CHAPTER

27

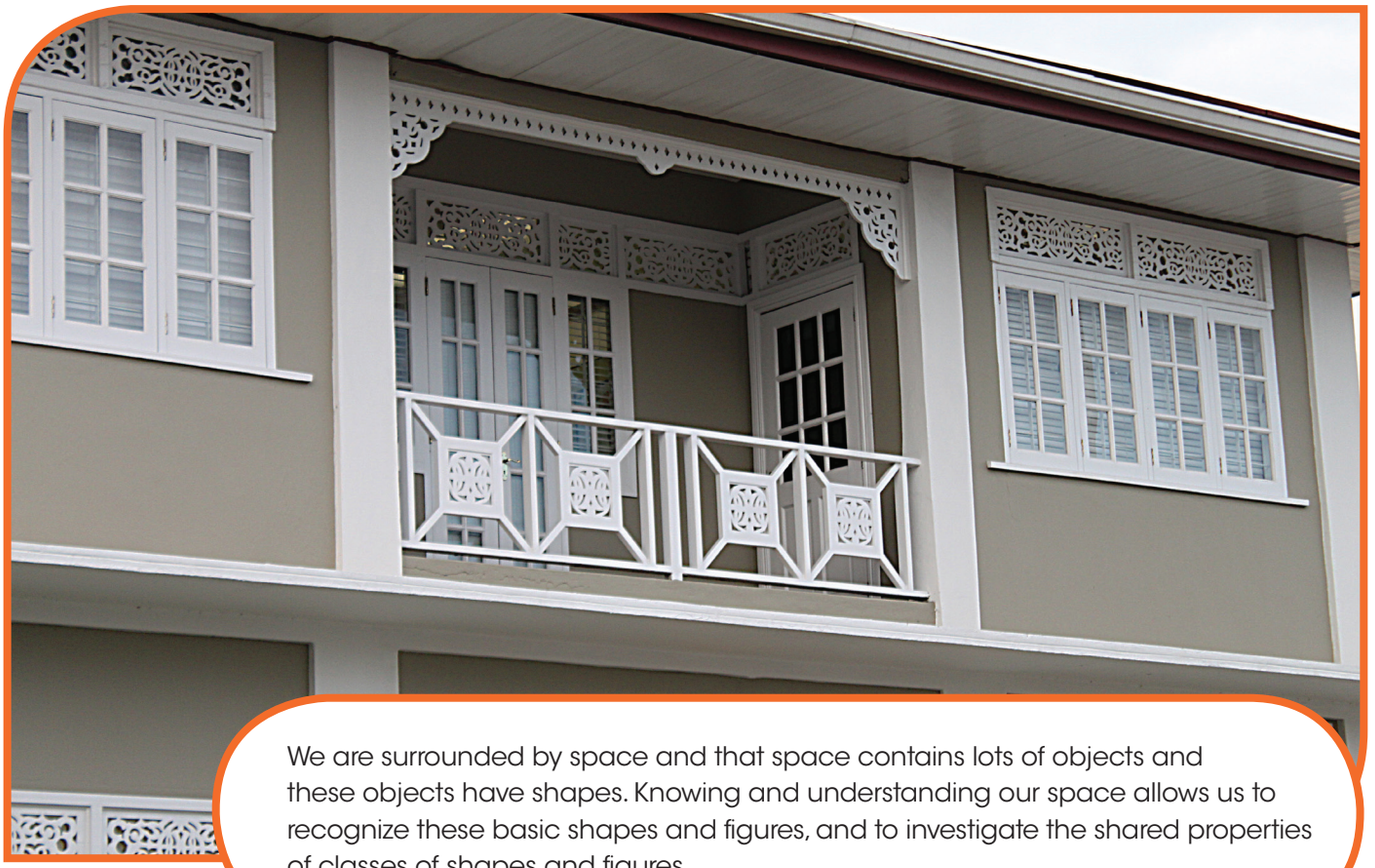
Plane Shapes

Vocabulary:

polygon
base
height
trapezium
parallelogram
rhombus
properties
attributes
quadrilateral

Chapter Outcomes:

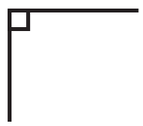
- Demonstrate an understanding of the properties of plane shapes.
- Classify and determine the properties of quadrilaterals.
- Construct and draw plane shapes given a description of their properties and using appropriate resources including computer software.
- Solve problems involving plane shapes.

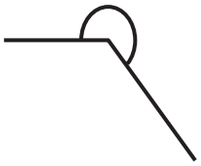


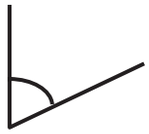
We are surrounded by space and that space contains lots of objects and these objects have shapes. Knowing and understanding our space allows us to recognize these basic shapes and figures, and to investigate the shared properties of classes of shapes and figures.

Getting Ready for Chapter 27

Classify the angles. Write right angle, greater than right angle, or smaller than right angle.

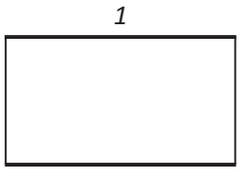
1. 

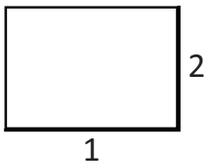
2. 

3. 

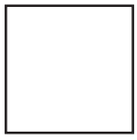
4. 

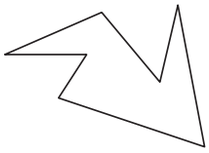
Write parallel, or perpendicular to describe the numbered sides of each shape.

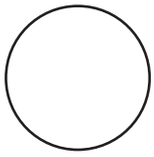
5. 

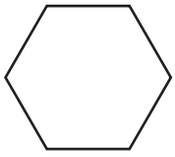
6. 

How many sides and vertices does each figure have?

7. 

8. 

9. 

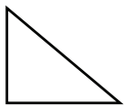
10. 

Identify and classify Plane Shapes

Teaching Point 1:

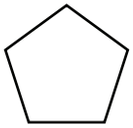
How do you classify plane shapes?

Polygons

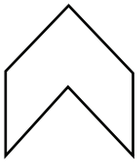


A **triangle** has 3 sides and 3 vertices.

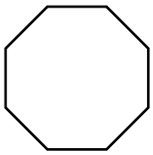
A **quardrilateral** has 4 sides and 4 vertices.



A **pentagon** has 5 sides and 5 vertices.

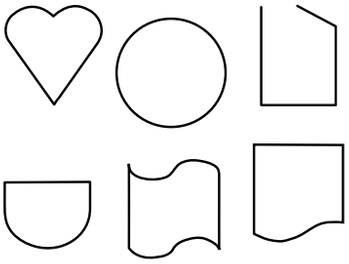


A **hexagon** has 6 sides and 6 vertices.



A **octagon** has 8 sides and 8 vertices.

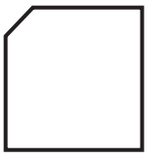
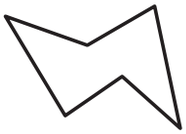
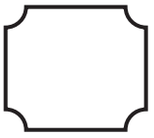
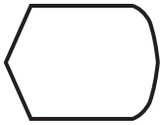
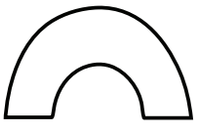
Not Polygons



A **polygon** is a closed plane shape that is formed by three or more line segments called sides.

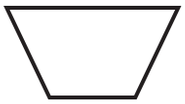
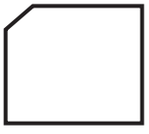
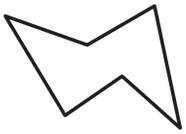
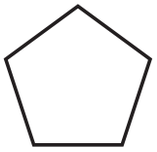
Activity 1:

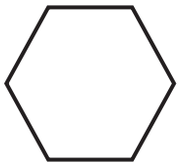
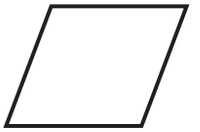
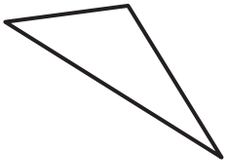
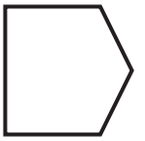
Write polygon or not polygon to classify each plane shape.

1. 	2. 
3. 	4. 
5. 	6. 
7. 	8. 
9. 	10. 

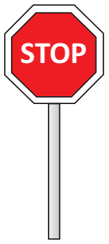
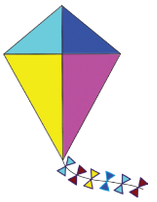
Activity 2:

Classify the polygons. Write triangle, quadrilateral, pentagon, hexagon or octagon.

1. 	2. 
3. 	4. 

5. 	6. 
7. 	8. 
9. 	10. 

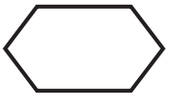
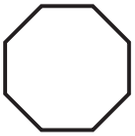
Identify two polygons on each object below.

11. 	12. 
13. 	14. 

Activity 3:

Complete the table below.

Polygons	Sides	Angles	Vertices
 triangle	3	3	3

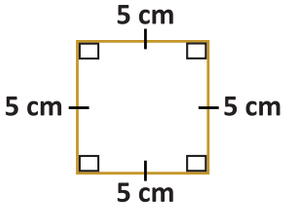
Polygons	Sides	Angles	Vertices
 quadrilateral			
 pentagon			
 hexagon			
 octagon			

Teaching Point 2:

How do you identify and classify polygons?

Regular Polygons

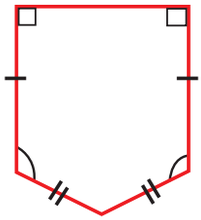
In a regular polygon, all sides are equal and all angles are equal.



A square is a regular polygon.

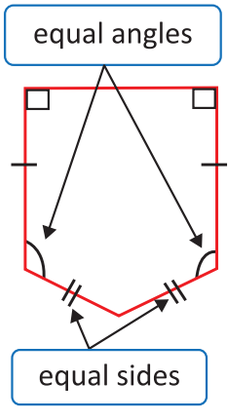
Irregular Polygons

In an irregular polygon, not all sides are equal and not all angles are equal.



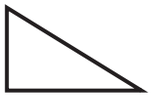
You can draw small lines on the sides of a shape to show whether the sides are equal or not.

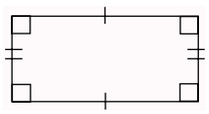
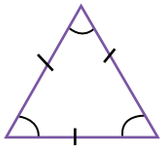
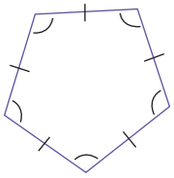
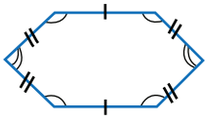
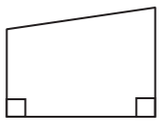
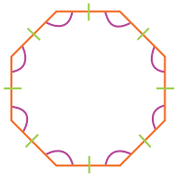
You can draw curved lines or use letters to show whether angles are equal or not.



Activity 4:

Complete the table. Use the markings on the polygons to help you.

Polygon	Name	Regular or Irregular
	triangle	irregular

Polygon	Name	Regular or Irregular
		
		
		
		
		
		

Draw a regular and an irregular polygon for each of the following.

1. quadrilateral
2. triangle
3. pentagon
4. hexagon

Classify Quadrilaterals

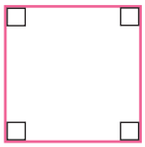
Teaching Point 1:

How do you identify and classify quadrilaterals?

Rectangle

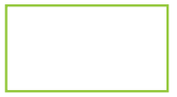
- Opposite sides equal
- All angles right angles
- Opposite sides parallel

Square



- All sides equal
- All angles right angles
- Opposite sides parallel

Parallelogram

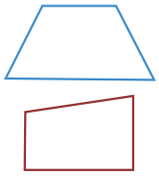


- Opposite sides equal
- Opposite sides parallel

Rhombus

- All sides equal
- Opposite sides parallel

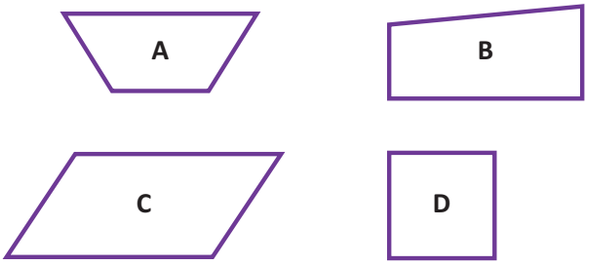
Trapezium



- Exactly one pair of opposite sides parallel

Activity 1:

Determine if the sides and angles of each figure are equal. Determine if any side is parallel. Complete the table.



Attributes	Figure(s)
1. Opposite sides are equal.	
2. Opposite sides are parallel.	
3. All angles are right angles.	

4. What are some additional attributes that D has that C does not have?

5. Classify each quadrilateral above.

6. Which quadrilateral named below has all the attributes of a parallelogram?

   rectangle rhombus square trapezium

7. Which quadrilateral named below has all the attributes of a rhombus?

   rectangle parallelogram square trapezium

Activity 2:

Describe the attributes of each quadrilateral below. Then classify the quadrilateral based on its attributes.

1. 

   The opposite sides of the quadrilateral are _____ and _____.

   There are _____ right angles.

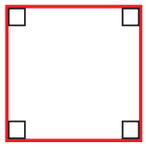
   So the quadrilateral is a _____

2. 

   The opposite sides of the quadrilateral are _____ and _____.

   There are _____ right angles.

   So the quadrilateral is a _____

3. 

   The opposite sides of the quadrilateral are _____.

   All sides are _____.

   There are _____ right angles.

   So the quadrilateral is a _____.

4. 

   Exactly one pair of opposite sides of the quadrilateral is _____.

   There are _____ right angles.

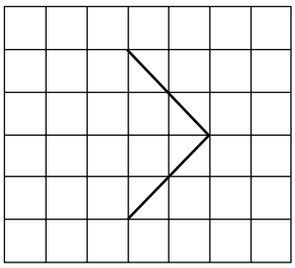
   So the quadrilateral is a _____.

Sketch Quadrilaterals

Teaching Point 1:

How do you sketch and label quadrilaterals from given descriptions?

The diagram below shows two sides of a figure. Complete the sketch to show a parallelogram.

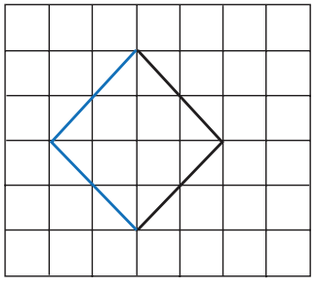


Think: A parallelogram has opposite sides equal and opposite sides parallel.

Step 1: **Determine the length of the sides.**

Both sides are the same length of 2 units.

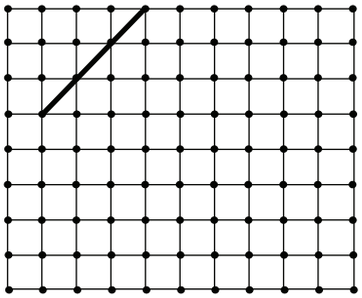
Step 2: **Draw opposite sides parallel to each other according to the length.**



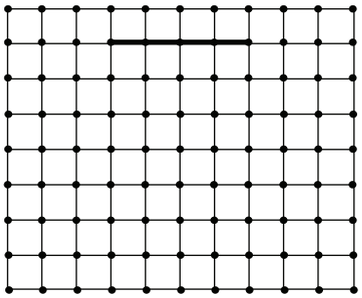
Activity 1:

Join the dots to complete each quadrilateral.

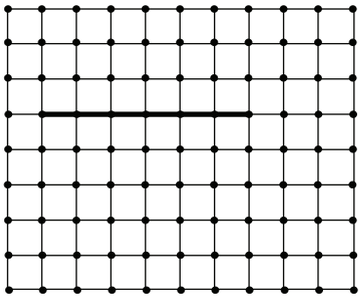
1. rectangle



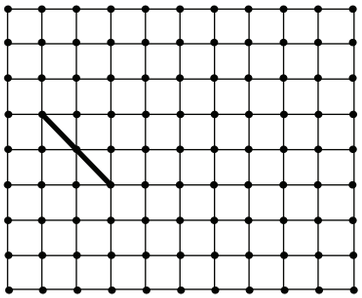
2. square



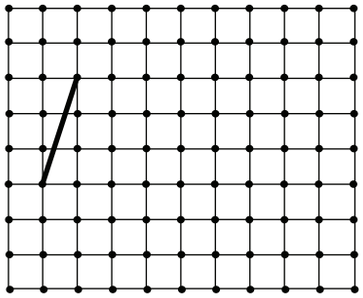
3. parallelogram



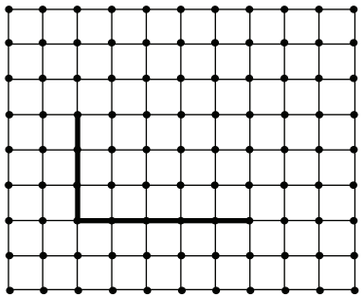
4. rhombus



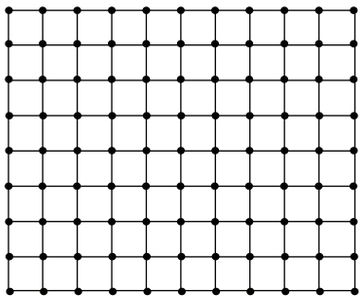
5. trapezium



6. Join the dots to form a quadrilateral that has ONLY one pair of parallel sides.



7. Megan draws a quadrilateral with two right angles. Draw Megan's shape.



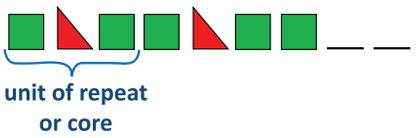
Patterns with Plane Shapes

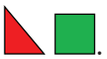
Teaching Point 1:

How are patterns used in Geometry?

A geometric pattern uses shapes in a repeating sequence to follow a set of rules.

Draw the missing shapes in the pattern.



So the missing shapes are  .

 _____ _____

(a) Draw the next two shapes in the pattern.

(b) How many triangles would be in the tenth shape?

You can use a table to help find the pattern.

Shape	1	2	3	4	5	6	7
No. of △	1	2	3				

So, the missing shapes are 

and  .

So, the tenth shape would have 10 triangles.

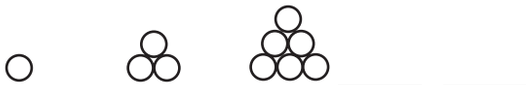
Activity 1:

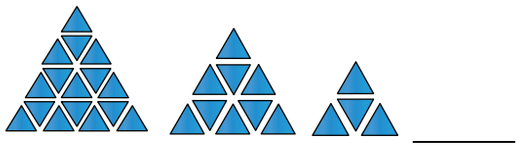
Copy and extend each pattern.

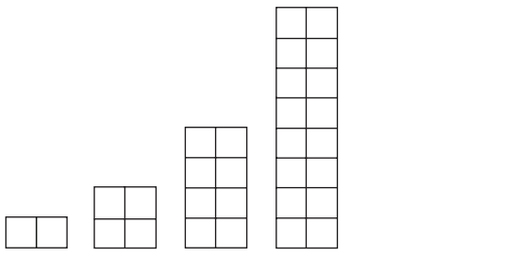
1. 

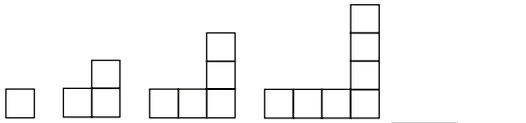
2. 

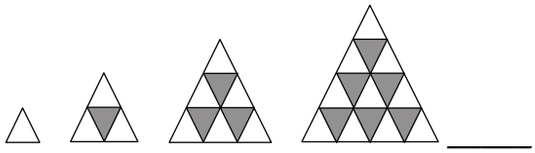
3. 

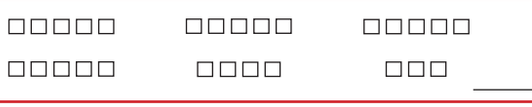
4. 

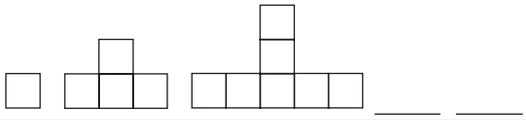
5. 

6. 

7. 

8. 

9. 

10. 

11. 

Activity 2:

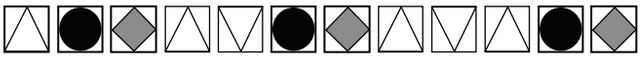
Solve the pattern problems below.

1. Rihanna is drawing a border around a poster. She wants to copy the design below.

   (a) What shape should Rihanna draw next to continue the design pattern?

   (b) What will be the 16th shape in Rihanna's design?

2. Draw the 15th shape for the pattern that is shown below.



3. What is the error in the pattern below?

4. Tamara is drawing a pattern using two kinds of shapes. She begins the pattern with a square then follows it with circles.

   (a) If after every 4 circles there is a square, what will be the 18th shape?

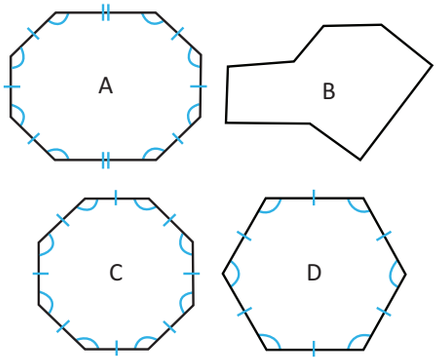
   (b) How many circles would she have drawn by the 20th shape?

5. Use the following shapes to create a repeating pattern.

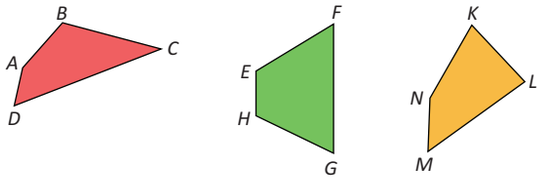
Chapter Review

Answer the questions.

1. Which of the following is a regular hexagon?

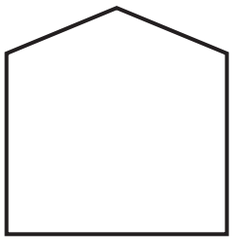


2. Which figure is a trapezium?

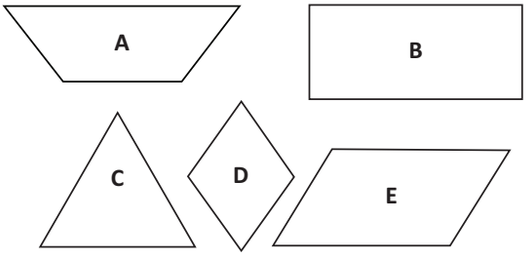


3. How can you classify the sides and angles of a square?

4. Name the shape below.



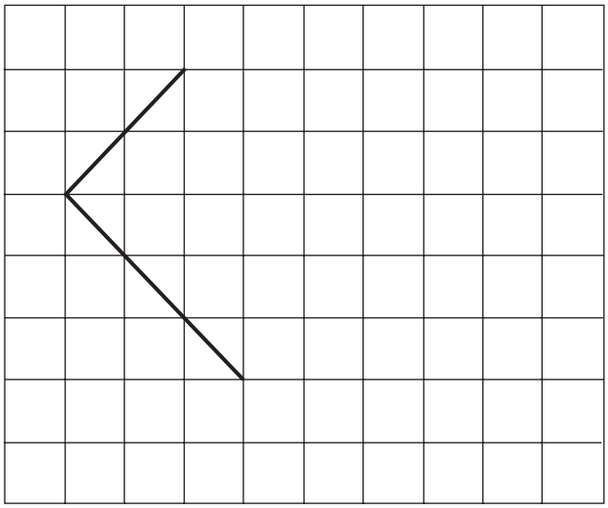
5. Five plane shapes, A, B, C, D, and E, are shown below.



(a) Which of the shapes has ONLY ONE pair of parallel lines?

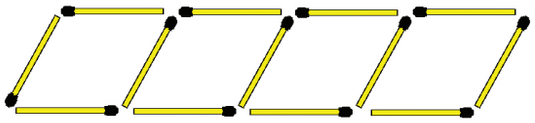
(b) Name the shape.

6. The following diagram shows two sides of an incomplete shape.

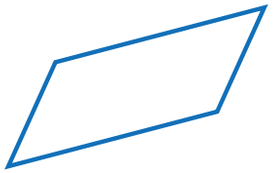


Complete the shape shown in the diagram by drawing the other sides to form a quadrilateral with opposite sides equal and parallel.

7. If the pattern shown below is continued until there are 12 rhombuses, how many matchsticks will be in the pattern?



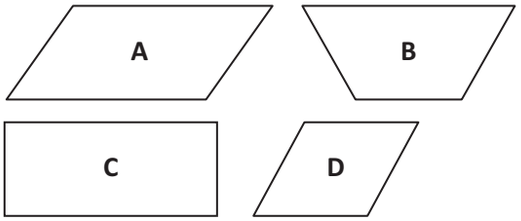
8. Describe the attributes of the polygon shown below. Then classify the polygon.



9. A bathroom has a tiled border with a repeating pattern as shown below.

Shade the tiles to complete the pattern.

10. Four quadrilaterals are shown below.

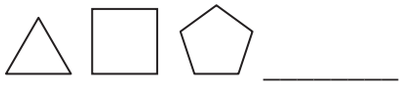


(a) Which has 4 right angles?

(b) Which shape has exactly one pair of opposite parallel sides?

(c) Which has opposite sides that are parallel and equal?

11. Leanna drawing a pattern with shapes.



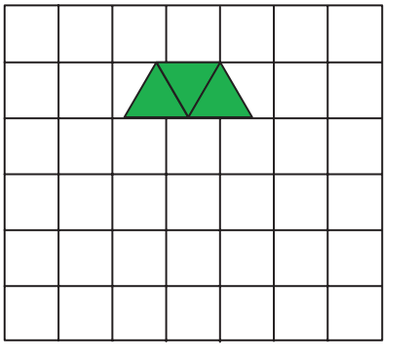
(a) If the pattern continues what shape will she draw next?

(b) What will be the name of that shape?

12. Teanna uses pattern blocks to make the shape below.

(a) What is the name of the shape that she made?

(b) She joins 3 other similar triangles to form a regular six-sided polygon. Complete the shape below.



(c) What is the name of the new shape?

13. Choose four endpoints and connect them to form a trapezium.