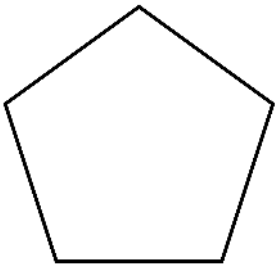
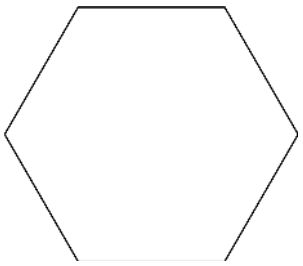
QT - Angles in Polygons

1. The diagrams show regular polygons. For each polygon work out the size of the exterior angle and the interior angle.



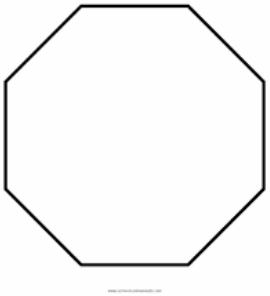
(a) Exterior angle = $360 \div 5 = 72°$ (2 marks)

(b) Interior angle = $180 - 72 = 108°$ (2 marks)



(a) Exterior angle = $360 \div 6 = 60°$ (2 marks)

(b) Interior angle = $180 - 60 = 120°$ (2 marks)



(a) Exterior angle = $360 \div 8 = 45°$ (2 marks)

(b) Interior angle = $180 - 45 = 135°$ (2 marks)

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2. The interior angle of a regular polygon is 135°.

(a) Write down the size of the exterior angle of the polygon

$180 - 135° = 45°$

(1 mark)

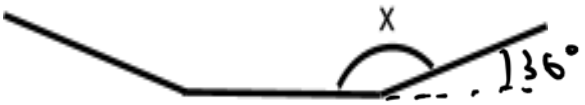
(b) Work out the number of sides of the polygon

$\frac{360}{45} = 8$

$= 8$ sides.

(2 marks)

3. The diagram shows part of a regular decagon. 10 sides.



Work out the size of the angle marked x.

External angle $= \frac{360}{10} = 36°$

Internal angle $x = 180 - 36$

$= 144°$

(3 marks)

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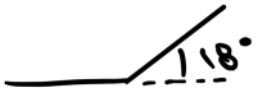
4. The size of each exterior angle of a regular polygon is 18°.
Work out how many sides the polygon has.

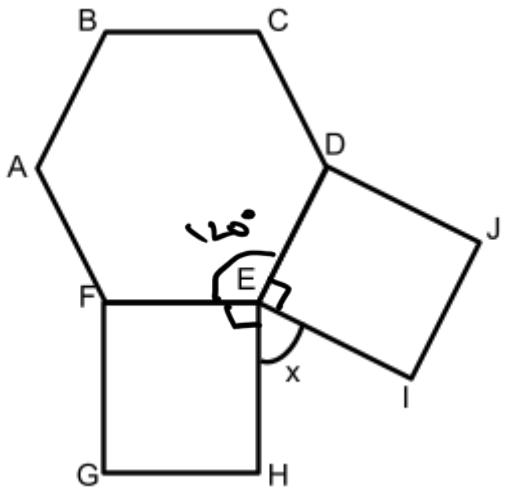


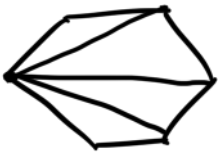
Sides = $\frac{360}{18} = 20$

= 20 sides.

(2 marks)

5. ABCDEF is a regular hexagon. EFGH and DEIJ are squares. Angle HEI = x.
Work out the value of x.





180 × 4 = 720

Interior angle = $\frac{720}{6} = 120$

360 − 120 − 90 − 90

= 60

x = 60°

(4 marks)

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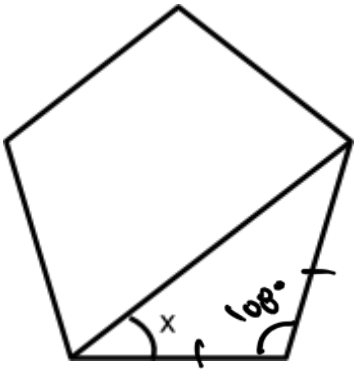
6. The diagram shows a regular pentagon. Find the value of x.



Isosceles

$180 \times 3 = 540$

$\frac{540}{5} = 108$

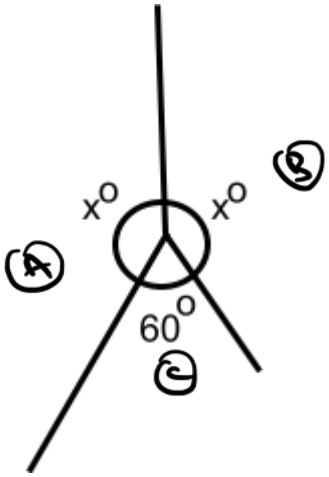
$180 - 108 = 72°$

$\frac{72}{2} = 36$

$x = 36°$

(3 marks)

7. Three regular polygons meet at a point. Find the number of sides of each of the three regular polygons in the diagram.



Equilateral

$360 - 60 = 300$

$\frac{300}{2} = 150°$

External angle of $x = 180 - 150 = 30°$

No. of sides $= \frac{360}{30} = 12$

A 12 sides

B 4 sides

C 3 sides

(5 marks)

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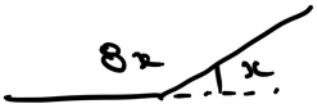
8. A regular polygon has n sides. The polygons interior angle is eight times the size of its exterior angle. Work out how many sides the regular polygon has.



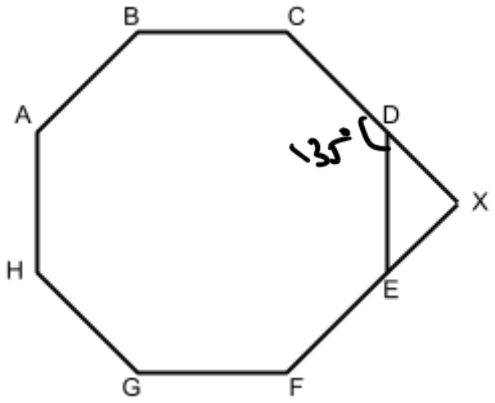
$9x = 180$

$x = 20$

$\text{sides} = \frac{360}{20} = 18 \text{ sides.}$

(4 marks)

9. ABCDEFGH is a regular octagon. CDX and FEX are straight lines.
Work out the size of angle DXE.
You must show how you got your answer.



octagon has 6 triangles

$180 \times 6 = 1080$

Each internal angle $= \frac{1080}{8} = 135$

Isosceles triangle

$180 - 135 = 45°$

Angle DXE $= 90°$

(4 marks)

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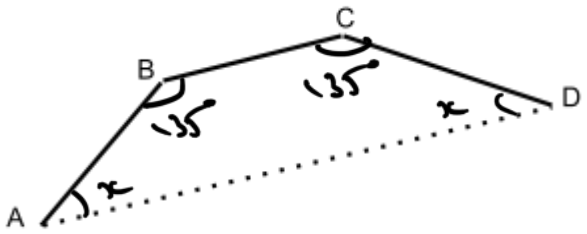
10. AB, BC and CD are three sides of a regular octagon. Work out the size of angle BAD.



Octagon has 6 triangles

$180 \times 6 = 1080$

Each interior angle $= \frac{1080}{8}$

$= 135°$

Quadrilateral $= 360°$

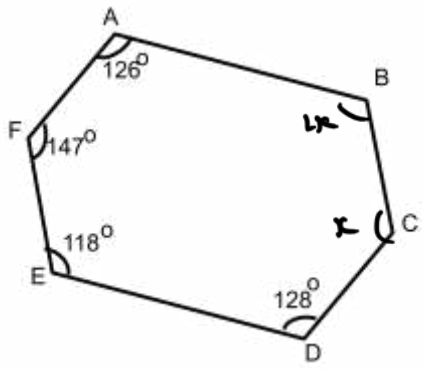
$360 = 135 + 135 + x + x$

$360 = 270 + 2x$

$90 = 2x$ $\quad \therefore \angle BAD = 45°$

(3 marks)

11. ABCDEF is a hexagon. Angle ABC = 2 x Angle BCD. Work out the size of angle BCD.



(not drawn to accurately)

Hexagon = 4 triangles

$180 \times 4 = 720$

$126 + 147 + 118 + 128 + x + 2x = 720$

$519 + 3x = 720$

$3x = 201$

$x = 67$

$\angle BCD = 67°$

(4 marks)