

Name: _____

GCSE (1 – 9)

Angles in Polygons

Instructions

- Use **black** ink or ball-point pen.
- Answer all Questions.
- Answer the Questions in the spaces provided
– *there may be more space than you need.*
- Diagrams are **NOT** accurately drawn, unless otherwise indicated.
- You must **show all your working out.**

Information

- The marks for each Question are shown in brackets
– *use this as a guide as to how much time to spend on each Question.*

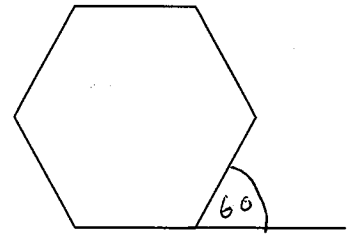
Advice

- Read each Question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every Question.
- Check your answers if you have time at the end

1 Work out the size of an exterior angle of a regular hexagon.

(Exterior angles always add to 360°)

$$\frac{360}{6} = 60$$



..... 60

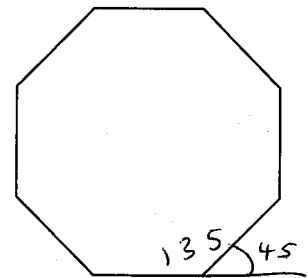
(Total for question 1 is 2 marks)

2 Work out the size of each interior angle in a regular octagon.

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

$$180 - 45 = 135$$

(Interior angle + Exterior angle = 180)



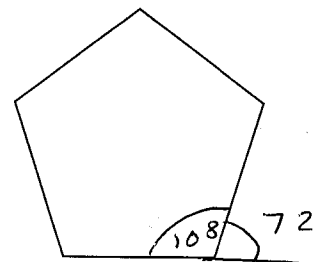
..... 135

(Total for question 2 is 2 marks)

3 Work out the size of each interior angle in a regular pentagon

$$\frac{360}{5} = 72$$

$$180 - 72 = 108$$



..... 108

(Total for question 3 is 2 marks)

- 4 The size of each exterior angle in a regular polygon is 20° .
Work out how many sides the polygon has.

$$\frac{360}{20} = \frac{36}{2} = 18$$

..... 18

(Total for question 4 is 2 marks)

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

$$\frac{360}{18} = \frac{180}{9} = 20$$

..... 20

(Total for question 5 is 2 marks)

- 6 The size of each interior angle in a regular polygon is 165° .
Work out how many sides the polygon has.

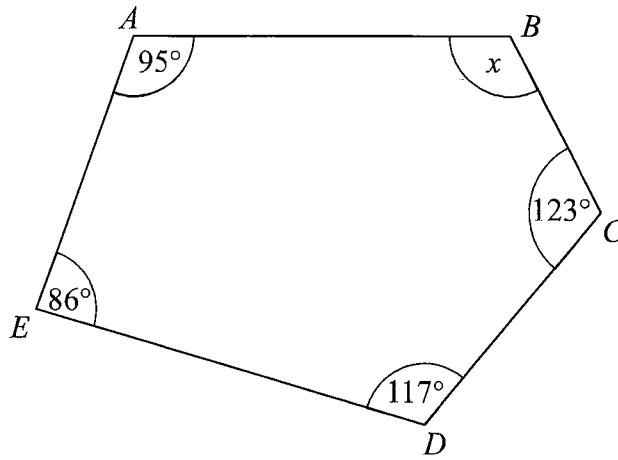
$$180 - 165 = 15 \quad (\text{Exterior angle} = 15^\circ)$$

$$\frac{360}{15} = \frac{120}{5} = 24$$

..... 24

(Total for question 6 is 2 marks)

7



$$\begin{array}{r}
 123 \\
 117 \\
 95 \\
 + 86 \\
 \hline
 22 \\
 421
 \end{array}$$

ABCDE is a pentagon.

Work out the size of angle ABC.

$$\begin{aligned}
 \text{Angle sum} &= (n - 2) \times 180 \\
 &= (5 - 2) \times 180 \\
 &= 3 \times 180 \\
 &= 540
 \end{aligned}$$

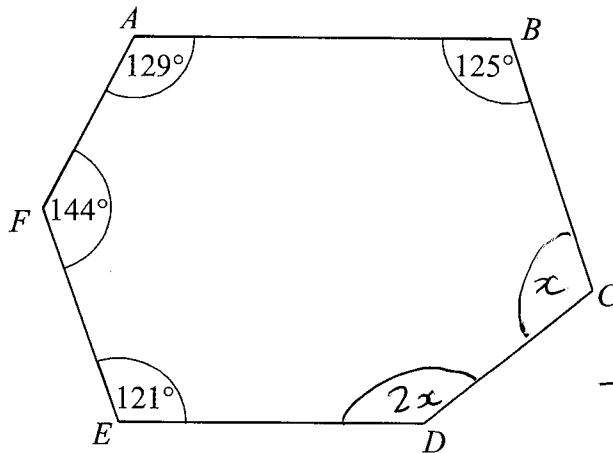
$$\begin{aligned}
 540 - 421 \\
 = 119
 \end{aligned}$$

(Angles in a pentagon add to 540°)

.....119.....°

(Total for question 7 is 2 marks)

8



$$\begin{array}{r}
 129 \\
 125 \\
 144 \\
 + 121 \\
 \hline
 519
 \end{array}$$

$$720 - 519 = 201$$

ABCDEF is a hexagon.

Angle CDE = 2 × Angle BCD

Work out the size of angle CDE.

$$3 \overline{) 201} \begin{array}{l} 67 \end{array}$$

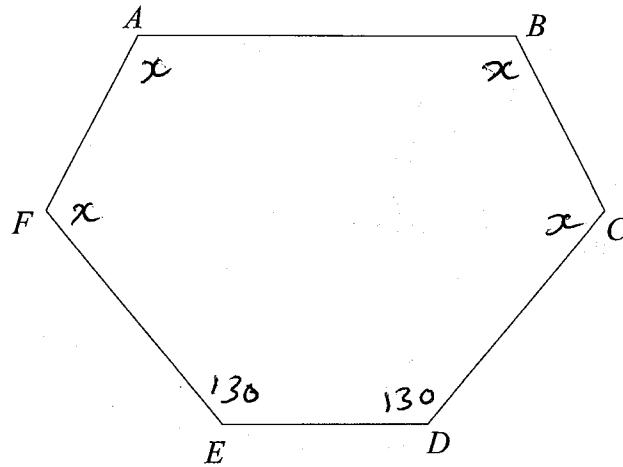
$$x = 67$$

$$\begin{aligned}
 2x &= 2 \times 67 \\
 &= 134
 \end{aligned}$$

$$\begin{aligned}
 \text{Angles in a hexagon} &= (6 - 2) \times 180 \\
 &= 4 \times 180 \\
 &= \underline{\underline{720}}
 \end{aligned}$$

.....134.....°

(Total for question 8 is 3 marks)



$ABCDEF$ is a hexagon.

Angle $BAF = \text{Angle } ABC = \text{Angle } AFE = \text{Angle } BCD$.
 Angle $DEF = \text{Angle } CDE = 130^\circ$

Work out the size of angle BAF .
 You must show all your working.

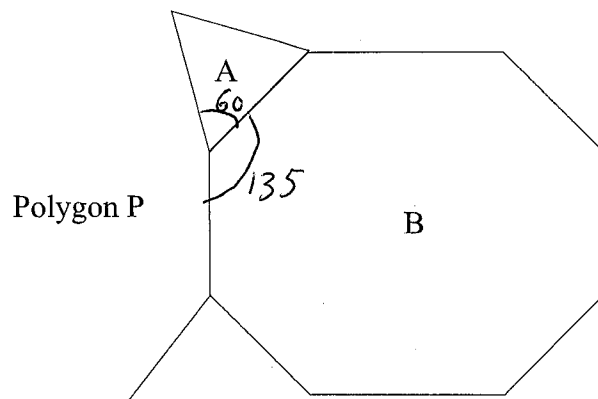
$$\begin{aligned} \text{Angles in a hexagon} &= (6 - 2) \times 180 \\ &= 720^\circ \end{aligned}$$

$$\begin{aligned} 720 - 130 - 130 \\ 720 - 260 &= 460 \end{aligned}$$

$$\frac{460}{4} = \underline{115^\circ}$$

.....115..... $^\circ$

(Total for question 9 is 3 marks)



Shape A is a regular triangle. Shape B is a regular octagon.

Another regular polygon, P, is shown on the diagram.

How many sides does polygon P have?

You must show your working.

$$\text{Interior angle of } A = 60^\circ$$

$$\text{Exterior angle of } B = \frac{360}{8} = 45^\circ$$

$$\begin{aligned} \text{Interior angle of } B &= 180 - 45 \\ &= 135^\circ \end{aligned}$$

$$\begin{aligned} \text{Interior angle of } P &= 360 - 60 - 135 \\ &= 165^\circ \end{aligned}$$

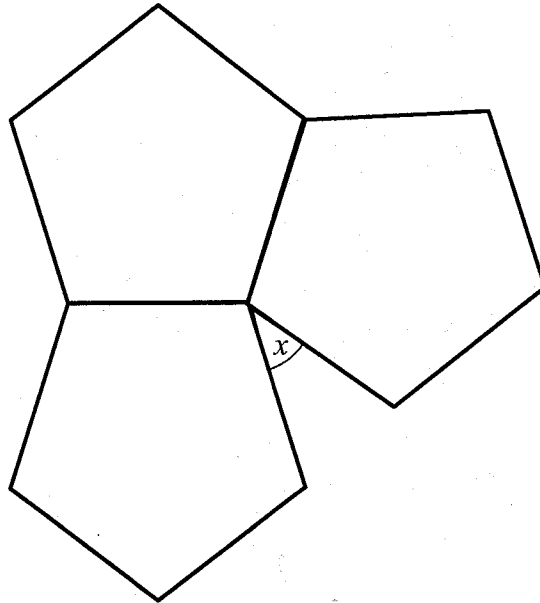
$$\begin{aligned} \text{Exterior angle of } P &= 180 - 165 \\ &= 15^\circ \end{aligned}$$

$$\frac{360}{15} = \frac{120}{5} = 24$$

.....24.....

(Total for question 10 is 4 marks)

11



The diagram shows three regular pentagons meeting at a point.

Work out the size of the angle marked x .
You must show all your working.

$$\text{Exterior angle of pentagon} = \frac{360}{5} = 72$$

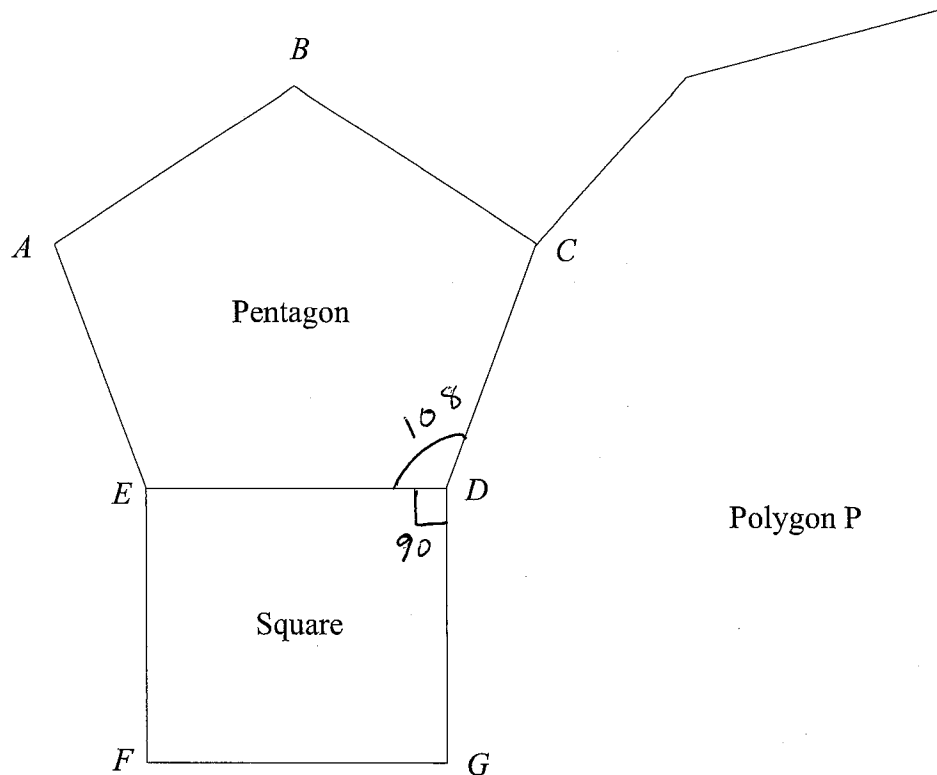
$$\begin{aligned} \text{Interior angle of pentagon} &= 180 - 72 \\ &= 108^\circ \end{aligned}$$

$$3 \times 108 = 324$$

$$360 - 324 = \underline{\underline{36}}$$

..... 36

(Total for question 11 is 3 marks)



The diagram shows a regular pentagon, ABCDE, and a square, EDFG.

The lines CD and DG are both sides of another regular polygon, P.

How many sides does polygon P have?

You must show how you got your answer.

$$\text{Exterior angle of pentagon} = \frac{360}{5} = 72$$

$$\begin{aligned} \text{Interior angle of pentagon} &= \cancel{36} \\ &= 180 - 72 \\ &= 108 \end{aligned}$$

$$\begin{aligned} \text{Interior angle of P} &= 360 - 90 - 108 \\ &= 162^\circ \end{aligned}$$

$$\begin{aligned} \text{Exterior angle of P} &= 180 - 162 \\ &= 18 \end{aligned}$$

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

..... 20

(Total for question 12 is 4 marks)