

# Reasoning and Problem Solving

## Step 8: Regular and Irregular Polygons

### National Curriculum Objectives:

Mathematics Year 5: (5G2b) [Distinguish between regular and irregular polygons based on reasoning about equal sides and angles](#)

### Differentiation:

Questions 1, 4 and 7 (Reasoning)

**Developing** Explain whether regular and irregular polygons have been sorted correctly. 5 polygons to investigate with 1 or 2 errors to find. Using regular and irregular triangles, quadrilaterals, pentagons and hexagons.

**Expected** Explain whether regular and irregular polygons have been sorted correctly. 5 or 6 polygons to investigate with 2 or 3 errors to find. Using regular and irregular triangles, quadrilaterals, pentagons, hexagons, octagons and a circle.

**Greater Depth** Explain whether regular and irregular polygons have been sorted correctly. 7 polygons to investigate with 3 errors to find. Includes all polygons up to decagons and some non-polygon shapes.

Questions 2, 5 and 8 (Reasoning)

**Developing** Explain whether a child has described a polygon correctly. Using regular and irregular triangles and quadrilaterals.

**Expected** Explain whether a child has described a polygon correctly. Using regular and irregular pentagons and hexagons.

**Greater Depth** Explain whether a child has described a polygon correctly. Includes polygons up to decagons.

Questions 3, 6 and 9 (Problem Solving)

**Developing** Investigate how many regular polygons can be found in a shape. Using regular and irregular triangles and quadrilaterals.

**Expected** Investigate how many regular polygons can be found in a shape. Using regular and irregular triangles, quadrilaterals, pentagons and hexagons.

**Greater Depth** Investigate how many regular polygons can be found in a shape. Includes all polygons up to decagons.

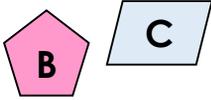
More [Year 5 Properties of Shapes](#) resources.

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# Regular and Irregular Polygons

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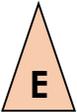
1a. Has Omar sorted these shapes correctly? Explain your answer.

	Regular Polygon	Irregular Polygon
Has exactly 3 sides		
Not 4 sides		



R

1b. Has Abbie sorted these shapes correctly? Explain your answer.

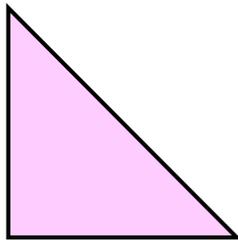
	Regular Polygon	Irregular Polygon
Has exactly 4 sides		
Not 4 sides		



R

2a. Jack says,

All triangles are regular polygons like the one below.



Is Jack correct? Explain your answer.



R

2b. Sunita says,

A rectangle is a regular polygon because it has 4 angles of equal size.

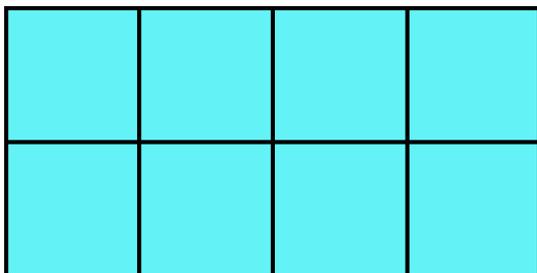


Is Sunita correct? Explain your answer.



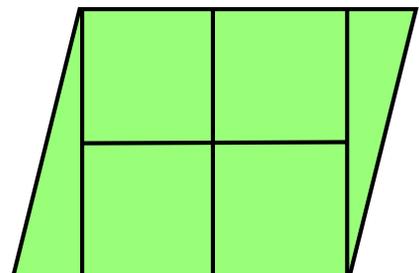
R

3a. How many regular polygons can you see in this shape?



PS

3b. How many regular polygons can you see in this shape?



PS

# Regular and Irregular Polygons

# Regular and Irregular Polygons

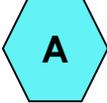
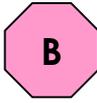
4a. Has Shamir sorted these shapes correctly? Explain your answer.

	Regular Polygon	Irregular Polygon
Has exactly 5 sides		
Not 5 sides	 	



R

4b. Has Malia sorted these shapes correctly? Explain your answer.

	Regular Polygon	Irregular Polygon
Has exactly 6 sides		
Not 6 sides	 	 



R

5a. Matty says,

My polygon is a regular hexagon because some of the sides are the same length and some of the angles are the same size.



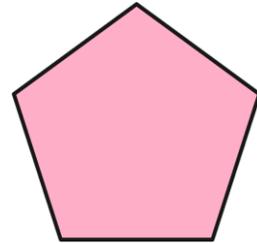
Is Matty correct? Explain your answer.



R

5b. Alexa says,

My regular pentagon has 5 angles that each measure  $120^\circ$ .

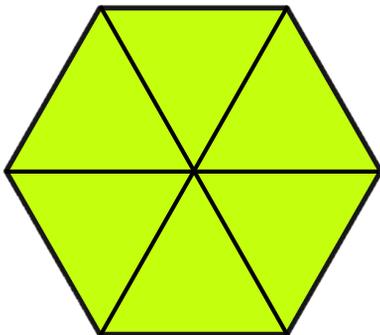


Is Alexa correct? Explain your answer.



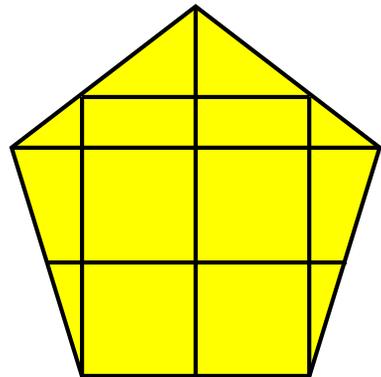
R

6a. How many regular polygons can you see in this shape?



PS

6b. How many regular polygons can you see in this shape?

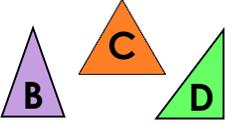


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# Regular and Irregular Polygons

# Regular and Irregular Polygons

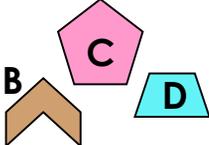
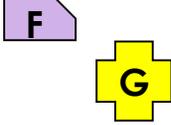
7a. Has Andy sorted these shapes correctly? Explain your answer.

	Regular Polygon	Irregular Polygon
Has exactly 7 sides		
Not 7 sides		



R

7b. Has Kelly sorted these shapes correctly? Explain your answer.

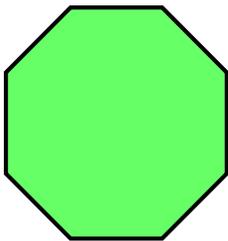
	Regular Polygon	Irregular Polygon
Has exactly 9 sides		
Not 9 sides		



R

8a. Nehal says,

My regular octagon has 8 angles that each measure  $180^\circ$ .



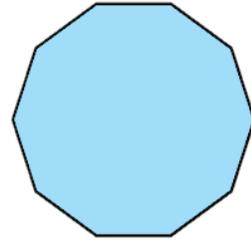
Is Nehal correct? Explain your answer.



R

8b. Martha says,

My regular decagon has 9 angles that each measure  $140^\circ$ .

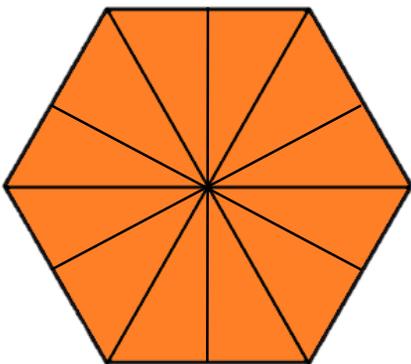


Is Martha correct? Explain your answer.



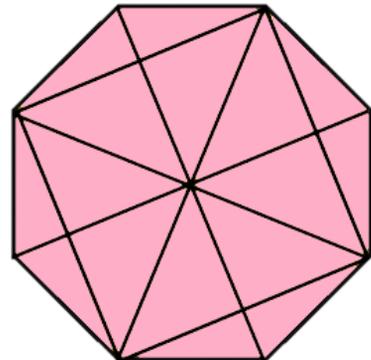
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9a. How many regular polygons can you see in this shape?



PS

9b. How many regular polygons can you see in this shape?



PS

## Reasoning and Problem Solving Regular and Irregular Polygons

### Developing

- 1a. Omar is incorrect as shape C is an irregular polygon with 4 sides.
- 2a. Jack is incorrect as regular triangles have sides and angles of equal length. The triangle shown is a right-angled triangle, so it is not a regular polygon.
- 3a. 11 regular quadrilaterals (squares).

### Expected

- 4a. Shamir is incorrect. Shape E is irregular because it has different length sides and angles. Shape D is regular as it has sides of equal length and the angles are the same size.
- 5a. Matty is incorrect as a regular polygon has all sides of equal length and all angles which are the same size.
- 6a. 7 regular polygons (6 regular triangles and 1 regular hexagon).

### Greater Depth

- 7a. Andy is incorrect. Shape B and shape D are in the wrong place as they are irregular polygons. Shape G is also incorrect as it is not a polygon due to its curved side.
- 8a. Nehal is incorrect as the angles in a regular octagon each measure  $135^\circ$ .
- 9a. 7 regular polygons (6 regular triangles and 1 regular hexagon).

## Reasoning and Problem Solving Regular and Irregular Polygons

### Developing

- 1b. Abbie is incorrect as shape A is an irregular polygon and shape D is a regular polygon.
- 2b. Sunita is incorrect as a regular polygon has equal angles and equal sides. The rectangle has sides of different lengths.
- 3b. 5 regular quadrilaterals (squares).

### Expected

- 4b. Malia is incorrect. Shape C is an irregular polygon because it has different length sides and angles. Shape F is not a polygon due to its curved side. Shape D is a pentagon as it only has 5 sides.
- 5b. Alexa is incorrect as the angles in a regular pentagon each measure  $108^\circ$ .
- 6b. 6 regular polygons (5 regular squares and 1 regular pentagon).

### Greater Depth

- 7b. Kelly is incorrect. Shape E is an irregular octagon. Shapes B and D are also in the wrong place as they are irregular polygons.
- 8b. Martha is incorrect as a regular decagon has 10 angles that each measure  $144^\circ$ .
- 9b. 6 regular polygons (5 regular squares and 1 regular octagon).