1 The diagram shows a trapezium *ABCD* in which *AB* and *DC* are parallel.

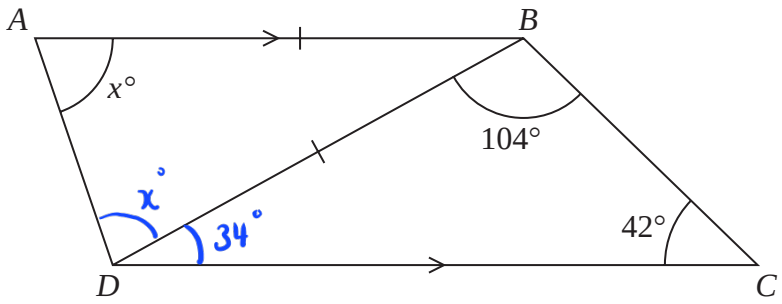


Diagram **NOT** accurately drawn

AB = *DB*

Work out the value of *x*.
Give a reason for each stage of your working.

angle BDC = 180° - 104° - 42°

= 34° (angle in a triangle sums up to 180°) (1)

angle BAD = angle ADB = x° (because ABD is an isosceles triangle) (1)

angle BAD = 180° - x° - 34° (because co-interior angle adds up to 180°)

x° = 180° - x° - 34° (1)

2x° = 146°

x° = 73° (1)

x = 73

(Total for Question 1 is 4 marks)

2

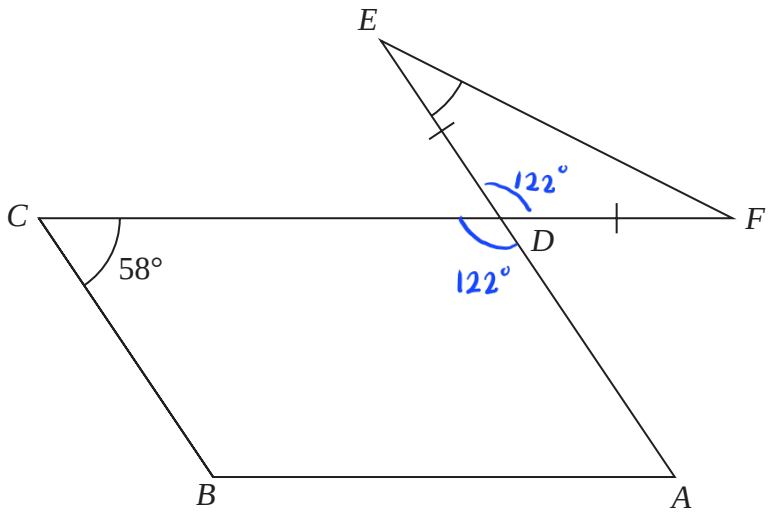


Diagram **NOT** accurately drawn

The diagram shows a parallelogram *ABCD* and an isosceles triangle *DEF* in which *DE* = *DF*

CDF and *ADE* are straight lines.
Angle *BCD* = 58°

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

angle ADC = $180^\circ - 58^\circ$

$= 122^\circ$ (1)

(co-interior angles add up to 180°) (1)

angle EDF = angle ADC = 122°

(vertically opposite angles are equal)

angle DEF = $\frac{180^\circ - 122^\circ}{2}$ (1) = $\frac{58^\circ}{2}$ ← (base angles in isosceles are the same)

$= 29^\circ$ (1)

(angles in triangle adds up to 180°) (1)

29 °

.....

(Total for Question 2 is 5 marks)

3

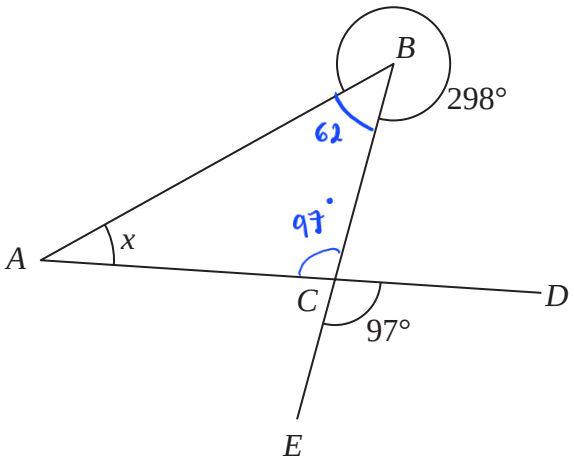


Diagram **NOT** accurately drawn

ABC is a triangle.
D and *E* are points such that *ACD* and *BCE* are straight lines.

reflex angle *ABC* = 298°
angle *ECD* = 97°

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

- angle ACB = angle ECD = 97° (1)
  (vertically opposite angles are equal) (1)

- angle ABC = 360° − 298°
  = 62°
  (angles around a point adds up to 360°) (1)

- x = 180° − 62° − 97°
  = 21° (1)
  (angles in a triangle sums up to 180°)

$x =$ 21 °

(Total for Question 3 is 4 marks)

4

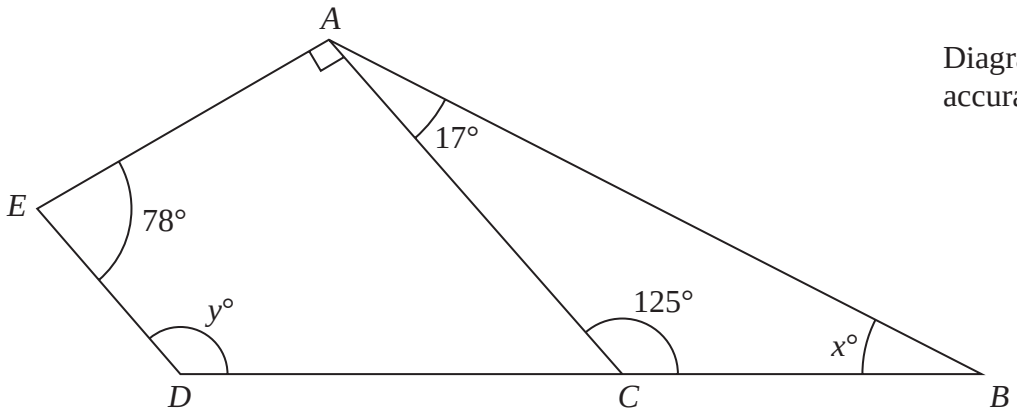


Diagram **NOT** accurately drawn

ABDE is a quadrilateral.
ABC is a triangle.
DCB is a straight line.

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

$x = 180^\circ - 125^\circ - 17^\circ$

$= 38^\circ$ (1)

$x =$ 38

(1)

(ii) Give a reason for your answer.

Angles in a triangle sums up to 180° (1)

(1)

(b) Work out the value of *y*.
Give a reason for each stage of your working.

angle ACD $= 180^\circ - 125^\circ$ (1)
$= 55^\circ$ (angles on a straight line add up to 180°)

$y^\circ = 360^\circ - 78^\circ - 90^\circ - 55^\circ$ (1)

$= 137^\circ$ (1)

(angles in a quadrilateral adds up to 360°)

$y =$ 137

(3)

(Total for Question 4 is 5 marks)

5 The diagram shows a square *ABCD* and a regular pentagon *CDEFG*.

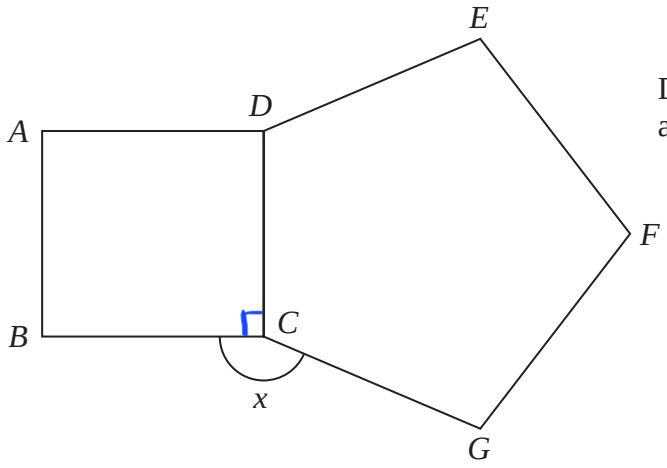


Diagram **NOT** accurately drawn

Work out the size of the angle marked *x*.

angle DCB = 90°

angle DCG = $\frac{5-2}{5} \times 180°$ – interior angle of a pentagon

= 108° (1)

angle BCG = 360° – 90° – 108° (1)

= 162° (1)

162 °

(Total for Question 5 is 3 marks)

6

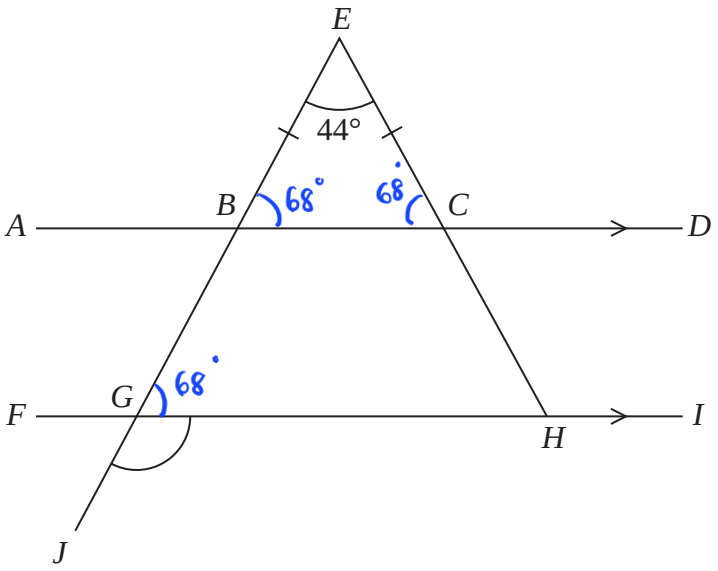


Diagram **NOT** accurately drawn

ABCD and *FGHI* are parallel straight lines.
EBGJ and *ECH* are straight lines.

BE = *CE*
Angle *BEC* = 44°

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

angle EBC = $\frac{180^\circ - 44^\circ}{2}$ = 68° (1)

(angles at the base of isosceles triangle are the same)

Angle BGH = angle EBC = 68° (1)

(corresponding angles are the same) (1)

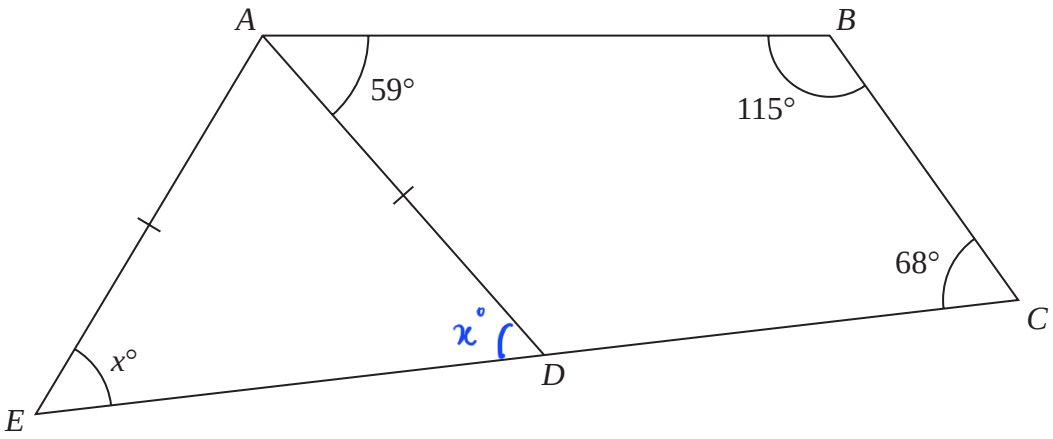
angle JGH = 180° - 68° = 112° (1)

(angles on a straight line sum up to 180°) (1)

112 °

(Total for Question 6 is 5 marks)

7 The diagram shows quadrilateral *ABCD* and isosceles triangle *ADE*, where *AE* = *AD*.



EDC is a straight line.

Work out the value of *x*.
Give a reason for each stage of your working.

$\angle ADE = x°$
(the base angles of an isosceles angle are equal)

$\angle ADC = 360° - 115° - 68° - 59°$
$= 118°$ (1)
(angles in a quadrilateral sums up to 360°) (2)

$\angle ADE = 180° - 118°$
$= 62°$ (1)
(angles on a straight line sums up to 180°)

$x =$ 62° .....

(Total for Question 7 is 4 marks)

8

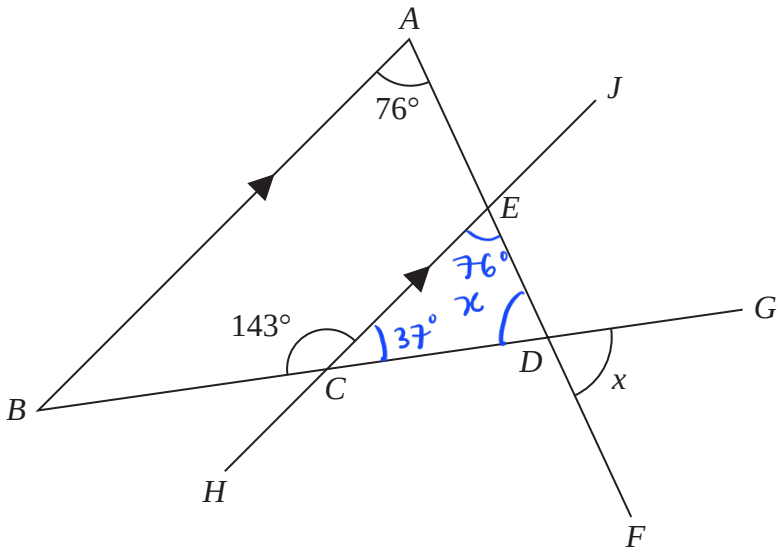


Diagram **NOT** accurately drawn

ABD is a triangle.

AEDF, *BCDG* and *HCEJ* are straight lines.
BA is parallel to *HCEJ*.

Work out the size of the angle marked *x*.

ECD = 180° − 143° = 37° (1)

x = 180° − 76° − 37° = 67°
(1) (1)

67 °

(Total for Question 8 is 3 marks)

9

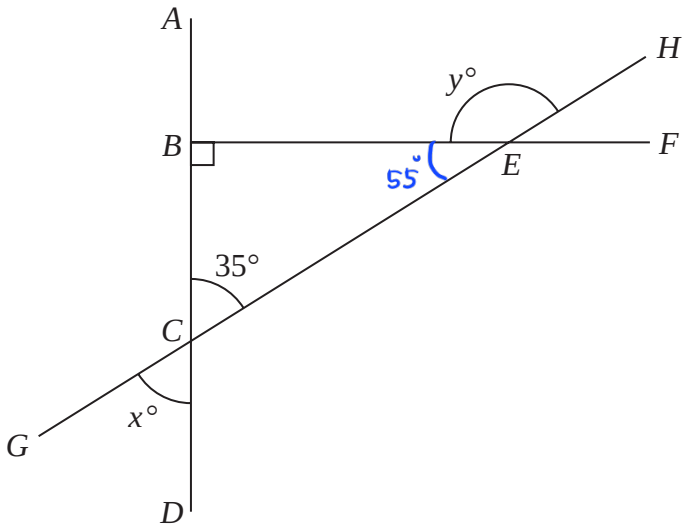


Diagram **NOT** accurately drawn

In the diagram, *BCE* is a right-angled triangle.
ABCD, *BEF* and *GCEH* are straight lines.

Angle *BCE* = 35°

(a) (i) Find the value of *x*

x° = angle BCE = 35° (1)

$x =$ 35

(1)

(ii) Give a reason for your answer.

Vertically opposite angles are equal. (1)

(1)

(b) (i) Work out the value of *y*

angle BEC = $180^\circ - 35^\circ - 90^\circ$
= 55° (1)

$y^\circ = 180^\circ - 55^\circ$
= 125° (1)

$y =$ 125

(2)

(ii) Give a reason for your answer.

Angles in a triangle add up to 180°. Angles on a straight line add up to 180°. (1)

(1)

(Total for Question 9 is 5 marks)

10

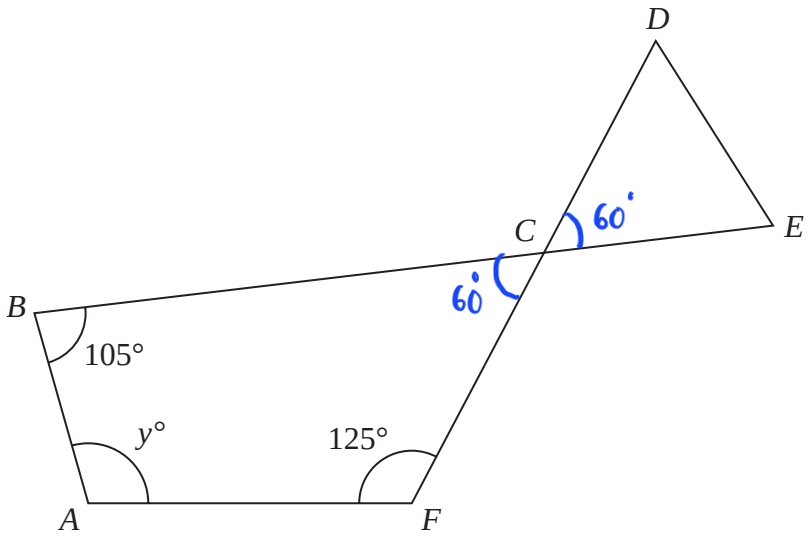


Diagram **NOT** accurately drawn

CDE is an equilateral triangle.
ABCF is a quadrilateral.

BCE and *DCF* are straight lines.

(b) Work out the value of *y*
You must show your working.

CDE : $180^\circ \div 3$
$= 60^\circ$ each angle (1)

$y^\circ = 360^\circ - (105^\circ + 125^\circ + 60^\circ)$ (1)
$= 360^\circ - 290^\circ$
$= 70^\circ$ (1)

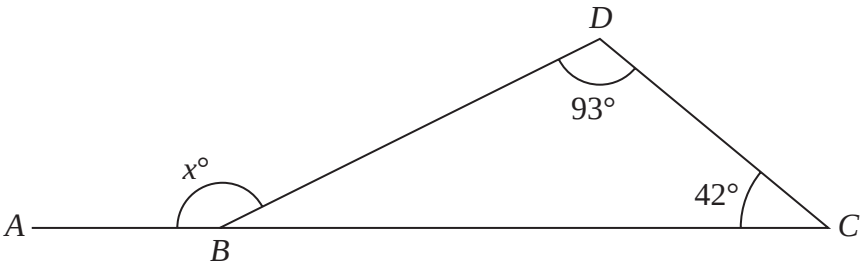
$y =$ 70

(3)

(Total for Question 10 is 3 marks)

11 *ABC* is a straight line and *BCD* is a triangle.

Diagram **NOT** accurately drawn



(a) Work out the value of *x*

$x = 180^\circ - (180^\circ - 93^\circ - 42^\circ)$ (1)

$= 93^\circ + 42^\circ$

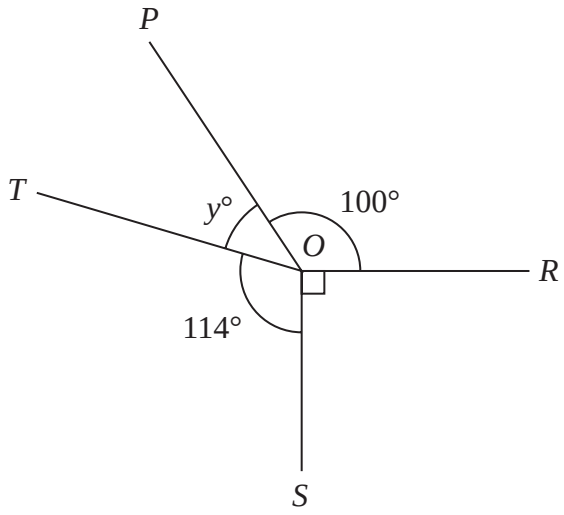
$= 135^\circ$ (1)

$x =$ 135

(2)

PO, *RO*, *SO* and *TO* are four straight lines.

Diagram **NOT** accurately drawn



(b) (i) Work out the value of *y*

$y = 360^\circ - 100^\circ - 114^\circ - 90^\circ$ (1)

$= 56^\circ$ (1)

$y =$ 56

(2)

(ii) Give a reason for your answer.

Angles at a point sum up to 360°. (1)

(1)

(Total for Question 11 is 5 marks)

12 The diagram shows triangle *ABD*

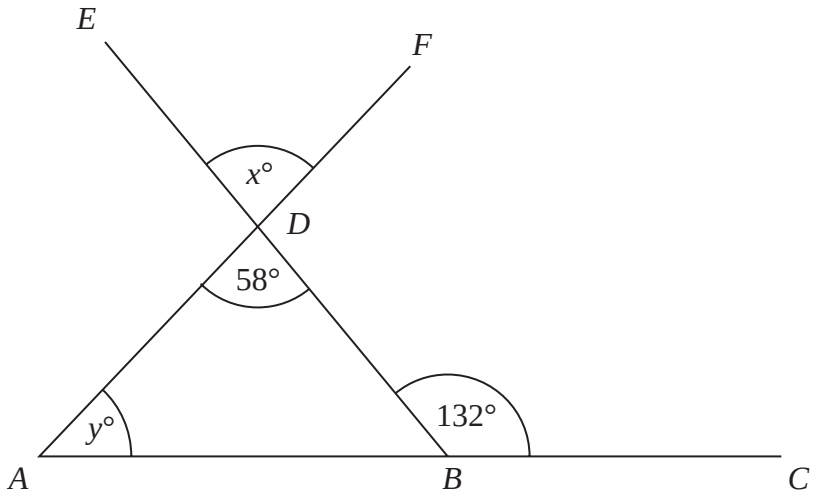


Diagram **NOT** accurately drawn

ABC, *BDE* and *ADF* are straight lines.

angle *CBD* = 132° angle *ADB* = 58°

(a) (i) Write down the value of *x*

x = 58° (1)

(ii) Give a reason for your answer.

Vertically opposite angles are equal (1)

(2)

(b) Work out the value of *y*

ABD = 180° - 132°
= 48° (1)

y° = 180° - 58° - 48°
= 74° (1)

y = 74°

(2)

(Total for Question 12 is 4 marks)

13

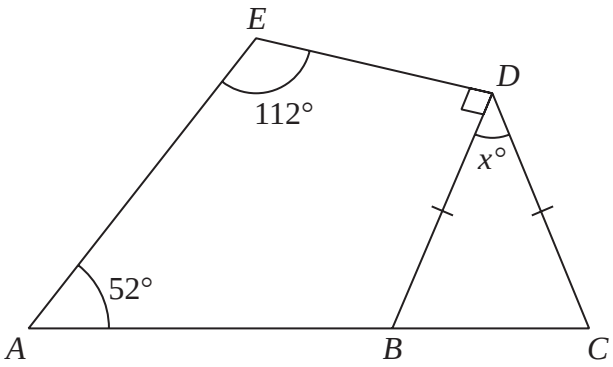


Diagram **NOT** accurately drawn

BCD is an isosceles triangle with *BD* = *CD*
ABC is a straight line.
ABDE is a quadrilateral.

Work out the value of *x*
Give a reason for each stage of your working.

ABD = 360 - 52 - 112 - 90

= 106 (1)

(angles in a quadrilateral add up to 360°) (1)

CBD = 180 - 106

= 74 (1)

(angles on a straight line add to 74°)

x = 180° - 2(74°) - (base angles in isosceles are equal)

= 180° - 148°

= 32° (1)

x = 32

(Total for Question 13 is 4 marks)

14

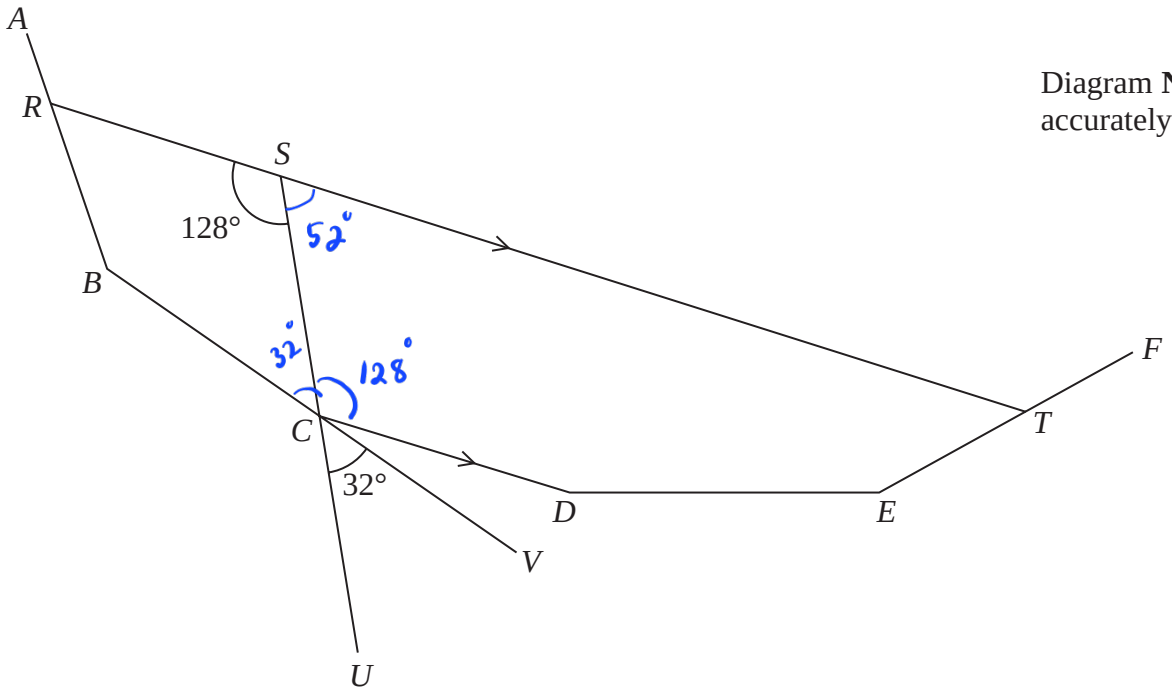


Diagram **NOT** accurately drawn

AB, *BC*, *CD*, *DE* and *EF* are five sides of a regular polygon.

RST, *SCU* and *BCV* are straight lines.
RST is parallel to *CD*
Angle *RSC* = 128°
Angle *UCV* = 32°

Work out how many sides the polygon has.
Show your working clearly.

BCS = UCV = 32°

SCD = RSC = 128° (1)

TSC = 180° − 128° = 52°

interior angle = 128° + 32° = 160° (1)

180 (n − 2) = 160 n (1)

180 n − 360 = 160 n

20 n = 360

n = 18 (1)

18

(Total for Question 14 is 4 marks)

15 The diagram shows a pentagon.

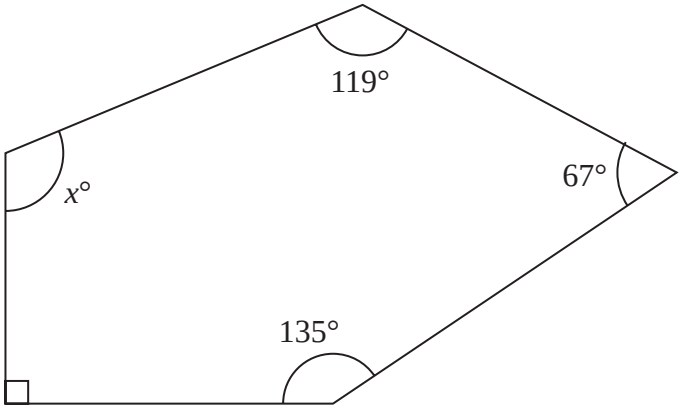


Diagram **NOT** accurately drawn

Work out the value of x

Total angle : $3 \times 180^\circ = 540^\circ$ (1)

$540 - 90 - 135 - 67 - 119$ (1)

$= 540 - 411$

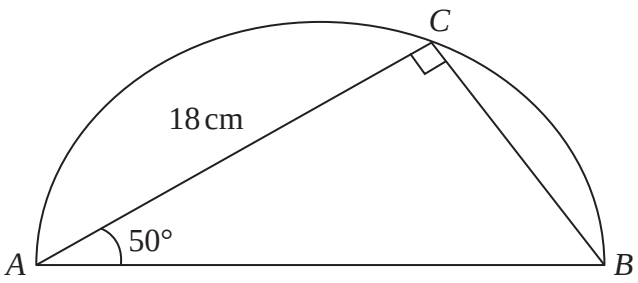
$= 129$ (1)

$x =$ 129

(Total for Question 15 is 3 marks)

16 The diagram shows a triangle *ABC* inside a semicircle.

Diagram **NOT** accurately drawn



A, *B* and *C* are points on the semicircle.

AB is the diameter of the semicircle.

Angle *ACB* = 90°
Angle *BAC* = 50°
AC = 18 cm

Work out the perimeter of the semicircle.
Give your answer correct to 2 significant figures.

$\cos 50^\circ = \frac{18}{AB}$ (1)

$AB = \frac{18}{\cos 50^\circ}$ (1)

$= 28.0030\ldots$

$\frac{1}{2} \times \pi \times 28.0030\ldots = 43.9\ldots$ (1)

$28.0030\ldots + 43.9\ldots$ (1)

$= 71.9900\ldots$

≈ 72 (1)

72

..... cm

(Total for Question 16 is 5 marks)

17 The diagram shows two parallel lines *AB* and *DEF*

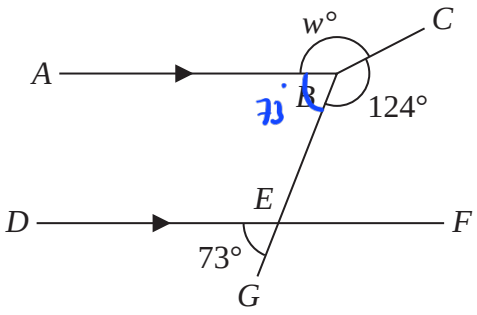


Diagram **NOT** accurately drawn

BEG is a straight line.

angle *DEG* = 73° angle *EBC* = 124° angle *ABC* = *w*°

Work out the value of *w*
Give reasons for each stage of your working.

angle ABE = angle DEG = 73° (1)

(corresponding angles are equal) (1)

w = 360° − 124° − 73° (1)

= 163° (1)

(angles at a point add up to 360°)

w = 163

(Total for Question 17 is 4 marks)

18 The diagram shows quadrilateral *ABCD*

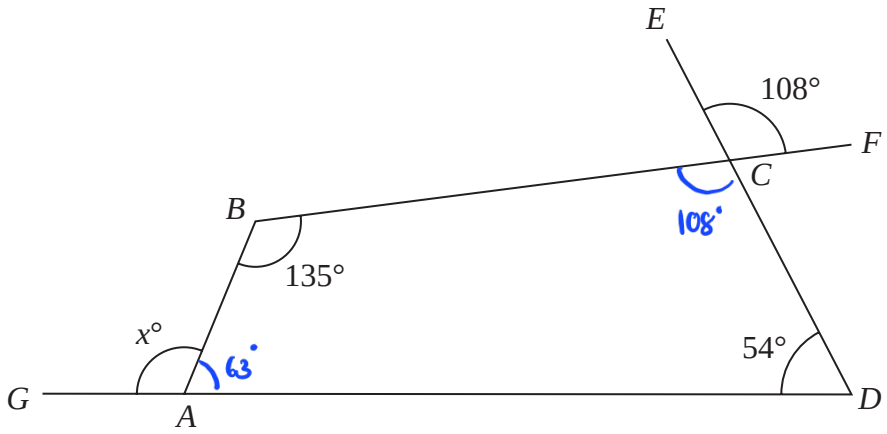


Diagram **NOT** accurately drawn

ECD, *BCF* and *GAD* are straight lines.

Work out the value of x
Give a reason for each stage of your working.

angle BCD = angle ECF = 108° (1)
(vertically opposite angles are equal)

angle BAD = 360° − 135° − 108° − 54° = 63° (1)
(angles in a quadrilateral add up to 360°) (1)

$x°$ = 180° − 63°
= 117° (1)
(angles on a straight line add up to 180°) (1)

x = 117

(Total for Question 18 is 5 marks)

19 The diagram shows quadrilateral *ABCD*

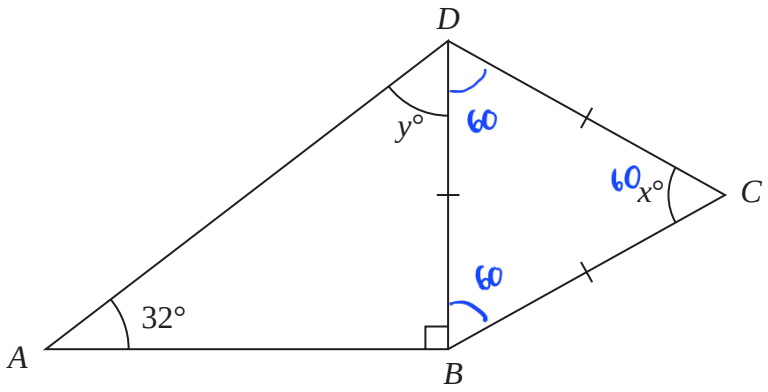


Diagram **NOT** accurately drawn

BC = *CD* = *DB*
angle *DBA* = 90° and angle *DAB* = 32°

(a) Work out the value of *x*

x = 60 (1)

(1)

(b) (i) Work out the value of *y*

180 − 90 − 32 = 58

y = 58 (1)

(1)

(ii) Give a reason for your answer to (b)(i).

Angles in a triangle add up to 180° (1)

(1)

(Total for Question 19 is 3 marks)

20 *ABCD* is a trapezium.

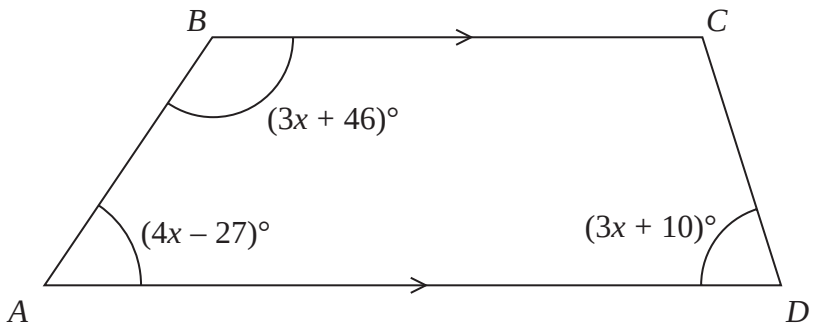


Diagram **NOT** accurately drawn

BC is parallel to *AD*

Find the size of the largest angle inside the trapezium.

$(4x - 27) + (3x + 46) = 180$ (1)

$7x = 180 - 19$

$7x = 161$

$x = 23$ (1)

$ABC = 3(23) + 46 = 115$

$BAD = 4(23) - 27 = 65$ (1)

$ADC = 3(23) + 10 = 79$

$BCD = 180 - 79 = 101$

(1) 115 °

(Total for Question 20 is 4 marks)

21 Here is a 9-sided regular polygon *ABCDEFGHJ*, with centre *O*

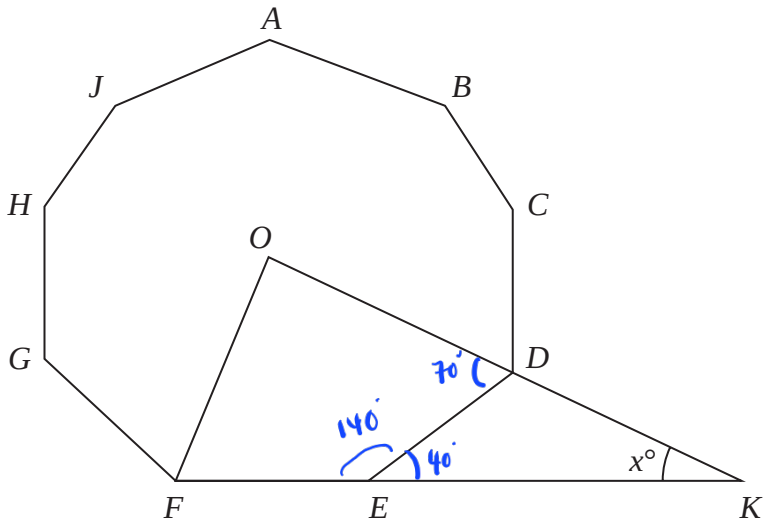


Diagram **NOT** accurately drawn

ODK and *FEK* are straight lines.

Work out the value of *x*

interior angle of polygon $= \frac{(9-2)(180)}{9} = 140°$ (1)

$DEK = 180° - 140° = 40°$

$EDK = 180° - \left(\frac{140}{2}\right) = 110°$ (1)

$x = 180° - 110° - 40°$

$= 30°$ (1)

$x =$ 30

(Total for Question 21 is 3 marks)