

Name

ANSWERS

Class



MATHS TEACHER HUB

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Angles in polygons

(9 – 1) Topic booklet

Foundation

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 **1F** question you are not allowed to use a calculator.
- If the question is a **2F** or a **3F** 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

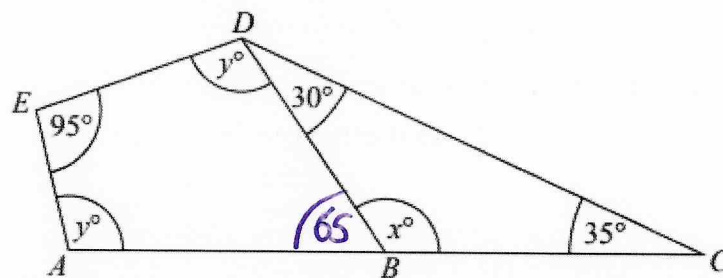
- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end.

Answer ALL questions

Write your answers in the space provided.

You must write down all the stages in your working.

13



ABC is a straight line.

BCD is a triangle.

ABDE is a quadrilateral.

(a) (i) Work out the value of x .

$$180 - 35 - 30 =$$

$$x = 115^\circ$$

(ii) Give a reason for your answer.

Angles in a triangle add to 180°

(2)

(b) Work out the value of y .

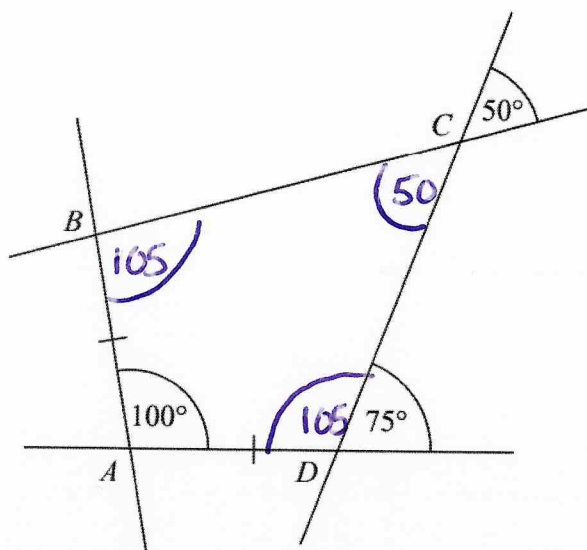
$$360 - 95 - 65 = 200$$

$$200 \div 2 = 100$$

$$y = 100^\circ$$

(2)

14 The diagram shows quadrilateral $ABCD$ with each of its sides extended.



$$AB = AD$$

Show that $ABCD$ is a kite.

Give a reason for each stage of your working.

$\angle BCD = 50^\circ$ because vertically opposite angles are equal.

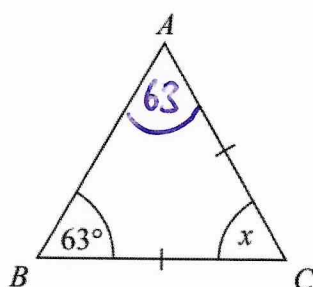
$\angle ADC = 105^\circ$ because angles on a straight line add up to 180°

$\angle ABC = 105^\circ$ because angles in a quadrilateral add up to 360

$$\angle ABC = \angle ADC$$

so $ABCD$ is a kite

15 Mary needs to work out the size of angle x in this diagram.



She writes

$x = 63^\circ$ because base angles of an isosceles triangle are equal.

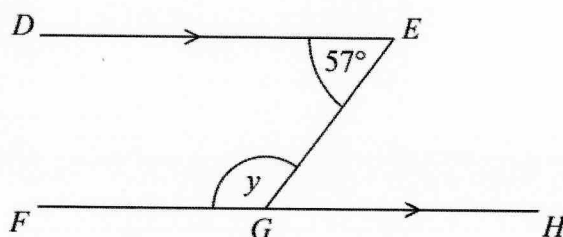
Mary is wrong.

(a) Explain why.

$BAC = 63^\circ$ because base angles of an isosceles triangle are equal. $x = 54^\circ$

(1)

William needs to work out the size of angle y in this diagram.



William writes

Working	Reason
angle $EGH = 57^\circ$	because corresponding angles are equal
$y = 180^\circ - 57^\circ$ $y = 123^\circ$	because angles on a straight line add up to 180°

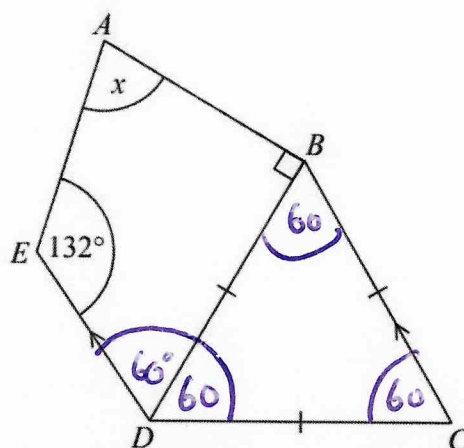
One of William's reasons is wrong.

(b) Write down the correct reason.

$EGH = 57^\circ$ because alternate angles are equal.

(1)

19 The diagram shows a quadrilateral $ABDE$ and an equilateral triangle BCD .



CB is parallel to DE .

Angle $AED = 132^\circ$

Work out the size of the angle marked x .

You must give a reason for each stage of your working.

$$\angle DBC = \angle BCD = \angle CDB = 60^\circ$$

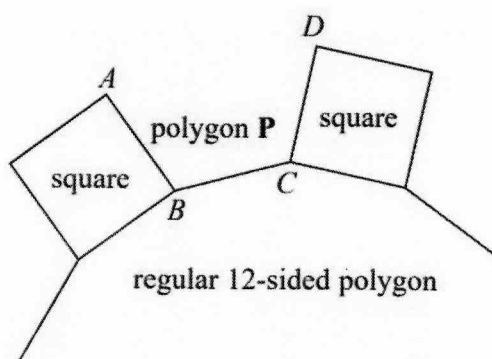
because it is an equilateral triangle

$$\angle BDE = 60^\circ \text{ because } \angle EDC \text{ is supplementary to } \angle BCD.$$

$$x = 78^\circ \text{ because angles in a quadrilateral add up to } 360^\circ$$

$$x = 78^\circ$$

19 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.

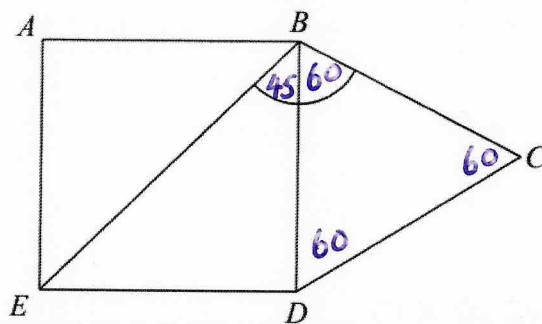
$$\frac{360}{12} = 30^\circ \text{ exterior angle}$$
$$= 150^\circ \text{ interior angle.}$$

$$360 - 150 - 90 = 120^\circ \text{ (interior polygon P)}$$

Hexagon = 6 sides.

$$\frac{(6-2) \times 180}{6} = 120^\circ$$

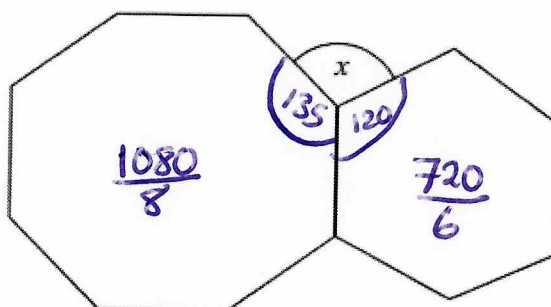
- 20 The diagram shows a square $ABDE$ and an equilateral triangle BCD .



Work out the size of angle EBC .

$$45 + 60 = 105^\circ$$

105



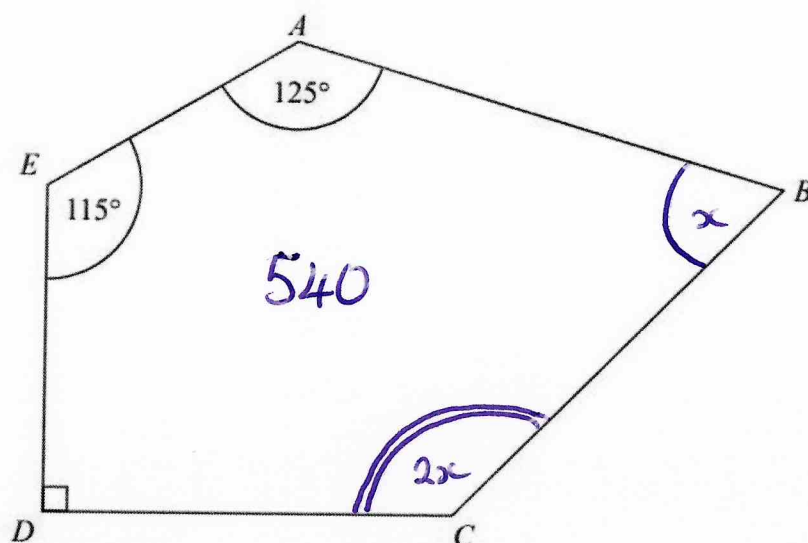
The diagram shows a regular octagon and a regular hexagon.

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

$$360 - 135 - 120 = 105^\circ$$

$$x = 105^\circ$$

26 $ABCDE$ is a pentagon.



Angle $BCD = 2 \times \text{angle } ABC$

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

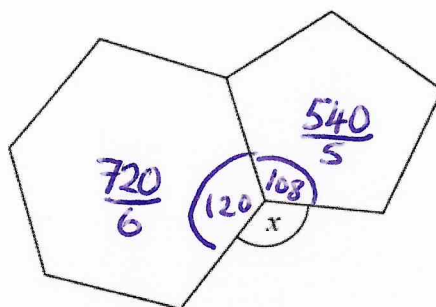
$$540 - 115 - 125 - 90 = 210$$

$$x = \frac{210}{3} = 70^\circ$$

$$2x = 140^\circ$$

140

27 Here is a regular hexagon and a regular pentagon.



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

$$360 - 108 - 120 = 132^\circ$$

$$x = 132$$

28 Each exterior angle of a regular polygon is 15°

Work out the number of sides of the polygon.



$$\frac{360}{\text{sides}} = \text{Exterior angle}$$

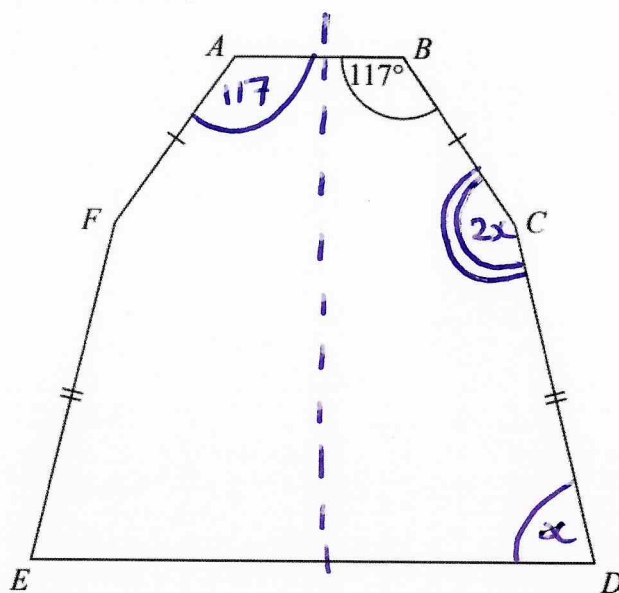
$$\frac{360}{15} = 24$$

24

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(Total for Question 28 is 2 marks)

- 28 The diagram shows a hexagon.
The hexagon has one line of symmetry.



$$FA = BC$$

$$EF = CD$$

$$\text{Angle } ABC = 117^\circ$$

$$\text{Angle } BCD = 2 \times \text{angle } CDE$$

Work out the size of angle AFE.

You must show all your working.

$$720 \div 2 = 360$$

$$360 - 117 = 243$$

$$x = \frac{243}{3} = 81$$

$$AFE = 2 \times 81 = 162$$

162

28 The size of each interior angle of a regular polygon is 11 times the size of each exterior angle.

Work out how many sides the polygon has.

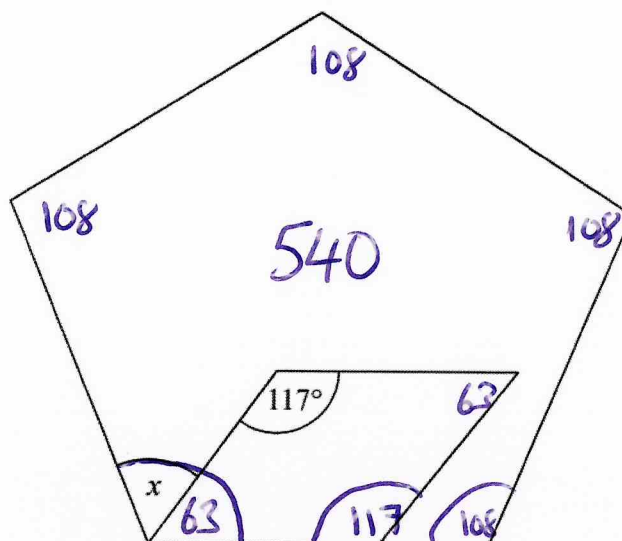
$$\begin{array}{c} \text{Ex} \\ x \end{array} + \begin{array}{c} \text{In} \\ 11x \end{array} = 180$$

$$x = \frac{180}{12} = 15^\circ$$

$$\frac{360}{15} =$$

24 sides

29 The diagram shows a regular pentagon and a parallelogram.



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

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

$$108 - 63 = 45$$

$$x = 45$$