

Varied Fluency

Step 9: Angles in Polygons

National Curriculum Objectives:

Mathematics Year 6 (6G2a) [Compare and classify geometric shapes based on their properties and sizes](#)

Mathematics Year 6: (6G4a) [Find unknown angles in any triangles, quadrilaterals and regular polygons](#)

Mathematics Year 6: (6G4b) [Recognise angles where they meet at a point, are on a straight line, or are vertically opposite, and find missing angles](#)

Differentiation:

Developing Questions to support finding angles in polygons or angles on a straight line (triangles or straight lines identified for children on shapes and some angles given.)

Expected Questions to support finding angles in polygons, angles on a straight line or at a point (triangles or straight lines identified for children on shapes.)

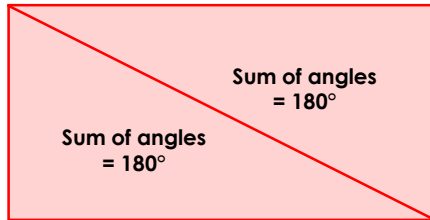
Greater Depth Questions to support finding angles in polygons, angles on a straight line, angles at a point and vertically opposite angles (children expected to independently split shapes into triangles, find straight lines and opposite angles.) Include irregular polygons?

More [Year 6 Properties of Shapes](#) resources.

Did you like this resource? Don't forget to [review](#) it on our website.

Angles in Polygons

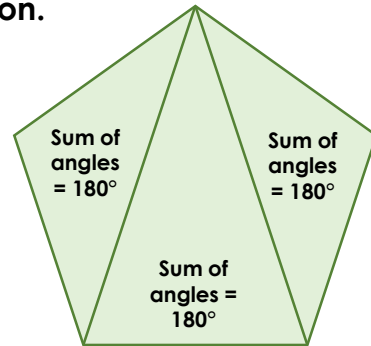
1a. This rectangle is split into 2 triangles. The sum of the angles in each triangle is 180° . Use this to help you work out the sum of all of the interior angles in the rectangle.



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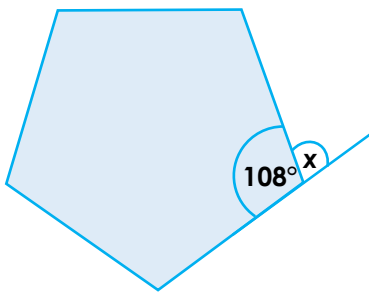
Angles in Polygons

1b. This pentagon is split into 3 triangles. The sum of the angles in each triangle is 180° . Use this to help you work out the sum of all of the interior angles in the pentagon.



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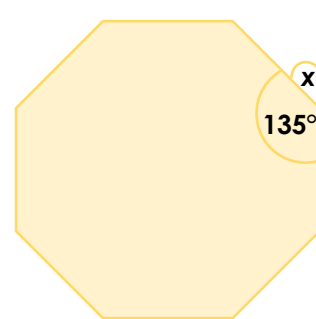
2a. The sum of angles on a straight line is 180° . Use this to help you to work out the size of an exterior angle (x) in this pentagon.



Not to scale

VF

2b. The sum of angles on a straight line is 180° . Use this to help you to work out the size of an exterior angle (x) in this octagon.



Not to scale

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3a. Each interior angle of a regular polygon is 90° . The sum of its interior angles is 360° . What is its name?



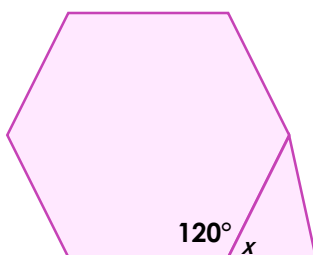
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3b. Each interior angle of a regular polygon is 60° . The sum of its interior angles is 180° . What is its name?



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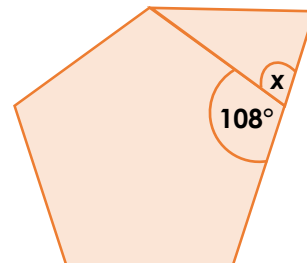
4a. Use your understanding of the sum of angles on a straight line to help you calculate the size of angle x .



Not to scale

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4b. Use your understanding of the sum of angles on a straight line to help you calculate the size of angle x .

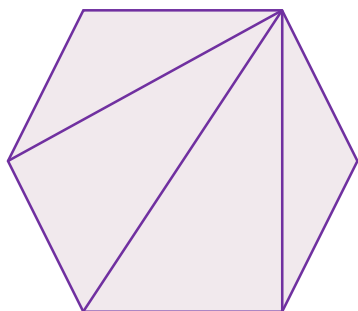


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Angles in Polygons

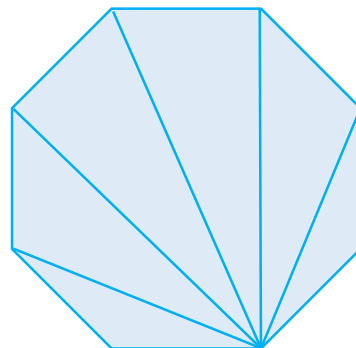
5a. This hexagon is split into 4 triangles. Think about the sum of the angles in each triangle. Use this to help you work out the sum of the interior angles in the hexagon.



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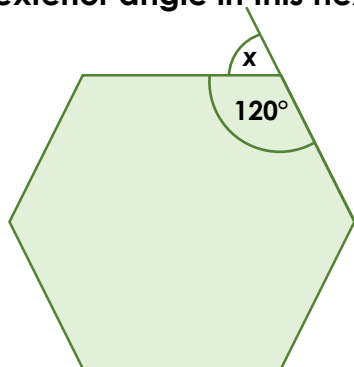
Angles in Polygons

5b. This octagon is split into 6 triangles. Think about the sum of the angles in each triangle. Use this to help you work out the sum of the interior angles in the octagon.



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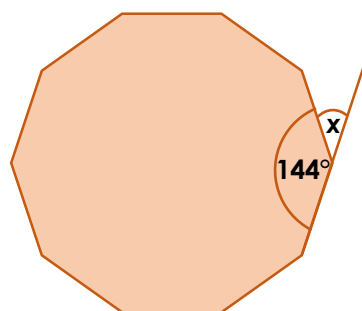
6a. Think about the sum of angles on a straight line. Use this to help you to work out the exterior angle in this hexagon (x).



Not to scale

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6b. Think about the sum of angles on a straight line. Use this to help you to work out the exterior angle in this decagon (x).



Not to scale

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7a. The sum of the angles in a polygon is 360° . What is the name of the polygon?



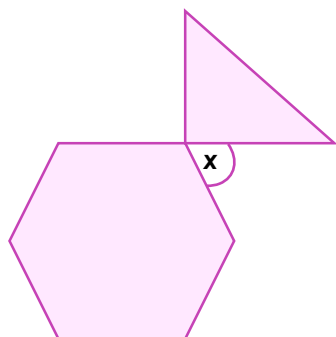
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7b. The sum of the angles in a regular polygon is 540° . What is the name of the polygon?



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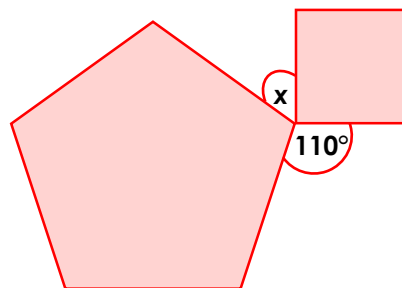
8a. Use your understanding of interior angles of a polygon and angles at a point to help you calculate the size of angle x .



Not to scale

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8b. Use your understanding of interior angles of a polygon and angles at a point to help you calculate the size of angle x .

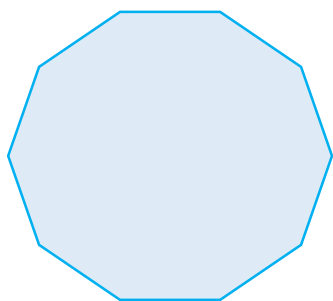


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Angles in Polygons

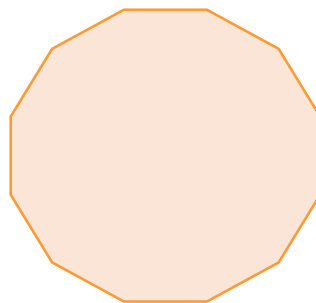
9a. Split the decagon below into triangles. Think about the sum of the angles in each triangle. Use this to help you work out the sum of the interior angles in the decagon.



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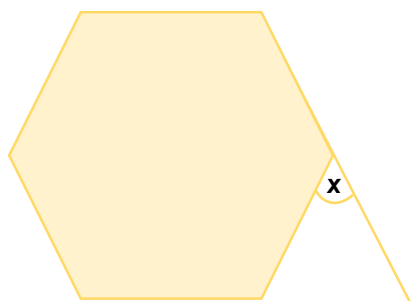
Angles in Polygons

9b. Split the dodecagon below into triangles. Think about the sum of the angles in each triangle. Use this to help you work out the sum of the interior angles in the dodecagon.



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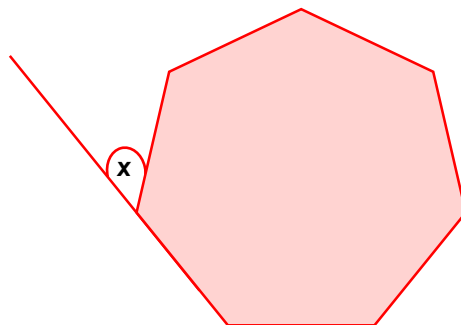
10a. Use what you know about angles to find the size of angle x . Then find the sum of all exterior angles of a hexagon.



Not to scale

VF

10b. Use what you know about angles to find the size of angle x . Then find the sum of all exterior angles of a heptagon.



Not to scale

VF

11a. Each interior angle of a regular polygon is 108° . Work out the name of the polygon.



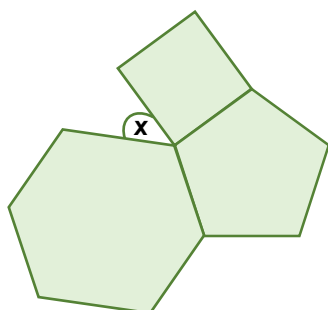
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11b. Each interior angle of a regular polygon is 140° . Work out the name of the polygon.



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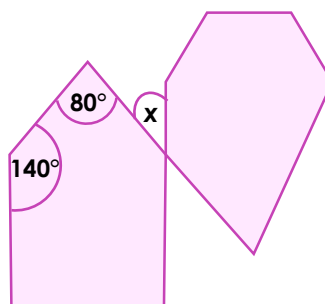
12a. Use your understanding of angles to help you calculate the size of angle x .



Not to scale

VF

12b. Use your understanding of angles to help you calculate the size of angle x .



Not to scale

VF

Varied Fluency Angles in Polygons

Developing

1a. $180^\circ \times 2 = 360^\circ$

2a. $180^\circ - 108^\circ = 72^\circ$

3a. $360^\circ \div 90 = 4$. The shape has 4 sides and as is regular, it must be a square.

4a. $180^\circ - 120^\circ = 60^\circ$. $x = 60^\circ$.

Expected

5a. $180^\circ \times 4 = 720^\circ$

6a. $180^\circ - 120^\circ = 60^\circ$. $x = 60^\circ$.

7a. It could be any quadrilateral.

8a. $120^\circ + 90^\circ + 90^\circ = 300^\circ$. $360^\circ - 300^\circ = 60^\circ$. $x = 60^\circ$

Greater Depth

9a. A decagon can be split into 8 triangles. $180^\circ \times 8 = 1440^\circ$.

10a. The interior angle of a hexagon is 120° . $180^\circ - 120^\circ = 60^\circ$. $x = 60^\circ$.

11a. Pentagon.

12a. $120^\circ + 90^\circ + 108^\circ = 318^\circ$. $360^\circ - 318^\circ = 42^\circ$. $x = 42^\circ$.

Varied Fluency Angles in Polygons

Developing

1b. $180^\circ \times 3 = 540^\circ$

2b. $180^\circ - 135^\circ = 45^\circ$

3b. $180^\circ \div 60 = 3$. The shape has 3 sides and as is regular, it must be an equilateral triangle.

4b. $180^\circ - 108^\circ = 72^\circ$. $x = 72^\circ$.

Expected

5b. $180^\circ \times 6 = 1080^\circ$

6b. $180^\circ - 144^\circ = 36^\circ$. $x = 36^\circ$.

7b. Pentagon.

8b. $108^\circ + 110^\circ + 90^\circ = 308^\circ$. $360^\circ - 308^\circ = 52^\circ$. $x = 52^\circ$

Greater Depth

9b. A dodecagon can be split into 10 triangles. $180^\circ \times 10 = 1800^\circ$.

10b. The interior angle of a heptagon is 128.6° (rounded to one decimal place). $180^\circ - 128.6^\circ = 51.4^\circ$. $x = 51.4^\circ$

11b. Nonagon.

12b. $140^\circ + 140^\circ = 280^\circ$. $360^\circ - 280^\circ = 80^\circ$. $80^\circ \div 2 = 40^\circ$.