

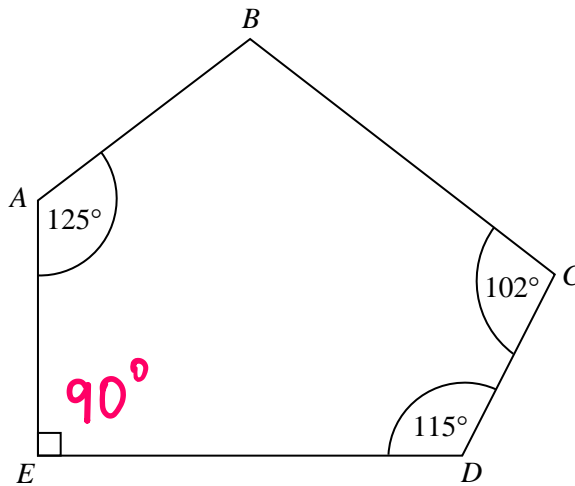


Angles in Polygons



← REVISE THIS TOPIC

1 *ABCDE* is a pentagon.



Work out the size of angle *ABC*.

$$(5 - 2) \times 180 = 540^\circ$$

$$125 + 90 + 115 + 102 = 432$$

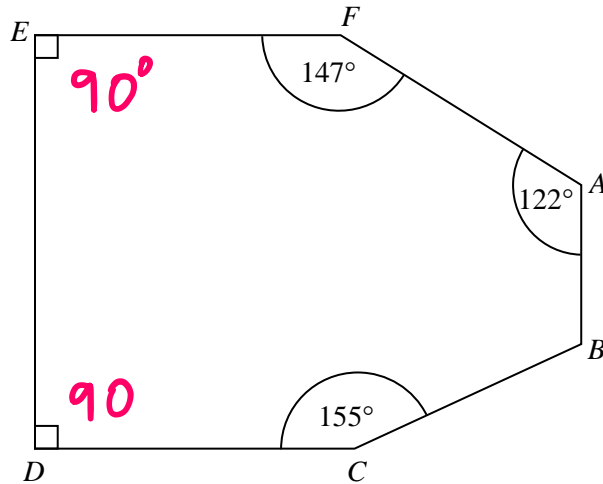
$$540 - 432 = 108$$

108°

(Total for Question 1 is 3 marks)



2 $ABCDEF$ is a hexagon.



Work out the size of angle ABC .

$$(6 - 2) \times 180 = 720^\circ$$

$$90 + 90 + 155 + 122 + 147 = 604$$

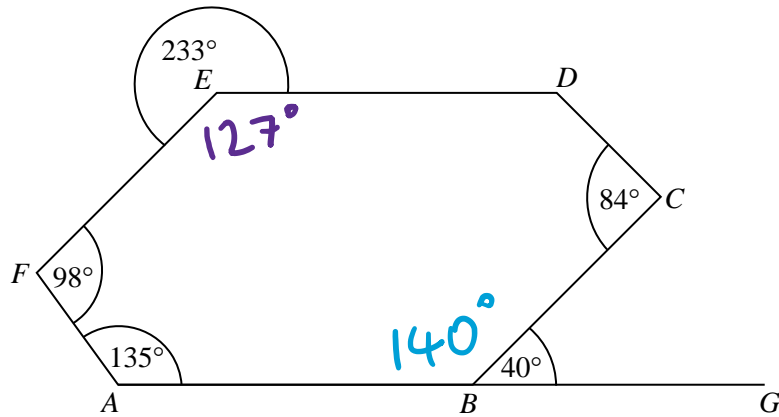
$$720 - 604 = 116$$

116

(Total for Question 2 is 3 marks)



3 $ABCDEF$ is a hexagon.



ABG is a straight line.
Work out the size of angle CDE .

$$180 - 40 = 140^\circ$$

$$360 - 233 = 127^\circ$$

$$(6 - 2) \times 180 = 720^\circ$$

$$98 + 135 + 140 + 84 + 127 = 584$$

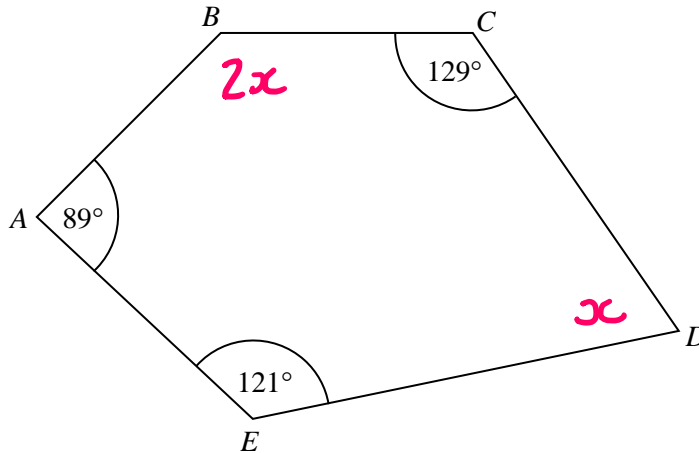
$$720 - 584 = 136^\circ$$

136

(Total for Question 3 is 4 marks)



4 $ABCDE$ is a pentagon.



Angle $ABC = 2 \times$ angle CDE
 Work out the size of angle CDE .

$$(5 - 2) \times 180 = 540^\circ$$

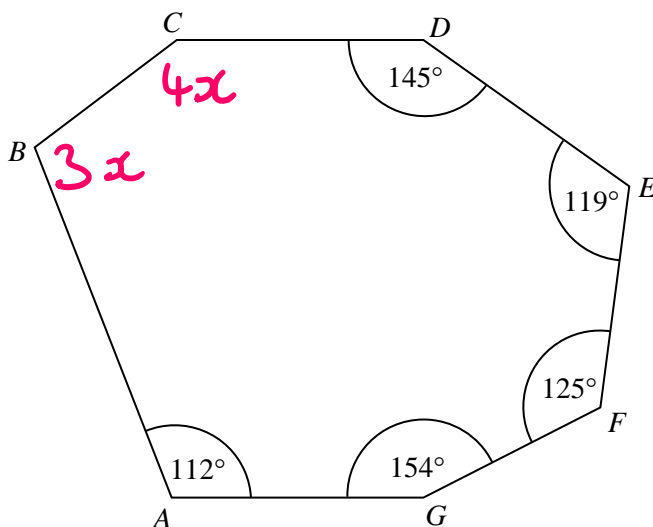
$$\begin{aligned}
 2x + x + 89 + 121 + 129 &= 540 \\
 3x + 339 &= 540 \\
 3x &= 201 \\
 x &= 67^\circ
 \end{aligned}$$

67

(Total for Question 4 is 4 marks)



5 $ABCDEFG$ is a heptagon.



Angle ABC : Angle $BCD = 3 : 4$
 Work out the size of angle ABC .

$$(7 - 2) \times 180 = 900^\circ$$

$$3x + 4x + 145 + 119 + 125 + 154 + 112 = 900$$

$$7x + 655 = 900$$

$$7x = 245$$

$$x = 35^\circ$$

$$3 \times 35 = 105$$

..... 105 °

(Total for Question 5 is 5 marks)



6 Shape **M** is an irregular polygon with 9 sides.

8 of the interior angles of shape **M** are each equal to 150°

Work out the size of the other interior angle of shape **M**.

$$\begin{aligned} (9 - 2) \times 180 &= 1260 \\ 8 \times 150 &= 1200 \\ 1260 - 1200 &= 60 \end{aligned}$$

60

(Total for Question 6 is 3 marks)

7 (a) Work out the size of the **exterior** angle of a regular pentagon.

$$360 \div 5 = 72$$

72

(2)

(b) Work out the size of the **interior** angle of a regular pentagon.

$$180 - 72 = 108$$

108

(2)

(Total for Question 7 is 4 marks)



8 (a) Work out the size of the **exterior** angle of a regular hexagon.

$$360 \div 6 = 60$$

60

(2)

(b) Work out the size of the **interior** angle of a regular hexagon.

$$180 - 60 = 120$$

120

(2)

(Total for Question 8 is 4 marks)

9 (a) Work out the size of the **exterior** angle of a regular decagon.

$$360 \div 10 = 36$$

36

(2)

(b) Work out the size of the **interior** angle of a regular decagon.

$$180 - 36$$

144

(2)

(Total for Question 9 is 4 marks)



10 The interior angle of a regular polygon is 175°
Write down the size of the exterior angle of the regular polygon.

5°

(Total for Question 10 is 1 mark)

11 The interior angle of a regular polygon is x°
Write down an expression, in terms of x , for the size of the exterior angle of the regular polygon.

$180 - x$

(Total for Question 11 is 1 mark)

12 A regular icosagon has 20 sides.
Work out the sum of the interior angles of a regular icosagon.

$$(20 - 2) \times 180$$

3240

(Total for Question 12 is 2 marks)

13 A regular hexadecagon has 16 sides.
Show that the interior angle of a regular hexadecagon is not an integer.

$$(16 - 2) \times 180 = 2520$$

$$2520 \div 16 = 157.5$$

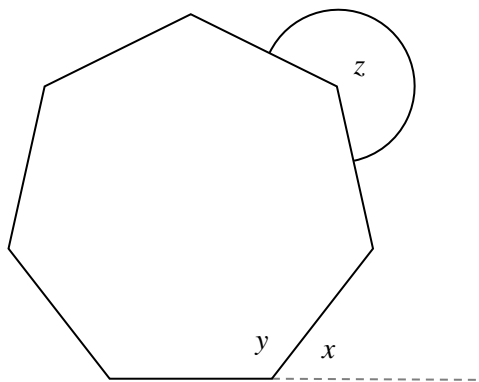
↑

not an integer

(Total for Question 13 is 3 marks)



14 Here is a regular polygon.



(a) Work out the size of the angle marked x .
Give your answer to 1 decimal place.

$$360 \div 7 = 51.428\dots$$

$$\begin{array}{r} 51.4 \\ \hline \end{array} \quad (2)$$

(b) Work out the size of the angle marked y .
Give your answer to 1 decimal place.

$$180 - 51.4$$

$$\begin{array}{r} 128.6 \\ \hline \end{array} \quad (2)$$

(c) Work out the size of the angle marked z .
Give your answer to 1 decimal place.

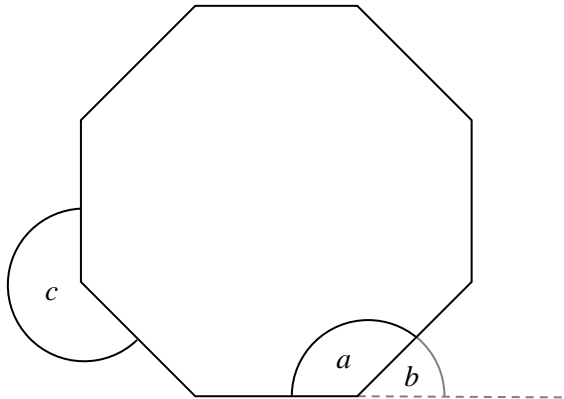
$$360 - 128.6$$

$$\begin{array}{r} 231.4 \\ \hline \end{array} \quad (2)$$

(Total for Question 14 is 6 marks)



15 Here is a regular octagon.



Write a number in each of the boxes below to make the statements correct.

$$a + b = \boxed{180} \quad (1)$$

$$a + c = \boxed{360} \quad (1)$$

$$a = 135$$

$$b = 45$$

$$\frac{a}{b} = \boxed{3} \quad (2)$$

(Total for Question 15 is 4 marks)



16 The **exterior** angle of a regular polygon is 24°

Work out the number of sides that the regular polygon has.

$$360 \div 24 = 15$$

15

(Total for Question 16 is 2 marks)

17 The **interior** angle of a regular polygon is 162°

Work out the number of sides that the regular polygon has.

$$180 - 162 = 18$$
$$360 \div 18 = 20$$

20

(Total for Question 17 is 2 marks)

18 The **exterior** angle of a regular polygon is 5°

Work out the number of sides that the regular polygon has.

$$360 \div 5 = 72$$

72

(Total for Question 18 is 2 marks)



19 The **interior** angle of a regular polygon is 168°

Work out the number of sides that the regular polygon has.

$$180 - 168 = 12$$
$$360 \div 12 = 30$$

30

(Total for Question 19 is 2 marks)

20 The **exterior** angle of a regular polygon is 20°

Work out the number of sides that the regular polygon has.

$$360 \div 20 = 18$$

18

(Total for Question 20 is 2 marks)

21 The **interior** angle of a regular polygon is 176°

Work out the number of sides that the regular polygon has.

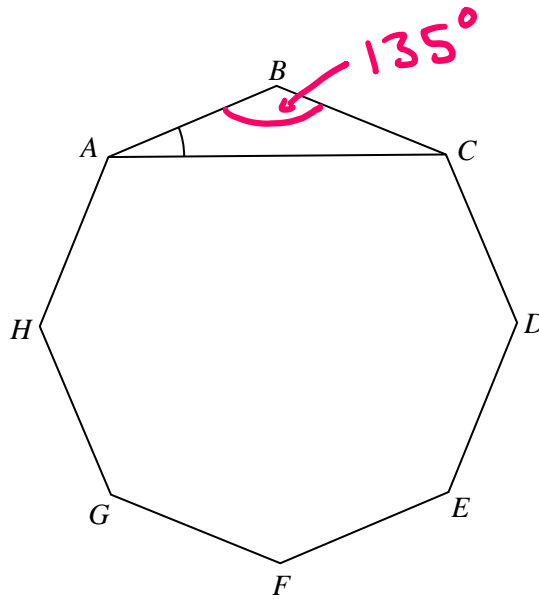
$$180 - 176 = 4$$
$$360 \div 4 = 90$$

90

(Total for Question 21 is 2 marks)



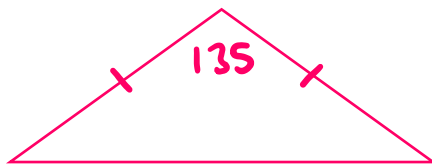
22 $ABCDEFGH$ is a regular octagon.



Work out the size of angle BAC

$$(8 - 2) \times 180 = 1080$$

$$1080 \div 8 = 135^\circ$$



$$180 - 135 = 45$$

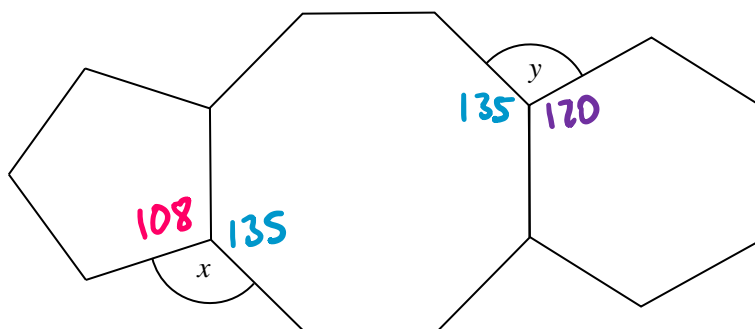
$$45 \div 2 = 22.5$$

22.5°

(Total for Question 22 is 4 marks)



23 Here is a regular pentagon, a regular octagon and a regular hexagon.



Work out $x : y$
Give your answer in its simplest form.

$$(5-2) \times 180 = 540$$

$$540 \div 5 = 108^\circ$$

$$(8-2) \times 180 = 1080$$

$$1080 \div 8 = 135^\circ$$

$$(6-2) \times 180 = 720$$

$$720 \div 6 = 120^\circ$$

$$x = 360 - 108 - 135$$

$$x = 117$$

$$y = 360 - 120 - 135$$

$$y = 105$$

$$x : y$$

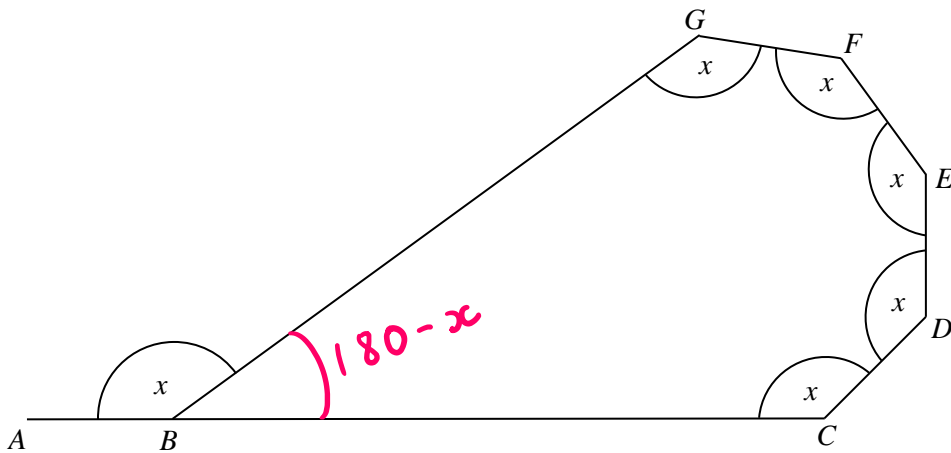
$$\begin{array}{l} 117 : 105 \\ \div 3 \curvearrowleft \quad \quad \quad \curvearrowright \div 3 \\ 39 : 35 \end{array}$$

$$39 : 35$$

(Total for Question 23 is 5 marks)



24 $ABCDEF$ is a hexagon



ABC is a straight line

Angle $ABC =$ angle $BCD =$ angle $CDE =$ angle $DEF =$ angle $EFG =$ angle $FGB = x^\circ$

Work out the value of x

$$(6 - 2) \times 180 = 720$$

$$x + x + x + x + x + 180 - x = 720$$

$$4x + 180 = 720$$

$$4x = 540$$

$$x = 135$$

$$x = 135^\circ$$

(Total for Question 24 is 4 marks)



25 Shape A is a regular polygon.

Interior angle of shape A : exterior angle of shape A = 13 : 2

Work out how many sides shape A has.

$$\begin{aligned}
 13 + 2 &= 15 \\
 180 \div 15 &= 12 \\
 \text{Interior} &= 13 \times 12 \\
 &= 156 \\
 \text{Exterior} &= 2 \times 12 \\
 &= 24
 \end{aligned}$$

$$\text{sides} = \frac{360}{24}$$

15

(Total for Question 25 is 4 marks)

26 Shape B is a regular polygon.

The interior angle of shape B is 100° greater than the exterior angle of shape B.

Work out how many sides shape B has.



$$\begin{aligned}
 x + x + 100 &= 180 \\
 2x + 100 &= 180 \\
 2x &= 80 \\
 x &= 40
 \end{aligned}$$

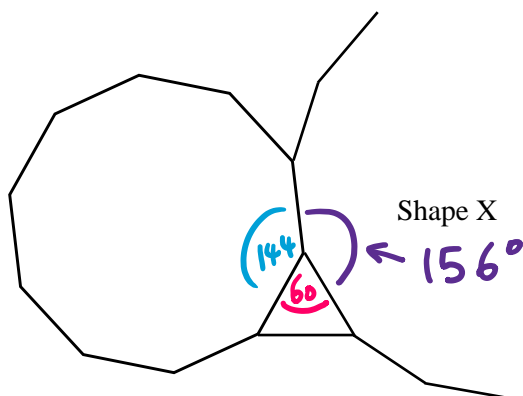
$$\text{sides} = \frac{360}{40}$$

9

(Total for Question 26 is 4 marks)



29 The diagram shows a regular decagon, an equilateral triangle and shape X.



Shape X is a regular polygon.
Work out how many sides shape X has.

$$180 \div 3 = 60$$

$$(10 - 2) \times 180 = 1440$$

$$1440 \div 10 = 144^\circ$$

$$360 - 60 - 144 = 156$$

$$180 - 156 = 24$$

$$360 \div 24 = 15$$

