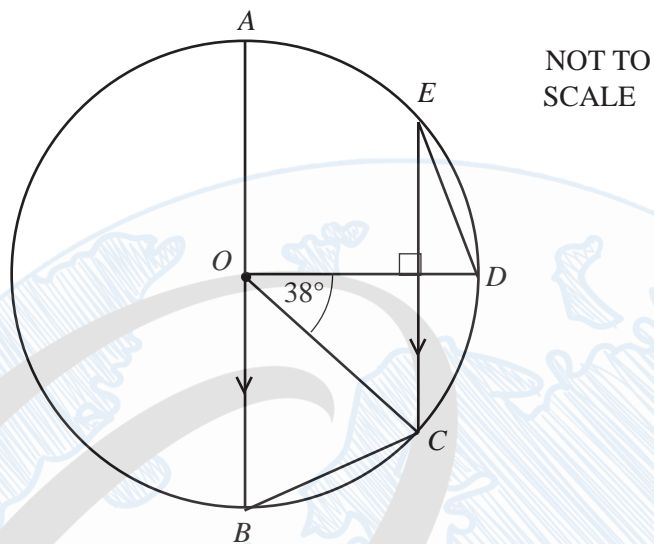




Circles

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17



AB is the diameter of a circle, centre O . C , D and E lie on the circle. EC is parallel to AB and perpendicular to OD . Angle DOC is 38° .

Work out

(a) angle BOC ,

Answer(a) Angle $BOC =$ [1]

(b) angle CBO ,

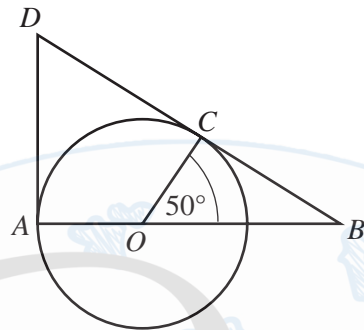
Answer(b) Angle $CBO =$ [1]

(c) angle EDO .

Answer(c) Angle $EDO =$ [2]

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4



NOT TO
SCALE

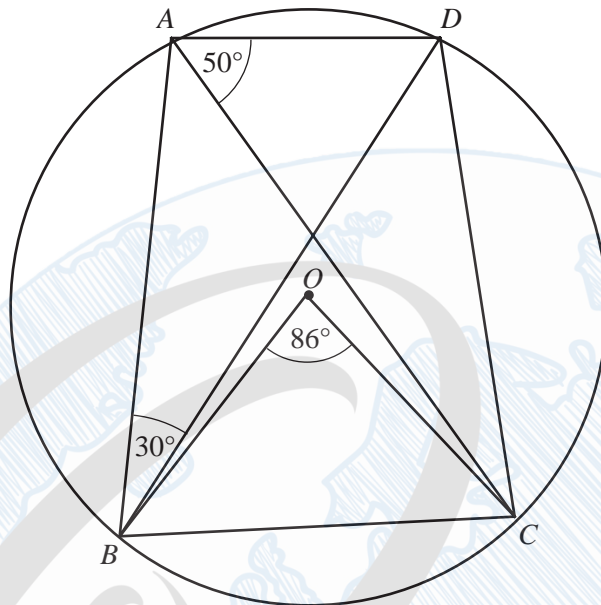
O is the centre of the circle.
 DA is the tangent to the circle at A and DB is the tangent to the circle at C
 AOB is a straight line. Angle $COB = 50^\circ$.
 Calculate

(a) angle CBO ,

Answer(a) Angle $CBO = \dots\dots\dots$ [1]

(b) angle DOC

Answer(b) Angle $DOC = \dots\dots\dots$ [1]



NOT TO SCALE

The points A, B, C and D lie on the circumference of the circle, centre O .

Angle $ABD = 30^\circ$, angle $CAD = 50^\circ$ and angle $BOC = 86^\circ$.

- (a) Give the reason why angle $DBC = 50^\circ$.

Answer(a) [1]

- (b) Find

- (i) angle ADC ,

Answer(b)(i) Angle $ADC =$ [1]

- (ii) angle BDC ,

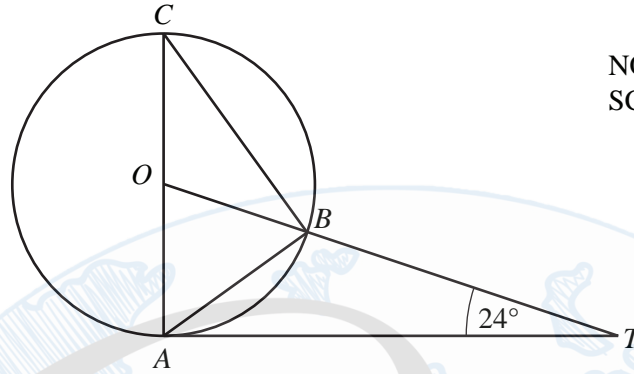
Answer(b)(ii) Angle $BDC =$ [1]

- (iii) angle OBD .

Answer(b)(iii) Angle $OBD =$ [2]

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17



NOT TO SCALE

A, B and C are points on a circle, centre O .
 TA is a tangent to the circle at A and OBT is a straight line.
 AC is a diameter and angle $OTA = 24^\circ$.

Calculate

(a) angle AOT ,

Answer(a) Angle $AOT = \dots\dots\dots$ [2]

(b) angle ACB ,

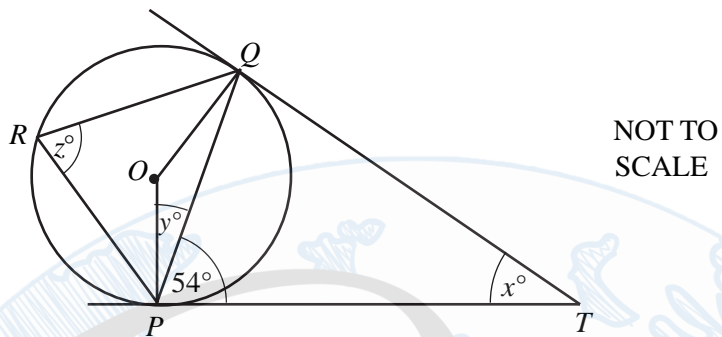
Answer(b) Angle $ACB = \dots\dots\dots$ [1]

(c) angle ABT .

Answer(c) Angle $ABT = \dots\dots\dots$ [2]

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13



The points P , Q and R lie on a circle, centre O .
 TP and TQ are tangents to the circle.
 Angle $TPQ = 54^\circ$.

Calculate the value of

(a) x ,

Answer(a) $x = \dots\dots\dots$ [1]

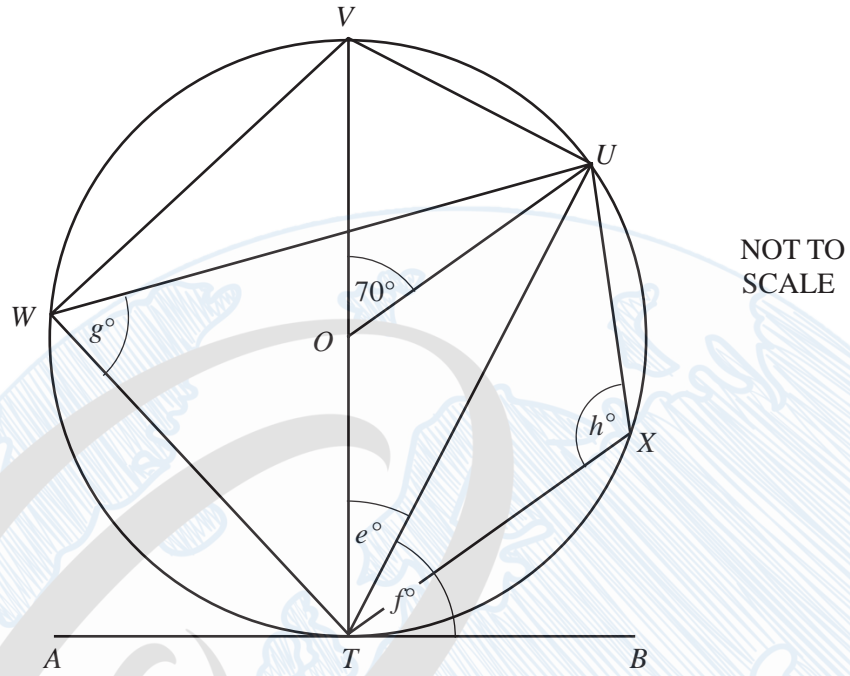
(b) y ,

Answer(b) $y = \dots\dots\dots$ [1]

(c) z .

Answer(c) $z = \dots\dots\dots$ [2]

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The diagram shows a circle, centre O .
 VT is a diameter and ATB is a tangent to the circle at T .
 U, V, W and X lie on the circle and angle $VOU = 70^\circ$.

Calculate the value of

(a) e ,

Answer(a) $e = \dots\dots\dots$ [1]

(b) f ,

Answer(b) $f = \dots\dots\dots$ [1]

(c) g ,

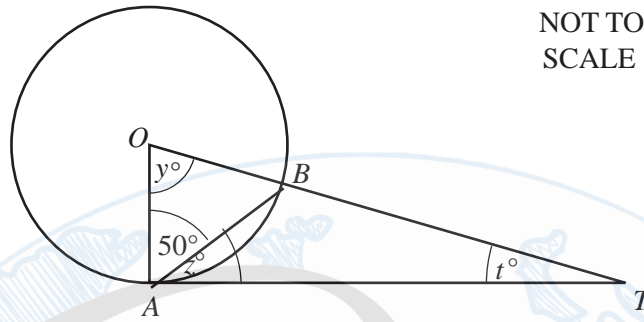
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Answer(c) $g = \dots\dots\dots$ [1]

(d) h .

Answer(d) $h = \dots\dots\dots$ [1]

7

NOT TO
SCALE

TA is a tangent at A to the circle, centre O
 Angle $OAB = 50^\circ$.

Find the value of

(a) y ,

Answer(a) $y =$ [1]

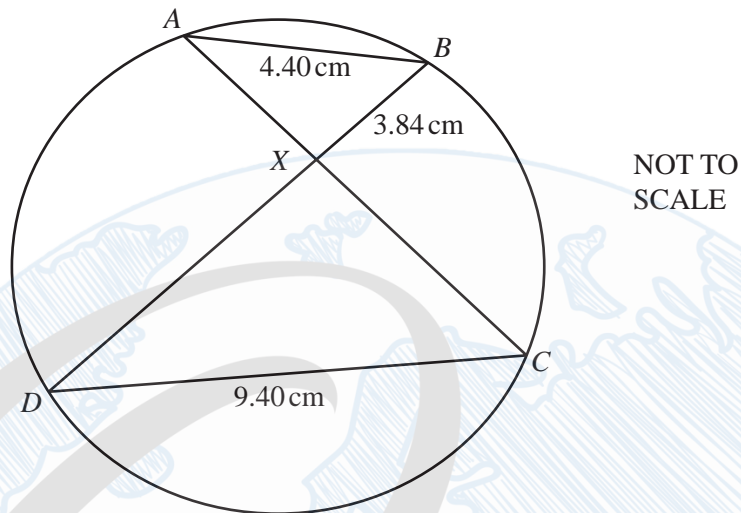
(b) z ,

Answer(b) $z =$ [1]

(c) t

Answer(c) $t =$ [1]

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A, B, C and D lie on a circle.
 AC and BD intersect at X .

- (a) Give a reason why angle BAX is equal to angle CDX .

Answer(a) [1]

- (b) $AB = 4.40$ cm, $CD = 9.40$ cm and $BX = 3.84$ cm.

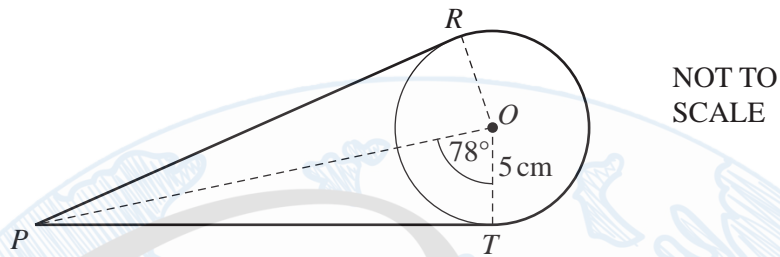
- (i) Calculate the length of CX .

Answer(b)(i) $CX =$ cm [2]

- (ii) The area of triangle ABX is 5.41 cm².

Calculate the area of triangle CDX .

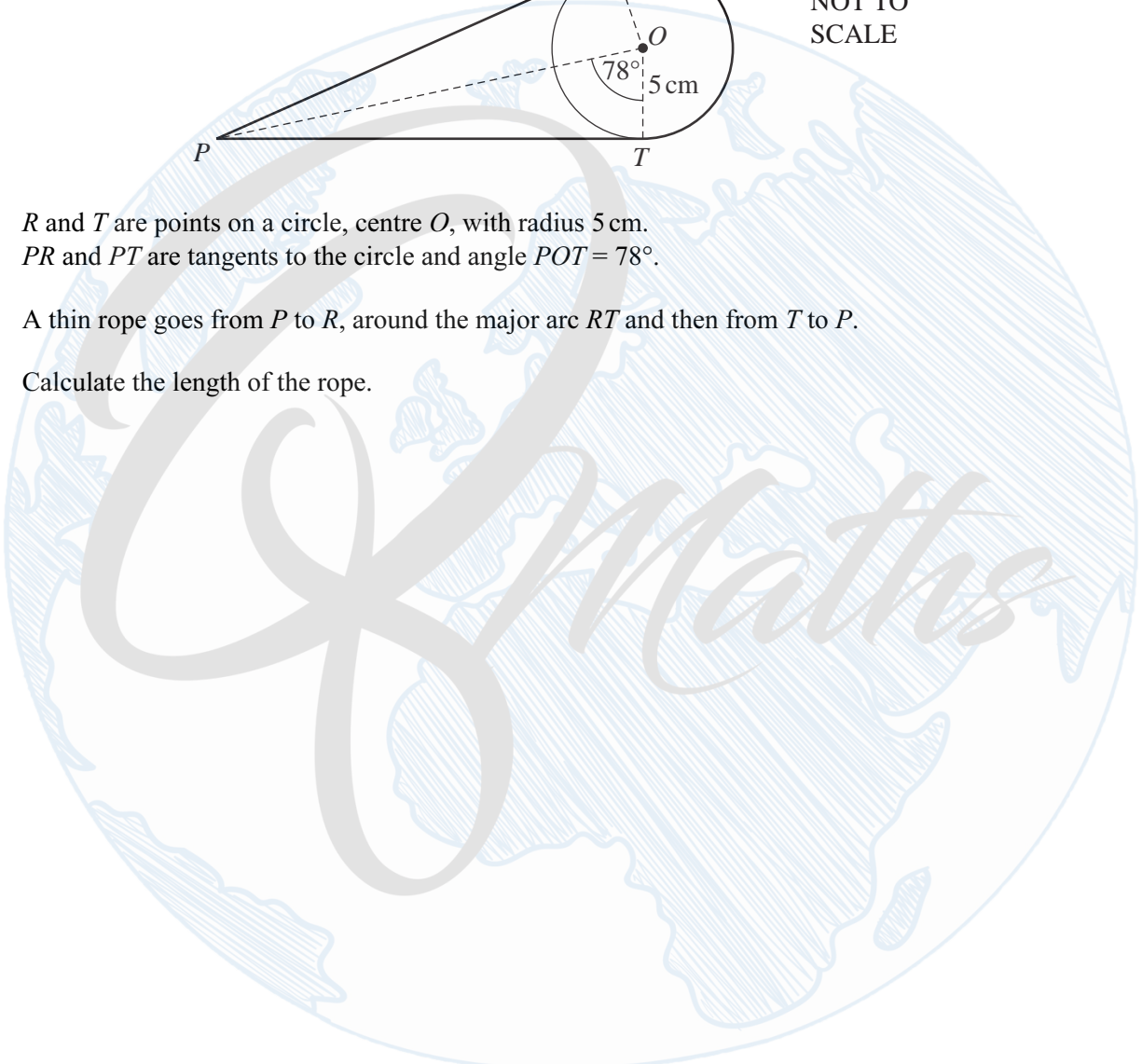
Answer(b)(ii) cm² [2]



R and T are points on a circle, centre O , with radius 5 cm.
 PR and PT are tangents to the circle and angle $POT = 78^\circ$.

A thin rope goes from P to R , around the major arc RT and then from T to P .

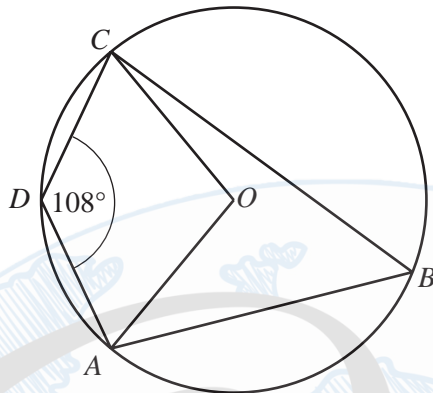
Calculate the length of the rope.



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Answer cm [6]

6



NOT TO
SCALE

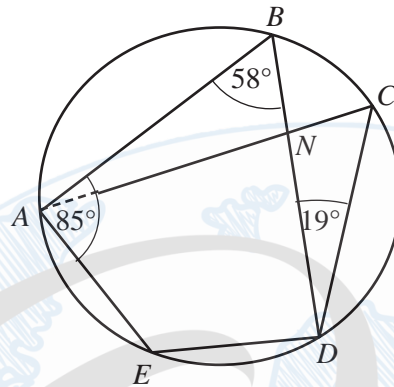
A , B , C and D lie on a circle centre O . Angle $ADC = 108^\circ$.

Work out the obtuse angle AOC .

Answer Angle $AOC =$ [2]

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10



NOT TO SCALE

A, B, C, D and E are points on a circle.
 Angle $ABD = 58^\circ$, angle $BAE = 85^\circ$ and angle $BDC = 19^\circ$.
 BD and CA intersect at N .

Calculate

(a) angle BDE ,

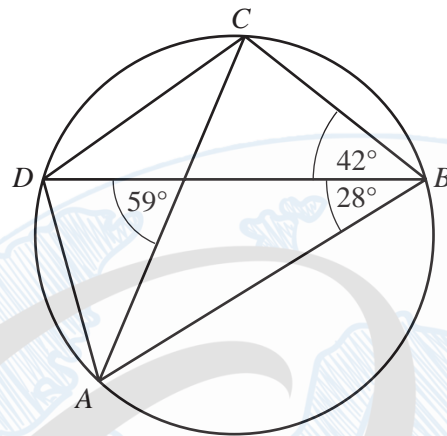
Answer(a) Angle $BDE = \dots\dots\dots$ [1]

(b) angle AND

Answer(b) Angle $AND = \dots\dots\dots$ [2]

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12



NOT TO
SCALE

A , B , C and D lie on the circle.

Find

(a) angle ADC ,

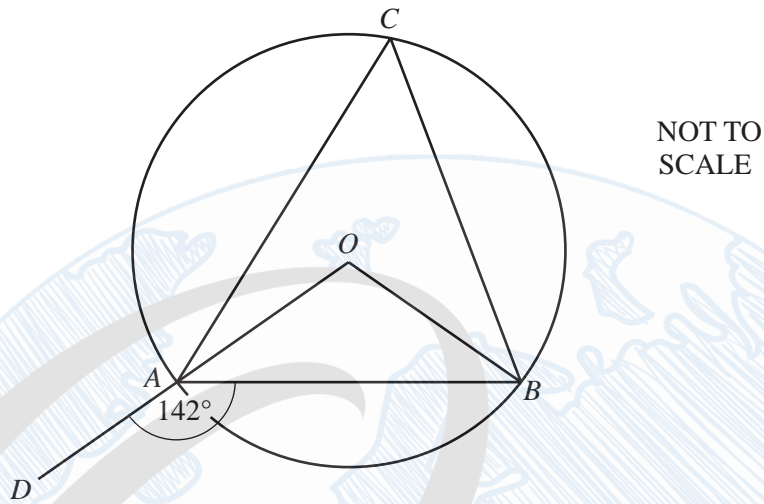
Answer(a) Angle $ADC = \dots\dots\dots$ [1]

(b) angle ADB .

Answer(b) Angle $ADB = \dots\dots\dots$ [2]

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14



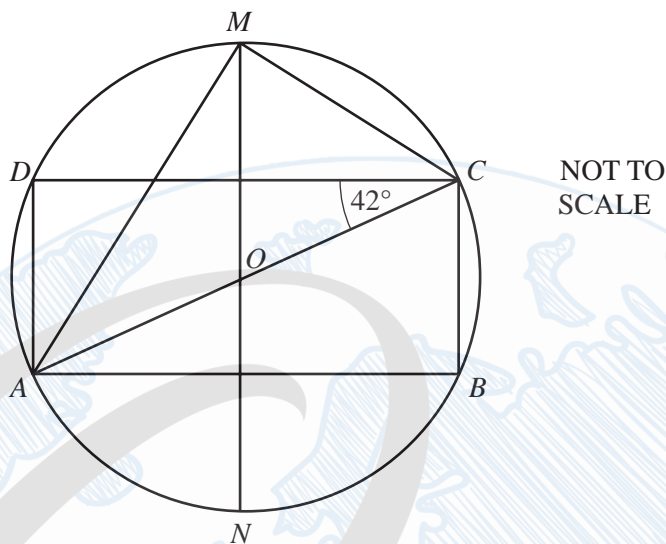
A , B and C are points on the circumference of a circle centre O .
 OAD is a straight line and angle $DAB = 142^\circ$.

Calculate the size of angle ACB .

Answer Angle $ACB = \dots\dots\dots$ [3]

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13



The vertices of the rectangle $ABCD$ lie on a circle centre O
 MN is a line of symmetry of the rectangle.
 AC is a diameter of the circle and angle $ACD = 42^\circ$.

Calculate

(a) angle CAM ,

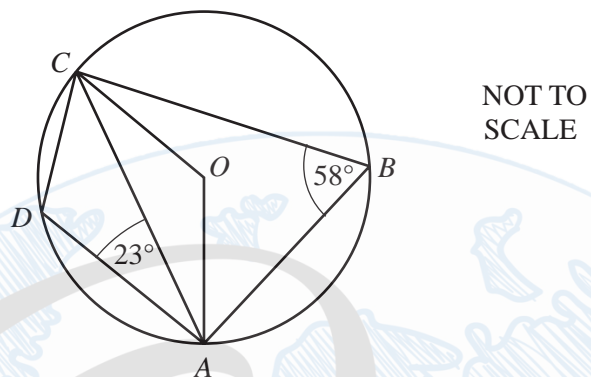
Answer(a) Angle $CAM = \dots\dots\dots$ [2]

(b) angle DCM .

Answer(b) Angle $DCM = \dots\dots\dots$ [2]

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13



A, B, C and D lie on a circle centre O
 Angle $ABC = 58^\circ$ and angle $CAD = 23^\circ$.

Calculate

(a) angle OCA ,

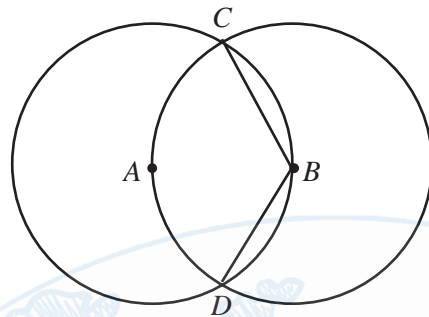
Answer(a) Angle $OCA = \dots\dots\dots$ [2]

(b) angle DCA

Answer(b) Angle $DCA = \dots\dots\dots$ [2]

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19



NOT TO SCALE

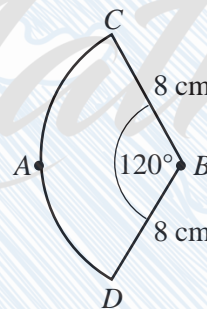
Two circles, centres A and B , are each of radius 8 cm and intersect at C and D . Each circle passes through the centre of the other circle.

(a) Explain why angle CBD is 120° .

Answer(a)

[1]

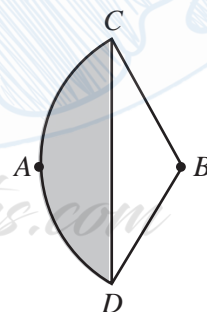
(b) For the circle, centre B , find the area of the sector BCD



NOT TO SCALE

Answer(b) cm^2 [2]

(c) (i) Find the area of the shaded segment CAD



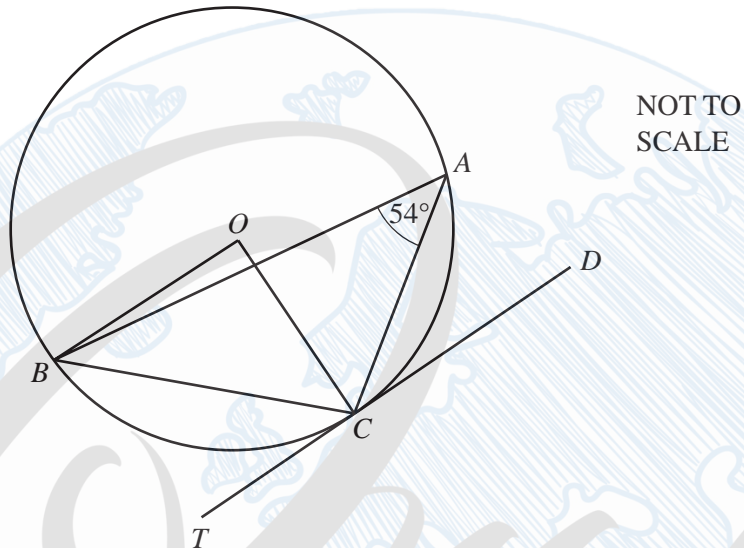
NOT TO SCALE

Answer(c)(i) cm^2 [3]

(ii) Find the area of overlap of the two circles.

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

- 16 A, B and C are points on a circle, centre O .
 TCD is a tangent to the circle.
 Angle $BAC = 54^\circ$.



- (a) Find angle BOC , giving a reason for your answer.

Answer(a) Angle $BOC = \dots\dots\dots$ because $\dots\dots\dots$

$\dots\dots\dots$ [2]

- (b) When O is the origin, the position vector of point C is $\begin{pmatrix} 3 \\ -4 \end{pmatrix}$.

- (i) Work out the gradient of the radius OC .

Answer(b)(i) $\dots\dots\dots$ [1]

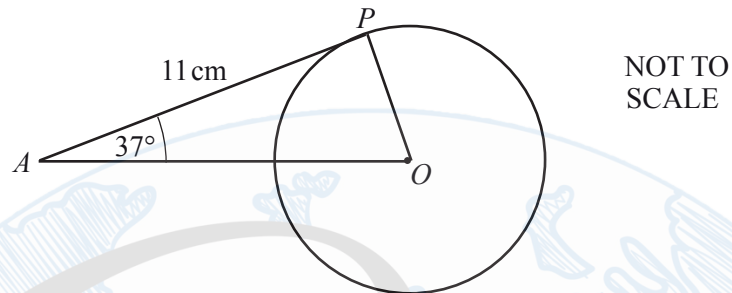
- (ii) D is the point $(7, k)$.

Find the value of k .

Answer(b)(ii) $k = \dots\dots\dots$ [1]

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8



In the diagram, AP is a tangent to the circle at P .
 O is the centre of the circle, angle $PAO = 37^\circ$ and $AP = 11$ cm.

- (a) Write down the size of angle OPA .

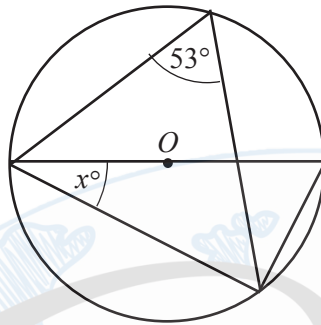
Answer(a) Angle $OPA = \dots\dots\dots$ [1]

- (b) Work out the radius of the circle.

Answer(b) $\dots\dots\dots$ cm [2]

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7



NOT TO SCALE

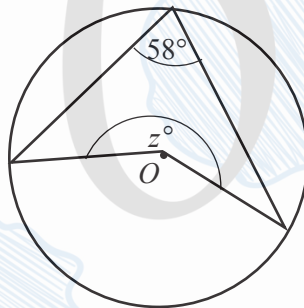
The diagram shows a circle, centre O

Find the value of x

Answer $x = \dots\dots\dots$ [2]

18

(c)



NOT TO SCALE

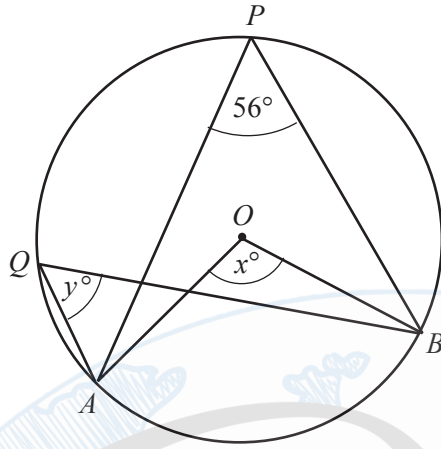
The diagram shows a circle, centre O

Find the value of z .

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$z = \dots\dots\dots$ [2]

11



NOT TO SCALE

A, B, P and Q lie on the circle, centre O .
Angle $APB = 56^\circ$.

Find the value of

(a) x ,

$x =$ [1]

(b) y .

$y =$ [1]

12 Simplify $(16p^{16})^{\frac{1}{4}}$

..... [2]

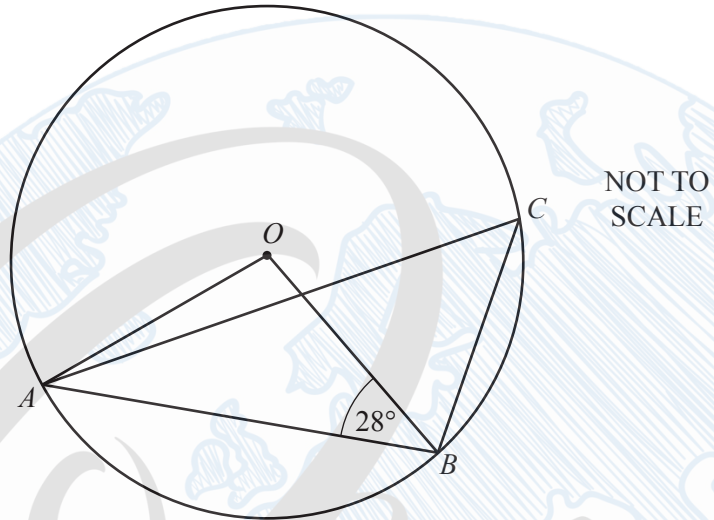
13 Solve the inequality.

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$$n + 7 < 5n - 8$$

..... [2]

21



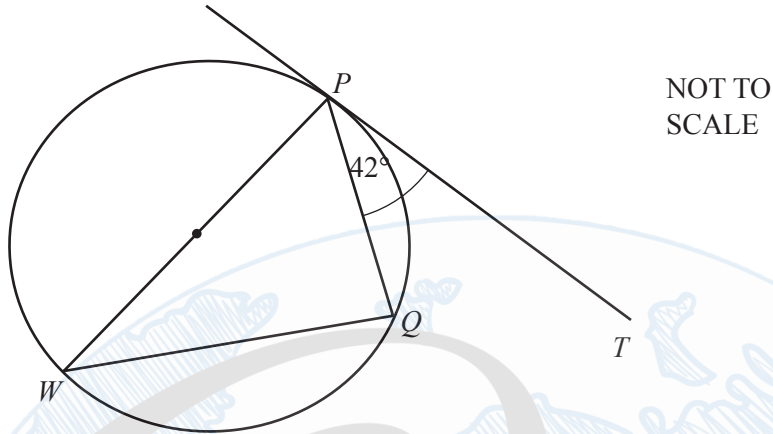
In the diagram, A , B and C lie on the circumference of a circle, centre O .

Work out the size of angle ACB .

Give a reason for each step of your working.

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Angle $ACB = \dots\dots\dots [4]$

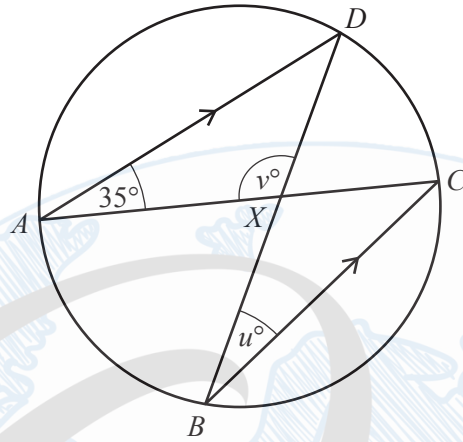


In the diagram, PT is a tangent to the circle at P .
 PW is a diameter and angle $TPQ = 42^\circ$.

Find angle PWQ .

Angle $PWQ = \dots\dots\dots$ [2]

21 (a)



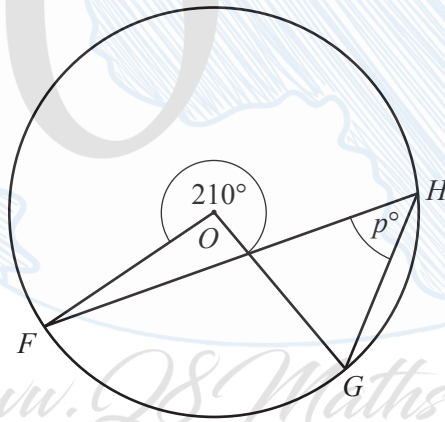
NOT TO SCALE

A, B, C and D are points on the circle.
 AD is parallel to BC .
 The chords AC and BD intersect at X .

Find the value of u and the value of v .

$u = \dots\dots\dots$
 $v = \dots\dots\dots [3]$

(b)



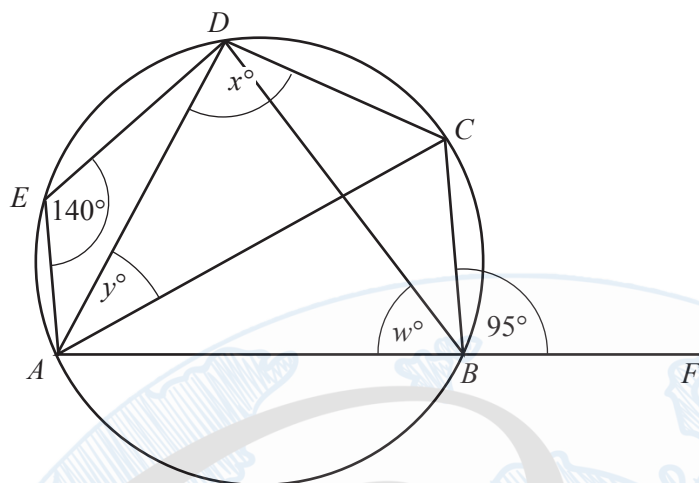
NOT TO SCALE

F, G and H are points on the circle, centre O .

Find the value of p .

$p = \dots\dots\dots [2]$

26



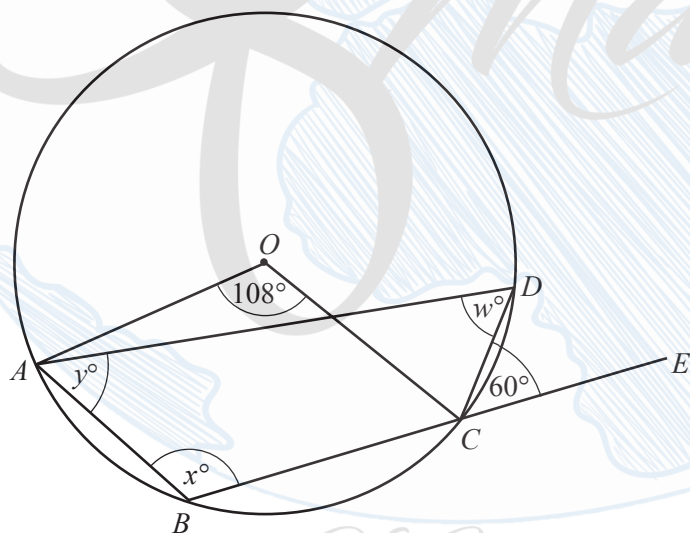
NOT TO SCALE

A, B, C, D and E lie on the circle.
 AB is extended to F .
 Angle $AED = 140^\circ$ and angle $CBF = 95^\circ$.

Find the values of w, x and y .

$w =$
 $x =$
 $y =$ [5]

22

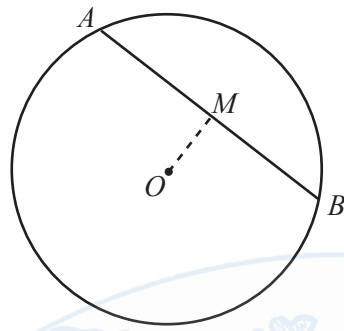


NOT TO SCALE

A, B, C and D are points on the circle, centre O .
 BCE is a straight line.
 Angle $AOC = 108^\circ$ and angle $DCE = 60^\circ$.

Calculate the values of w, x and y .

$w =$
 $x =$
 $y =$ [3]



NOT TO
SCALE

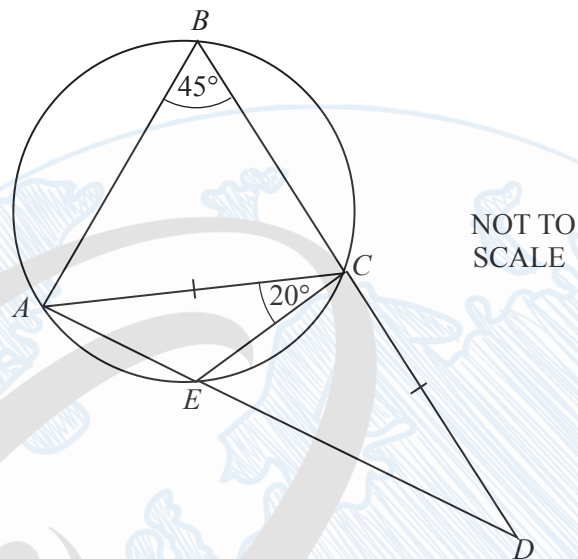
The diagram shows a circle, centre O .
 AB is a chord of length 12cm.
 M is the mid-point of AB and $OM = 4.5$ cm.

Calculate the radius of the circle.

..... cm [3]

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12



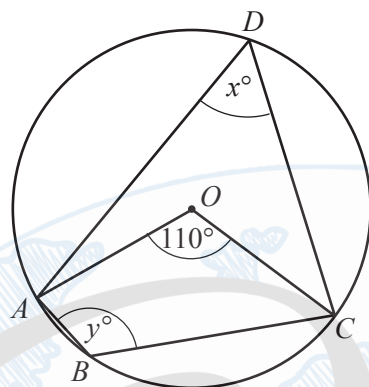
$ABCE$ is a cyclic quadrilateral.
 AED and BCD are straight lines.
 $AC = CD$, angle $ABC = 45^\circ$ and angle $ACE = 20^\circ$.

Work out angle ECD .

Angle $ECD = \dots\dots\dots$ [3]

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9



NOT TO
SCALE

A, B, C and D lie on the circle, centre O .

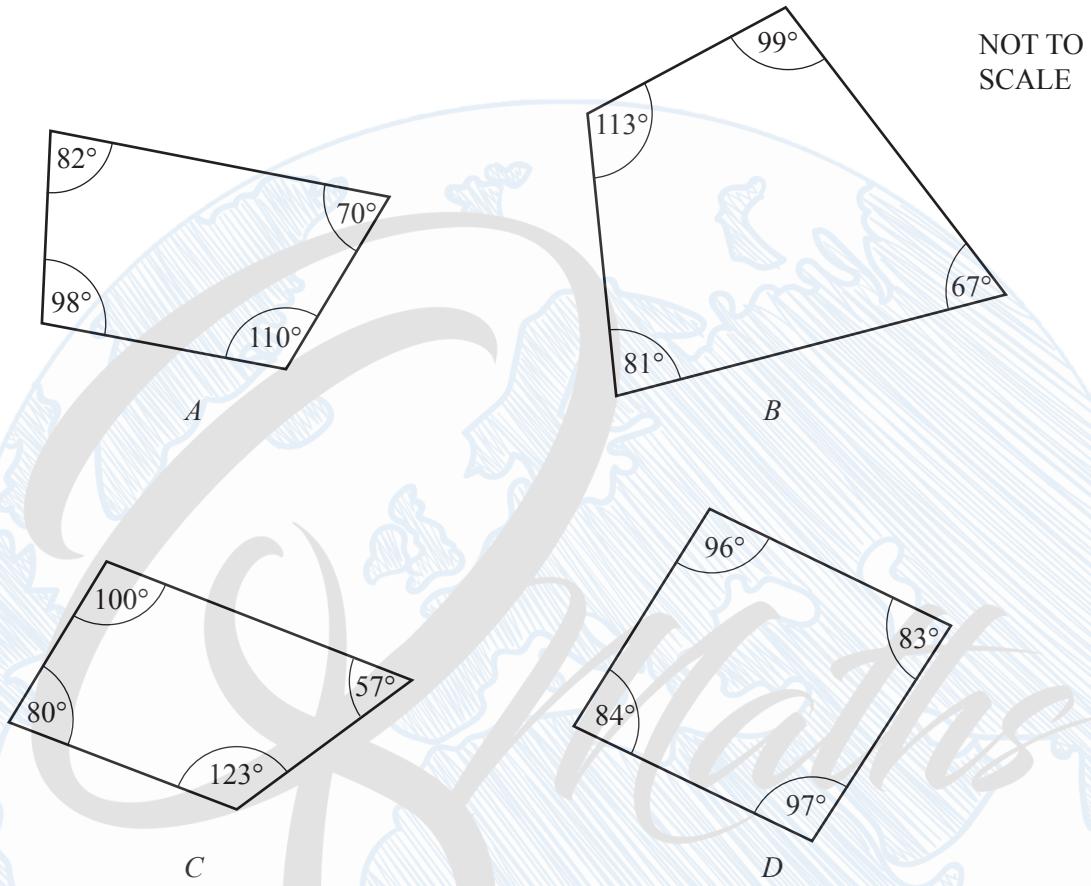
Find the value of x and the value of y .

$x =$

$y =$ [2]

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3



The diagram shows four quadrilaterals A , B , C and D .

Which one of these could be a cyclic quadrilateral?

..... [1]