Rising 8th Grade Summer Math Enrichment Packet

Chestnut TAG

And with resources from
PRINCE GEORGE'S COUNTY PUBLIC SCHOOLS
Office of Academic Programs
Department of Curriculum and Instruction

Summer Math Enrichment Packet

Rising 8

Note to the Student

You learned so much in Grade 7! It is important that you keep practicing your mathematical knowledge over the summer to be ready for Math 8. In this packet, you will find weekly activities for the summer break.

Directions:

- Create a personal and fun math journal by stapling several pieces of paper together or use a notebook or binder with paper. Be creative and decorate the cover to show math in your world.
- Each journal entry should:
  - Have the week number and the problem number.
  - Have a clear and complete answer that explains your thinking.
  - Be neat and organized.
- *Pay attention to the gray boxes that you see at the beginning of each week's activities. Those boxes indicate the Common Core domain and standard that the subsequent activities address. If you see a NON-CALCULATOR SYMBOL* *next to a gray box, then do not use a calculator for the activities in that section!*

Playing board and card games are a good way to reinforce basic computation skills and mathematical reasoning. Try to play board and card games at least once a week. Some suggested games to play are: Monopoly, Chess, War, Battleship, Mancala, Dominoes, Phase 10, Yahtzee, 24 Challenge, Sudoku, KenKen, Connect Four, and Risk.

Where to Go to Get Help … or Practice!

During the course of your math work this summer, you may need some assistance with deepening your understanding the skills and concepts. You also might want to get some more practice. Here are some sites you can visit online:

COMMON CORE STATE STANDARDS INITIATIVE — PREPARING AMERICA'S STUDENTS FOR COLLEGE & CAREER To get the exact definition of each standard, go to www.corestandards.org and search for the content standard (for example, *7.NS.1a*).
LearnZillion has video lessons on every Math standard. Go to www.LearnZillion.com and search for any math topic or standard. LearnZillion
KHAN ACADEMY ***Khan Academy*** has helpful videos and self-guided practice problems for every grade level. Go to www.khanacademy.org to get started.

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WEEK 1 || Equations & Expressions Standards 7.EE.3-7.EE.4: Solve real-life and mathematical problems using numerical and algebraic expressions and equations.

Directions: Read the problem below, then answer the questions.

The Dysons love to give parties. Last Friday, they gave a party and the doorbell rang 15 times. At the first ring, one guest arrived. Each time the doorbell rang after that, two more guests arrived than the time before.

On Saturday, they had another party. At the first ring of the doorbell a single guest arrived, at the second ring two guests appeared, at the third ring three guests and so on. If the doorbell rang 20 times Saturday night, how many guests attended? Was this party bigger than Friday's party? How do you know?

2. Draw a picture to show one way to solve this problem.

3. Create a table to show a second way to solve the problem.

4. Write your answer below and explain how you arrived at your solution.

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WEEK 2 || Ratios & Proportions Standards 7.RP.1-7.RP.3: Analyze proportional relationships and use them to solve real-world and mathematical problems.

Directions: Complete the following three problems to apply your understanding of percentages and ratios.

Problem #1:
Jesse's Awesome Autos advertised a special sale on cars – Dealer cost plus 5%! Quinten and Shapera bought a luxury sedan for $23,727.90. What was the dealer's cost?

Problem #2:
You and some friends went out to T.G.I. Fridays for dinner. You ordered a root beer, sweet potato fries, and cheese quesadillas. The total bill came to $21.86. Your dad has told you many times that it's important to leave a good tip; about 20%. You have $26.00 in your wallet. How much would the total be if you left a 20% tip? Can you cover the cost?

Problem #3:
Builders have observed that windows in a home are most attractive if they have the width to length ratio 3:5. If a window is to be 48 inches wide, what should its length be for the most attractive appearance?

2. Create your own problems.

- Create one original problem involving a percentage (discount or tax).
- Create one original problem involving a ratio or part/whole relationship.
- Solve both and keep the answer key.
- Challenge a friend or family member to solve your problems.

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WEEK 3 || Statistics & Probability Standards 7.SP.1- 7.SP.2: Use random sampling to draw inferences about a population.

Directions: Look at the following data set. It shows the heights, in centimeters, of a group of students:

Student	Height in cm
Tamu	145
Lisa	136
Michelle	154
Garnetta	178
Julius	164
Valerie	144
Zeke	170
Kolby	183
Beyunka	144

1. Answer the following questions based on the data set above.

   What is the mode of the set? _____

   What is the range of the set? _____

   Whose height is closest to the median height for the set? _____

   Whose height is closest to the mean height for the set? _____

. Create a box plot using all of the above data. Give the five-number summary the data displayed in the box plot.

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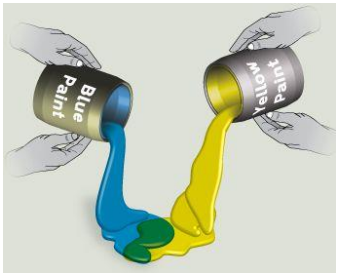
WEEK 4 || Ratios & Proportional Reasoning Standards 7.RP.1-7.RP.3: Analyze proportional relationships and use them to solve real-world and mathematical problems.

Directions: Solve the following problems.



The students in Ms. Brown's art class were mixing yellow and blue paint. She told them that two mixtures will be the same shade of green if the blue and yellow paint are in the same ratio.

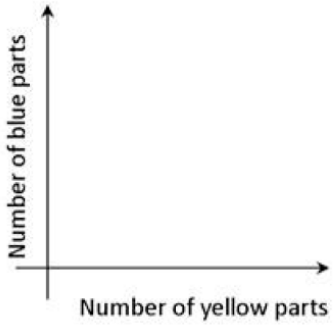
The table below shows the different mixtures of paint that the students made.

	A	B	C	D	E
Yellow	1 part	2 parts	3 parts	4 parts	6 parts
Blue	2 parts	3 parts	6 parts	6 parts	9 parts

a. How many different shades of paint did the students make?

b. Some of the shades of paint were bluer than others. Which mixture(s) were the bluest? Show work or explain how you know.

c. Carefully plot a point for each mixture on a coordinate plane like the one that is shown in the figure. (Graph paper might help.)



d. Draw a line connecting each point to (0,0). What do the mixtures that are the same shade of green have in common?

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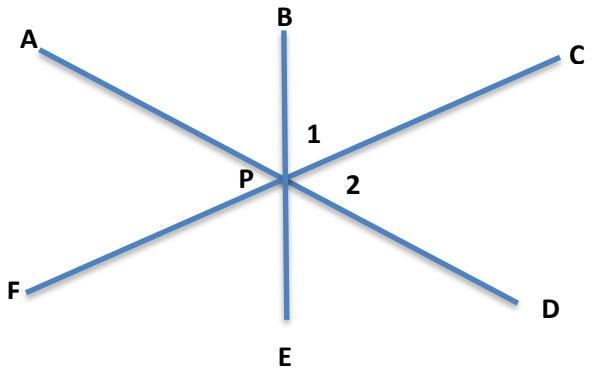
WEEK 5 || Geometry Standards 7.G.4-7.G.6: Solve real-life and mathematical problems involving angle measure, area, surface area, and volume.

Directions:

1. Study the diagram and information below.



Angle 1 is vertical with $\angle FPE$. Angle 2 is vertical with $\angle APF$.
In each case these pairs of angles form an X.

$\angle APF$ and $\angle APC$ are supplementary because they form the straight line FC.
$\angle APC$ and $\angle CPD$ are supplementary because they form the straight line AD.
$\angle APB$ and $\angle EPD$ are vertical.
$\angle EPF$ and $\angle EPC$ are supplementary because they form the straight line FC.

2. Find 2-3 real objects in your home or neighborhood that demonstrates one or more of the same relationships expressed in the diagram above. Take pictures of each of the objects you found and either download the pictures and paste them into an electronic document(s) or create a poster and paste your pictures on the poster. *If you do not have access to a digital camera and source for printing pictures, you may draw a picture of your objects instead.*

3. Finally, label each line, each angle, and each corresponding relationship. Use words to describe the angles and relationships formed by the intersecting lines on your document or poster (as done in the example above).

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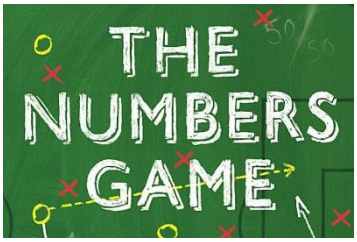
WEEK 6 || Number System Standards 7.NS.1-7.NS.3: Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.

Directions: Complete the two problems below.



Problem 1:
Using exactly four 4's and any operations or symbols [+, –, x, ÷, ( ), x^e] write an expression to equal each of the following:

*_Example_: 16 = (4 x 4 x 4) ÷ 4

1 = _____ 4 = _____ 7 = _____

2 = _____ 5 = _____ 8 = _____

3 = _____ 6 = _____ 9 = _____

Problem 2:
Find three different ways to fill in operations in the boxes below to make the equations true.

*Hint: Operations include: +, –, x, ÷, ( )

$6 \square 1 \square 2 \square 2 = 5$

$6 \square 1 \square 2 \square 2 = 5$

$6 \square 1 \square 2 \square 2 = 5$

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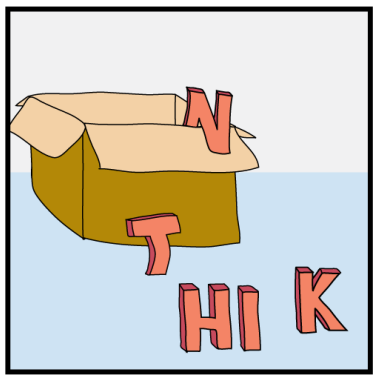
WEEK 7 || Expressions & Equations Standards 7.EE.3 -7.EE.4: Solve real-life and mathematical problems using numerical and algebraic expressions and equations.



You have tried many ways to solve problems throughout this Math Summer Packet. Already you know that when one strategy does not lead you to a solution, you back up and try something else. Sometimes you can find a smaller problem inside the larger one that must be solved first. Sometimes you need to think about the information that is missing rather than what is there. Sometimes you need to read the problem again and look for a different point of view. Sometimes you need to tell your brain to try to think about the problem in an entirely different way – perhaps a way you have never used before. Looking for different ways to solve problems is like brainstorming. Try to solve this problem. You may need to ***change your point of view.***

Directions:

Fishing Adventures rents small fishing boats to tourists for day-long fishing trips. Each boat can only carry 1,200 pounds of people and gear for safety reasons. Assume the average weight of a person is 150 pounds. Each group will require 200 lbs. of gear for the boat plus 10 lbs. of gear for each person.

1. Create an inequality describing the restrictions on the number of people possible in a rented boat. Graph the solution set.

2. Several groups of people wish to rent a boat. Group 1 has 4 people. Group 2 has 5 people. Group 3 has 8 people. Which of the groups, if any, can safely rent a boat? What is the maximum number of people that may rent a boat?

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WEEK 8 || MATH 8 UNIT 1 PREVIEW – Geometry Standards: 8.G.1- 8.G.5:
Understand congruence and similarity using physical models, transparencies, or geometry software.

Directions: Study the graphic below. Use it to complete the following tasks.

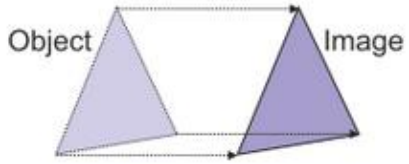
Transformations

A change in size, shape, orientation, or position of an object is called transformation.

Congruence Transformations

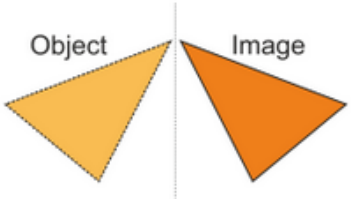
The object and image is always congruent. Side lengths and angle measures remain unchanged (equal).

Translation (Slide)



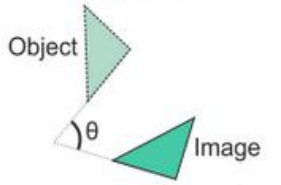
Every point moves the same distance in a given direction

Reflection



Mirror image

Rotation

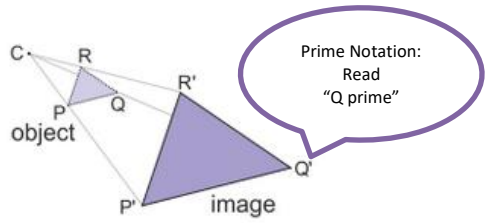


Rotating around a point O with angle θ

Similarity Transformations: Dilations

The object and image is always similar. Side lengths are proportional and angle measures are unchanged (equal).

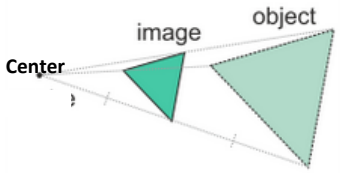
Enlargement



$k = 3$

The "k" is the scale factor. For an enlargement $k > 1$.

Reduction

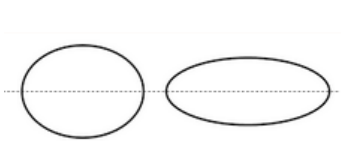


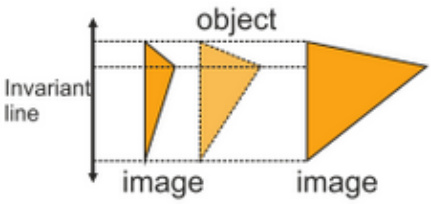
$k = \frac{1}{2}$

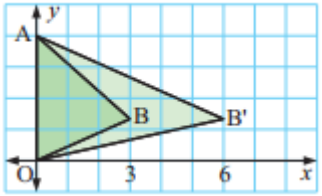
The "k" is the scale factor. For a reduction $k < 1$.

Non-examples of Congruence or Similarity Transformations

Stretch







Stretching: Increasing or decreasing an object in one deminsion/direction only.
Stretches are define by a stretch factor and an invariant line. The image is neither congruent or similar to its object.

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Strange Pictures!

Look carefully at this picture of a playing card:

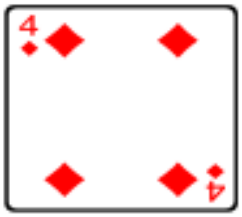
What has happened to these cards? In each case describe the changes.

A.

B.

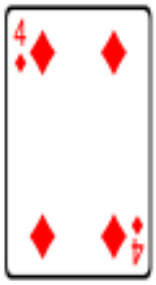
C.

D.



E.

F.



G.

H.

K.

M.

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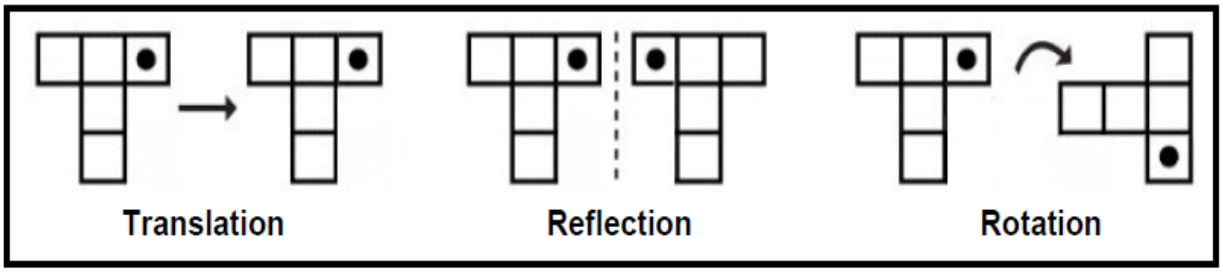
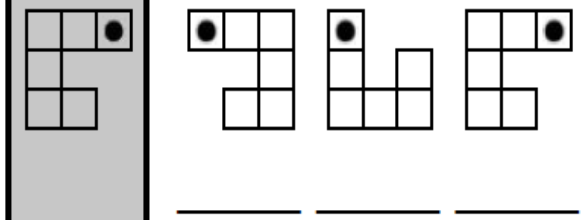
Translation, Rotation, and Reflection

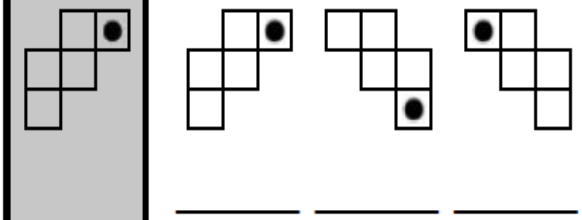


Identify each shape as translation, rotation, and reflection.

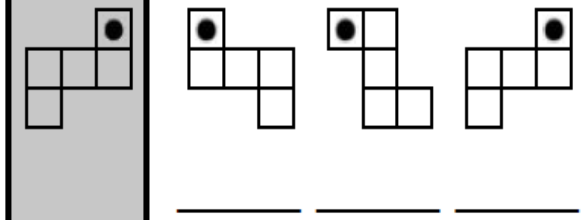
1)



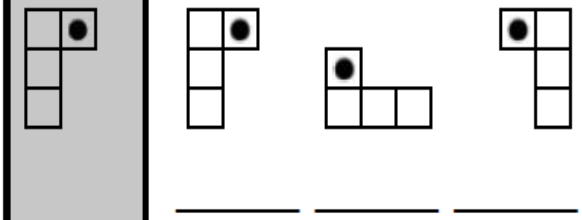
2)



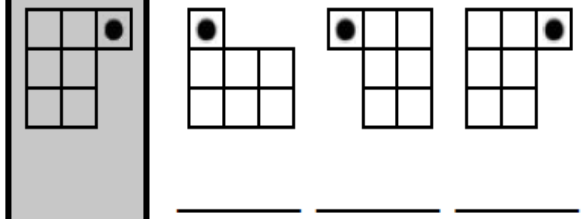
3)



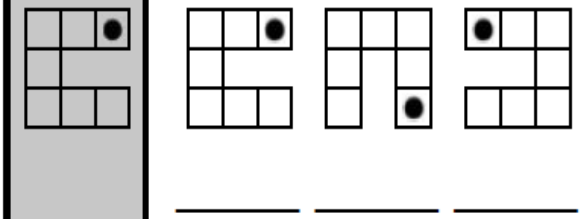
4)



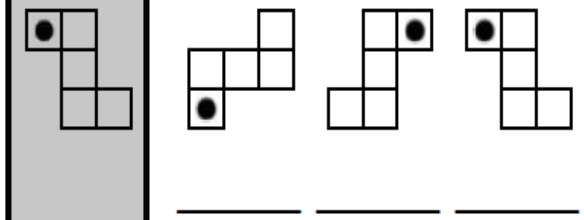
5)



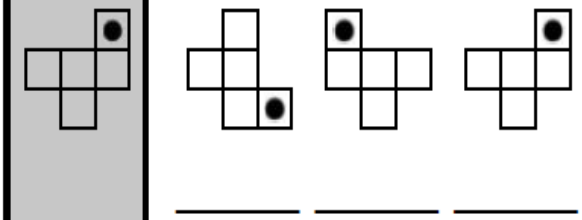
6)



7)



8)



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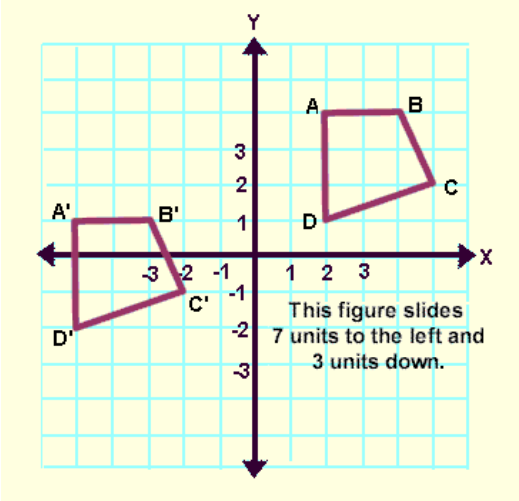
Translations in the Coordinate Plane



Description:

7 units to the left and 3 units down.

Mapping Rule:

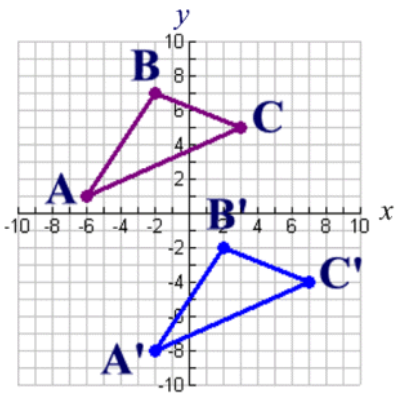
$(x, y) \rightarrow (x - 7, y - 3)$

(*This is read: "the x and y coordinates will be translated into x-7 and y-3..*
Notice that adding a negative value (subtraction), moves the image left and/or down, while adding a positive value moves the image right and/or up.)

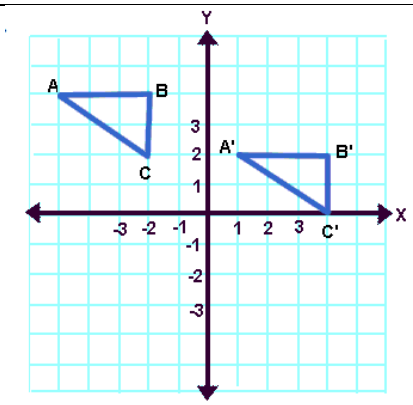
Notation:

$T_{(-7,-3)}$

(The -7 tells you to subtract 7 from all of your x-coordinates, while the -3 tells you to subtract 3 from all of your y-coordinates.)

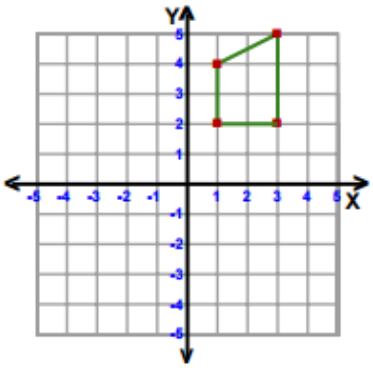


Describe the translation that will move triangle ***ABC*** onto triangle ***A'B'C'.*** Name the corresponding parts.



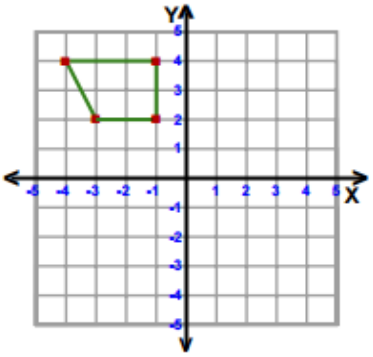
Give the mapping rule for the translation that will move triangle ***ABC*** onto triangle ***A'B'C'.***

Translation: 4 left and 3 down



Graph the image of the figure using the given translation. Provide the notation of the translation.

Translation: 3 right and 4 down



Graph the image of the figure using the given translation. Provide the notation and mapping rule of the translation.

Triangle Reflections Task Sheet

Perform each reflection and name the location of each point for the image.

1. Reflect figure ABC over the x axis

A (–10, –9) → A'(___,___)

B (–6, –8) → B'(___,___)

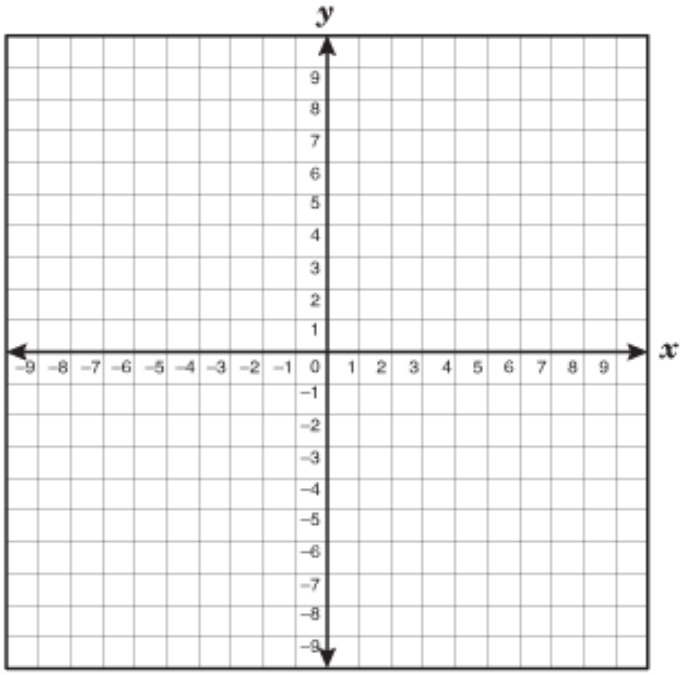
C (–4, –10) → C'(___,___)

2. Reflect figure DEF over the y axis

D (–5, –3) → D'(___,___)

E (–1, –1) → E'(___,___)

F (–2, –6) → F'(___,___)



What are the shortcuts that can be applied to each coordinate?

When reflecting a figure over the x-axis …

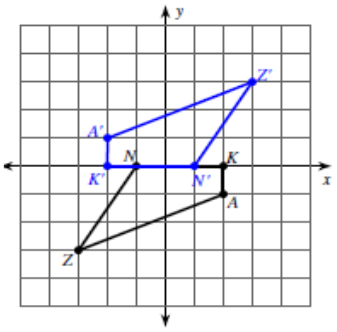
_____

When reflecting a figure over the y-axis …

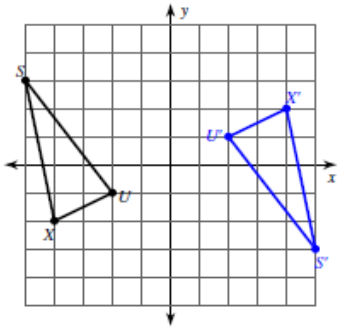
_____

Rotations Made Easy!

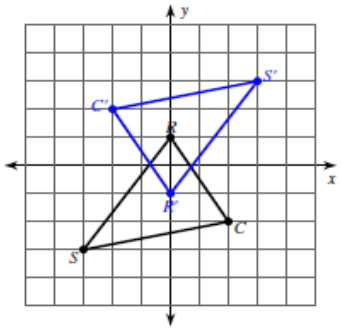
Look at the images of the figures below after their rotations 180º about the origin. The coordinates are given in the table. Fill in the coordinates of the images after the rotations. Then examine the pairs of coordinates and determine the coordinate mapping rule. Use the coordinate mapping rule to determine what the shortcut is when rotating figures 180º about the origin.



Quadrilateral ZNKA	Z (-3, 3)	N (-1, 0)
Coordinate Mapping Rule: (x,y)→(_____, _____)	Z'	N'
	K (2, 0)	A (2, -1)
	K'	A'



Triangle XUS	X(-4, -2)	U(-2, -1)
Coordinate Mapping Rule: (x,y)→(_____, _____)	X'	U'
	S(-5, 3)	
	S'	



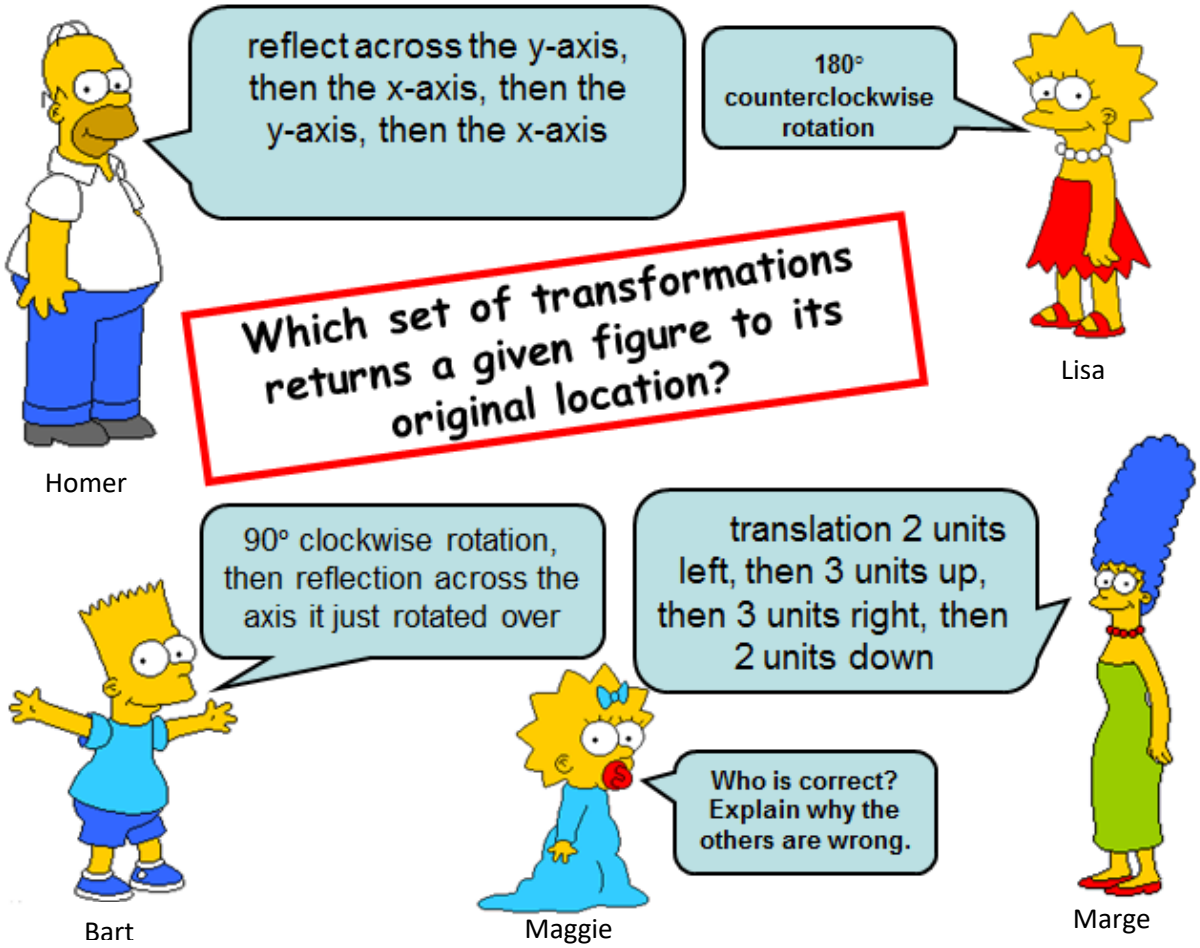
Triangle CRS	C(2, -2)	R(0, 1)
Coordinate Mapping Rule: (x,y)→(_____, _____)	C'	R'
	S(-3, -3)	
	S'	

What is the shortcut for rotating figures 180º?

Provide a congruency statement for the rotation of Triangle CRS.

Rising 8

Reasoning with Transformations



Use the space provided to write a note to Maggie.

Rising 8

Changing Shapes

Suppose you are going to be designing a logo for a club at your school. To prepare for this project, draw a non-rectangular shape in the coordinate plane so that portions of the shape are in each of the four quadrants. Explain what would happen to your shape if you transformed it using each of the given rules with the center of dilation at the origin.

a. $(4x, 4y)$

b. $(0.25x, 0.25y)$

c. $(2x, y)$

d. $(3x, 3y + 5)$

e. $(x + 5, y - 5)$

f. $(\frac{1}{2}x, \frac{1}{2}y)$

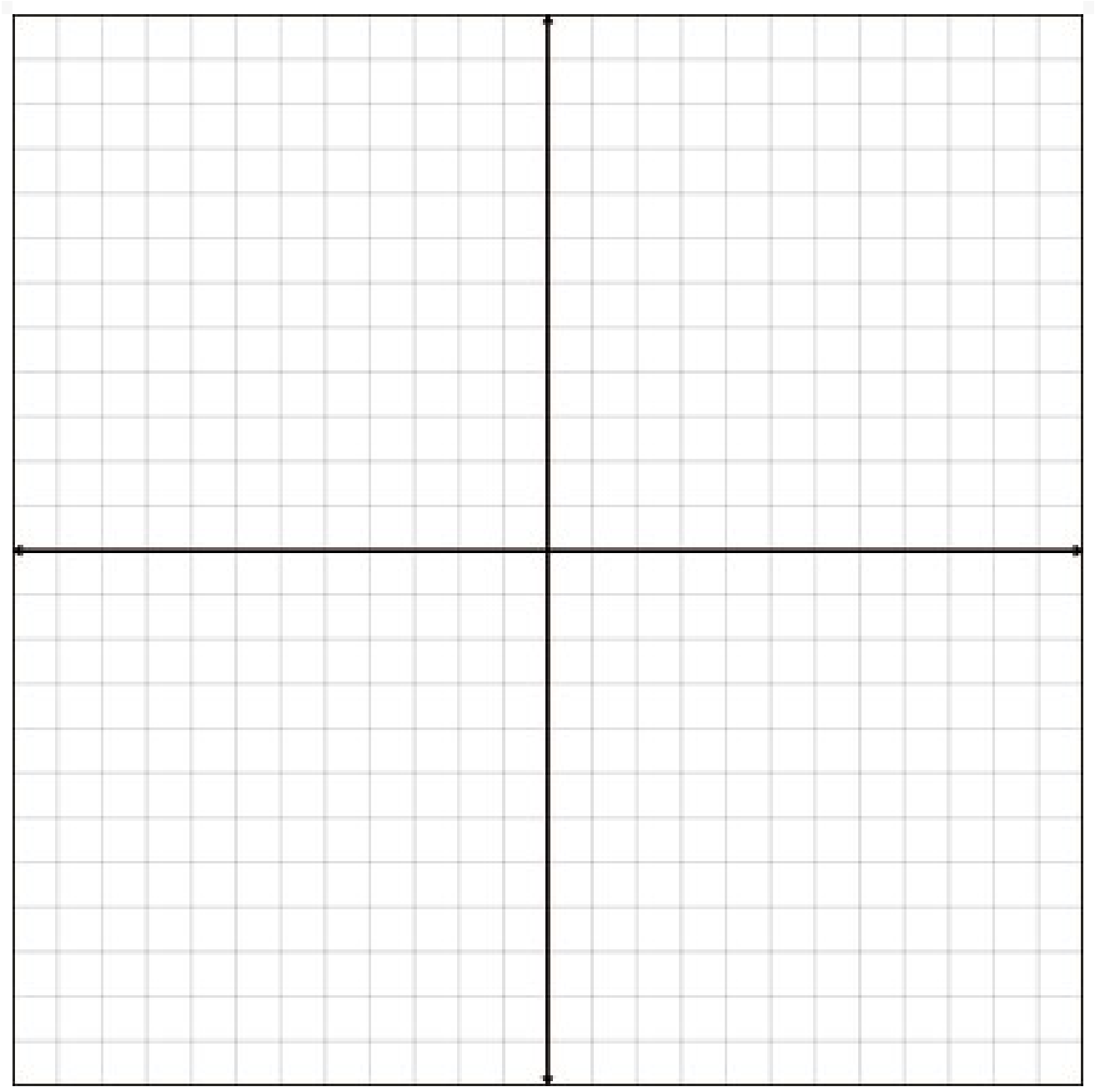
g. Will any of the transformed figures be similar to the original figure? Explain.

h. If you make a new figure by adding 2 units to the length of each side of your shape, will the two figures be similar? Why or why not?

i. Write a general rule for transformations in the plane that produce similar figures.

Rising 8

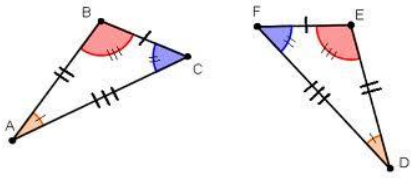
Changing Shapes

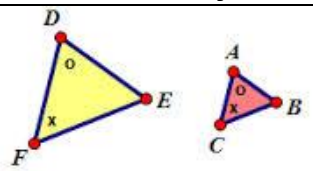


Rising 8

Summing It Up … TRANSFORMATIONS!

Complete this graphic organizer.

<table>
<tr><th>Congruence</th><th>Similarity</th></tr>
<tr><td> 

$\Delta ABC \cong \Delta DEF$</td><td> 

$\triangle DEF \sim \triangle ABC$</td></tr>
<tr><td>Imprecise Language (avoid)
The same, equal, “same shape and same size”</td><td>Imprecise Language (avoid)
Stretch, scaled, resized, shrink, expand, “same shape”</td></tr>
<tr><td>Precise Academic Language (use)
"corresponding angles equal and corresponding line segments equal"</td><td>Precise Academic Language (use)
"corresponding angles equal and corresponding line segments proportional"</td></tr>
<tr><td>Definition
A two- dimensional figure is congruent to another if the 2nd can be obtained from the 1st by a combination of translations, rotations, and reflections.</td><td>Definition
A two- dimensional figure is similar to another if the 2nd can be obtained from the 1st by a combination of congruence and dilation.</td></tr>
<tr><td>Properties
Congruency Statement: $\Delta ABC \cong \Delta DEF$
<table><tr><th>Corresponding Angles</th><th>Corresponding Sides</th></tr><tr><td>$\angle A \cong \angle D$</td><td>$AB \cong DE$</td></tr><tr><td>$\angle B \cong \angle E$</td><td>$BC \cong EF$</td></tr><tr><td>$\angle C \cong \angle F$</td><td>$AC \cong DF$</td></tr></table></td><td>Properties
Similarity Statement: $\Delta ABC \sim \Delta DEF$
<table><tr><th>Corresponding Angles</th><th>Corresponding Sides</th></tr><tr><td>$\angle A \cong \angle D$</td><td rowspan="3">$\frac{AB}{DE} = \frac{BC}{EF} = \frac{AC}{DF}$</td></tr><tr><td>$\angle B \cong \angle E$</td></tr><tr><td>$\angle C \cong \angle F$</td></tr></table></td></tr>
<tr><td>Examples</td><td>Examples</td></tr>
<tr><td>Non-examples</td><td>Non-examples</td></tr>
</table>

Rising 8

Complete the table.

Transformations	What Changes	What Stays the Same
Translation		*Side lengths, angle measures*
Rotation		
Reflection	*Orientation*	
Dilation		

TRANSFORMATIONS from A to Z

Reflect on what your learned by filling in a word or phrase related to transformations for each letter.

A	J	S
B	K	T
C	L	U
D	M	V
E	N	W
F	O	X
G	P	Y
H	Q	Z
I	R	