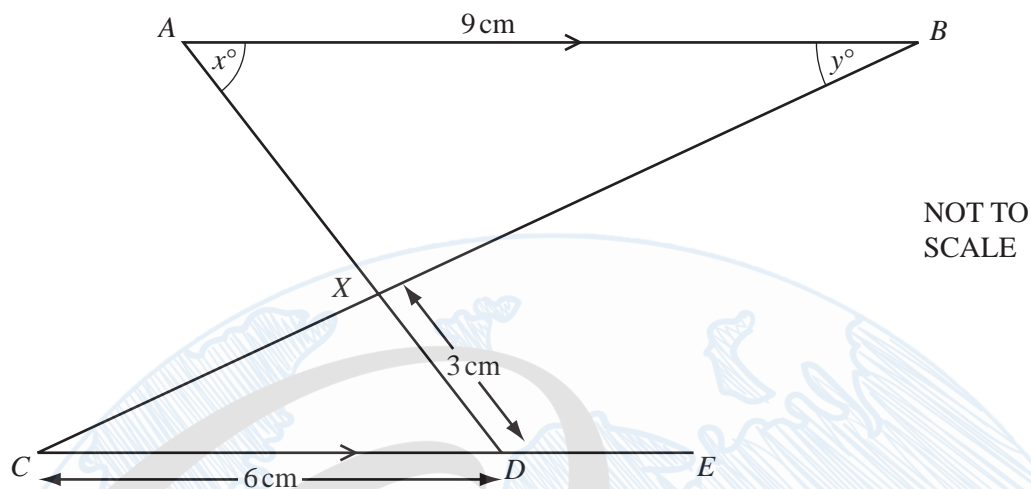# Plane Geometry

9 **(a)**

The lines AB and CDE are parallel.
AD and CB intersect at X.
$AB = 9$ cm, $CD = 6$ cm and $DX = 3$ cm.

(i) Complete the following statement.

Triangle ABX is .... to triangle DCX.   [1]

(ii) Calculate the length of AX.

Answer(a)(ii) $AX =$ .... cm   [2]

(iii) The area of triangle DCX is 6 cm^2.

Calculate the area of triangle ABX.

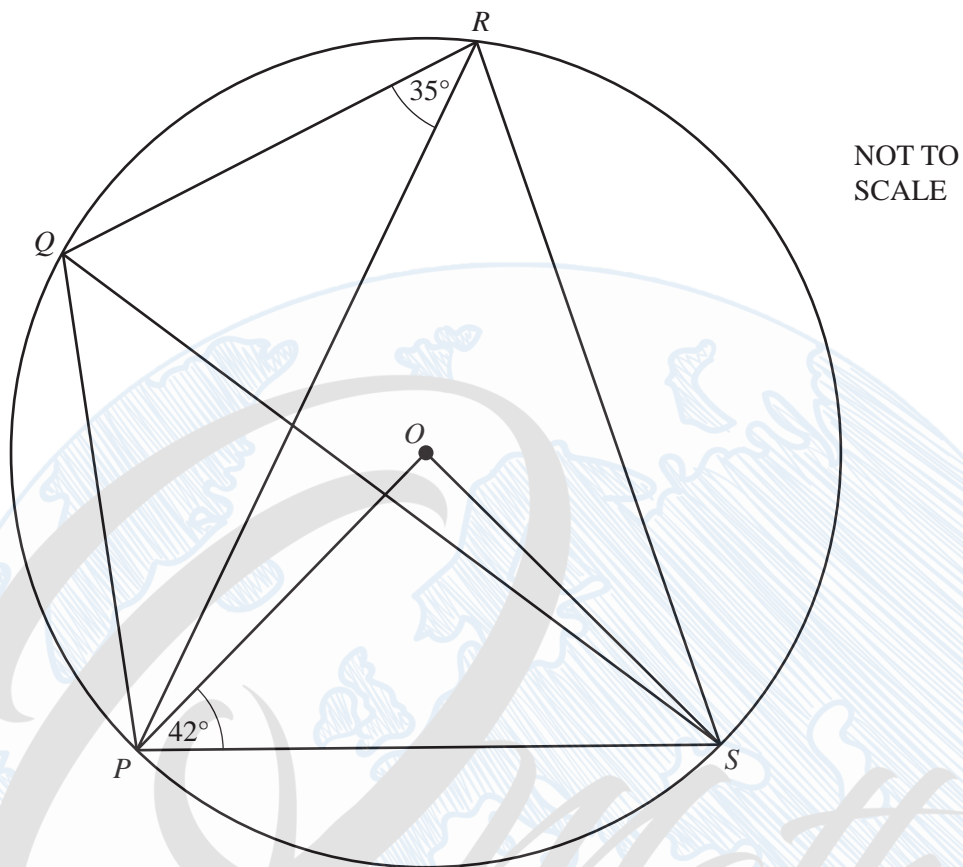*Answer(a)*(iii) .... cm^2 [2]

(iv) Angle $BAX = x°$ and angle $ABX = y°$.

Find angle AXB and angle XDE in terms of x and/or y.

Answer(a)(iv) Angle AXB = ...

Angle XDE = ...   [2]

(b)

NOT TO SCALE

P, Q, R and *S* lie on a circle, centre *O*.
Angle *OPS* = 42° and angle *PRQ* = 35°.

Calculate

(i) angle *POS*,

Answer(b)(i) Angle *POS* = ... [1]

(ii) angle *PRS*,

Answer(b)(ii) Angle *PRS* = ... [1]

(iii) angle *SPQ*,

Answer(b)(iii) Angle *SPQ* = ... [1]

(iv) angle *PSQ*.
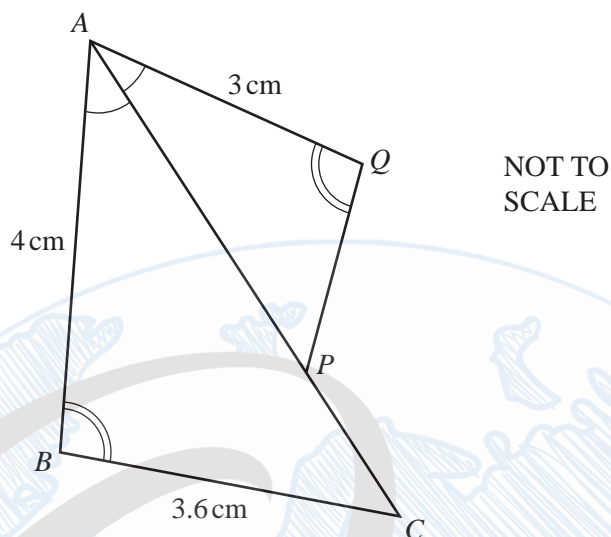
Answer(b)(iv) Angle *PSQ* = ... [1]

(c) The interior angle of a regular polygon is 8 times as large as the exterior angle.

Calculate the number of sides of the polygon.

Answer(c) .... [3]

5 **(a)**

The diagram shows two triangles *ACB* and *APQ*.

Angle *PAQ* = angle *BAC* and angle *AQP* = angle *ABC*.

AB = 4 cm, *BC* = 3.6 cm and *AQ* = 3 cm.

(i) Complete the following statement.

Triangle *ACB* is .... to triangle *APQ*. [1]

(ii) Calculate the length of *PQ*.

Answer(a)(ii) *PQ* = ... cm [2]

(iii) The area of triangle *ACB* is 5.6 cm^2.

Calculate the area of triangle *APQ*.

Answer(a)(iii) .... cm^2 [2]

(b)
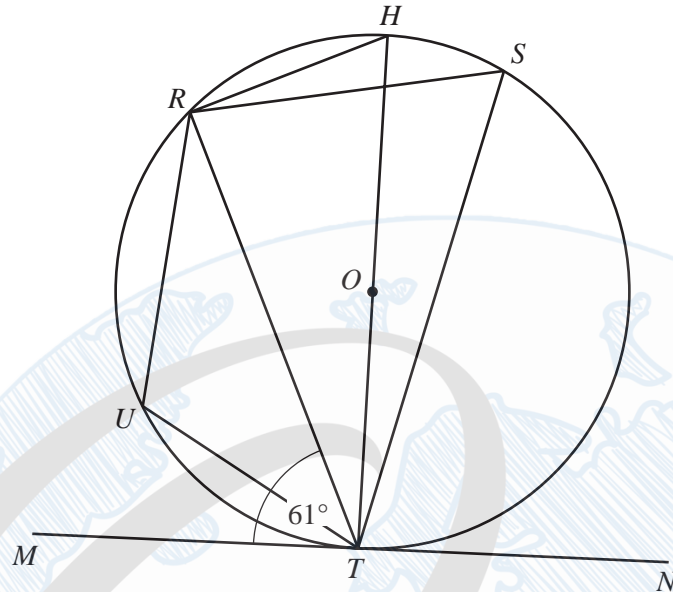
NOT TO
SCALE

R, H, S, T and U lie on a circle, centre O.
HT is a diameter and MN is a tangent to the circle at T.
Angle $RTM = 61°$.

Find

(i) angle RTH,

Answer(b)(i) Angle $RTH =$ .... [1]

(ii) angle RHT,

Answer(b)(ii) Angle $RHT =$ .... [1]

(iii) angle RST,

Answer(b)(iii) Angle $RST =$ .... [1]

(iv) angle RUT.

Answer(b)(iv) Angle $RUT =$ .... [1]

(c) *ABCDEF* is a hexagon.
The interior angle B is $4°$ greater than interior angle A.
The interior angle C is $4°$ greater than interior angle B, and so on, with each of the next interior angles $4°$ greater than the previous one.
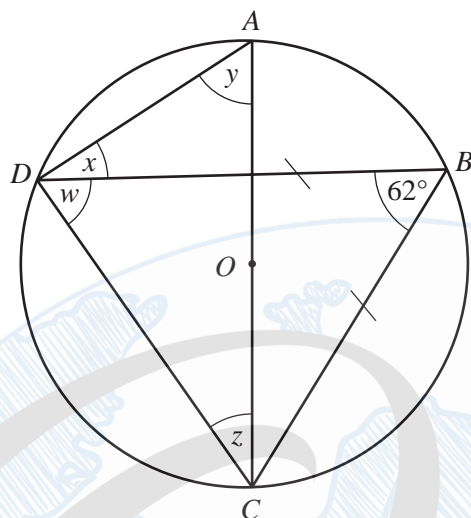
(i) By how many degrees is interior angle F greater than interior angle A?

Answer(c)(i) .... [1]

(ii) Calculate interior angle A.

Answer(c)(ii) .... [3]

7   (a)

NOT TO
SCALE

A, *B*, *C* and *D* are points on the circumference of a circle centre *O*.
AC is a diameter.
BD = *BC* and angle *DBC* = 62°.

Work out the values of *w*, *x*, *y* and *z*.
Give a reason for each of your answers.

w = ... because .... [2]

x = ... because .... [2]

y = ... because .... [2]

z = ... because .... [2]

4
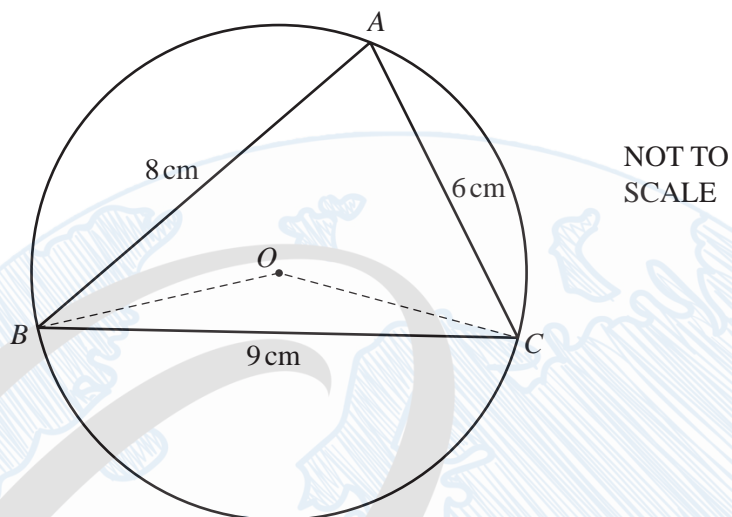
The circle, centre *O*, passes through the points *A*, *B* and *C*.

In the triangle *ABC*, *AB* = 8 cm, *BC* = 9 cm and *CA* = 6 cm.

(a) Calculate angle *BAC* and show that it rounds to 78.6°, correct to 1 decimal place.

Answer(a)

[4]

(b) *M* is the midpoint of *BC*.

    (i) Find angle *BOM*.

Answer(b)(i) Angle *BOM* = ... [1]

(ii) Calculate the radius of the circle and show that it rounds to 4.59 cm, correct to 3 significant figures.
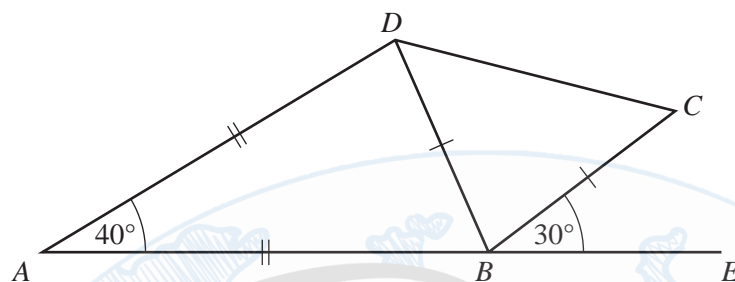
Answer(b)(ii)

[3]

(c) Calculate the area of the triangle *ABC* as a percentage of the area of the circle.

Answer(c) .... % [4]

3 **(a)**

NOT TO
SCALE

ABCD is a quadrilateral with angle *BAD* = 40°.
AB is extended to *E* and angle *EBC* = 30°.
AB = *AD* and *BD* = *BC*.

(i) Calculate angle *BCD*.

Answer(a)(i) Angle *BCD* = ... [3]

(ii) Give a reason why *DC* is not parallel to *AE*.

Answer(a)(ii) .... [1]

(b) A regular polygon has *n* sides.

Each exterior angle is $\dfrac{5n}{2}$ degrees.

Find the value of *n*.

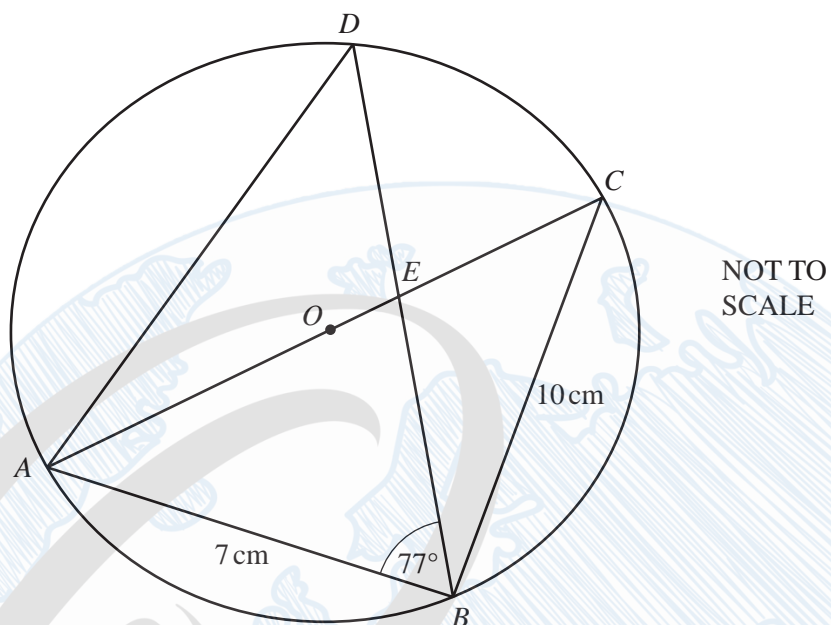*Answer(b) n* = ... [3]

(c)

NOT TO SCALE
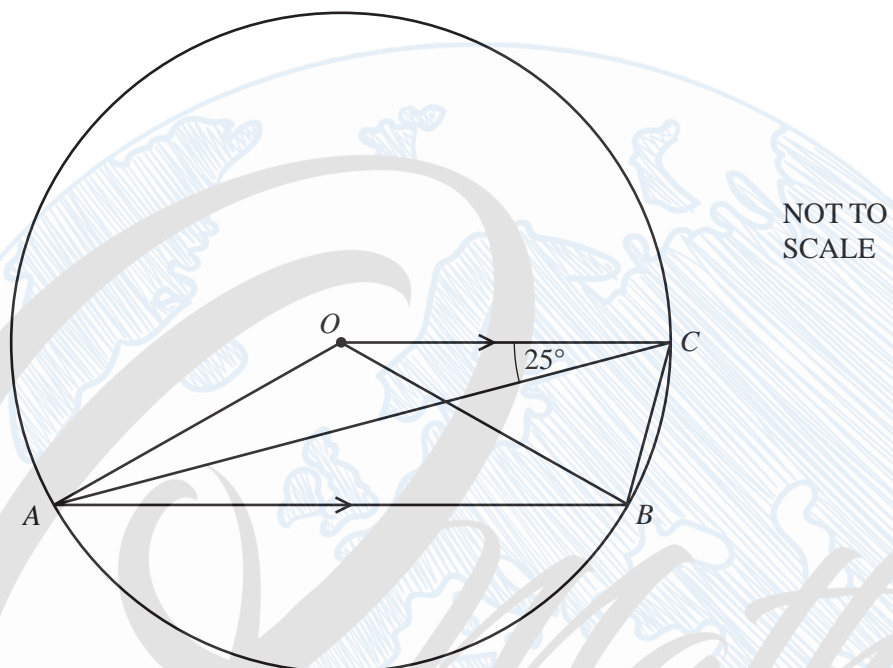
The diagram shows a circle centre *O*.
A, *B* and *C* are points on the circumference.
OC is parallel to *AB*.
Angle *OCA* = 25°.

Calculate angle *OBC*.

Answer(c) Angle *OBC* = ... [3]

4

NOT TO
SCALE

A, *B*, *C* and *D* lie on a circle, centre *O*.
AB = 7 cm, *BC* = 10 cm and angle *ABD* = 77°.
AOC is a diameter of the circle.

(a) Find angle *ABC*.

Answer(a) Angle *ABC* = ... [1]

(b) Calculate angle *ACB* and show that it rounds to 35° correct to the nearest degree.

Answer(b)

[2]

(c) Explain why angle *ADB* = angle *ACB*.

Answer(c) .... [1]

(d) (i) Calculate the length of *AD*.

Answer(d)(i) *AD* = ... cm [3]

(ii) Calculate the area of triangle *ABD*.

Answer(d)(ii) .... cm^2 [2]

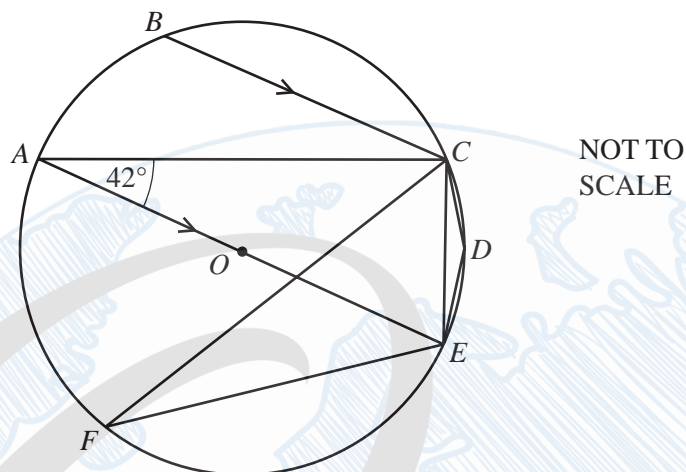**(e)** The area of triangle *AED* = 12.3 cm^2, correct to 3 significant figures.

Use similar triangles to calculate the area of triangle *BEC*.

Answer(e) .... cm^2 [3]

4 **(a)**

A, *B*, *C*, *D*, *E* and *F* are points on the circumference of a circle centre *O*.
AE is a diameter of the circle.
BC is parallel to *AE* and angle *CAE* = 42°.

Giving a reason for each answer, find

(i) angle *BCA*,

Answer(a)(i) Angle *BCA* = ...

Reason .... [2]

(ii) angle *ACE*,

Answer(a)(ii) Angle *ACE* = ...

Reason .... [2]

(iii) angle *CFE*,

Answer(a)(iii) Angle *CFE* = ...

Reason .... [2]

(iv) angle *CDE*.

Answer(a)(iv) Angle *CDE* = ...

Reason .... [2]
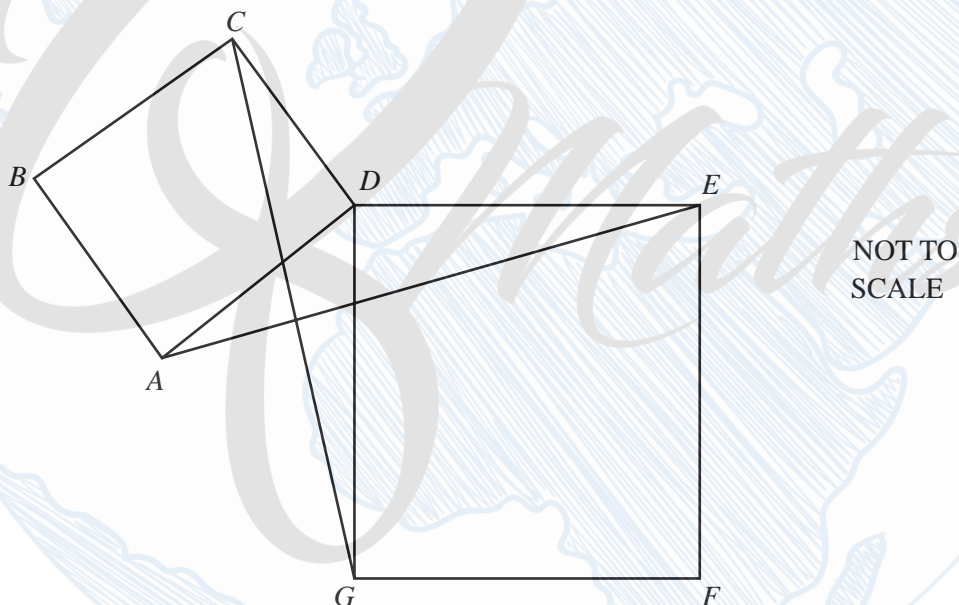
(b)

NOT TO SCALE
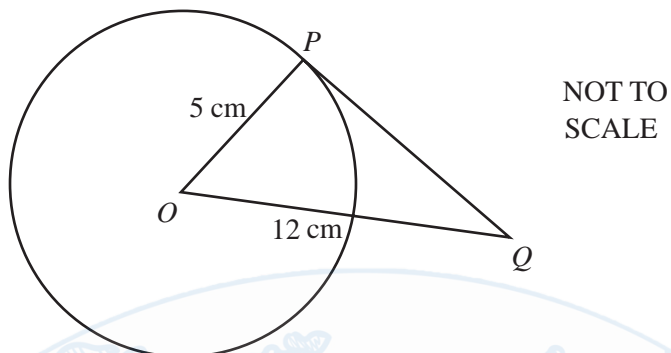
In the diagram, O is the centre of the circle and PQ is a tangent to the circle at P.
$OP = 5$ cm and $OQ = 12$ cm.

Calculate PQ.

Answer(b) PQ = ... cm [3]

(c)

NOT TO SCALE

In the diagram, $ABCD$ and $DEFG$ are squares.

(i) In the triangles CDG and ADE, explain with a reason which sides and/or angles are equal.
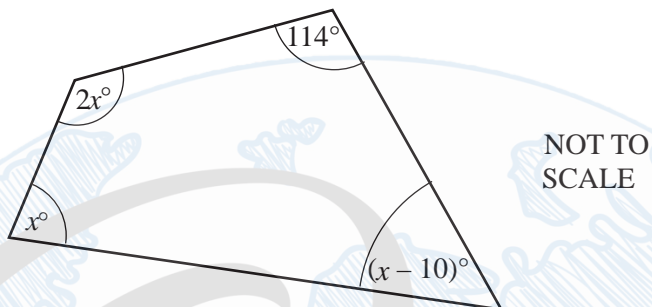
Answer (c)(i) www.Q8Maths.com

[3]

(ii) Complete the following statement.

Triangle CDG is .... to triangle ADE. [1]

6   (a)

Find the value of x.

Answer(a) x = ... **[3]**

8 **(a)**

NOT TO SCALE
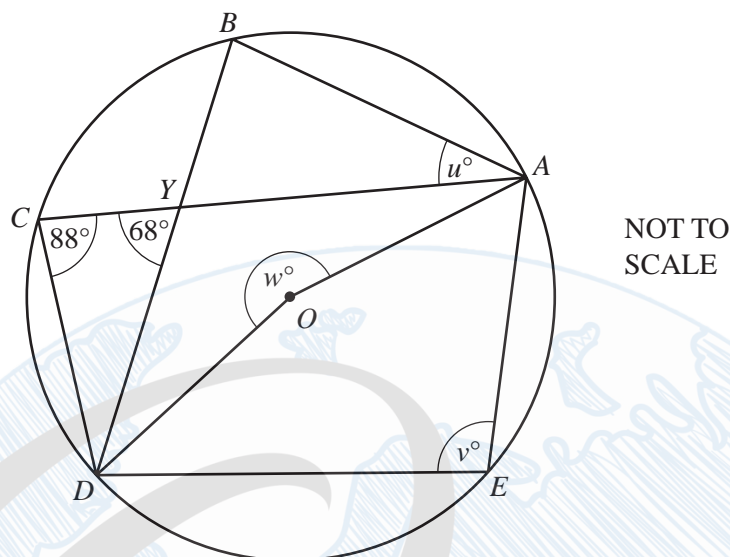
A, B, C, D and E lie on the circle, centre O.
CA and BD intersect at Y.
Angle $DCA = 88°$ and angle $CYD = 68°$.
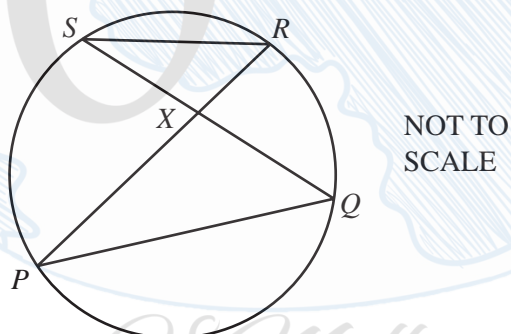Angle $BAC = u°$, angle $AED = v°$ and reflex angle $AOD = w°$.

Calculate the values of u, v and w.

Answer(a) $u =$ ....

$v =$ ....

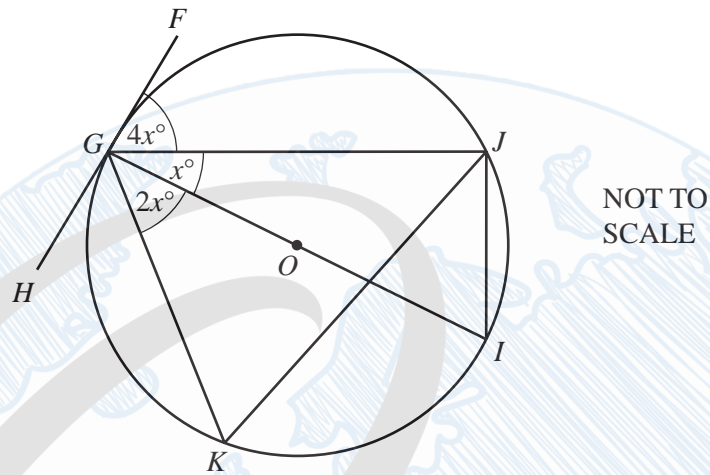$w =$ .... [4]

(b)

NOT TO SCALE

P, Q, R and S lie on the circle. PR and QS intersect at X.
The area of triangle $RSX = 1.2 \text{ cm}^2$ and $PX = 3\ SX$.

Calculate the area of triangle PQX.

Answer(b) .... cm^2 [2]

(c)

NOT TO
SCALE

GI is a diameter of the circle.
FGH is a tangent to the circle at *G*.
J and *K* also lie on the circle.
Angle *JGI* = $x°$, angle *FGJ* = $4x°$ and angle *KGI* = $2x°$.

Find

(i) the value of x,

Answer(c)(i) $x =$ .... [2]

(ii) the size of angle *JKG*,

Answer(c)(ii) Angle *JKG* = ... [2]

(iii) the size of angle *GJK*.

Answer(c)(iii) Angle *GJK* = ... [1]

7

NOT TO SCALE
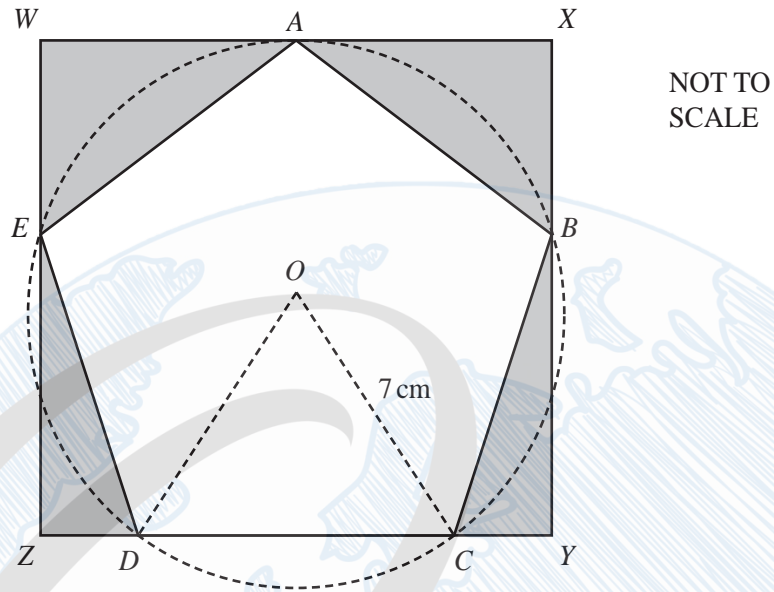
The vertices *A*, *B*, *C*, *D* and *E* of a regular pentagon lie on the circumference of a circle, centre *O*, radius 7 cm.
They also lie on the sides of a rectangle *WXYZ*.

(a) Show that

(i) angle *DOC* = 72°,

Answer(a)(i)

[1]

(ii) angle *DCB* = 108°,

Answer(a)(ii)

[2]

(iii) angle *CBY* = 18°.

Answer(a)(iii)

[1]

(b) Show that the length *CD* of one side of the pentagon is 8.23 cm correct to three significant figures.

Answer(b)

[3]

(c) Calculate

   (i) the area of the triangle *DOC*,

                                                              Answer(c)(i) .... cm^2 [2]

   (ii) the area of the pentagon *ABCDE*,

                                                              Answer(c)(ii) .... cm^2 [1]

   (iii) the area of the sector *ODC*,

                                                              Answer(c)(iii) .... cm^2 [2]

   (iv) the length *XY*.

                                                              Answer(c)(iv) .... cm [2]
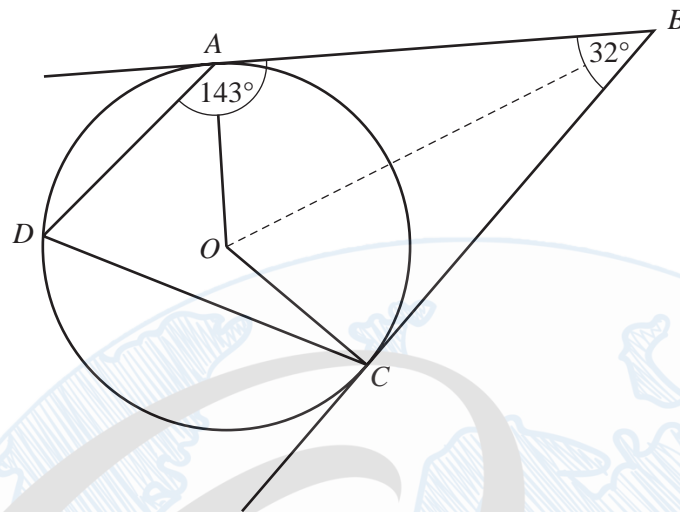
(d) Calculate the ratio

        area of the pentagon *ABCDE* : area of the rectangle *WXYZ*.

Give your answer in the form 1 : *n*.

                                        Answer(d)   1 : .... [5]

4 **(a)**

Points A, C and D lie on a circle centre O.
BA and BC are tangents to the circle.
Angle $ABC = 32°$ and angle $DAB = 143°$.

(i) Calculate angle AOC in quadrilateral $AOCB$.

Answer(a)(i) Angle $AOC =$ .... [2]

(ii) Calculate angle ADC.

Answer(a)(ii) Angle $ADC =$ .... [1]

(iii) Calculate angle OCD.

Answer(a)(iii) Angle $OCD =$ .... [2]

(iv) $OA = 6$ cm.

Calculate the length of AB.

Answer(a)(iv) $AB =$ .... cm [3]

(b)
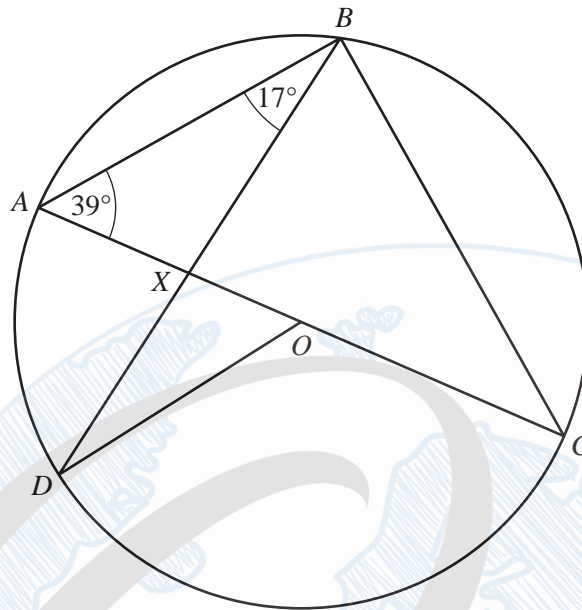
NOT TO SCALE

A, B, C and D are on the circumference of the circle centre O.
AC is a diameter.
Angle $CAB = 39°$ and angle $ABD = 17°$.

(i) Calculate angle ACB.

Answer(b)(i) Angle $ACB =$ .... [2]

(ii) Calculate angle BXC.

Answer(b)(ii) Angle $BXC =$ .... [2]

(iii) Give the reason why angle DOA is 34°.

Answer(b)(iii) .... [1]

(iv) Calculate angle BDO.

Answer(b)(iv) Angle $BDO =$ .... [1]

(v) The radius of the circle is 12 cm. Calculate the length of major arc $ABCD$

Answer(b)(v) Arc $ABCD =$ .... cm [3]
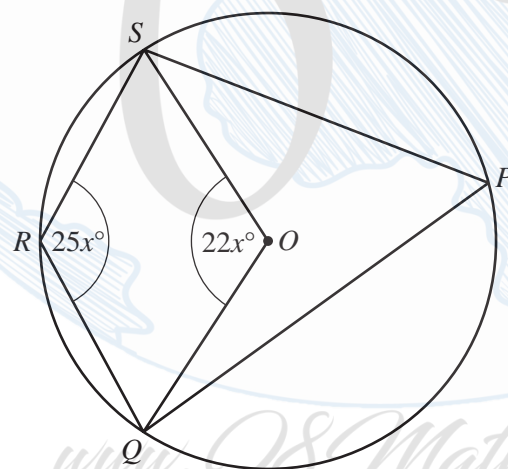
8 **(a)**
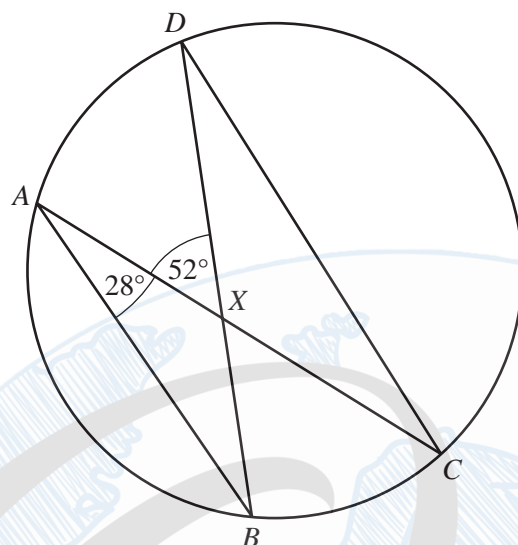
NOT TO
SCALE

A, *B*, *C* and *D* lie on a circle.
The chords *AC* and *BD* intersect at *X*.
Angle *BAC* = 28° and angle *AXD* = 52°.
Calculate angle *XCD*.

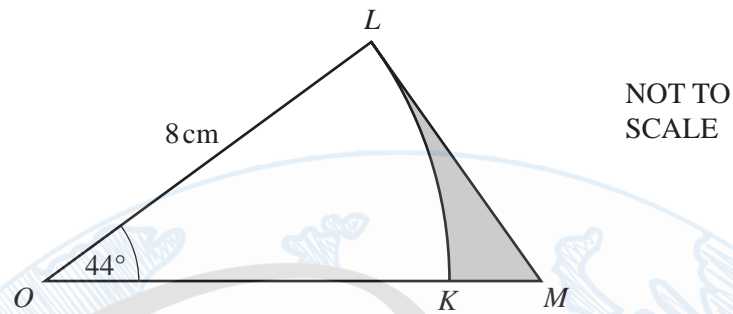*Answer(a)* Angle *XCD* = ... [3]

(b)

NOT TO
SCALE

PQRS is a cyclic quadrilateral in the circle, centre *O*.
Angle *QOS* = 22*x*° and angle *QRS* = 25*x*°.
Find the value of *x*.

Answer(b) x = ... [3]

(c)

NOT TO SCALE

In the diagram OKL is a sector of a circle, centre O and radius $8\,$cm.
OKM is a straight line and ML is a tangent to the circle at L.
Angle $LOK = 44°$.

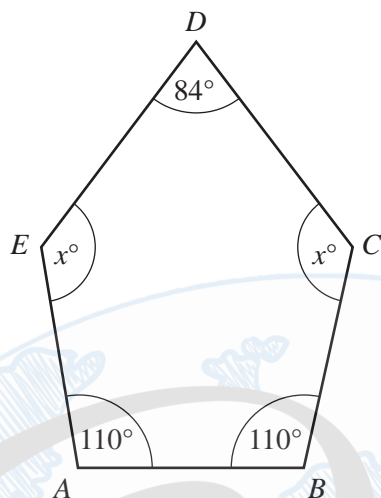Calculate the area shaded in the diagram.

Answer(c) .... cm^2 [5]

8 **(a)**

D
84°

E $x°$ $x°$ C

110°   110°

A   B

NOT TO
SCALE

In the pentagon *ABCDE*, angle *EAB* = angle *ABC* = 110° and angle *CDE* = 84°.
Angle *BCD* = angle *DEA* = $x°$.

(i) Calculate the value of *x*.

Answer(a)(i) *x* = ... [2]

(ii) *BC* = *CD*.
Calculate angle *CBD*.

Answer(a)(ii) Angle *CBD* = ... [1]

(iii) This pentagon also has one line of symmetry.
Calculate angle *ADB*.

Answer(a)(iii) Angle *ADB* = ... [1]

(b) *A*, *B* and *C* lie on a circle centre *O*.
Angle *AOC* = $3y°$ and angle *ABC* = $(4y + 4)°$.

Find the value of *y*.

NOT TO
SCALE

O
$3y°$
A
C
$(4y + 4)°$
B
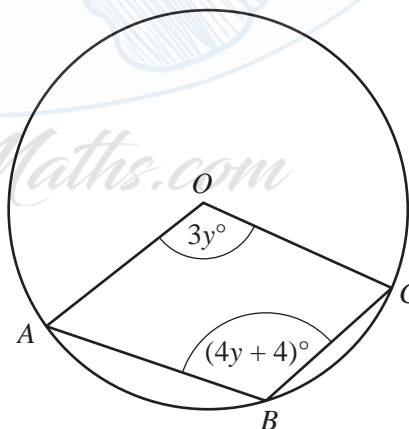
Answer(b) *y* = ... [4]

(c)
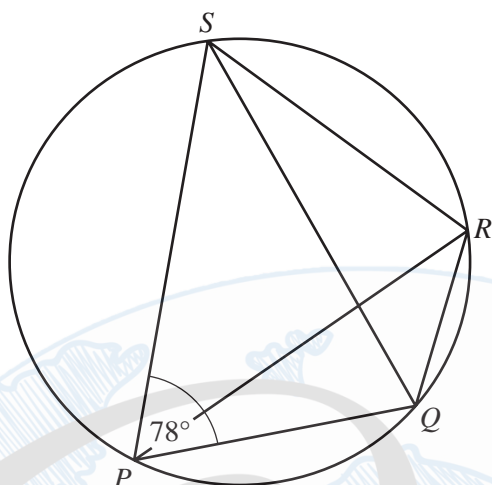
NOT TO SCALE

In the cyclic quadrilateral *PQRS*, angle *SPQ* = 78°.

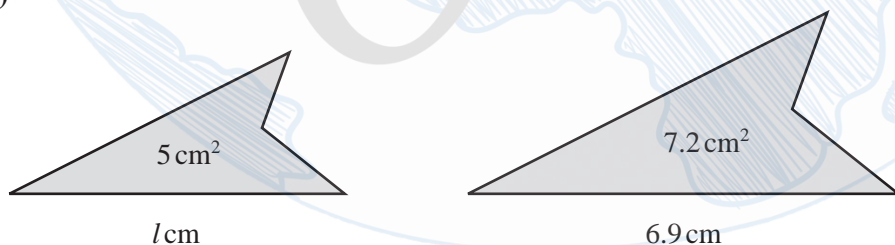**(i)** Write down the geometrical reason why angle *QRS* = 102°.

Answer(c)(i) .... [1]

(ii) Angle *PRQ* : Angle *PRS* = 1 : 2.

Calculate angle *PQS*.
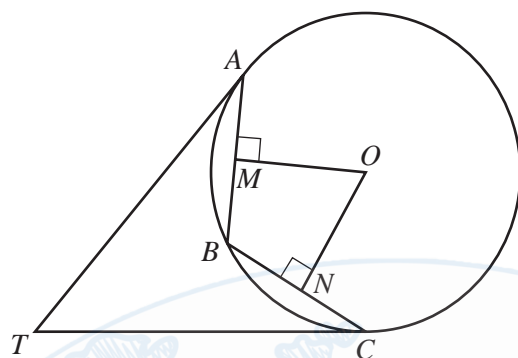
Answer(c)(ii) Angle *PQS* = ... [3]

(d)

NOT TO SCALE

The diagram shows two similar figures.
The areas of the figures are 5 cm² and 7.2 cm².
The lengths of the bases are *l* cm and 6.9 cm.

Calculate the value of *l*.

Answer(d) l = ... [3]

4

NOT TO
SCALE

A, B and C lie on the circle centre O, radius 8.5 cm.
$AB = BC = 10.7$ cm.
OM is perpendicular to AB and ON is perpendicular to BC.

(a) Calculate the area of the circle.

Answer(a) .... cm^2 [2]

(b) Write down the length of MB.

Answer(b) .... cm [1]

(c) Calculate angle MOB and show that it rounds to 39° correct to the nearest degree.

Answer(c)

[2]

(d) Using angle MOB = 39°, calculate the length of the **major** arc AC.

Answer(d) .... cm [3]

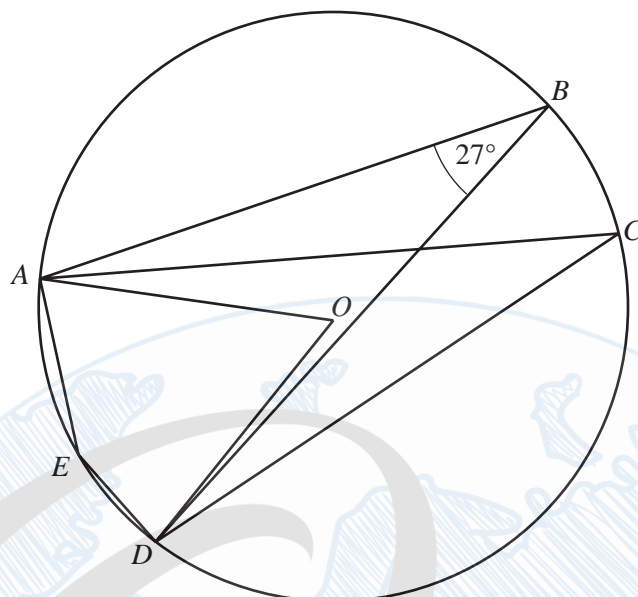**(e)** The tangents to the circle at A and at C meet at T.

Explain clearly why triangle ATB is congruent to triangle CTB.
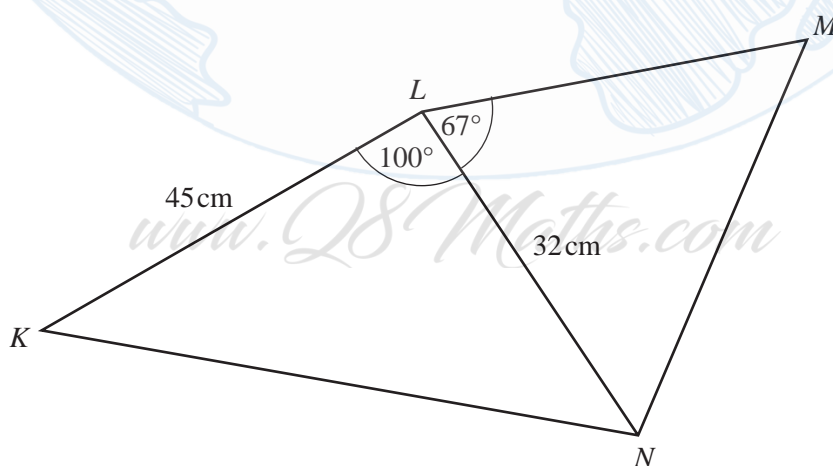
Answer(e)

[3]

8 **(a)**

NOT TO
SCALE

A, B, C, D and E are points on the circle centre O.
Angle $ABD = 27°$.

Find

(i) angle ACD,

Answer(a)(i) Angle $ACD =$ .... [1]

(ii) angle AOD,

Answer(a)(ii) Angle $AOD =$ .... [1]

(iii) angle AED.

Answer(a)(iii) Angle $AED =$ .... [1]

(b)

NOT TO
SCALE

The diagram shows quadrilateral $KLMN$
$KL = 45$ cm, $LN = 32$ cm, angle $KLN = 100°$ and angle $NLM = 67°$.

(i) Calculate the length *KN*.

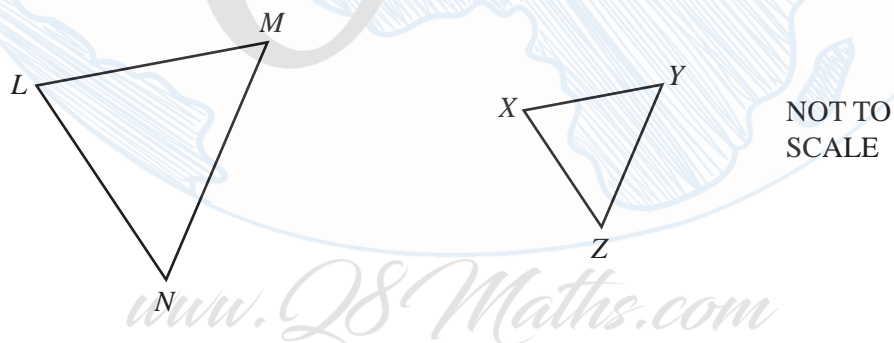*Answer(b)*(i) *KN* = ... cm [4]

(ii) The area of triangle *LMN* is 324 cm^2.

Calculate the length *LM*.

Answer(b)(ii) *LM* = ... cm [3]

(iii) Another triangle *XYZ* is mathematically similar to triangle *LMN*.

NOT TO SCALE

XZ = 16 cm and the area of triangle *LMN* is 324 cm^2.

Calculate the area of triangle *XYZ*.

Answer(b)(iii) .... cm^2 [2]

4   **(a)**   One angle of an isosceles triangle is 48°.

Write down the possible pairs of values for the remaining two angles.

Answer(a) .... and ....

.... and .... [2]

(b)   Calculate the sum of the interior angles of a pentagon.

Answer(b) .... [2]

(c)   Calculate the sum of the angles *a*, *b*, *c*, *d*, *e*, *f* and *g* shown in this diagram.
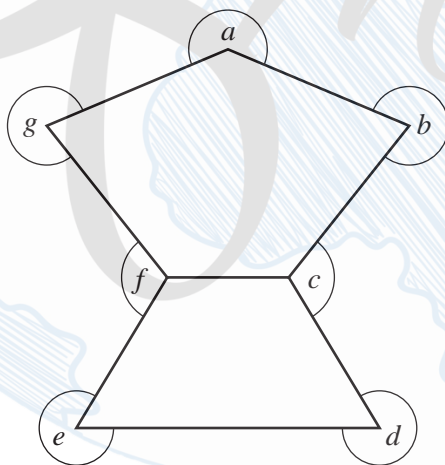
NOT TO SCALE

Answer(c) .... [2]

(d) The trapezium, *ABCD*, has four angles as shown.
All the angles are in degrees.
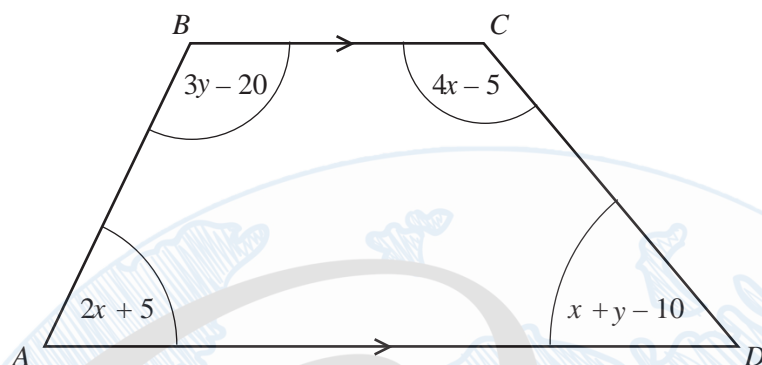
(i) Show that $7x + 4y = 390$.

Answer(d)(i)

[1]

(ii) Show that $2x + 3y = 195$.

Answer(d)(ii)

[1]

(iii) Solve these simultaneous equations.

Answer(d)(iii) $x =$ ....

$y =$ .... [4]
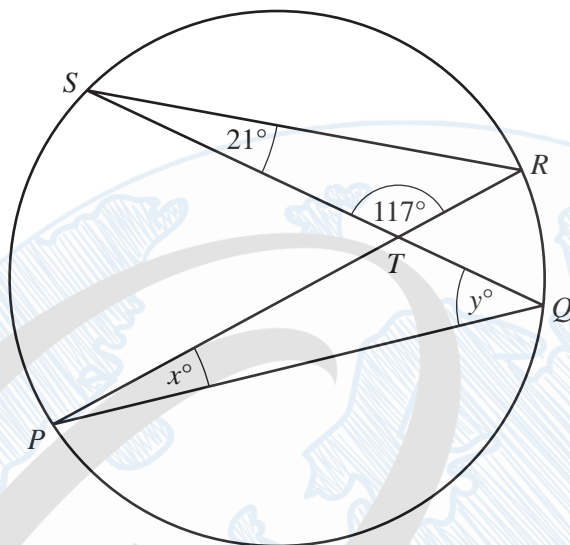
(iv) Use your answer to **part (d)(iii)** to find the sizes of all four angles of the trapezium.

Answer(d)(iv) .... , ... , ... , ... [1]

6

(a) The chords *PR* and *SQ* of the circle intersect at *T*.
Angle *RST* = 21° and angle *STR* = 117°.

(i) Find the values of *x* and *y*.

Answer(a)(i) *x* = ...

y = ... [2]

(ii) *SR* = 8.23 cm, *RT* = 3.31 cm and *PQ* = 9.43 cm.

Calculate the length of *TQ*.

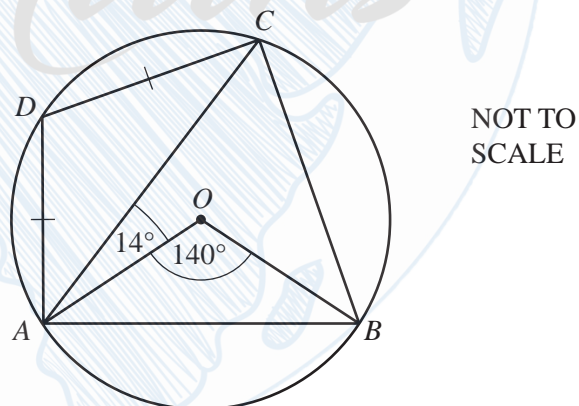*Answer(a)*(ii) *TQ* = ... cm [2]

(b) *EFGH* is a cyclic quadrilateral.
EF is a diameter of the circle.
KE is the tangent to the circle at *E*.
GH is parallel to *FE* and angle *KEG* = 115°.

NOT TO SCALE
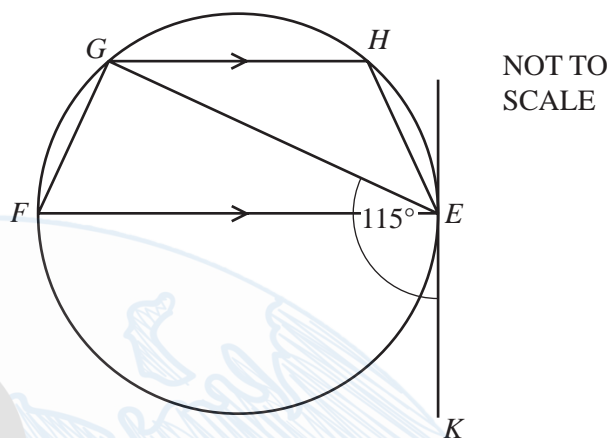
Calculate angle *GEH*.

Answer(b) Angle *GEH* = ... [4]

(c) *A*, *B*, *C* and *D* are points on the circle centre *O*.
Angle *AOB* = 140° and angle *OAC* = 14°.
AD = *DC*.

NOT TO SCALE

Calculate angle *ACD*.

Answer(c) Angle *ACD* = ... [5]

11 The total area of each of the following shapes is *X*.
The area of the shaded part of each shape is *kX*.

For each shape, find the value of *k* and write your answer below each diagram.

NOT TO
SCALE

NOT TO
SCALE

NOT TO
SCALE

O ⟨72°⟩

$AB = BC = CD$

Angle $JOK = 72°$

$EF = FG$ and $EI = IH$

k = ...

k = ...

k = ...
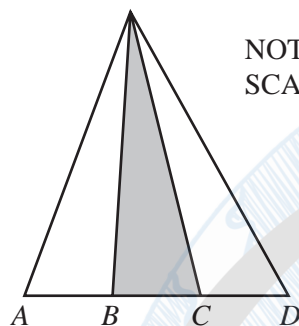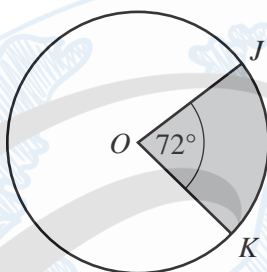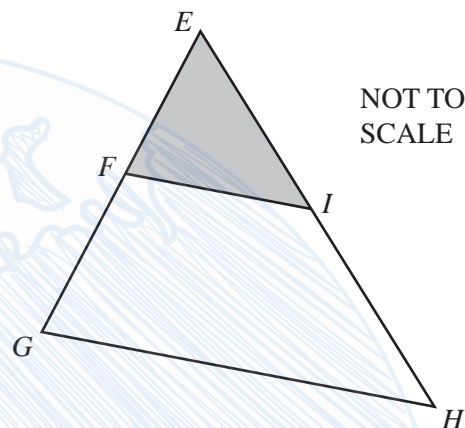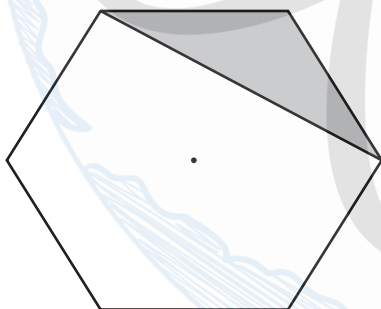
NOT TO
SCALE

NOT TO
SCALE

The shape is a regular hexagon.
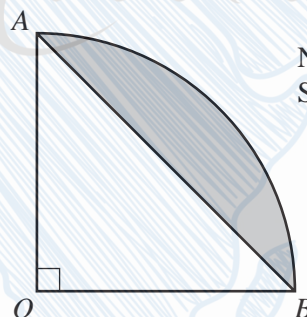
The diagram shows a sector of a circle centre *O*.
Angle $AOB = 90°$

k = ...

k = ...

[10]

7 **(a)**
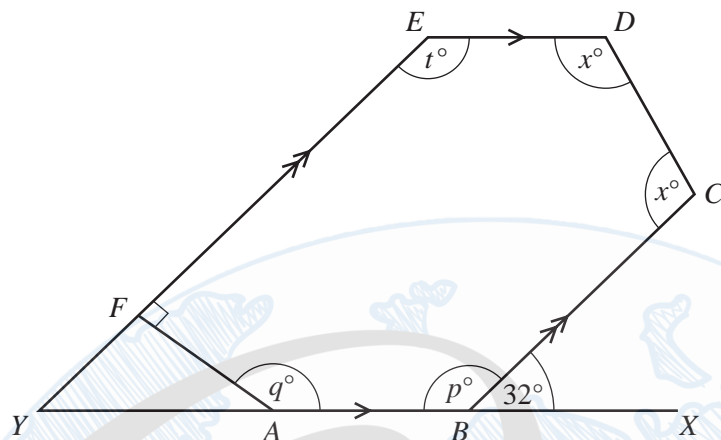
ABCDEF is a hexagon.
AB is parallel to *ED* and *BC* is parallel to *FE*.
YFE and *YABX* are straight lines.
Angle *CBX* = 32° and angle *EFA* = 90°.

Calculate the value of

 (i)   *p*,

Answer(a)(i) *p* = ... [1]

(ii)   *q*,

Answer(a)(ii) *q* = ... [2]

(iii)   *t*,

Answer(a)(iii) *t* = ... [1]

(iv)   *x*.

Answer(a)(iv) *x* = ... [3]

(b)

NOT TO SCALE
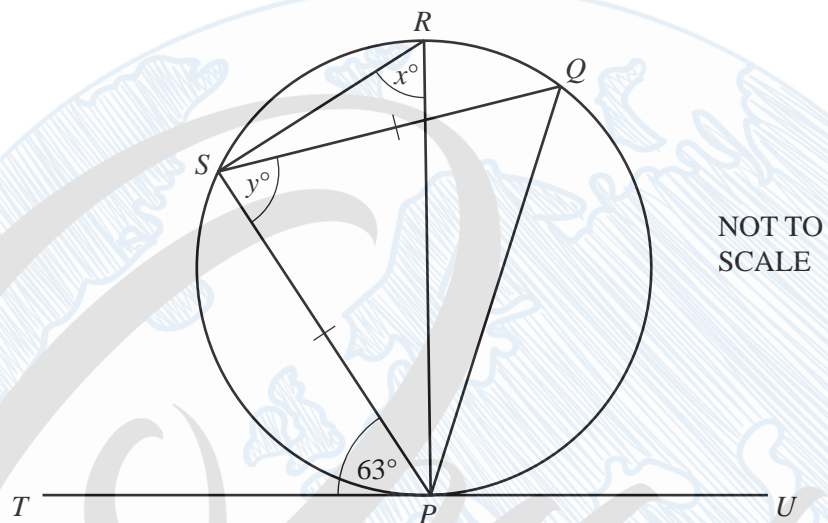
P, *Q*, *R* and *S* are points on a circle and *PS* = *SQ*.
PR is a diameter and *TPU* is the tangent to the circle at *P*.
Angle *SPT* = 63°.

Find the value of

(i) *x*,

Answer(b)(i) *x* = ... [2]

(ii) *y*.

Answer(b)(ii) *y* = ... [2]

3
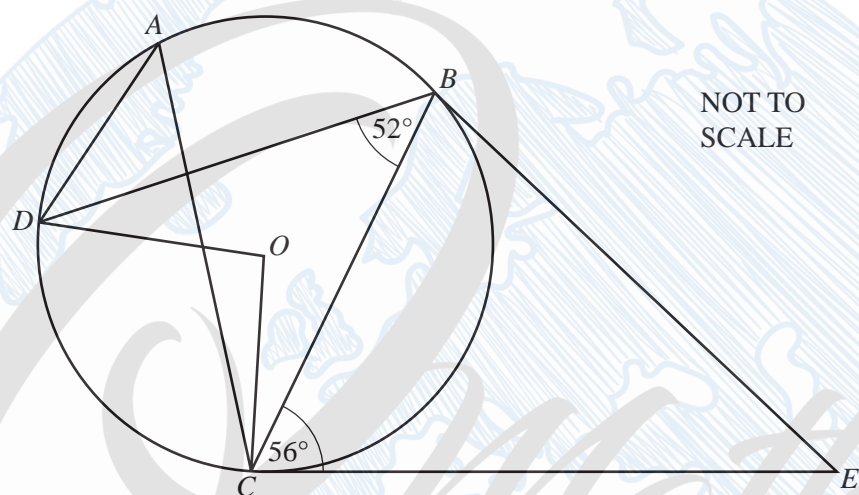
A, *B*, *C* and *D* are points on a circle, centre *O*.
CE is a tangent to the circle at *C*.

(a) Find the sizes of the following angles and give a reason for each answer.

(i) Angle *DAC* = ... because ....

.... [2]

(ii) Angle *DOC* = ... because ....

.... [2]

(iii) Angle *BCO* = ... because ....

.... [2]

(b) $CE = 8.9$ cm and $CB = 7$ cm.

    (i) Calculate the length of *BE*.

Answer(b)(i) *BE* = ... cm [4]

    (ii) Calculate angle *BEC*.

Answer(b)(ii) Angle *BEC* = ... [3]

7

A

P

NOT TO
SCALE

56°

6.5 cm

8 cm   8 cm

O   x

C   B

Q
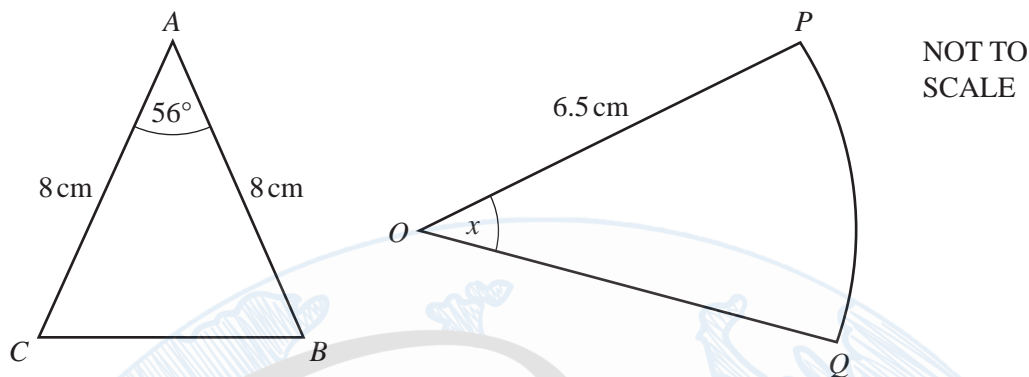
The diagram shows a triangle and a sector of a circle.
In triangle ABC, $AB = AC = 8$ cm and angle $BAC = 56°$.
Sector OPQ has centre O, sector angle x and radius 6.5 cm.

(a) Show that the area of triangle ABC is 26.5 cm^2 correct to 1 decimal place.

Answer(a)

[2]

(b) The area of sector OPQ is equal to the area of triangle ABC.
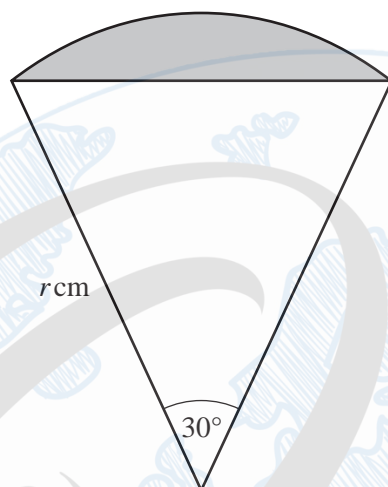
(i) Calculate the sector angle x.

Answer(b)(i) .... [3]

(ii) Calculate the perimeter of the sector OPQ.

Answer(b)(ii) .... cm [3]

(c) The diagram shows a sector of a circle, radius r cm.

NOT TO
SCALE

r cm

30°

(i) Show that the area of the shaded segment is $\frac{1}{4}r^2\left(\frac{1}{3}\pi - 1\right)$ cm².

Answer(c)(i)

[4]

(ii) The area of the segment is 5 cm².

Find the value of r.

Answer(c)(ii) $r =$ .... [3]

9 **(a)** The points A, B, C and D lie on a circle.
AC is a diameter of the circle.
ST is the tangent to the circle at A.

NOT TO SCALE
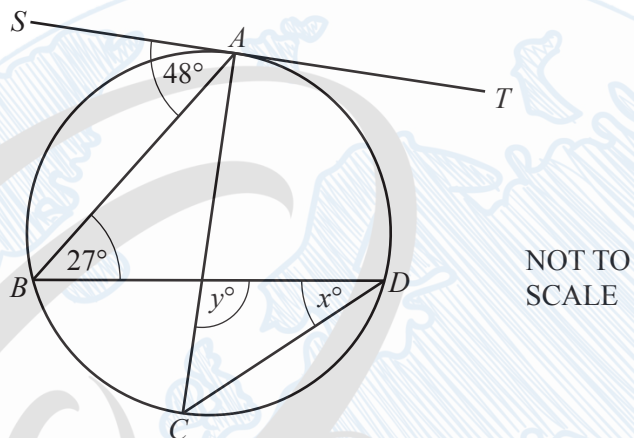
Find the value of

(i) x,

Answer(a)(i) $x =$ .... [2]

(ii) y.

Answer(a)(ii) $y =$ .... [2]

(b) The diagram shows a shaded shape formed by three semi-circular arcs.
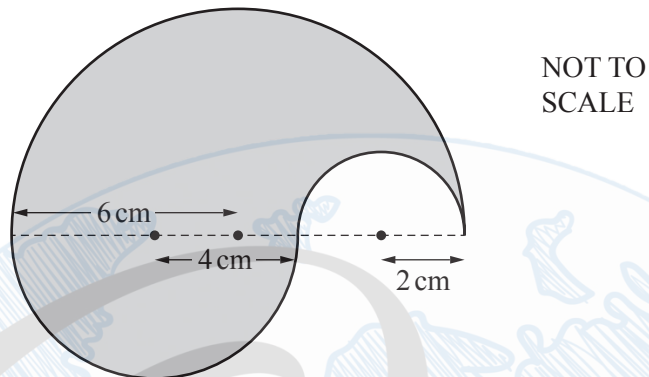The radius of each semi-circle is shown in the diagram.

NOT TO
SCALE

6 cm

4 cm

2 cm

(i) Calculate the perimeter of the shaded shape.

Answer(b)(i) .... cm [2]
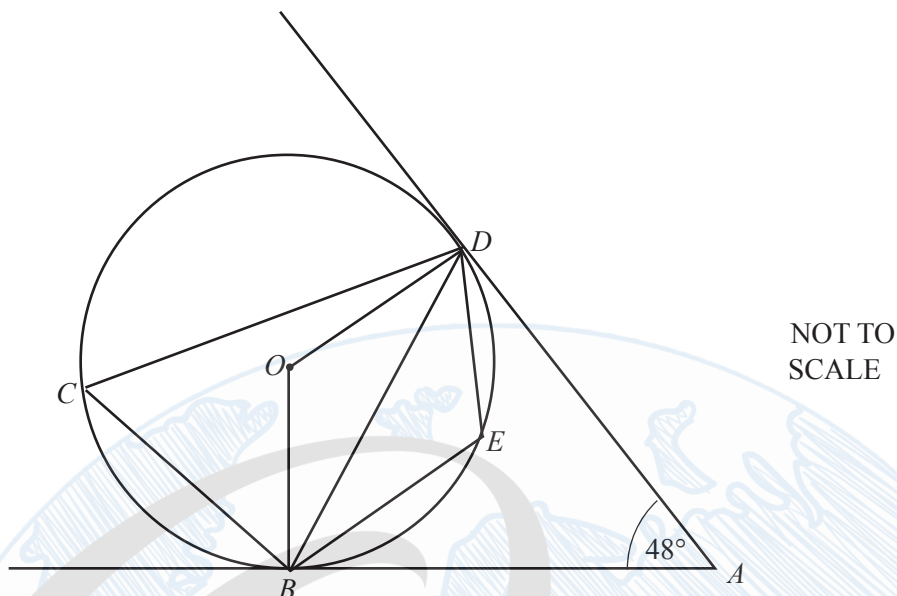
(ii) The shaded shape is made from metal 1.6 mm thick.

Calculate the volume of metal used to make this shape.
Give your answer in cubic millimetres.

Answer(b)(ii) .... mm³ [5]

2

NOT TO
SCALE

In the diagram, B, C, D and E lie on the circle, centre O.
AB and AD are tangents to the circle.
Angle $BAD = 48°$.

(a) Find

   (i) angle ABD,

Answer(a)(i) Angle ABD = ... [1]

   (ii) angle OBD,

Answer(a)(ii) Angle OBD = ... [1]

   (iii) angle BCD,

Answer(a)(iii) Angle BCD = ... [2]

   (iv) angle BED.

Answer(a)(iv) Angle BED = ... [1]

(b) The radius of the circle is 15 cm.

Calculate the area of triangle BOD

Answer(b) .... cm^2 [2]

(c) Give a reason why $ABOD$ is a cyclic quadrilateral.

Answer(c)

.... [1]
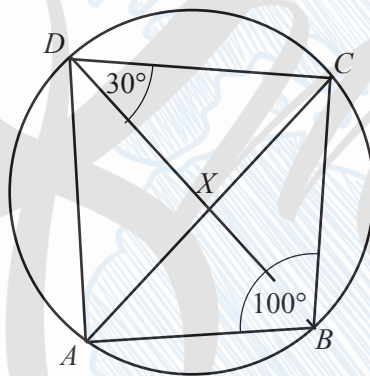
6 **(a)**
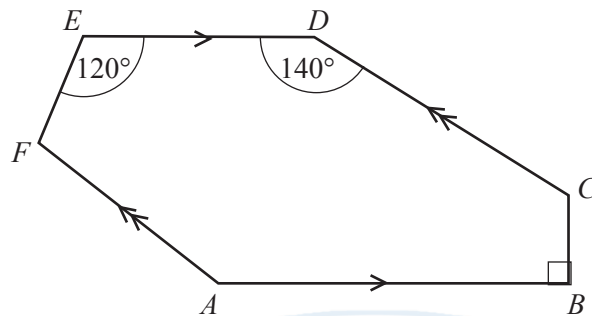
In the hexagon $ABCDEF$, AB is parallel to ED and AF is parallel to CD.
Angle $ABC = 90°$, angle $CDE = 140°$ and angle $DEF = 120°$.

Calculate angle EFA

Answer(a) Angle $EFA =$ .... [4]

(b)

NOT TO
SCALE

In the cyclic quadrilateral $ABCD$, angle $ABC = 100°$ and angle $BDC = 30°$.
The diagonals intersect at X.

(i) Calculate angle ACB

Answer(b)(i) Angle $ACB =$ .... [2]

(ii) Angle $BXC = 89°$.

Calculate angle CAD.

Answer(b)(ii) Angle $CAD =$ .... [2]

(iii) Complete the statement.

Triangles AXD and BXC are .... [1]

(c)
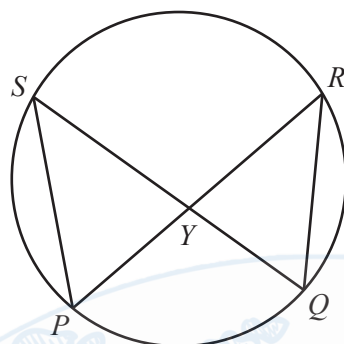
P, Q, R and S lie on a circle.
PR and QS intersect at Y.
PS = 11 cm, QR = 10 cm and the area of triangle QRY = 23 cm^2.

Calculate the area of triangle PYS.

Answer(c) .... cm^2 [2]

(d) A regular polygon has *n* sides.
Each exterior angle is equal to $\frac{n}{10}$ degrees.
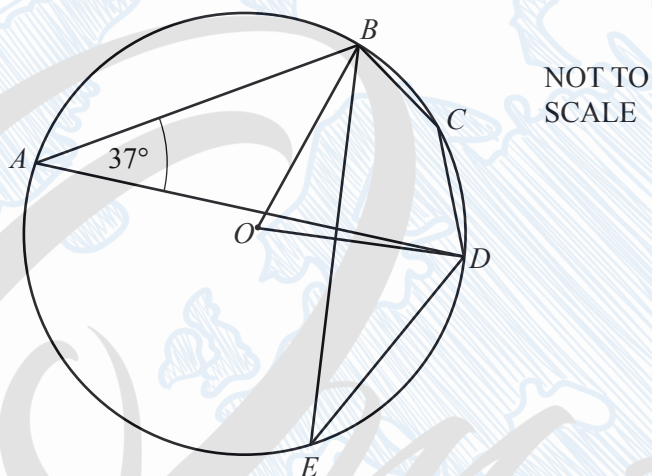
(i) Find the value of *n*.

Answer(d)(i) *n* = ... [3]

(ii) Find the size of an interior angle of this polygon.

Answer(d)(ii) .... [2]

5

NOT TO SCALE

A, *B*, *C*, *D* and *E* are points on the circle, centre *O*.
Angle *BAD* = 37°.

Complete the following statements.

(a) Angle *BED* = ... because ....

.... [2]

(b) Angle *BOD* = ... because ....

.... [2]

(c) Angle *BCD* = ... because ....

.... [2]

8 **(a)**
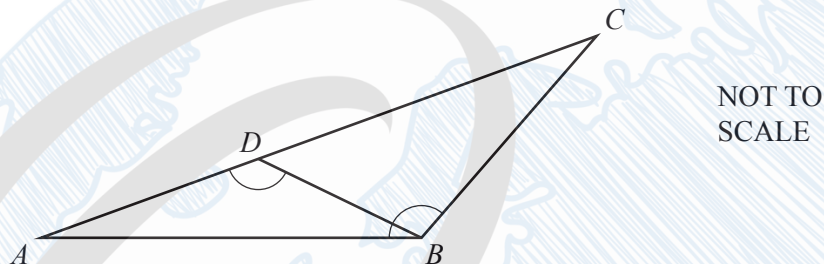
NOT TO
SCALE

In the diagram, *D* is on *AC* so that angle *ADB* = angle *ABC*.

(i) Show that angle *ABD* is equal to angle *ACB*.

Answer(a)(i)

[2]

(ii) Complete the statement.
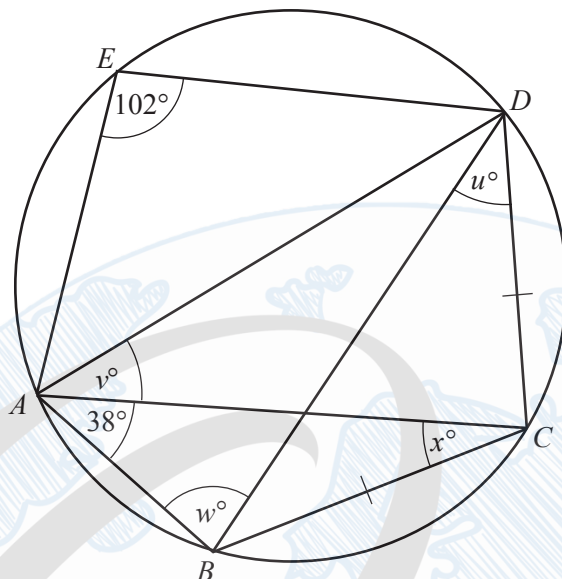
Triangles *ABD* and *ACB* are ....   [1]

(iii) *AB* = 12 cm, *BC* = 11 cm and *AC* = 16 cm.

Calculate the length of *BD*.

Answer(a)(iii) *BD* = ... cm [2]

(b)

NOT TO
SCALE

A, B, C, D and E lie on the circle.
Angle $AED = 102°$ and angle $BAC = 38°$.
$BC = CD$.

Find the value of

(i) u,

Answer(b)(i) $u = $ .... [1]

(ii) v,

Answer(b)(ii) $v = $ .... [1]

(iii) w,

Answer(b)(iii) $w = $ .... [1]

(iv) x.

Answer(b)(iv) $x = $ .... [1]

(c)
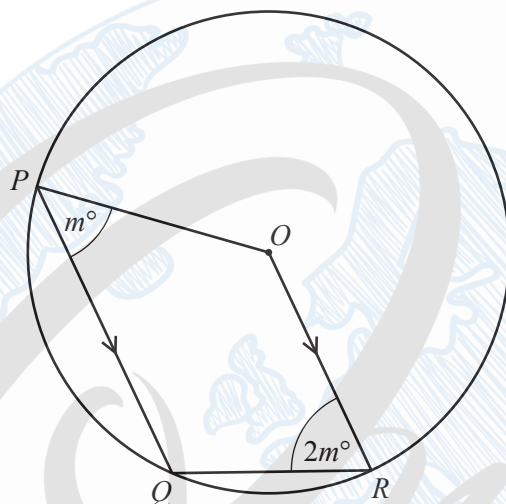
NOT TO
SCALE

In the diagram, *P*, *Q* and *R* lie on the circle, centre *O*.
PQ is parallel to *OR*.
Angle *QPO* = *m*° and angle *QRO* = 2*m*°.

Find the value of *m*.

Answer(c) m = ... [5]

7
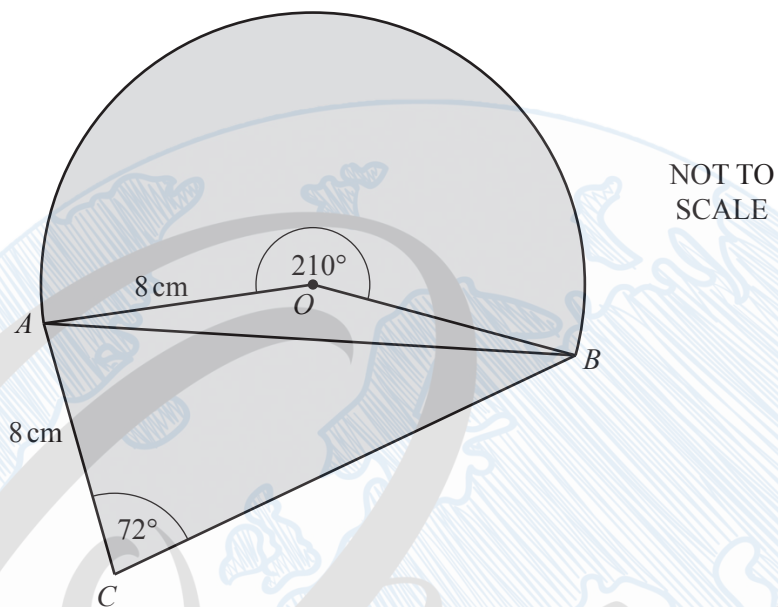
The diagram shows a design for a logo made from a sector and two triangles.
The sector, centre O, has radius 8 cm and sector angle $210°$.
$AC = 8$ cm and angle $ACB = 72°$.

(a) Show that angle $OAB = 15°$.

[2]

(b) Calculate the length of the straight line AB.

$AB =$ .... cm [4]

(c) Calculate angle *ABC*.

Angle *ABC* = ... [3]

(d) Calculate the total area of the logo design.

....cm^2 [6]

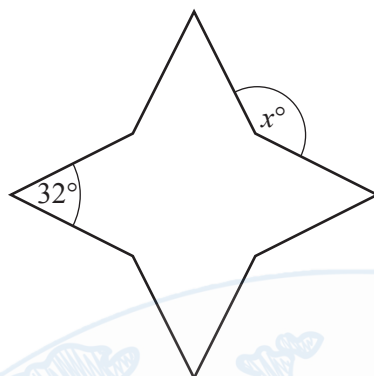**(e)** The logo design is an enlargement with scale factor 4 of the actual logo.

Calculate the area of the actual logo.

....cm^2 [2]

2 **(a)**
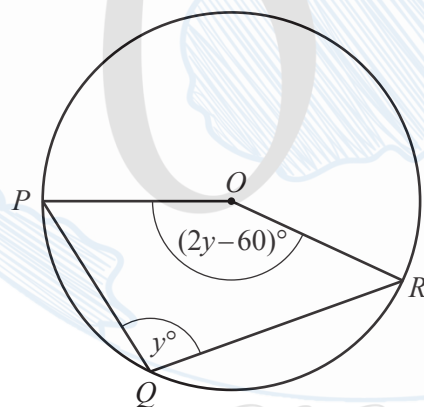

NOT TO
SCALE

The diagram shows an octagon.
All of the sides are the same length.
Four of the interior angles are each 32°.
The other four interior angles are equal.

Find the value of x.

$x =$ .... [4]

(b)

NOT TO
SCALE

P, Q and R lie on a circle, centre O.
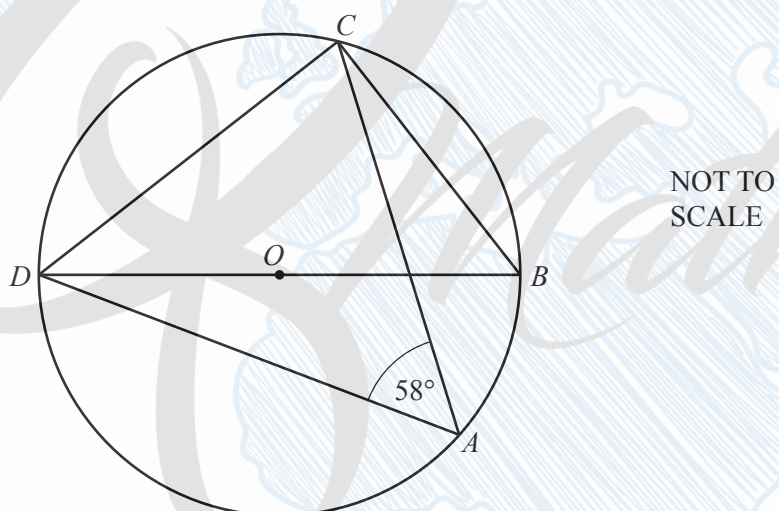Angle $PQR = y°$ and angle $POR = (2y - 60)°$.

Find the value of y.

$y =$ .... [3]

8 **(a)** The exterior angle of a regular polygon is $x°$ and the interior angle is $8x°$.

Calculate the number of sides of the polygon.

.... [3]

(b)

NOT TO
SCALE
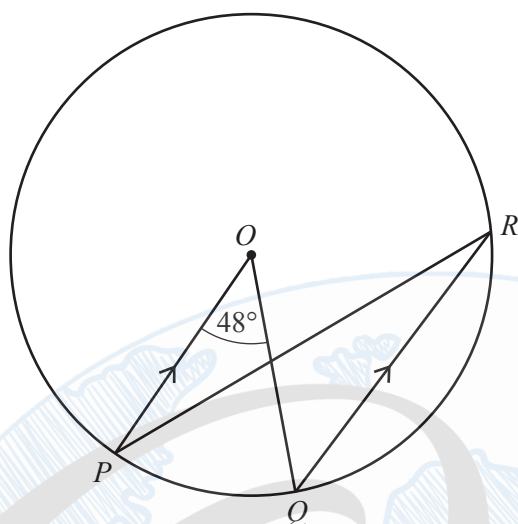
A, B, C and D are points on the circumference of the circle, centre O.
DOB is a straight line and angle $DAC = 58°$.

Find angle CDB.

Angle $CDB =$ .... [3]

(c)

NOT TO SCALE

P, Q and R are points on the circumference of the circle, centre O.
PO is parallel to QR and angle $POQ = 48°$.

(i) Find angle OPR.

Angle $OPR =$ .... [2]

(ii) The radius of the circle is $5.4\,$cm.

Calculate the length of the **major** arc PQ.

.... cm [3]

9 (a)
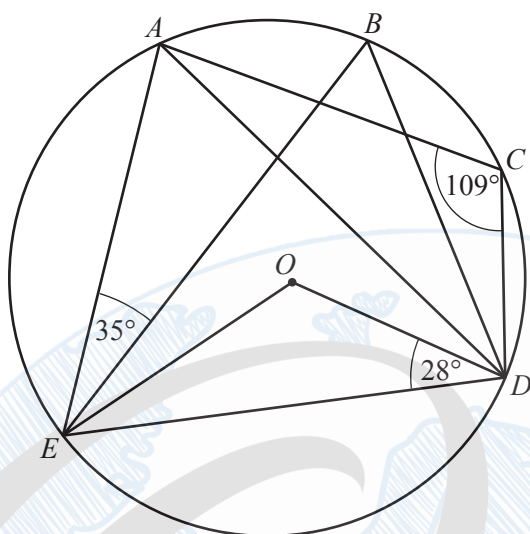
A, *B*, *C*, *D* and *E* lie on the circle, centre *O*.
Angle *AEB* = 35°, angle *ODE* = 28° and angle *ACD* = 109°.

(i) Work out the following angles, giving reasons for your answers.

(a) Angle *EBD* = ... because ....

....

.... [3]

(b) Angle *EAD* = ... because ....

.... [2]

(ii) Work out angle *BEO*.

Angle *BEO* = ... [3]

(b) In a regular polygon, the interior angle is 11 times the exterior angle.

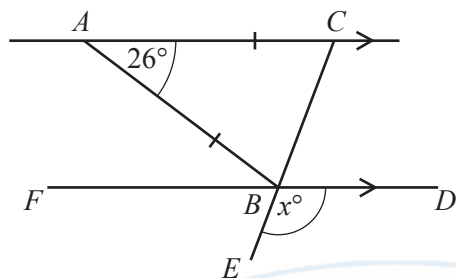   **(i)** Work out the number of sides of this polygon.

                    .... [3]

    (ii) Find the sum of the interior angles of this polygon.

                    .... [2]

2 **(a)**
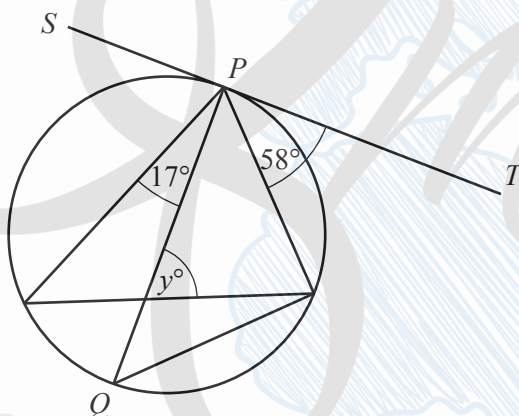

NOT TO SCALE

AC is parallel to *FBD*, *ABC* is an isosceles triangle and *CBE* is a straight line.

Find the value of *x*.

$x =$ .... [3]

(b)

NOT TO SCALE

The diagram shows a circle with diameter *PQ*.
SPT is a tangent to the circle at *P*.

Find the value of *y*.

$y =$ .... [5]

4
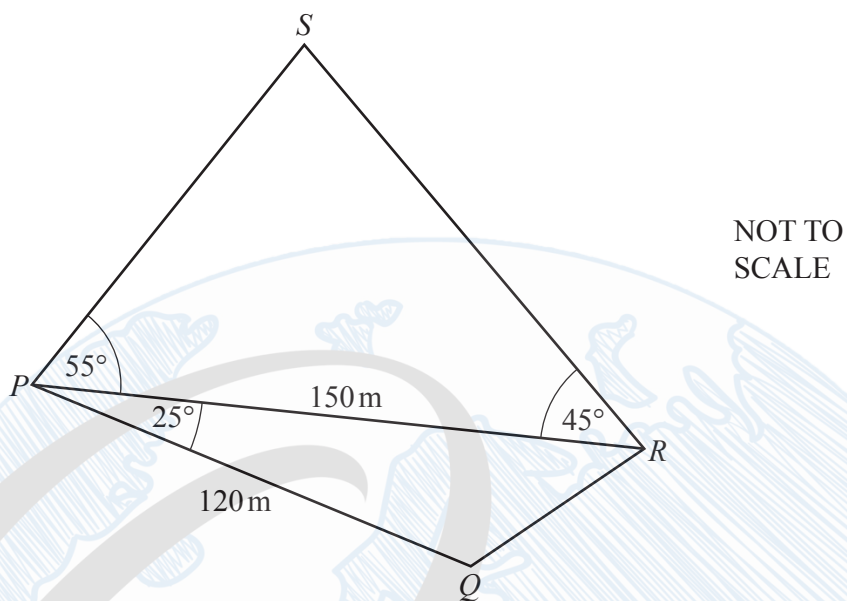
The diagram shows two triangles.

(a) Calculate *QR*.

QR = ... m [3]

(b) Calculate *RS*.

RS = ... m [4]

(c) Calculate the total area of the two triangles.

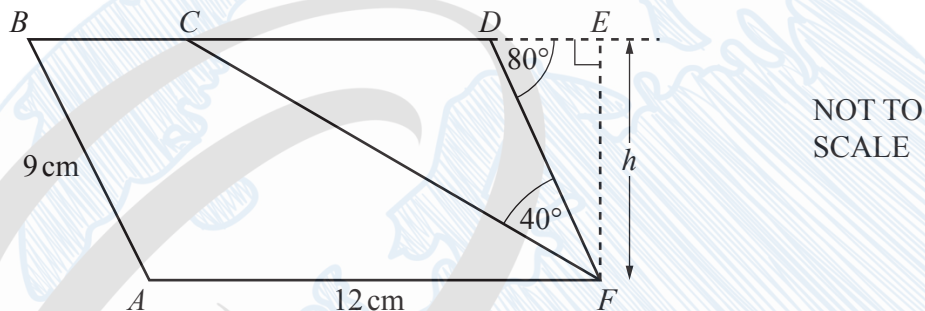... m^2 [3]

4 (a) A rectangle measures $8.5\,$cm by $10.7\,$cm, both correct to 1 decimal place.

Calculate the upper bound of the perimeter of the rectangle.

.... cm [3]

(b)

NOT TO SCALE

ABDF is a parallelogram and *BCDE* is a straight line.
$AF = 12\,$cm, $AB = 9\,$cm, angle $CFD = 40°$ and angle $FDE = 80°$.

(i) Calculate the height, *h*, of the parallelogram.

$h =$ .... cm [2]

(ii) Explain why triangle *CDF* is isosceles.

....

.... [2]

(iii) Calculate the area of the **trapezium** *ABCF*.

.... cm² [3]

(c)
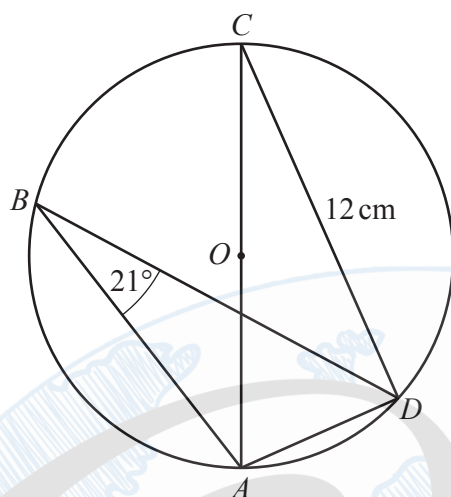
A, *B*, *C* and *D* are points on the circle, centre *O*.
Angle *ABD* = 21° and *CD* = 12 cm.

Calculate the area of the circle.

.... cm² [5]

(d)
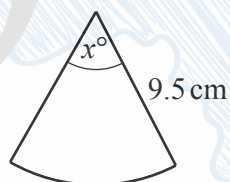
The diagram shows a square with side length 8 cm and a sector of a circle with radius 9.5 cm
and sector angle *x*°.
The perimeter of the square is equal to the perimeter of the sector.

Calculate the value of *x*.

x = ... [3]