

Skill: Polygons

Standard: 5.13.a ~ The student, using plane figures (square, rectangle, triangle, parallelogram, rhombus, and trapezoid), will develop definitions of these plane figures;

5.13.b ~ The student, using plane figures (square, rectangle, triangle, parallelogram, rhombus, and trapezoid), will investigate and describe the results of combining and subdividing plane figures

Vocabulary:

- **Polygon** - a closed two-dimensional figure with straight edges



Polygon



Not a Polygon (has a curve)



Not a Polygon (open, not closed)











Regular

Regular = equal sides



Irregular




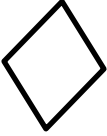
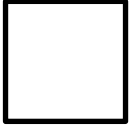
Irregular = unequal sides

- **Triangle** - a polygon with 3 sides 
- **Quadrilateral** - a polygon with 4 sides 
- **Pentagon** - a polygon with 5 sides 
- **Hexagon** - a polygon with 6 sides 
- **Heptagon** - a polygon with 7 sides 
- **Octagon** - a polygon with 8 sides 
- **Nonagon** - a polygon with 9 sides 
- **Decagon** - a polygon with 10 sides 

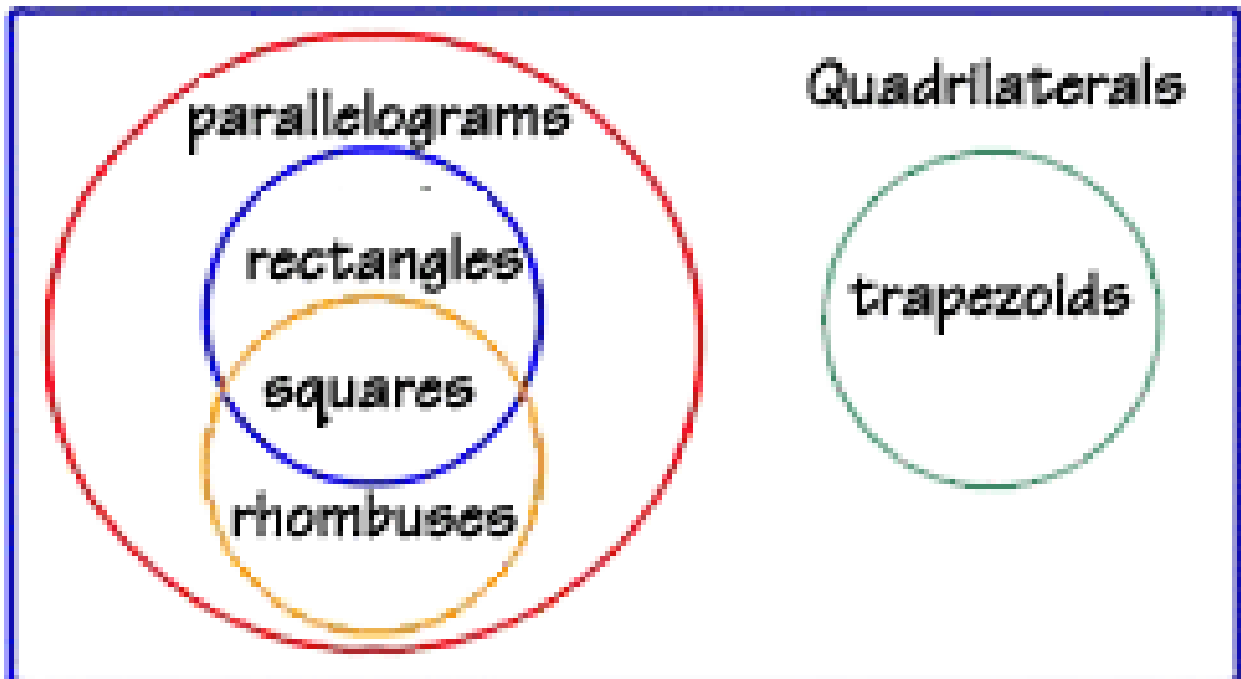
- Quadrilaterals

- **Trapezoid** - a quadrilateral with one pair of parallel sides
- **Parallelogram** - a quadrilateral with 2 pairs of parallel sides
- **Rectangle** - a parallelogram with 4 right angles
- **Rhombus** - a parallelogram with 4 congruent sides
- **Square** - a parallelogram with 4 equal sides & 4 right angles

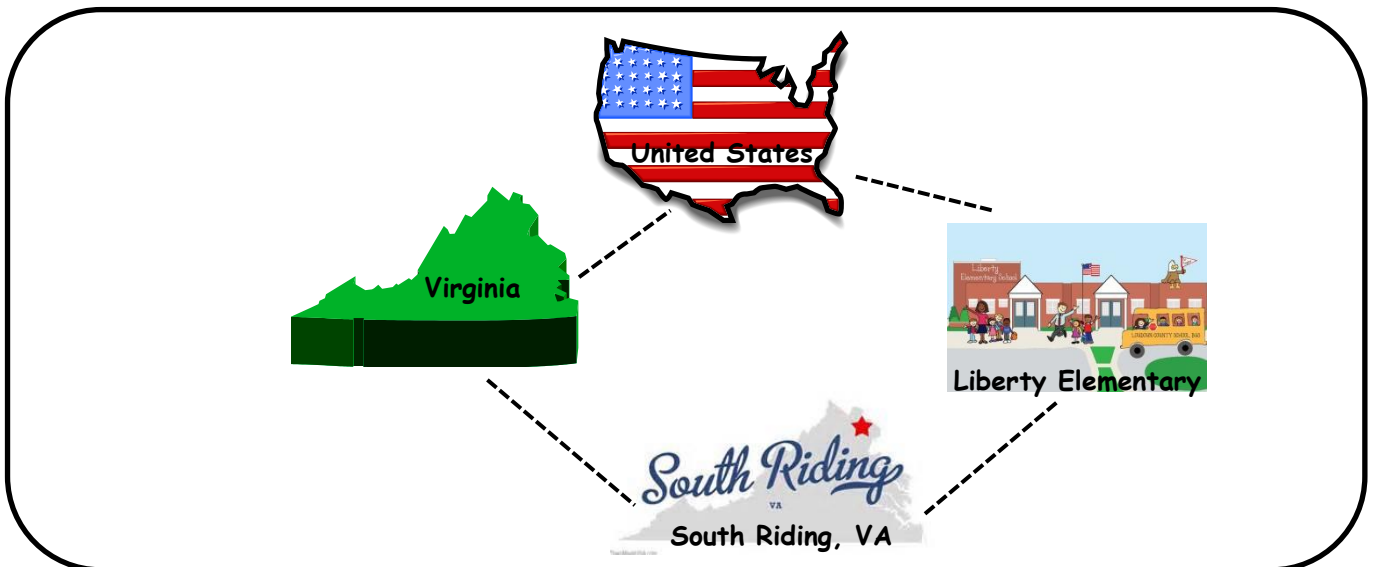
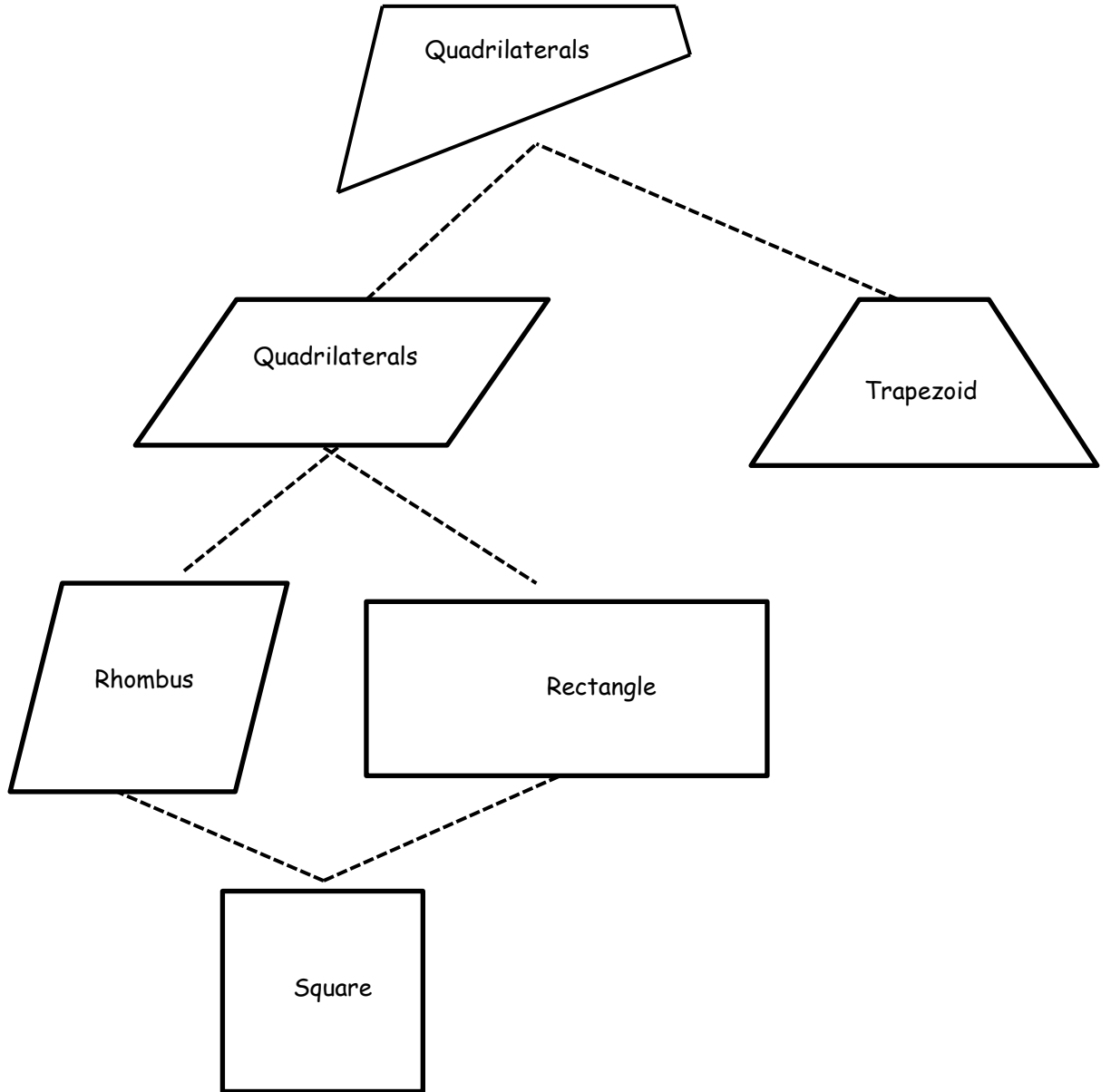
Quadrilaterals

Trapezoid	<ul style="list-style-type: none"> *4 sides *1 pair of parallel sides *other pair is not parallel 	
Parallelogram	<ul style="list-style-type: none"> *4 sides *2 pairs of parallel sides *opposite sides are = 	
Rectangle	<ul style="list-style-type: none"> *4 sides *2 pairs of parallel sides *opposite sides are = *4 right angles 	
Rhombus	<ul style="list-style-type: none"> *4 sides *2 pairs of parallel sides *all sides are = 	
Square	<ul style="list-style-type: none"> *4 sides *2 pairs of parallel sides *all sides are = *4 right angles 	

Venn Diagram



Relationship Between Quadrilaterals



When you are identifying quadrilaterals ask yourself the following questions.

- Does it have only 1 pair of parallel sides?
 - If yes → it's a trapezoid!
 - If no → keep asking questions!

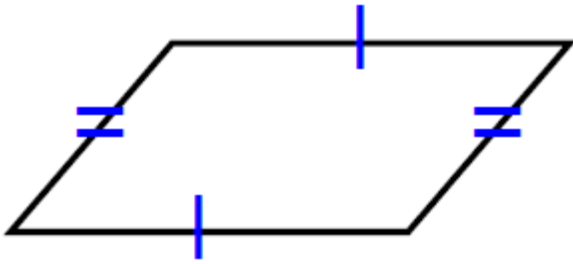
- Does it have 2 pairs of parallel sides?
 - If yes → it's a parallelogram! Keep asking questions!
 - If no → if it wasn't a trapezoid, then it's just a plain old quadrilateral

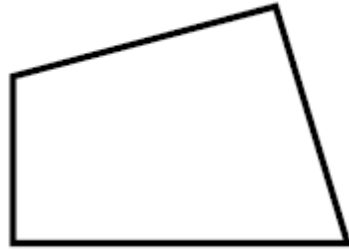
- Does the parallelogram have right angles?
 - If yes → it's a rectangle! Keep asking questions!
 - If no → keep asking questions, but it's not a rectangle

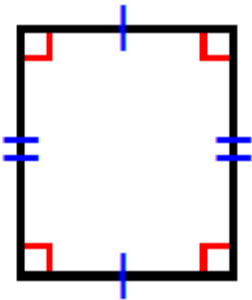
- Does the parallelogram have 4 congruent sides?
 - If yes → it's a rhombus! Keep asking questions!
 - If no → it's NOT a rhombus

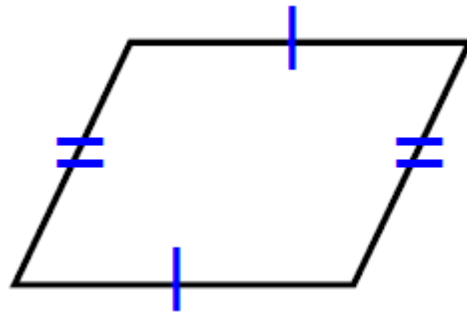
- Does the parallelogram have right angles AND 4 congruent sides?
 - If yes → it's a square!
 - If no → it's not a square

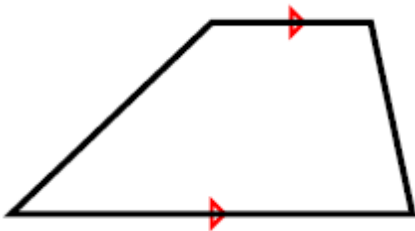
Name the Quadrilaterals. Use the words quadrilateral, trapezoid, parallelogram, rhombus, rectangle, and square. Use ALL the words that apply.

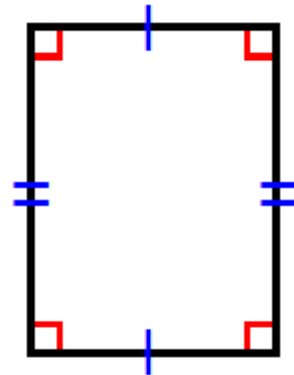


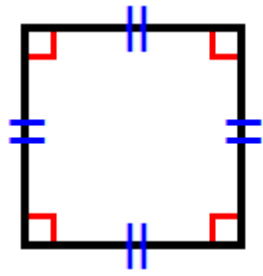


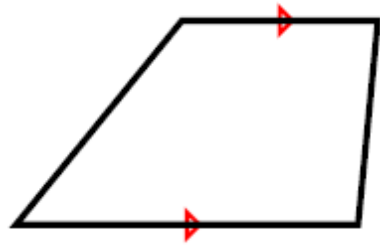


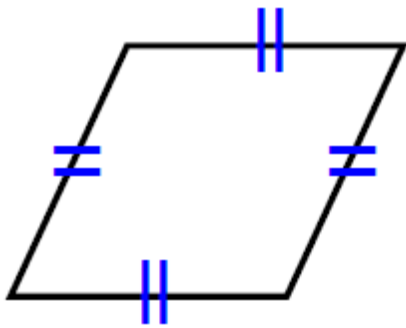


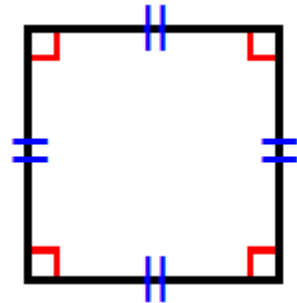


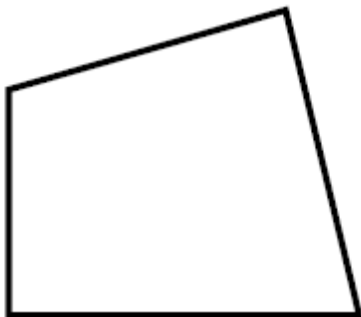


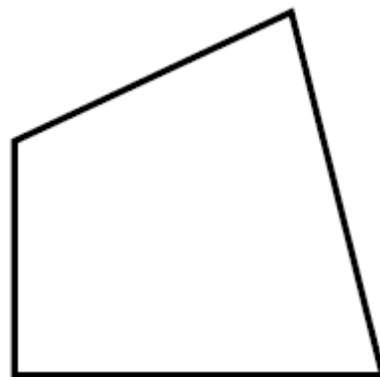










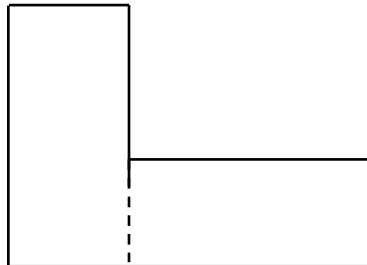


Read the following statements. Fill in the blanks as ALWAYS, SOMETIMES, or NEVER.

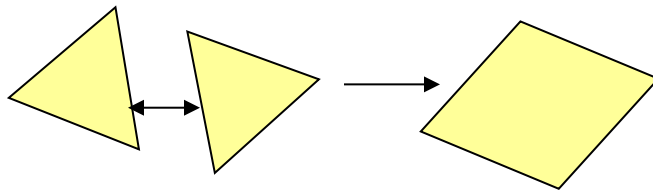
1. A square is _____ a rectangle.
2. A rhombus is _____ a square.
3. A parallelogram is _____ a rectangle.
4. A parallelogram is _____ a quadrilateral.
5. A rectangle is _____ a square.
6. A square is _____ a rhombus.
7. A quadrilateral is _____ a rectangle.
8. A trapezoid is _____ a square.
9. A rhombus is _____ a rectangle.
10. A quadrilateral is _____ a square.
11. A rectangle is _____ a rhombus.
12. A square is _____ parallelogram.
13. A parallelogram is _____ a square.
14. A rectangle is _____ a parallelogram.
15. A quadrilateral is _____ a trapezoid.
16. A trapezoid is _____ a quadrilateral.
17. A square is _____ a quadrilateral.
18. A quadrilateral is _____ a rhombus.
19. A rectangle is _____ a parallelogram.
20. A rectangle is _____ a trapezoid.
21. A quadrilateral is _____ a parallelogram.
22. A parallelogram is _____ a rhombus.
23. A square is _____ a trapezoid.
24. A trapezoid is _____ a rectangle.
25. A trapezoid is _____ a rhombus.

Plane figures (not plain as in boring, but plane... 2-dimensional) can be added together to make a more complicated shape. A complicated shape can be divided into plane figures.

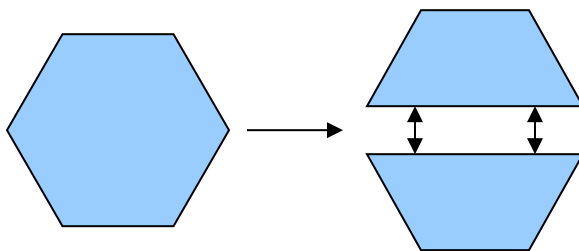
We can see in the figure below that we can divide this polygon into **two rectangles**.



We can see that a **rhombus** is formed by combining two triangles.



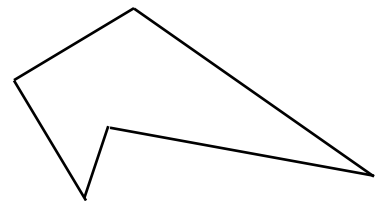
This **hexagon** is formed by combining two trapezoids.



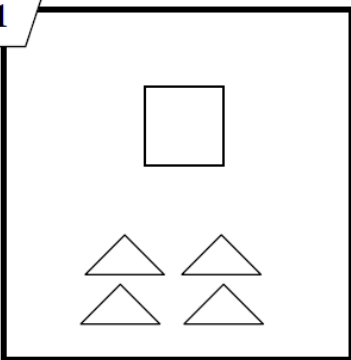
Think! What other polygons can we make from the hexagon?

PRACTICE!

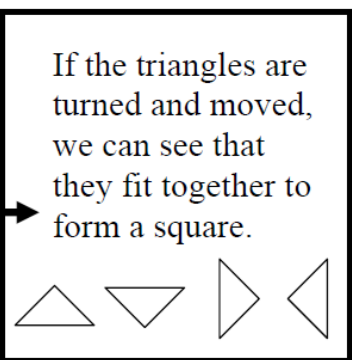
1. Divide this figure into two regular polygons. Identify the plane figures.



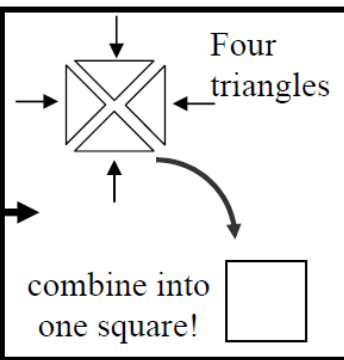
1



If the triangles are turned and moved, we can see that they fit together to form a square.



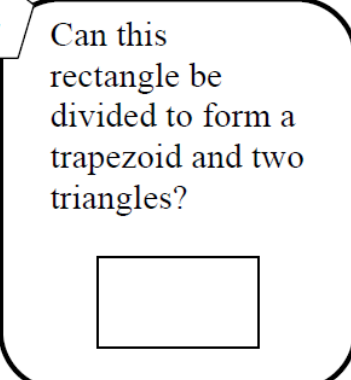
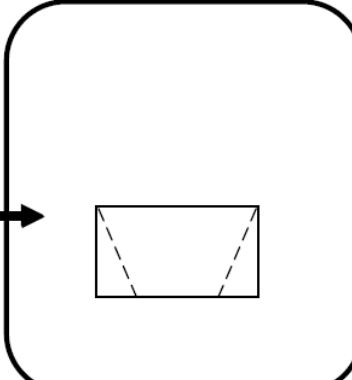
combine into one square!



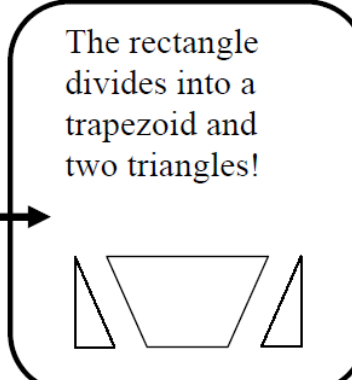
Four triangles

2

Can this rectangle be divided to form a trapezoid and two triangles?

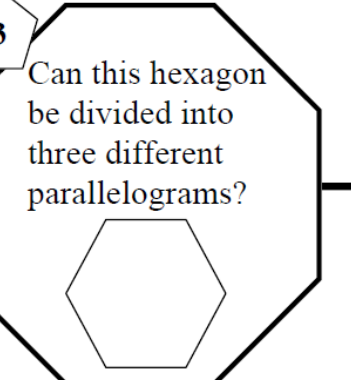



The rectangle divides into a trapezoid and two triangles!

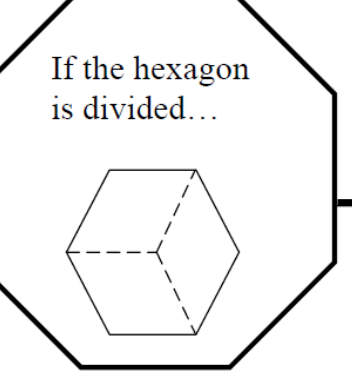


3

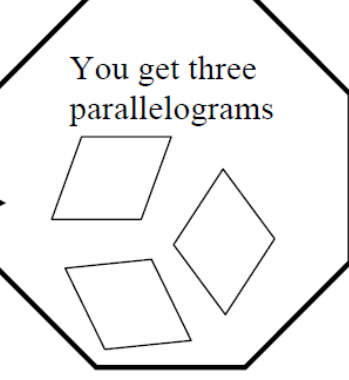
Can this hexagon be divided into three different parallelograms?



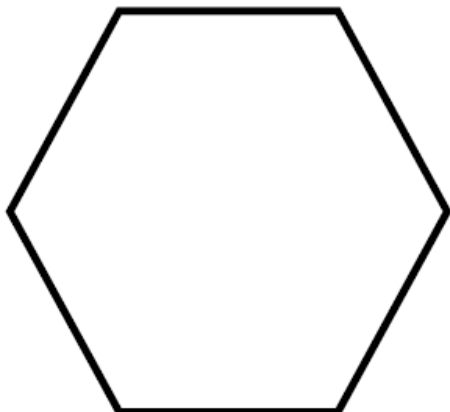
If the hexagon is divided...



You get three parallelograms



How many triangles and squares can you divide this shape into?



_____ triangles _____ squares

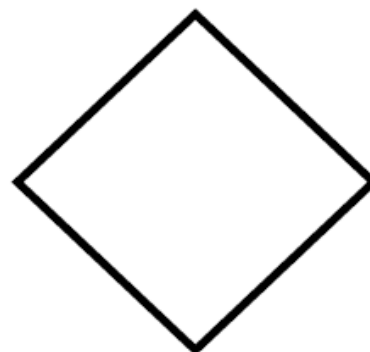
_____ triangles _____ squares

Directions: Using your pencil, divide the figures below to create new figures.

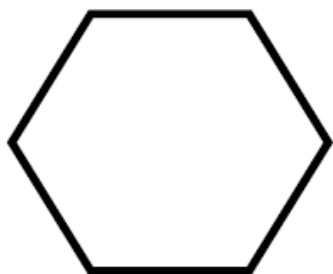
1.



3.



2.



4.



Directions: List which shapes were combined to create the new figure.

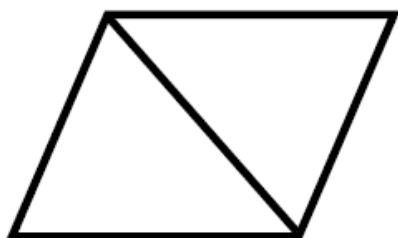
5.



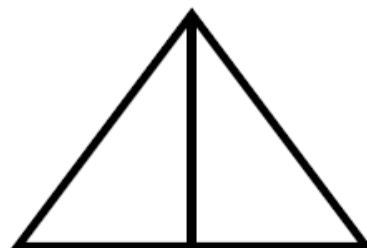
6.



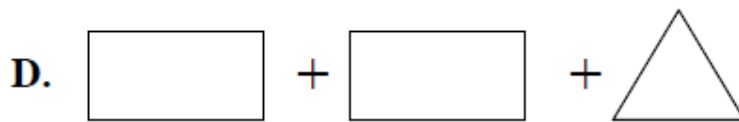
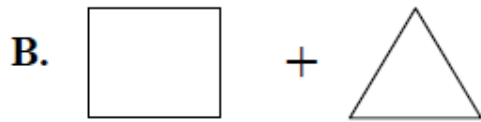
7.



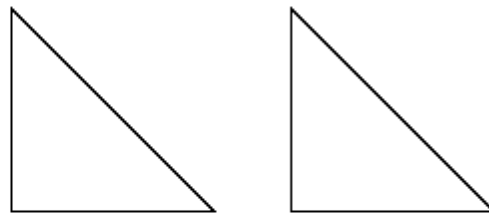
8.



1. Which two shapes below created the new shape pictured below?

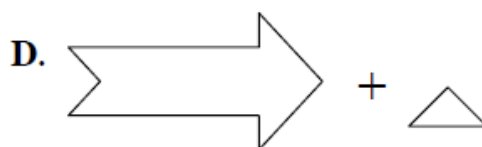
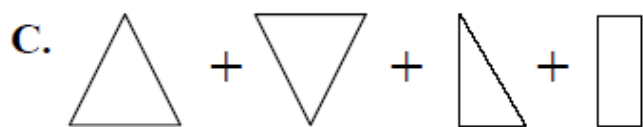
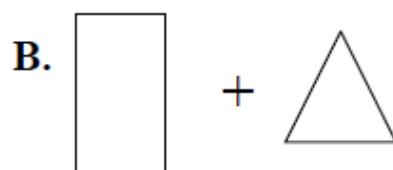
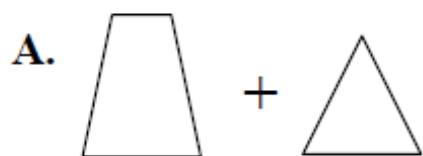


2. What shape can be created using the triangles below?

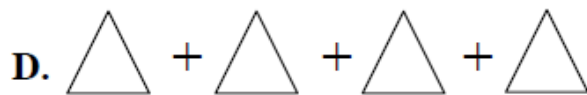
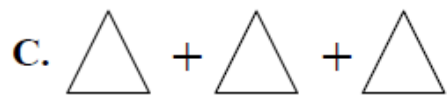


- A. square
- B. pentagon
- C. hexagon
- D. octagon

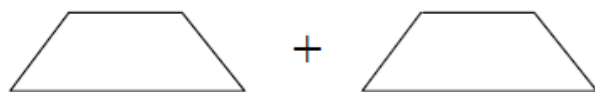
3. What shapes created the figure shown below.



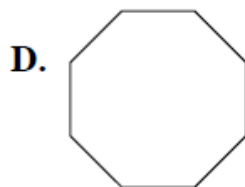
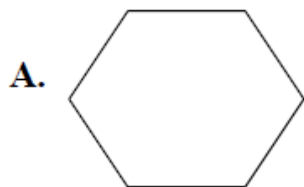
4. Look at the triangle below. Choose the set of shapes that could not combined to form this triangle.



5. Use the shapes below to answer the question.



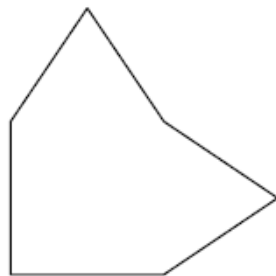
When the shapes above are combined with no empty spaces left over, what new shape is formed?



6. Ann covered a hexagon with two triangles and one other shape. What is the other shape?

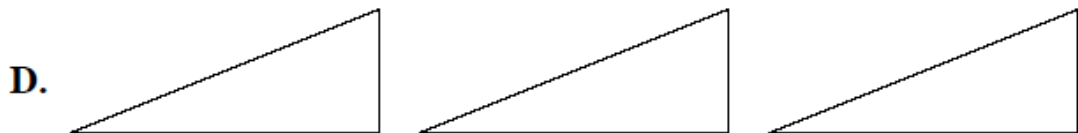
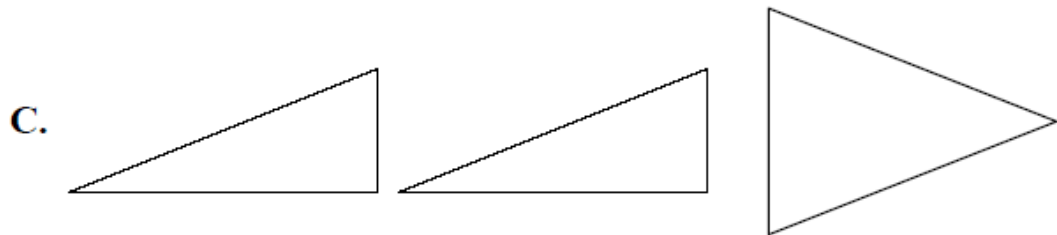
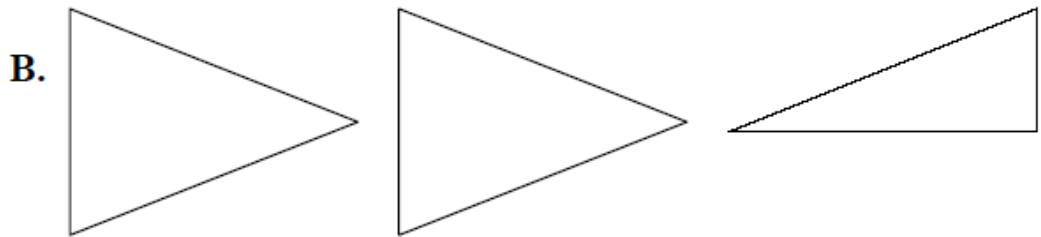
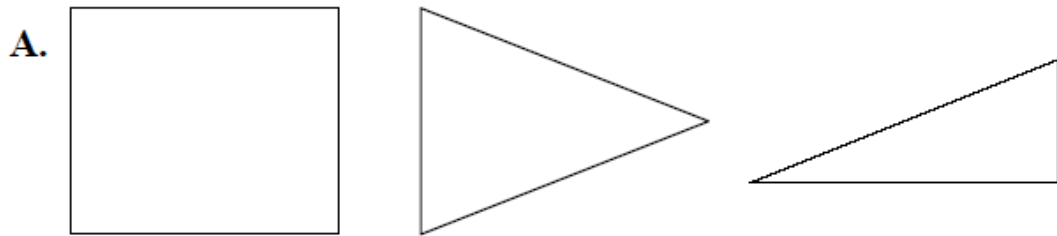
- A. trapezoid
- B. right triangle
- C. rectangle
- D. triangle

7. How many pattern block triangles were used to create the figure below?



- A. 3
- B. 4
- C. 5
- D. 6

8. Look at the shape below. Which figures were used to create the shape?

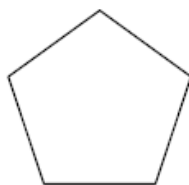


9. Divide the shape to create two different shapes. Then state the shapes that were created.



New shapes:

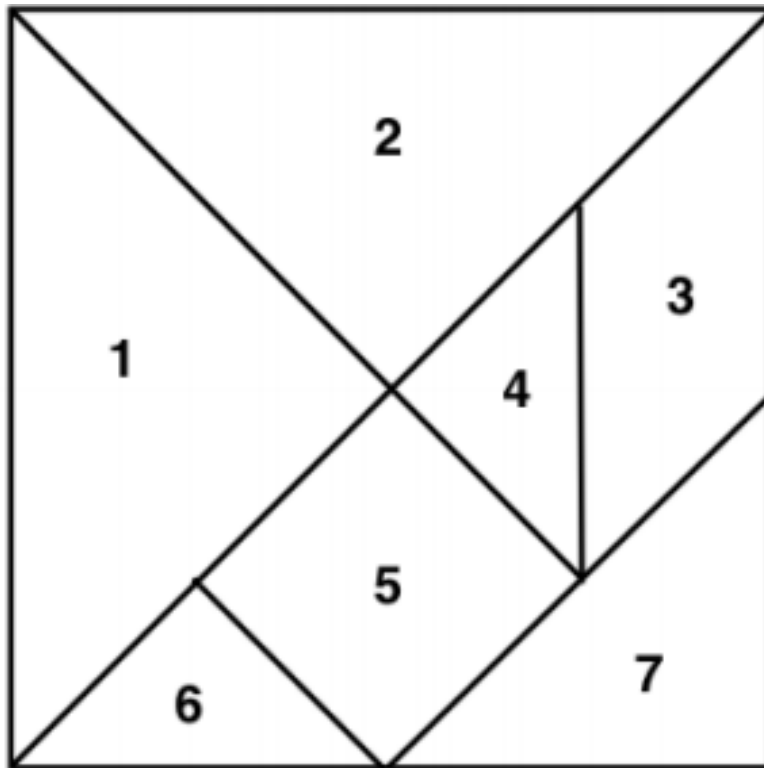
10. Divide the pentagon into two or more different shapes. On the lines, describe the new shapes you drew inside the pentagon.



Extension

Steps

1. Identify each tangram piece by the name of its shape.
2. Which pieces have the same area? How do you know?
3. If the area of #5, the small square is 1 (one) unit, find the area of each numbered piece.



<u>Piece #</u>	<u>Name</u>	<u>Area</u>
1	_____	_____
2	_____	_____
3	_____	_____
4	_____	_____
5	_square_____	_____1_____
6	_____	_____
7	_____	_____