Name ANSWERS	Class

MATHS TEACHER HUB

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Angles in polygons

(9 – 1) Topic booklet

Higher

These questions have been collated from previous years GCSE Mathematics papers.

You must have: Ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen, HB pencil, eraser.	Total Marks

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- 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.**
- If the question is a **1H** question you are not allowed to use a calculator.
- If the question is a **2H** or a **3H** question, you may use a calculator to help you answer.

Information

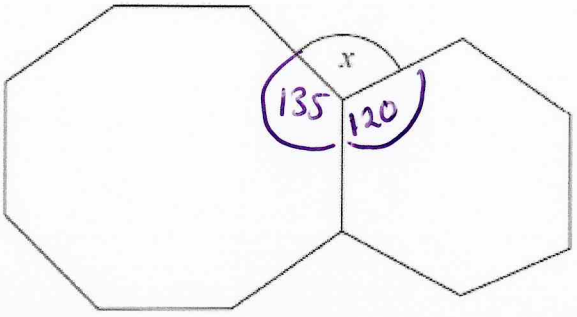
- The marks for **each** question are shown in brackets
  – *use this as a guide as to how much time to spend on each question.*

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.

Answer ALL questions
Write your answers in the space provided.
You must write down all the stages in your working.

4



The diagram shows a regular octagon and a regular hexagon.

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

$\frac{720}{6} = 120°$

$\frac{1080}{8} = 135°$

$135 + 120 = 255$

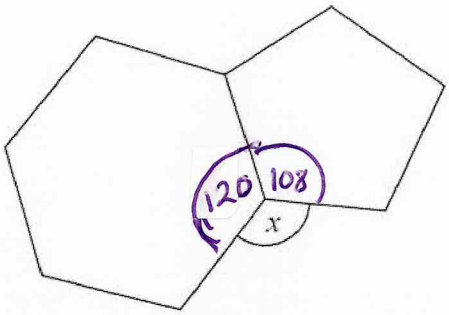
$360 - 255 = 105$

$x =$ 105 °

(Total for Question 4 is 3 marks)

5 Here is a regular hexagon and a regular pentagon.

$$6\overline{)720} = 120$$



$$5\overline{)540} = 108$$

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

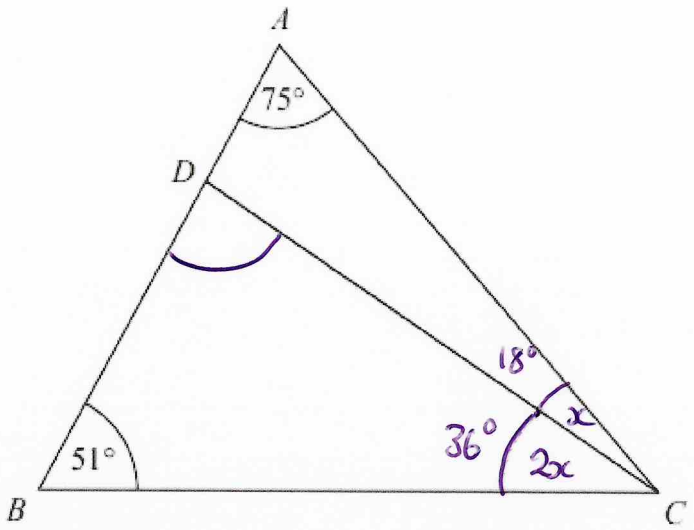
$$120 + 108 = 228$$

$$360 - 228 = 132$$

$x = 132$ °

(Total for Question 5 is 3 marks)

5 The diagram shows triangle ABC.



ADB is a straight line.

the size of angle DCB : the size of angle $ACD = 2 : 1$

Work out the size of angle BDC.

$$\begin{array}{r} 75 \\ +\,51 \\ \hline 126 \end{array} \qquad \begin{array}{r} {}^{7}1{}^{1}80 \\ -\,126 \\ \hline 54 \end{array} \qquad 3\overline{)54} = 18$$

$x = 18°$

$2x = 36°$

$$\begin{array}{r} 51 \\ +\,36 \\ \hline 87 \end{array} \qquad \begin{array}{r} {}^{0}1{}^{7}1{}^{1}80 \\ -\,87 \\ \hline 93 \end{array}$$

93 °

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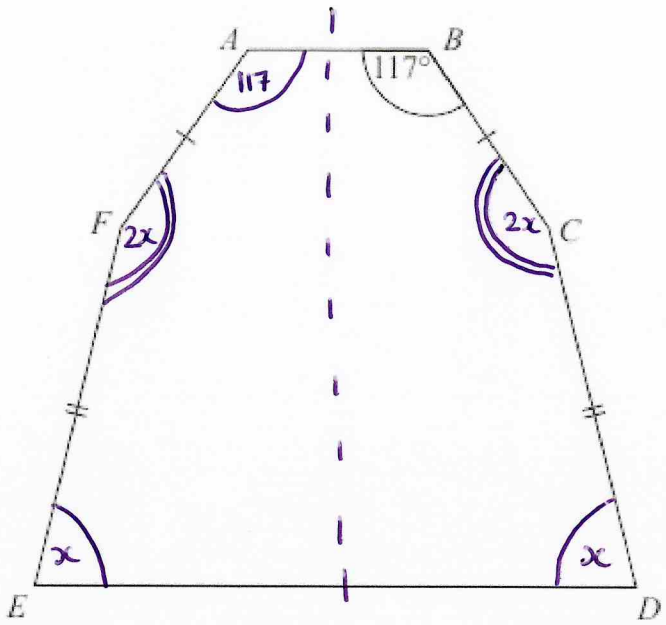
(Total for Question 5 is 4 marks)

5 The diagram shows a hexagon.
The hexagon has one line of symmetry.



6 sides = 720°

$FA = BC$
$EF = CD$
Angle $ABC = 117°$

Angle $BCD = 2 \times$ angle CDE

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

$117° + 117° + 2x + 2x + x + x = 720°$

$234° + 6x = 720°$

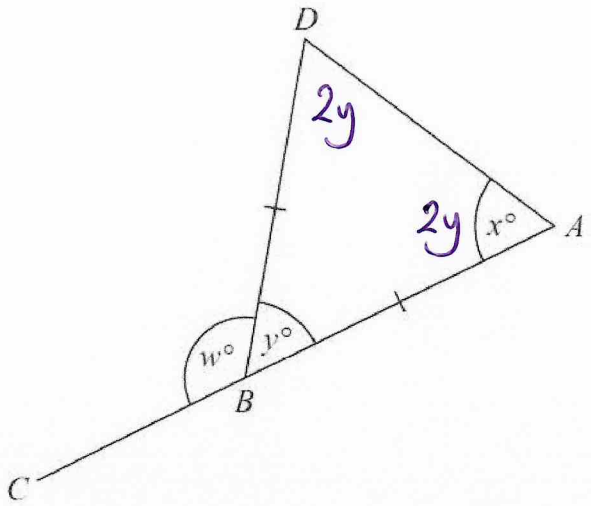
$6x = 486°$

$x = 81°$

AFE = 162 °

(Total for Question 5 is 4 marks)

6 The diagram shows an isosceles triangle ABD and the straight line ABC.



$BA = BD$

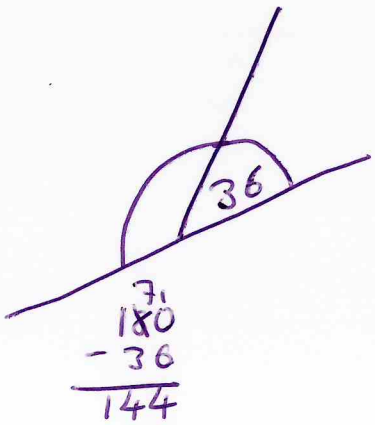
$x : y = 2 : 1$

Work out the value of w.

$2y + 2y + y = 180°$

$5y = 180°$

$y = 36°$

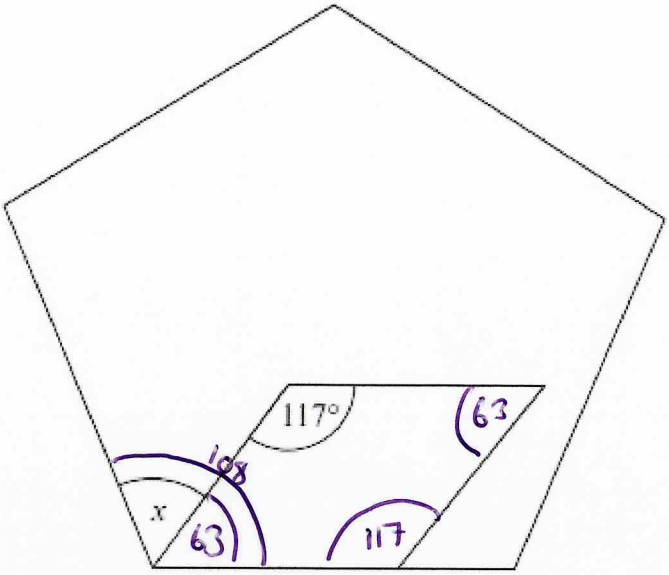


$180 - 36 = 144$

$w =$ 144°

(Total for Question 6 is 4 marks)

8 The diagram shows a regular pentagon and a parallelogram.



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

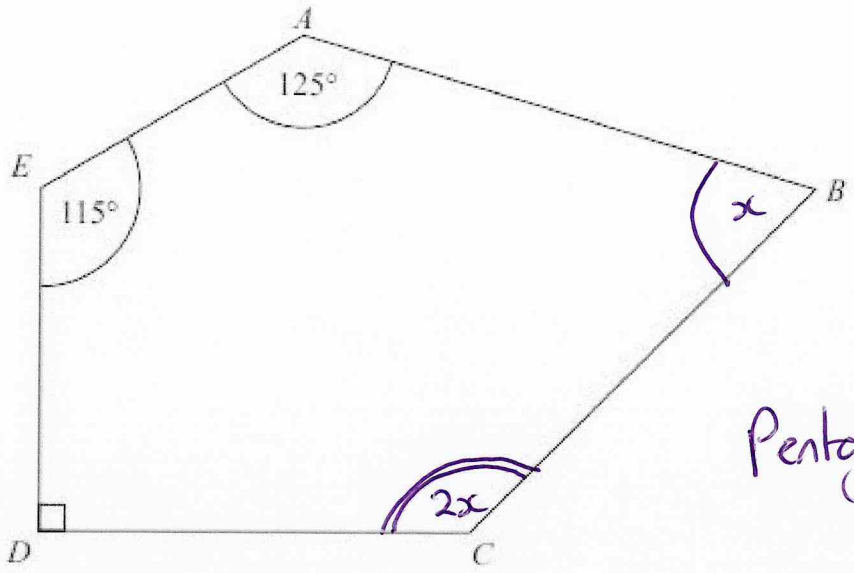
$\frac{540}{5} = 108°$

$108 - 63 = 45$

$x = 45$ °

(Total for Question 8 is 4 marks)

8 *ABCDE* is a pentagon.



Pentagon = 540°

Angle *BCD* = 2 × angle *ABC*

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

$90° + 115° + 125° + x + 2x = 540°$

$330° + 3x = 540°$

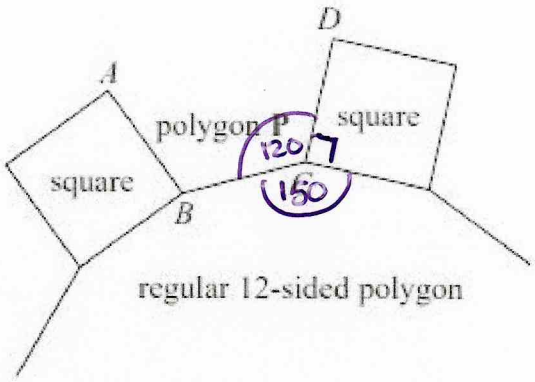
$3x = 210°$

$x = 70°$

BCD = 140°

(Total for Question 8 is 5 marks)

5 In the diagram, AB, BC and CD are three sides of a regular polygon **P**.



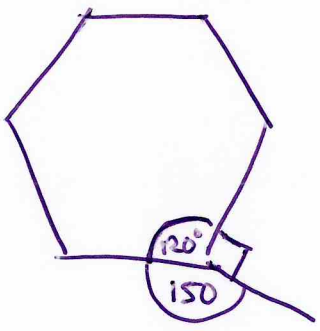
Show that polygon **P** is a hexagon.
You must show your working.

Exterior of 12 sided shape = $\frac{360}{12} = 30°$

Interior of 12 sided shape = $150°$

$150° + 90° = 240°$

$360° - 240° = 120°$

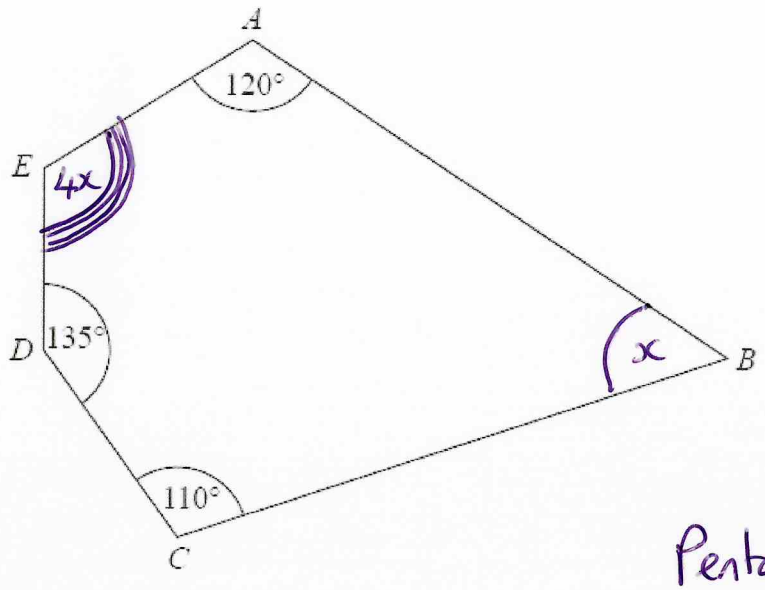


Hexagon = $720°$

$\frac{720}{6} = 120°$

(Total for Question 5 is 4 marks)

10 Here is a pentagon.



Pentagon = 540°

Angle $AED = 4 \times$ angle ABC

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

$120° + 110° + 135° + 4x + x = 540°$

$365° + 5x = 540°$

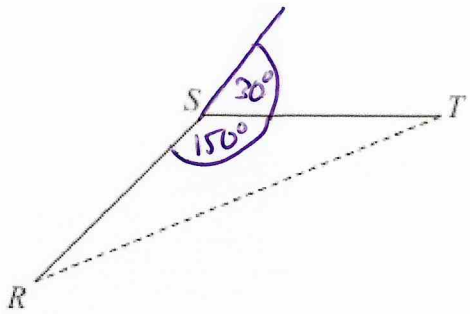
$5x = 175°$

$x = 35°$

AED = 140 °

(Total for Question 10 is 4 marks)

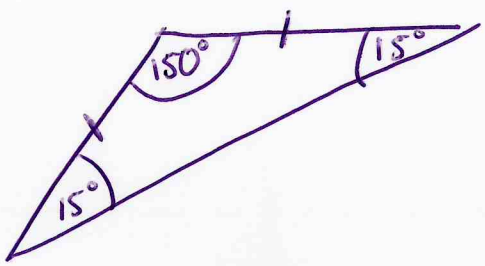
12



RS and *ST* are 2 sides of a regular 12-sided polygon.
RT is a diagonal of the polygon.

Work out the size of angle *STR*.
You must show your working.

Exterior of 12 sided shape = $\frac{360}{12} = 30°$



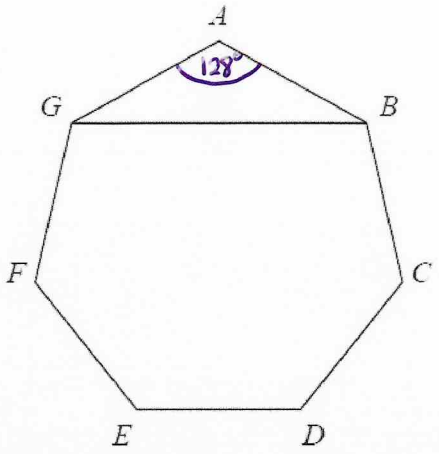
$180 - 150 = 30$

$\frac{30}{2} = 15°$

STR = 15 °

(Total for Question 12 is 3 marks)

26 *ABCDEFG* is a regular heptagon.

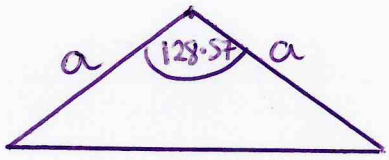


Heptagon = 900°

$\frac{900^\circ}{7} = 128.57^\circ$

The area of triangle *ABG* is 30 cm^2

Calculate the length of *GB*.
Give your answer correct to 3 significant figures.
You must show all your working.

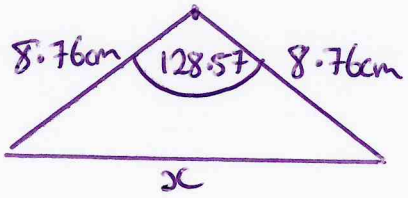


$\text{Area} = \frac{1}{2} a \times a \times \sin C$

$30 = \frac{1}{2} \times a^2 \times \sin(128.57)$

$76.7428 = a^2$

$8.760 = a$



$x^2 = 8.76^2 + 8.76^2 - 2(8.76)^2 \times \cos(128.57)$

$x^2 = 249.182430$

$x = 15.7848798$

15.8 cm

(Total for Question 26 is 5 marks)