Name	ANSWERS	Class

MATHS TEACHER HUB

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Angle facts

(9 – 1) Topic booklet

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

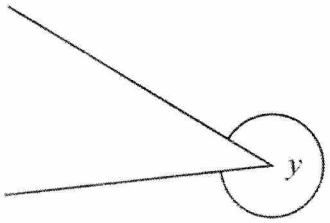
- The marks for **each** question are shown in brackets
  – *use this as a guide as to how much time to spend on each question.*

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.

3 Write down the mathematical name for the type of angle marked y.

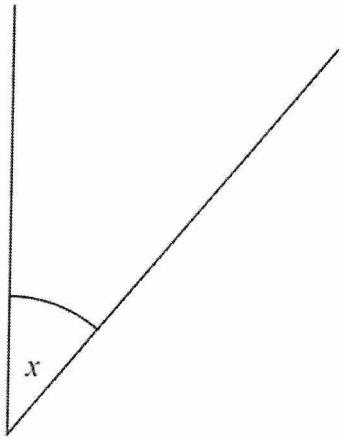


Reflex angle

May 2024 – Paper 1F

(Total for Question 3 is 1 mark)

4 Measure the size of the angle marked x.

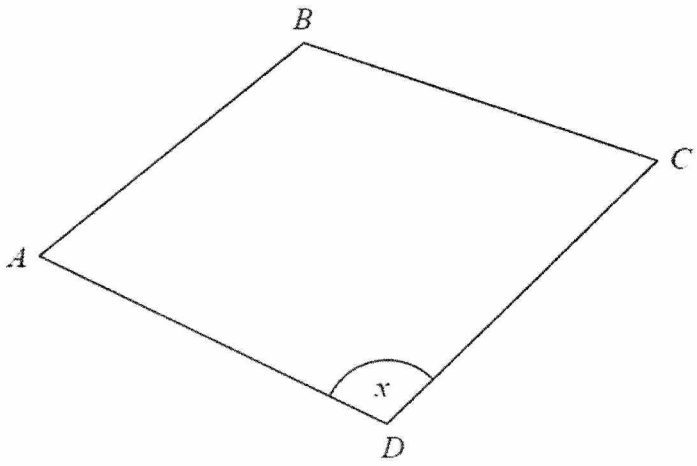


40 °

November 2023 – Paper 1F

(Total for Question 4 is 1 mark)

6 Here is a quadrilateral $ABCD$.



(a) Measure the length of the side AB.
Give your answer in centimetres.

4.4 centimetres
(1)

(b) Measure the size of the angle marked x.

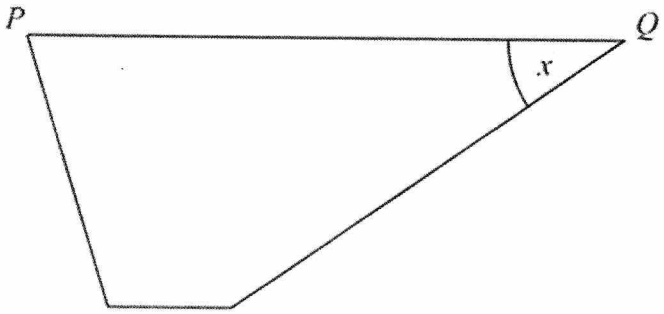
110 °
(1)

November 2022 – 2F

(Total for Question 6 is 2 marks)

6 Here is a trapezium.

This diagram is accurately drawn.



(a) Measure the length of the line PQ.

7.8 cm

(1)

(b) Measure the size of the angle marked x.

35 °

(1)

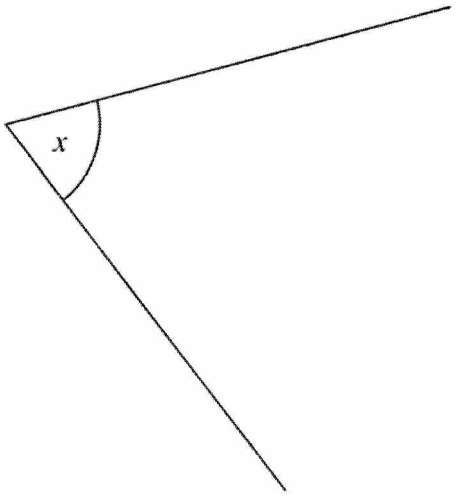
(Total for Question 6 is 2 marks)

7 (a) Measure the length of this line.
Give your answer in centimetres.

8.7 centimetres

(1)

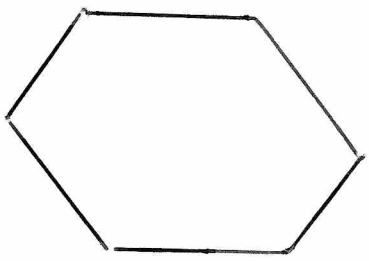
(b) Measure the size of the angle marked x.



67 °

(1)

(c) In the space below, draw a hexagon.

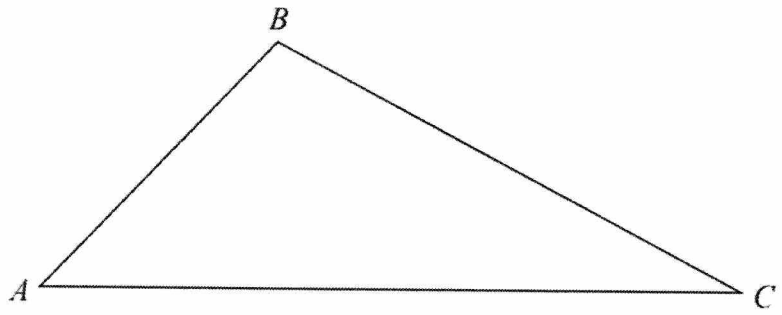


6 sides

(1)

(Total for Question 7 is 3 marks)

7 Here is a triangle.
The triangle is accurately drawn.



(a) Measure the length of AC.

9.2 cm

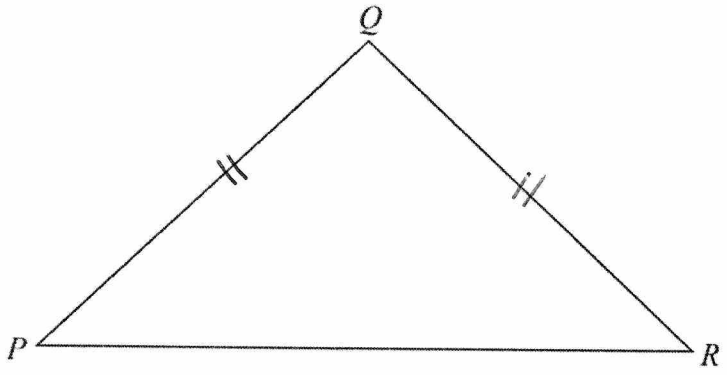
(1)

(b) Measure the size of angle B.

115 °

(1)

Here is a different triangle.



$QP = QR$

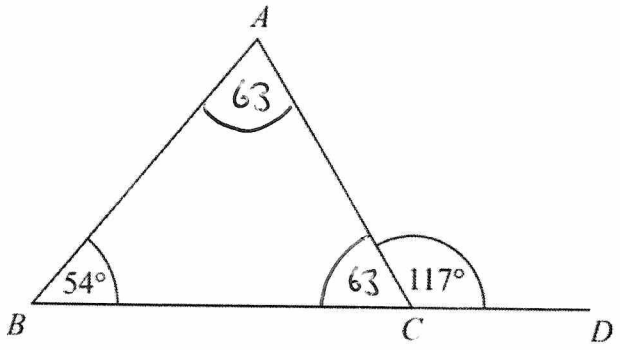
(c) Write down the mathematical name of this triangle.

ISOSCELES TRIANGLE

(1)

(Total for Question 7 is 3 marks)

7



BCD is a straight line.
ABC is a triangle.

Show that triangle *ABC* is an isosceles triangle.
Give a reason for each stage of your working.

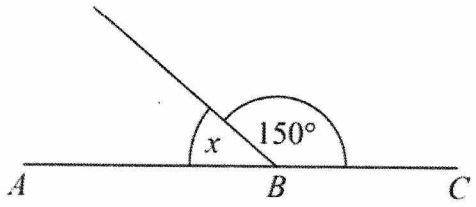
ACB = 63° because angles on a straight line add up to 180°

BAC = 63° because angles in a triangle add up to 180°

Triangle ABC is isosceles triangle, as they have two angles the same.

(Total for Question 7 is 4 marks)

8



ABC is a straight line.

(a) (i) Work out the size of the angle marked *x*.

30 °

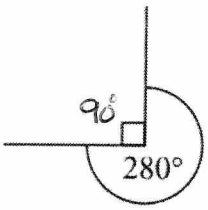
(1)

(ii) Give a reason for your answer.

Angles on a straight line, add up to 180°

(1)

The diagram below is wrong.



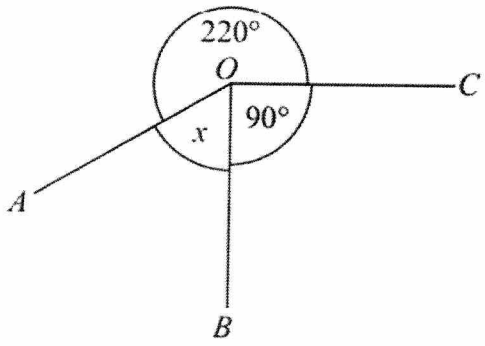
(b) Explain why.

360
- 90
270

(1)

May 2020 – Paper 2F **(Total for Question 8 is 3 marks)**

8 OA, OB and OC are three straight lines.



220
+ 90
310

(i) Work out the size of the angle marked x.

360
-310
50

50 °

(2)

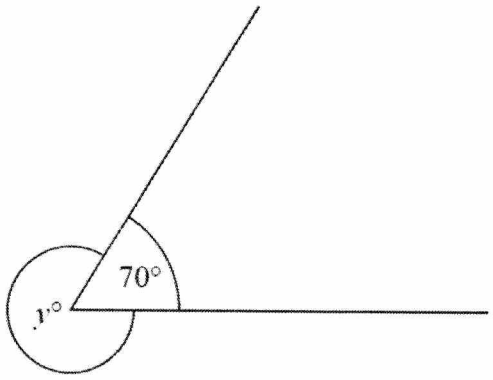
(ii) Give a reason for your answer.

Angles around a point add up to 360°

(1)

May 2024 – Paper 1F **(Total for Question 8 is 3 marks)**

9



(a) Find the value of y.

$$\begin{array}{r} {}^{2}\cancel{3}{}^{1}\cancel{6}0 \\ -\ 70 \\ \hline 290 \end{array}$$

$y =$ 290

(1)

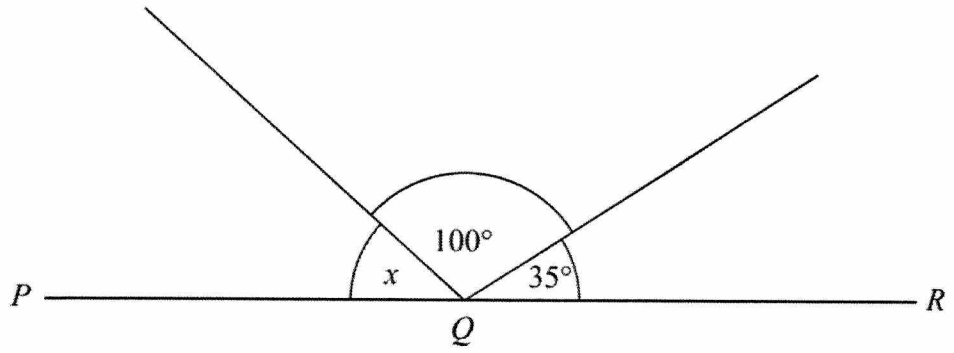
(b) Give a reason for your answer.

Angles around a point add up to 360°

(1)

November 2022 – 1F **(Total for Question 9 is 2 marks)**

9 PQR is a straight line.



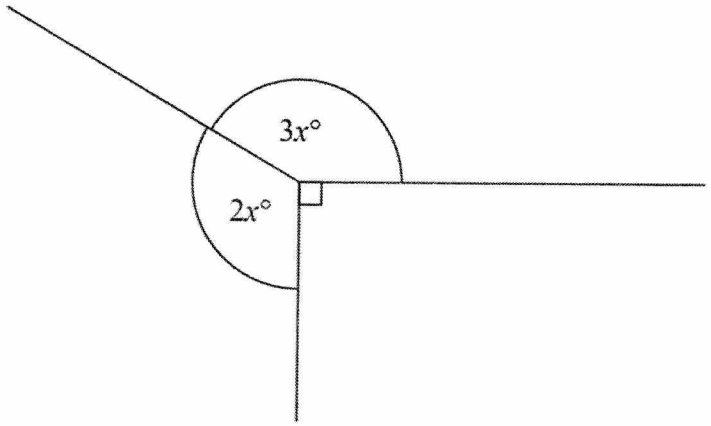
Work out the size of angle x.

$$\begin{array}{r} 100 \\ +\ 35 \\ \hline 135 \end{array} \qquad \begin{array}{r} {}^{7}1{}^{1}80 \\ -135 \\ \hline 45 \end{array}$$

45 °

November 2019 – Paper 1F **(Total for Question 9 is 2 marks)**

9



Find the value of x.

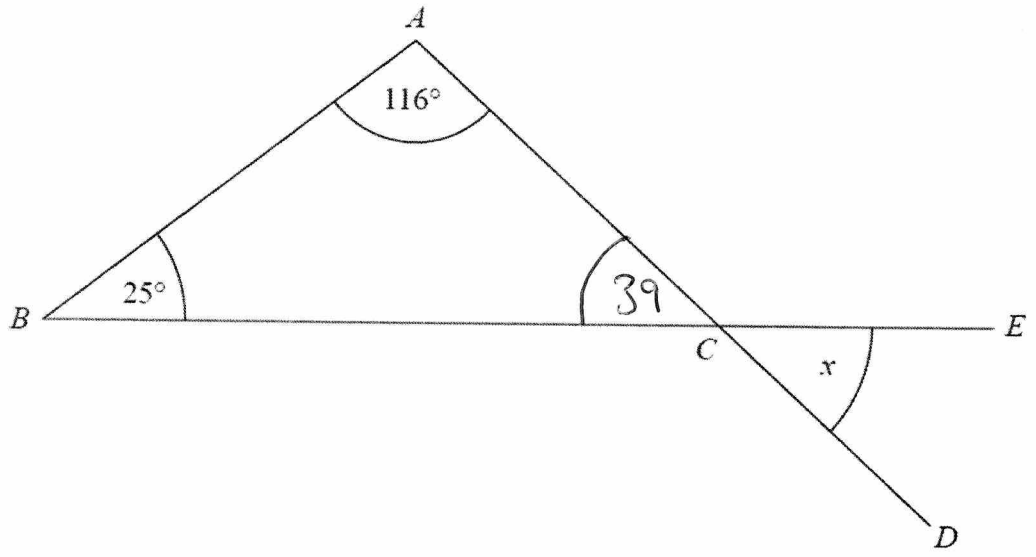
$$5\overline{)270}$$
$$52$$

$x = 52$

June 2017 – Paper 2F

(Total for Question 9 is 3 marks)

11 The diagram shows a triangle ABC.



ACD and BCE are straight lines.

Work out the size of the angle marked x.
Give a reason for each stage of your working.

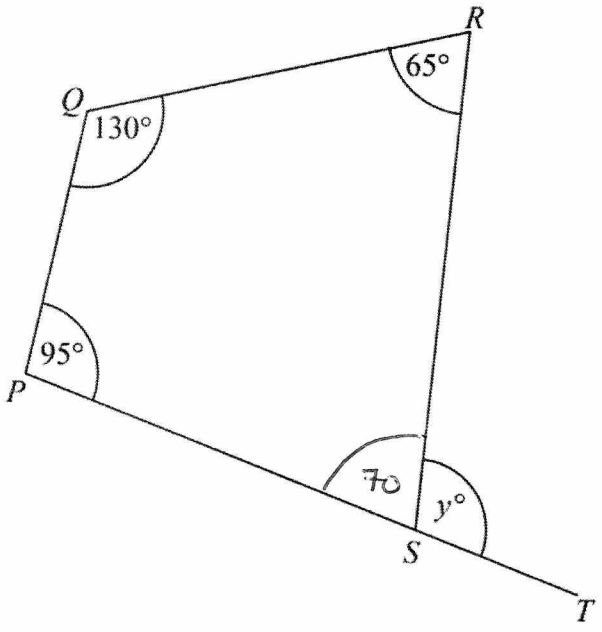
ACB = 39° because angles in a triangle add up to 180°

x = 39° because vertically opposite angles are equal.

39 °

(Total for Question 11 is 3 marks)

11 *PQRS* is a quadrilateral.
PST is a straight line.



Find the value of y.

130 + 95 + 65 = 290

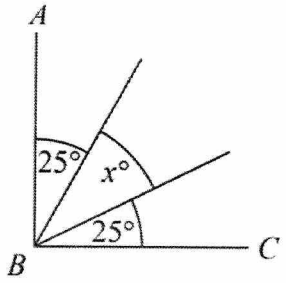
360 - 290 = 70

180 - 70 = 110

$y =$ 110°

May 2020 – Paper 3F **(Total for Question 11 is 3 marks)**

12 AB and BC are perpendicular lines.



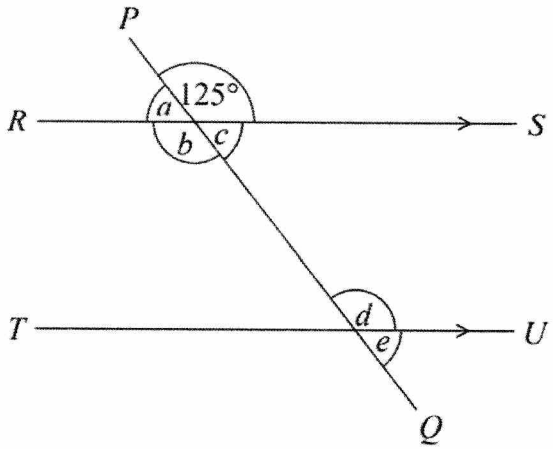
90
-50
40

(a) Find the value of x.

$x =$ 40

(2)

RS and TU are parallel lines.
PQ is a straight line.



An angle of size 125° is shown on the diagram.

(b) (i) Write down the letter of one other angle of size 125°
Give a reason for your answer.

b = 125° vertically opposite angles are equal.
d = 125° corresponding angles are equal.

(2)

(ii) Explain why $a + b + c = 235°$

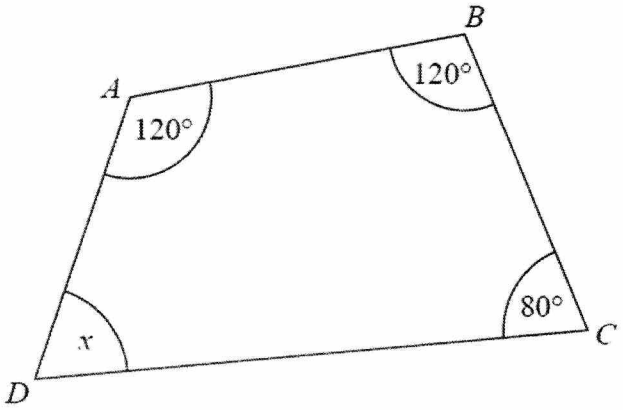
a = 55°
b = 125°
c = 55°

125
55
+ 55
235
1 1

(1)

(Total for Question 12 is 5 marks)

13 $ABCD$ is a quadrilateral.



120
120
+ 80
320

(a) (i) Work out the size of angle x.

40 °

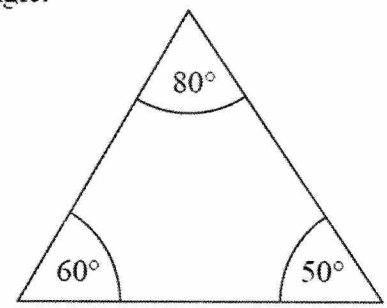
(1)

(ii) Give a reason for your answer.

Angles in a quadrilateral add up to 360°

(1)

The diagram below shows a triangle.



The diagram is wrong.

(b) Explain why.

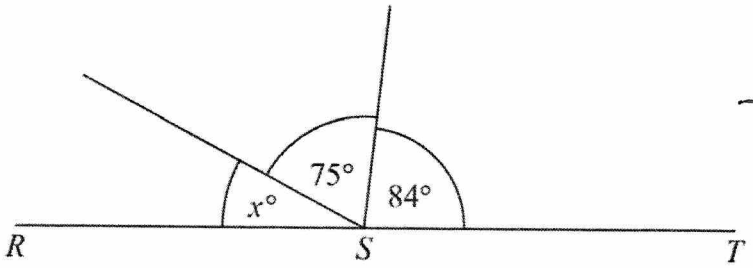
80 + 60 + 50 = 190

Angles in a triangle should add to 180°

(1)

(Total for Question 13 is 3 marks)

13



$84 + 75 = 159$

$180 - 159 = 021$

RST is a straight line.

(i) Work out the value of x.

$x = 21°$

(2)

(ii) Give a reason for your answer.

Angles on a straight line add up to 180°

(1)

November 2021 – Paper 1F **(Total for Question 13 is 3 marks)**

13 The size of the largest angle in a triangle is 4 times the size of the smallest angle.
The other angle is 27° less than the largest angle.

Work out, in degrees, the size of each angle in the triangle.
You must show your working.

Smallest	middle	largest
x	$4x-27$	$4x$

$9x - 27 = 180$

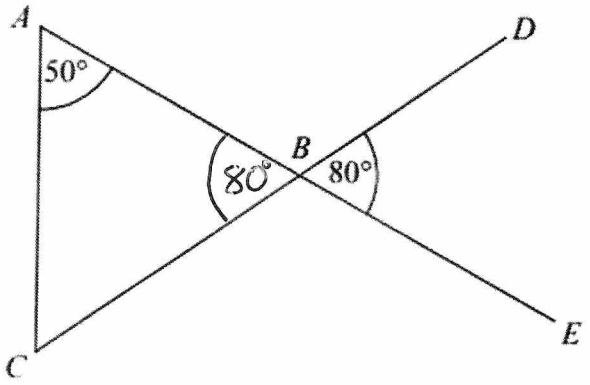
$9x = 207$

$x = 23$

23 °, 65 °, 92 °

(Total for Question 13 is 5 marks)

13



ABE and *CBD* are straight lines.

Show that triangle *ABC* is an isosceles triangle.
Give a reason for each stage of your working.

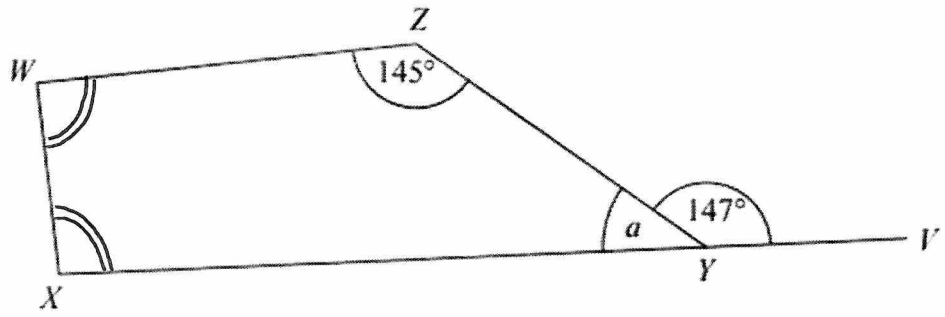
ABC = 80° because vertically opposite angles are equal.

ACB = 50° Angles in a triangle add up to 180°

Triangle ABC has two equal angles, so it is an isosceles triangle.

(Total for Question 13 is 4 marks)

13



WXYZ is a quadrilateral.
XYV is a straight line.

(a) (i) Find the size of the angle marked *a*.

33 °

(ii) Give a reason for your answer.

Angles on a straight line add up to 180°

(2)

Angle *ZWX* = angle *WXY*

(b) Work out the size of angle *ZWX*.

360 - 145 - 33 = 182

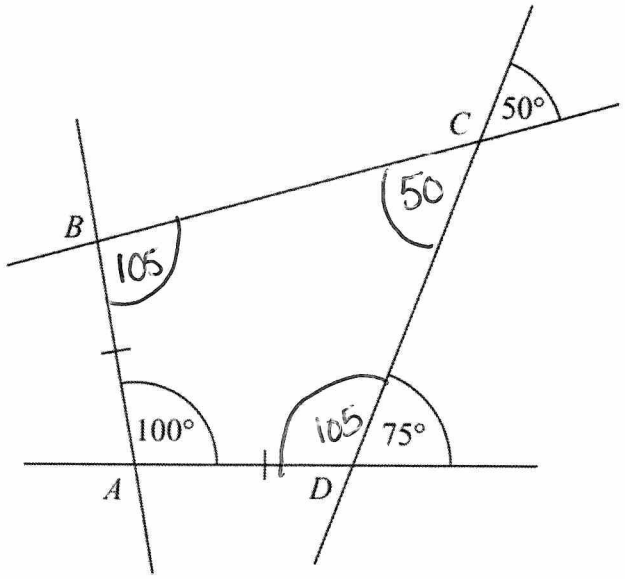
182 ÷ 2 = 91

91 °

(2)

Sample 1 – Paper 3F **(Total for Question 13 is 4 marks)**

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.

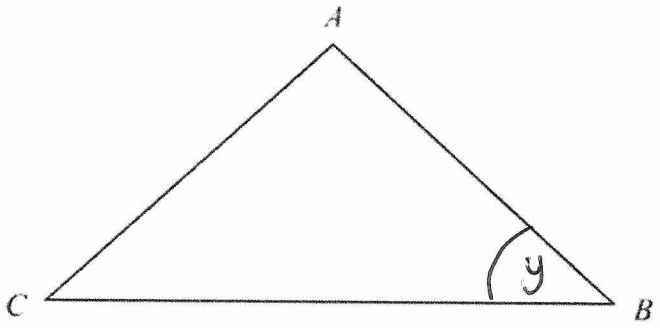
ACB = 50° because vertically opposite angles are equal.

CDA = 105° because angles on a straight line add up to 180°

ABC = 105° because angles in a quadrilateral add up to 360°

(Total for Question 14 is 4 marks)

14 Here is a triangle ABC.



Mark, with the letter y, the angle CBA.

(1)

Specimen 1 – Paper 3F **(Total for Question 14 is 1 mark)**

15 Jenna measures all the angles around a point.

Her results are 23°, 145°, 23° and 69°

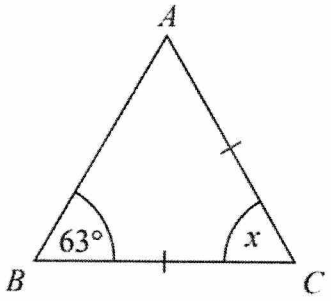
Explain why these results cannot be true.

23 + 145 + 23 + 69 = 260

Angles around a point add to 360

November 2021 – Paper 3F **(Total for Question 15 is 1 mark)**

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



She writes

$x = 63°$ because base angles of an isosceles triangle are equal.

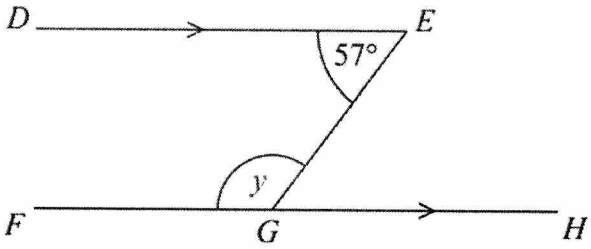
Mary is wrong.

(a) Explain why.

BAC must be 63°, as its the base angles that are equal.

(1)

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



William writes

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

One of William's reasons is wrong.

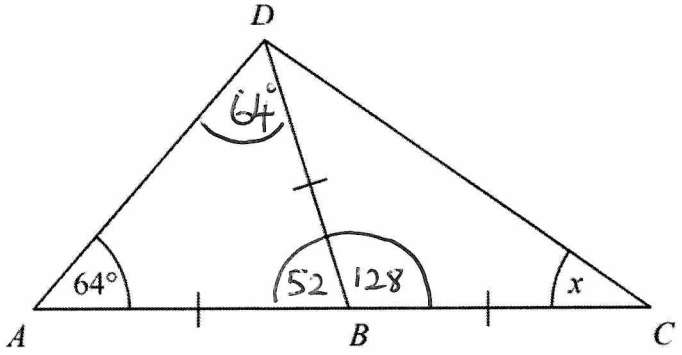
(b) Write down the correct reason.

EGH = 57° because alternate angles are equal

(1)

May 2018 – Paper 2F **(Total for Question 15 is 2 marks)**

17



ABC is a straight line.
AB = *BC* = *BD*.
Angle *DAB* = 64°

Work out the size of the angle marked *x*.
Give a reason for each stage of your working.

ADB = 64° because base angles of an isosceles triangle are equal.

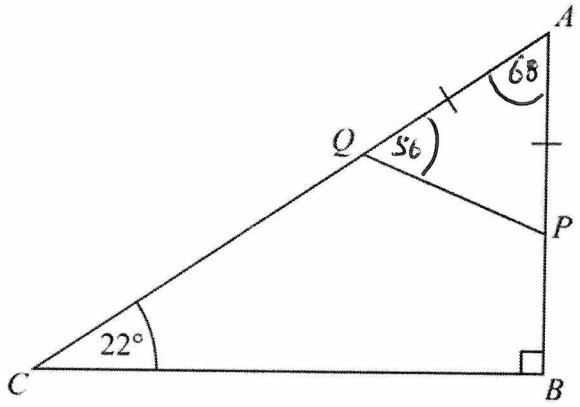
ABD = 52° because angles in a triangle add up to 180°

DBC = 128° because angles on a straight line add up to 180°

x = 26° because triangle DBC is an isosceles triangle.

(Total for Question 17 is 4 marks)

17 ABC is a right-angled triangle.



P is a point on AB.
Q is a point on AC.
$AP = AQ$.

Work out the size of angle AQP.
You must give a reason for each stage of your working.

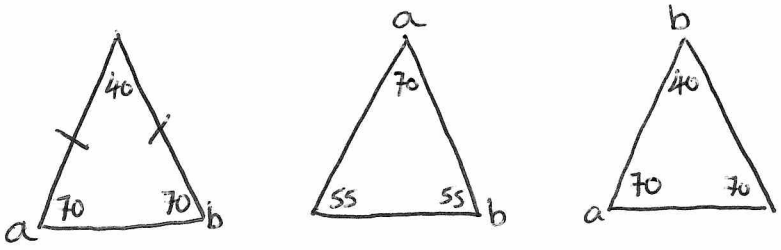
QAP = 68° because angles in a triangle (CAB) add up to 180°

AQP = 56° because base angles of an isosceles triangle (QAP) are equal.

(Total for Question 17 is 4 marks)

17 ABC is an isosceles triangle.
When angle $A = 70°$, there are 3 possible sizes of angle B.

(a) What are they?



70 . 55 . 40 .

(3)

When angle $A = 120°$, there is only one possible size of angle B.

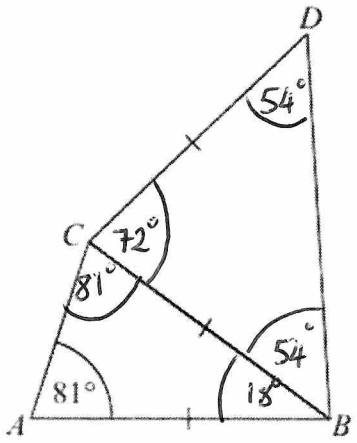
(b) Explain why.

You can only have one obtuse angle inside a triangle.

(1)

Specimen 1 – Paper 3F **(Total for Question 17 is 4 marks)**

20 ABC and BCD are isosceles triangles.



$AB = BC = CD$
Angle $CAB = 81°$

Angle $BCD = 4 \times$ angle ABC

Find

the size of angle ABC : the size of angle CBD

Give your answer in the form $1 : n$
You must show all your working.

BCA = 81° because base angles of an isosceles triangle are equal

CBA = 18° because angles in a triangle add up to 180°

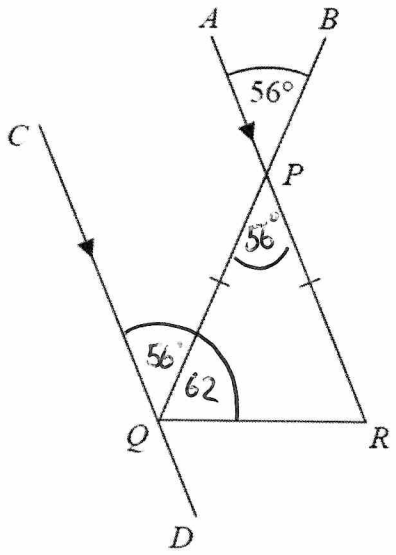
18 x 4 = BCD
= 72°

ABC : CBD
18 : 54

1 : 3

June 2024 – Paper 3F **(Total for Question 20 is 5 marks)**

20 In the diagram, PQR is an isosceles triangle with $PQ = PR$.



APR and CQD are parallel lines.
BPQ is a straight line.

Angle $APB = 56°$

Work out the size of angle CQR.
Give a reason for each stage of your working.

QPR = 56° because vertically opposite angles are equal.

CQP = 56° because corresponding angles are equal

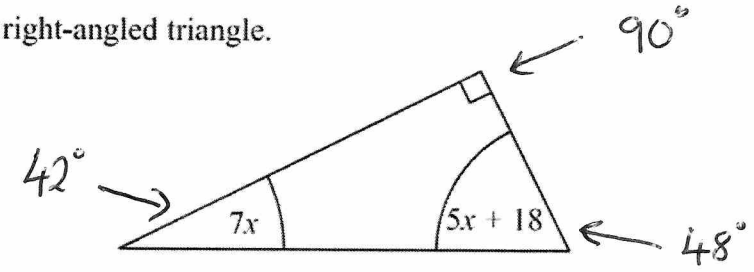
PQR = 62 because base angles of an isosceles triangle are equal.

CQR = 56 + 62

= 118°

June 2022 – Paper 3F **(Total for Question 20 is 5 marks)**

20 The diagram shows a right-angled triangle.



All the angles are in degrees.

Work out the size of the smallest angle of the triangle.

$90^\circ + 7x + 5x + 18 = 180^\circ$

$12x + 108 = 180$

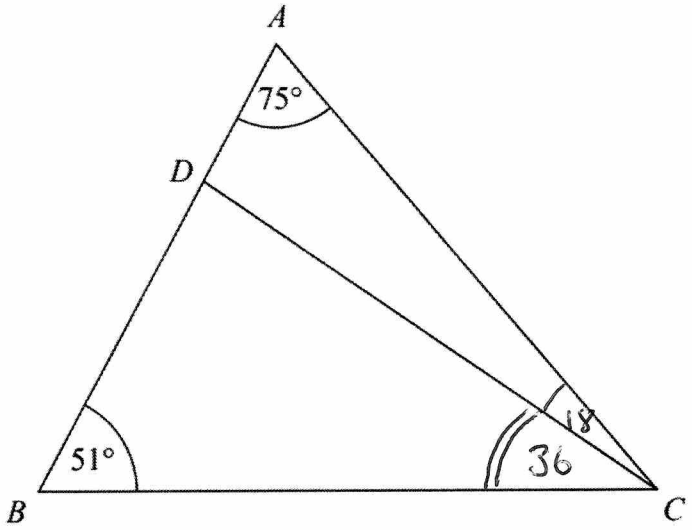
$12x = 72$

$x = 6$

42 °

(Total for Question 20 is 3 marks)

24 The diagram shows triangle *ABC*.



ACB = 54°

ADB is a straight line.

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

Work out the size of angle *BDC*.

$$\begin{array}{r} 51 \\ +\ 75 \\ \hline 126 \end{array} \qquad \begin{array}{r} 1\overset{7}{8}\overset{1}{0} \\ -126 \\ \hline 54 \end{array}$$

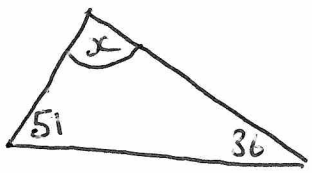
$$3\overline{)54} \quad 18$$

DCB = 18 × 2

= 36

ACD = 18 × 1

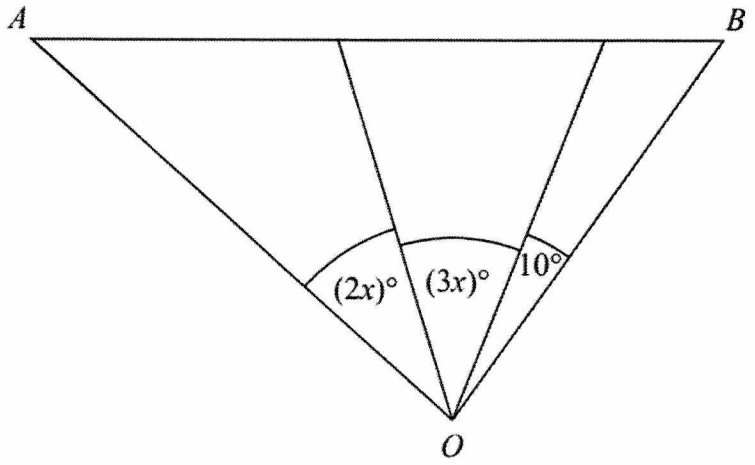
= 18



x = 93 °

(Total for Question 24 is 4 marks)

28 The diagram shows triangle AOB.



Angle AOB is **not** an obtuse angle.

Find the greatest value of x.
You must show all your working.

$AOB \leqslant 90^\circ$

$2x + 3x + 10 \leqslant 90$

$5x + 10 \leqslant 90$

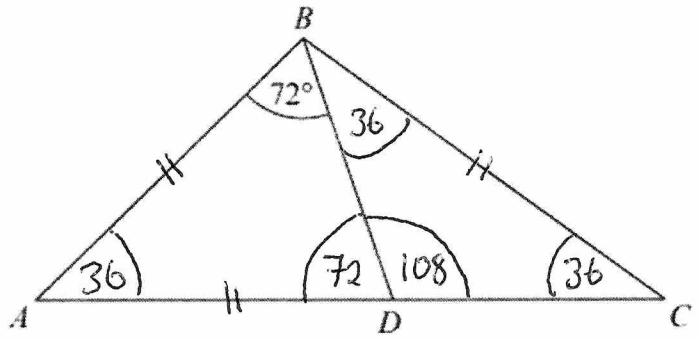
$5x \leqslant 80$

$x \leqslant 16$

16

(Total for Question 28 is 3 marks)

29



ABC is an isosceles triangle with *BA* = *BC*.

D lies on *AC*.
ABD is an isosceles triangle with *AB* = *AD*.

Angle *ABD* = 72°

Show that the triangle *BCD* is isosceles.
You must give a reason for each stage of your working.

BDC = 72° because base angles of an isosceles triangle are equal.

BAC = 36° because angles in a triangle add up to 180°

BDC = 108° because angles on a straight line add up to 180°

BCD = 36° because ABC is an isosceles triangle

CBD = 36°

Triangle DBC has two identicle angles so it is an isosceles triangle.

(Total for Question 29 is 5 marks)