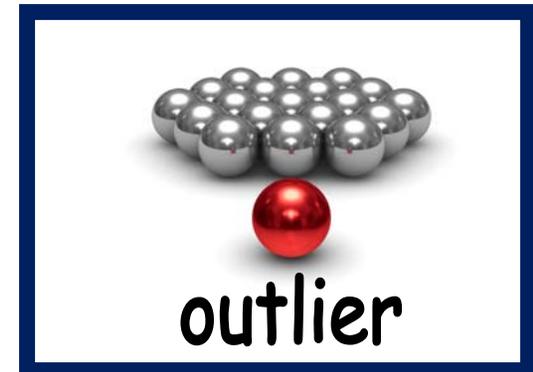"What is the outcome if I get a college degree?"

outcome

Outlier

Question: What is an outlier?

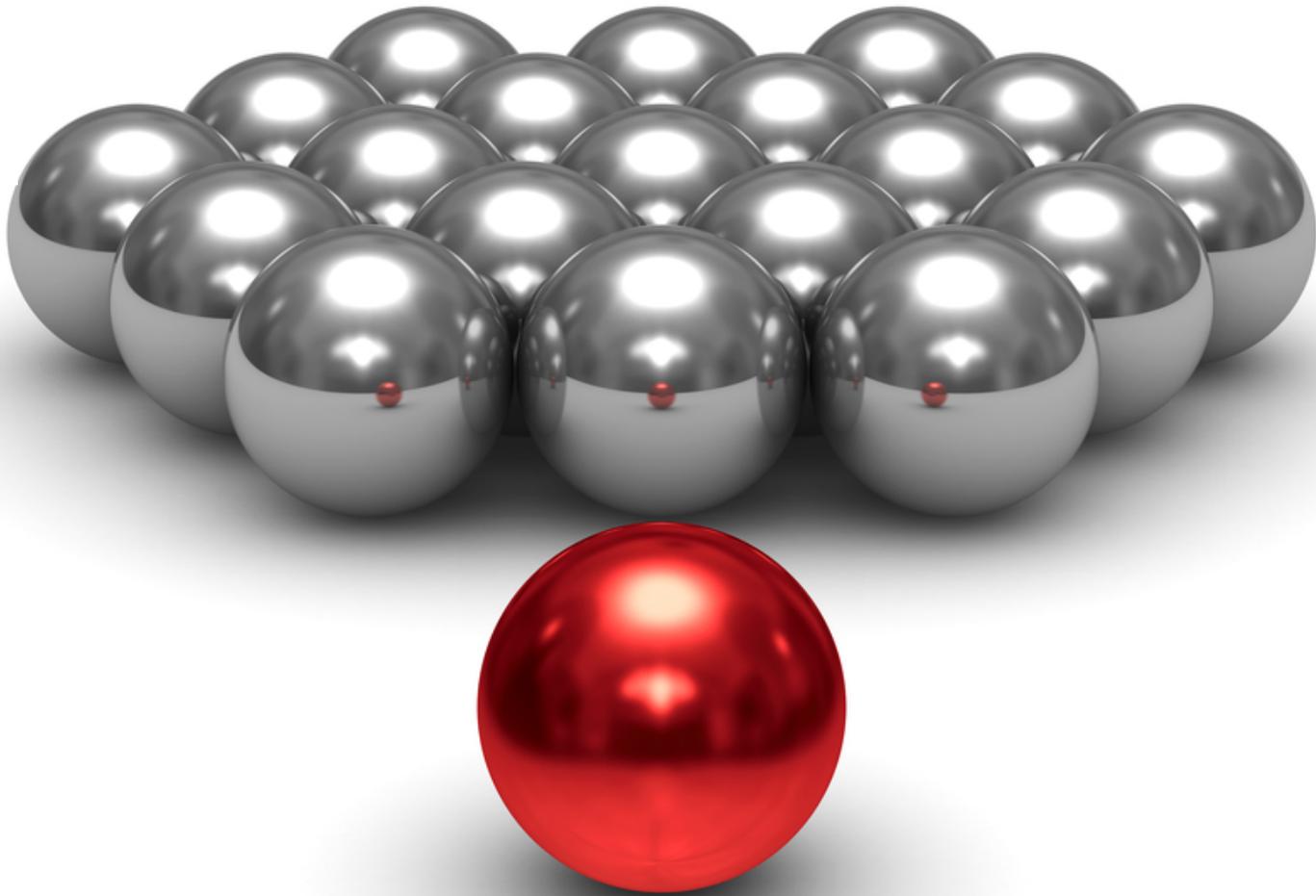**Answer:** An outlier lays far away from the rest of the set of data.

Gesture: Pretend to place several small items in one particular area in front of yourself and then lean to the side and pretend to put just one of the items way off to the side and then return to the original area in front of you.

Examples: Writes sets of data with one clear outlier, or item that does not belong in the group. It can be a set of numbers with one number not close to the other numbers, a list of items with one item which clearly does not belong, and other examples like these. Student must identify the outlier.

lettuce, onion, carrot, orange, chives, asparagus
Christmas, Thanksgiving, Easter, cheeseburger, Halloween
Tuesday, Mars, month, year, week
7, 7, 11, 13, 15, 21, 23, 23, 32, 95

outlier