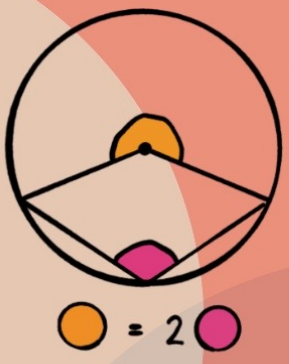
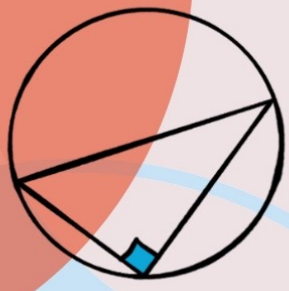
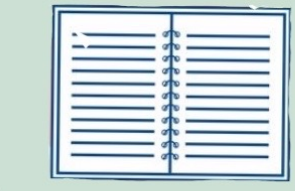
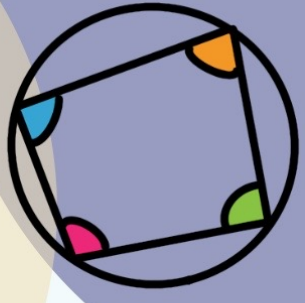
The Maths Society





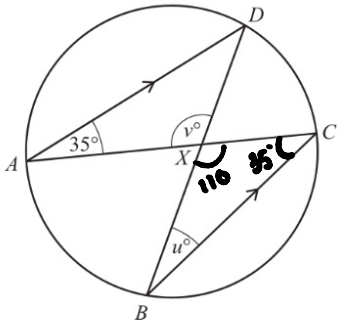
circle Theorem





Question 1

(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.

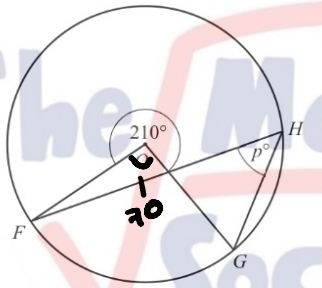
[3]

Find the value of u and the value of v.

$u = 35°$

$v = 110°$

(b)



NOT TO SCALE

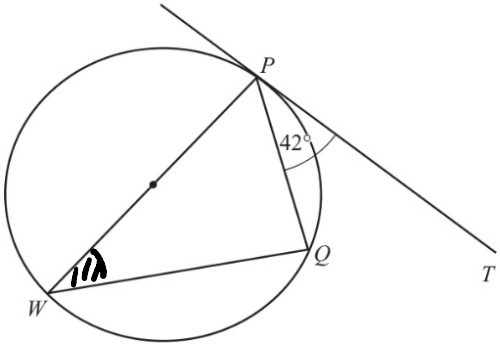
F, G and H are points on the circle, centre O.

[2]

Find the value of p.

$p = 35°$

Question 2



NOT TO SCALE

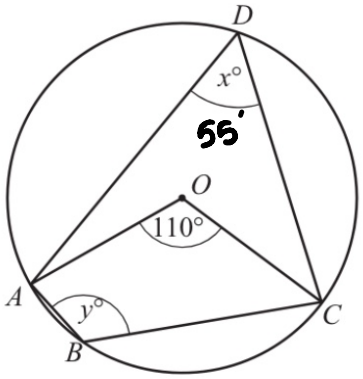
In the diagram, PT is a tangent to the circle at P.
PW is a diameter and angle $TPQ = 42°$.

Find angle PWQ.

$42°$

[2]

Question 3



NOT TO SCALE

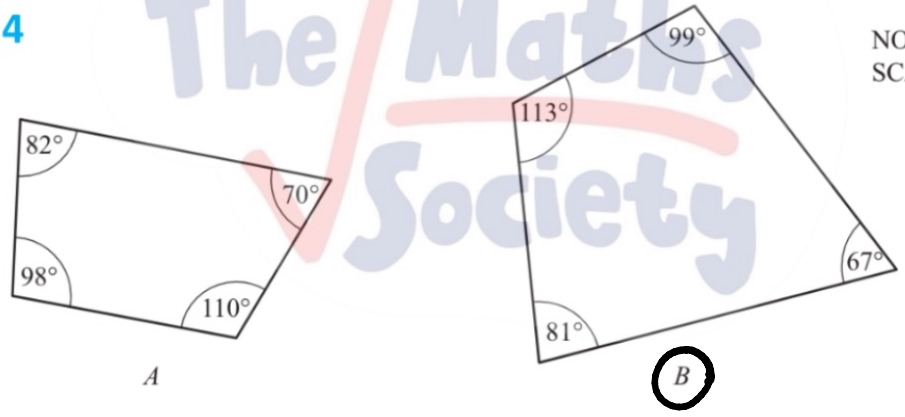
A, B, C and D lie on the circle, centre O.

Find the value of x and the value of y. [2]

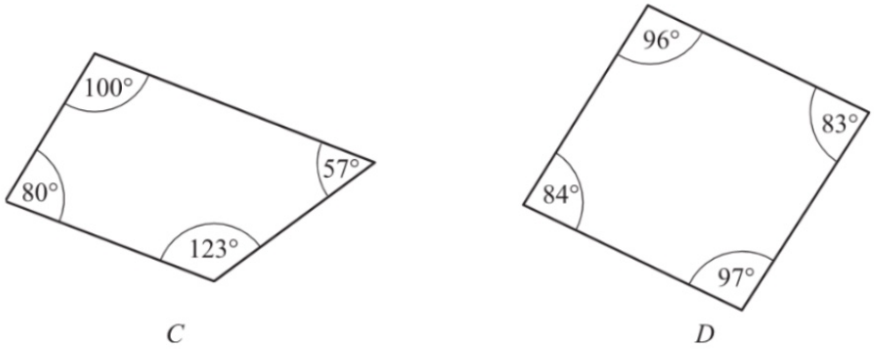
$x = 55°$

$y = 125°$

Question 4



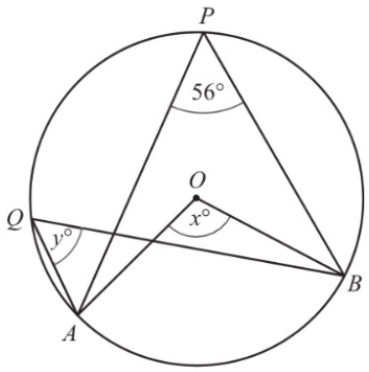
NOT TO SCALE



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

Which one of these could be a cyclic quadrilateral? [1]

Question 5



NOT TO SCALE

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

Find the value of

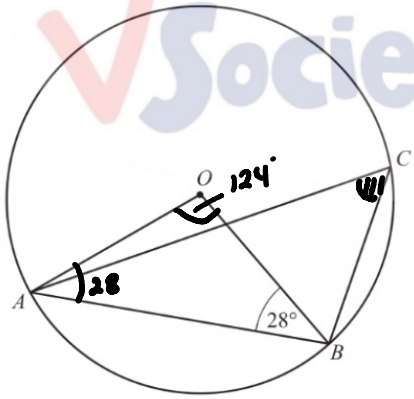
(a) x, [1]

112°

(b) y. [1]

56°

Question 6



NOT TO SCALE

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

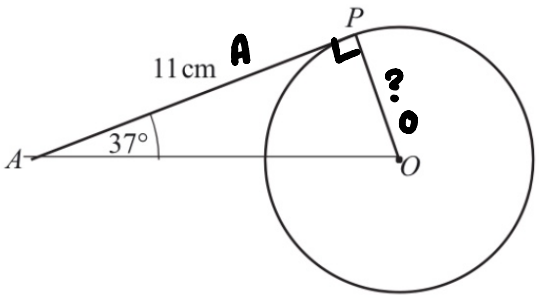
Work out the size of angle ACB.
Give a reason for each step of your working. [4]

$\angle OAB = 28°$ (isosceles Δ)

$\angle AOB = 124°$ (Ls in a triangle add up to 180°)

$\angle ACB = 62°$ (Ls at the centre is twice the Ls at the circumference)

Question 7



NOT TO SCALE

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

(a) Write down the size of angle OPA.

$90°$

[1]

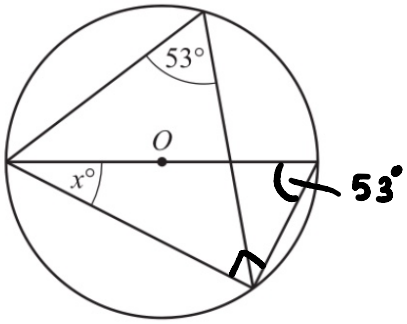
(b) Work out the radius of the circle.

$\tan 37° = \frac{O}{11}$

$O = 8.29\text{ cm}$

[2]

Question 8



NOT TO SCALE

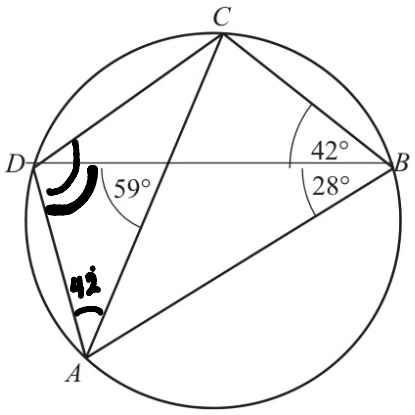
The diagram shows a circle, centre O.

Find the value of x.

$x = 37°$

[2]

Question 1



NOT TO SCALE

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

Find

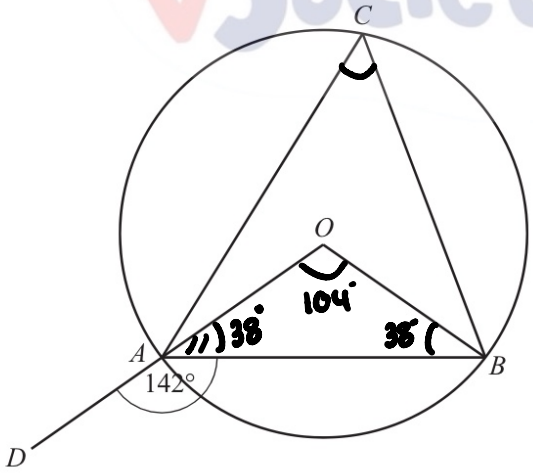
(a) angle ADC, [1]

110°

(b) angle ADB. [2]

79°

Question 2



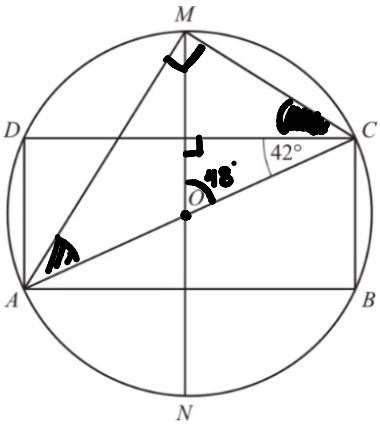
NOT TO SCALE

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

Calculate the size of angle ACB. [3]

52°

Question 3



NOT TO SCALE

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 $ACD = 42°$.

Calculate

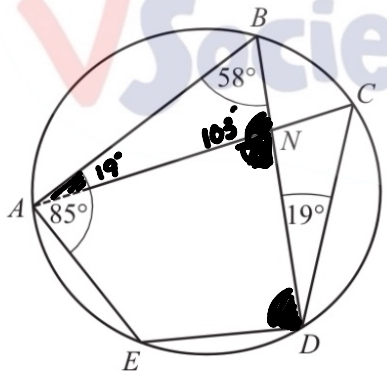
(a) angle CAM, [2]

24°

(b) angle DCM. [2]

24°

Question 4



NOT TO SCALE

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

Calculate

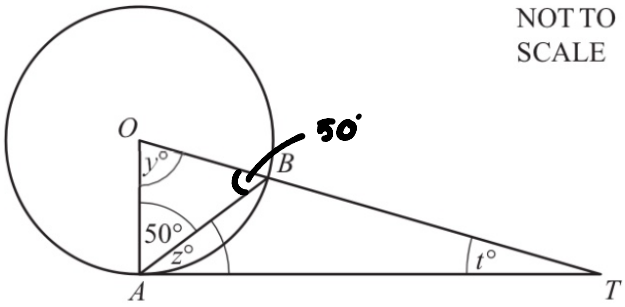
(a) angle BDE, [1]

95°

(b) angle AND. [2]

77°

Question 5



TA is a tangent at *A* to the circle, centre *O*.
Angle *OAB* = 50°.

Find the value of

(a) *y*, [1]

80°

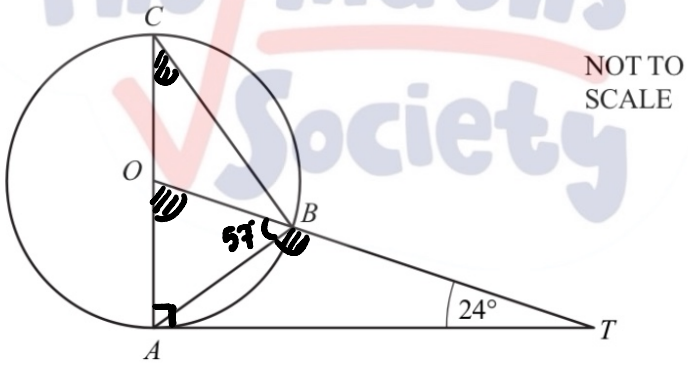
(b) *z*, [1]

40°

(c) *t*. [1]

10°

Question 6



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°.

Calculate

(a) angle *AOT*, [2]

66°

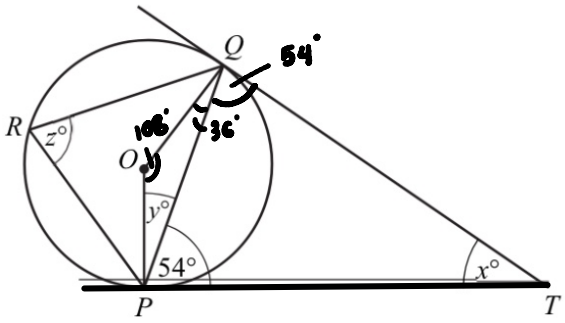
(b) angle *ACB*, [1]

33°

(c) angle *ABT*. [2]

123°

Question 1



NOT TO SCALE

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

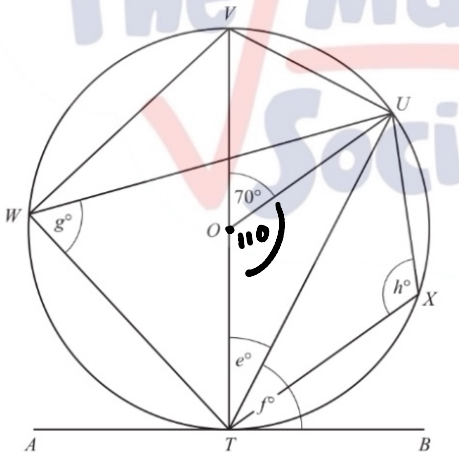
Calculate the value of

(a) x, 72° [1]

(b) y, 36° [1]

(c) z. 54° [2]

Question 2



NOT TO SCALE

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 $VOU = 70°$.

Calculate the value of

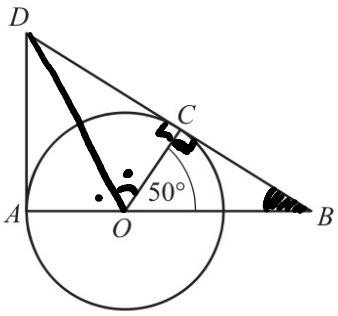
(a) e, 35° [1]

(b) f, 55° [1]

(c) g, 55° [1]

(d) h. 125° [1]

Question 3



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 $COB = 50°$.
Calculate

(a) angle CBO,

40°

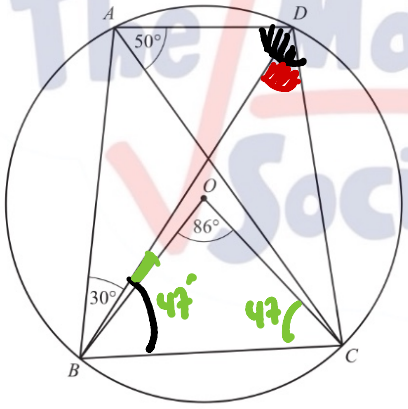
[1]

(b) angle DOC.

65°

[1]

Question 4



NOT TO SCALE

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

Angle $ABD = 30°$, angle $CAD = 50°$ and angle $BOC = 86°$.

(a) Give the reason why angle $DBC = 50°$.

DAC = DBC = 50° (same segment)

[1]

(b) Find

(i) angle ADC,

100°

[1]

(ii) angle BDC,

43°

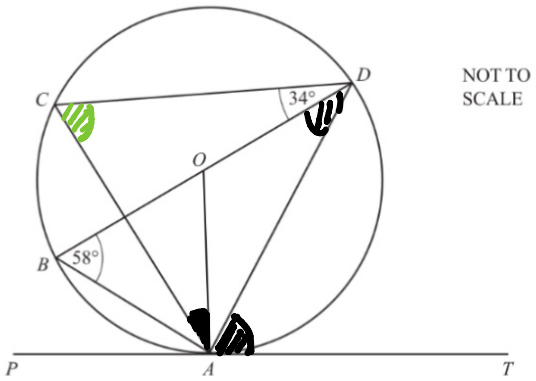
[1]

(iii) angle OBD.

3°

[2]

Question 5



A, B, C and *D* lie on the circle, centre *O*.
BD is a diameter and *PAT* is the tangent at *A*.
Angle *ABD* = 58° and angle *CDB* = 34°.

Find

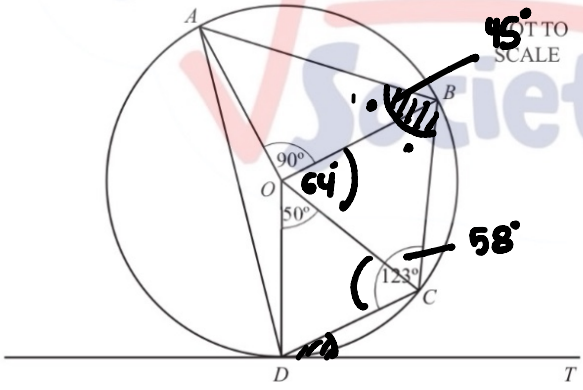
(a) angle *ACD*, 58° [1]

(b) angle *ADB*, 32° [1]

(c) angle *DAT*, 58° [1]

(d) angle *CAO*. 26° [2]

Question 1



The points *A*, *B*, *C* and *D* lie on a circle centre *O*.
Angle *AOB* = 90°, angle *COD* = 50° and angle *BCD* = 123°.
The line *DT* is a tangent to the circle at *D*.

Find

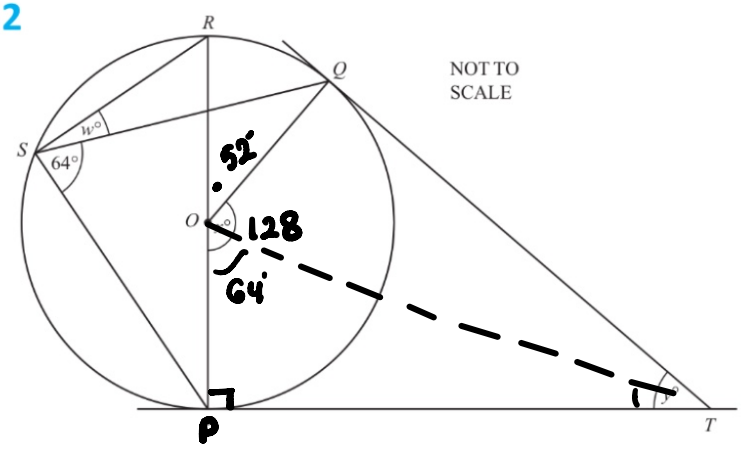
(a) angle *OCD*, 65° [1]

(b) angle *TDC*, 50° [1]

(c) angle *ABC*, 103° [1]

(d) reflex angle *AOC*. 206° [1]

Question 2



P, Q, R and S lie on a circle, centre O.
TP and TQ are tangents to the circle.
PR is a diameter and angle $PSQ = 64°$.

(a) Work out the values of w and x. [2]

$w = 26$

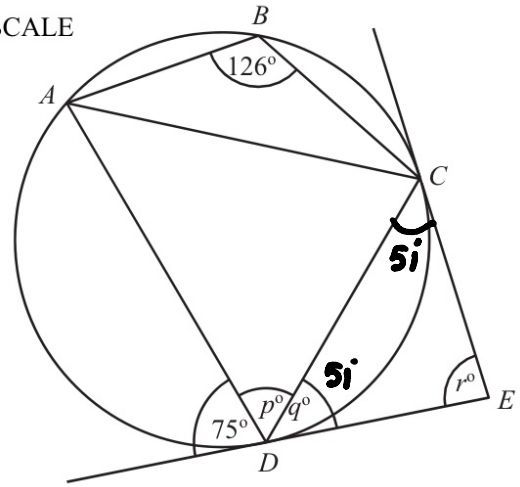
$x = 128$

(b) Showing all your working, find the value of y. [2]

$26 \times 2 = 52°$

Question 3

NOT TO SCALE



$ABCD$ is a cyclic quadrilateral.
The tangents at C and D meet at E.
Calculate the values of p, q and r.

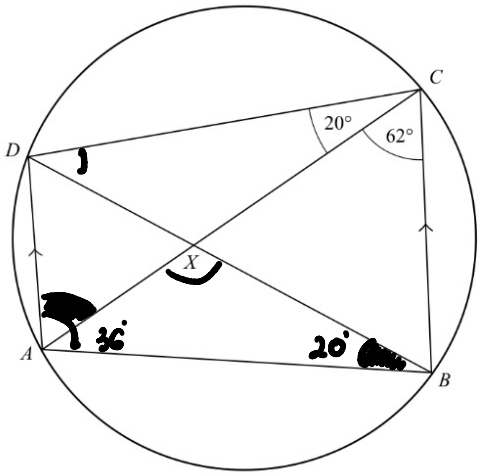
$p = 54°$

$q = 51°$

$r = 78°$

[4]

Question 4



NOT TO SCALE

$ABCD$ is a cyclic quadrilateral.
AD is parallel to BC. The diagonals DB and AC meet at X.
Angle $ACB = 62°$ and angle $ACD = 20°$.
Calculate

(a) angle DBA, 20° [1]

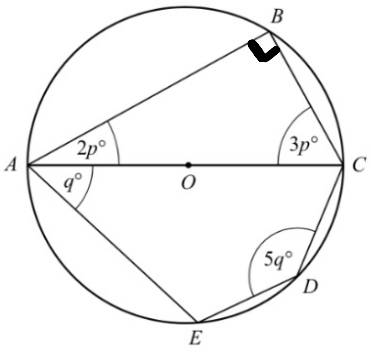
(b) angle DAB, 98° [1]

(c) angle DAC, 62° [1]

(d) angle AXB, 124° [1]

(e) angle CDB. 36° [1]

Question 5



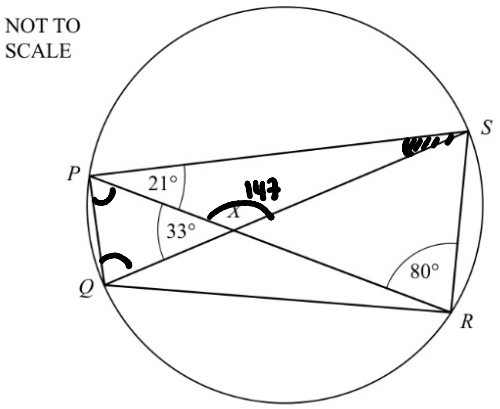
NOT TO SCALE

A, B, C, D and E lie on a circle, centre O. AOC is a diameter.
Find the value of

(a) p, 18° [2]

(b) q. 30° [2]

Question 6



PQRS is a cyclic quadrilateral. The diagonals *PR* and *QS* intersect at *X*.
Angle *SPR* = 21°, angle *PRS* = 80° and angle *PXQ* = 33°.
Calculate

(a) angle *PQS*, [1]

80°

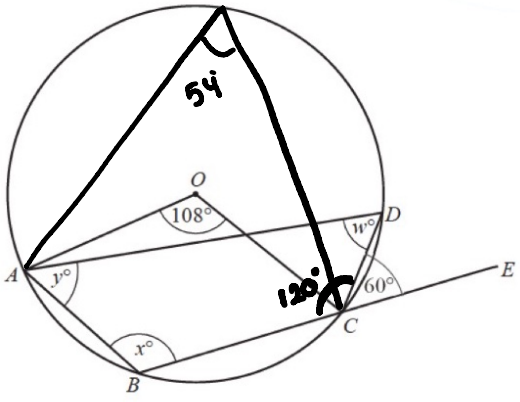
(b) angle *QPR*, [1]

67°

(c) angle *PSQ*. [1]

12°

Question 1



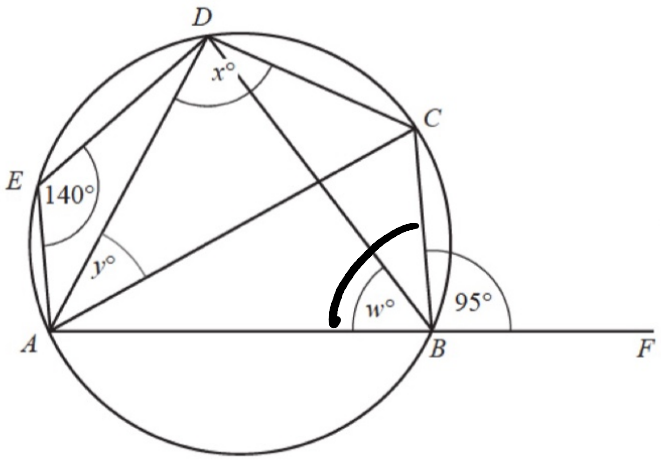
NOT TO
SCALE

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

Calculate the values of *w*, *x* and *y*. [3]

y=60°, x=126°, w=54°

Question 2



NOT TO SCALE

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

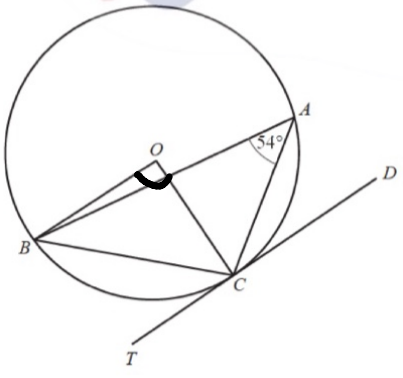
[5]

Find the values of w, x and y.

$x = 95°, w = 40, y = 45°$

Question 3

A, B and C are points on a circle, centre O.
TCD is a tangent to the circle.
Angle $BAC = 54°$.



NOT TO SCALE

Find angle BOC, giving a reason for your answer.

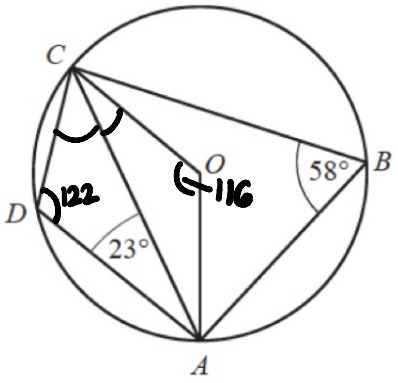
[2]

$108°$

[1]

[1]

Question 4



NOT TO SCALE

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

Calculate

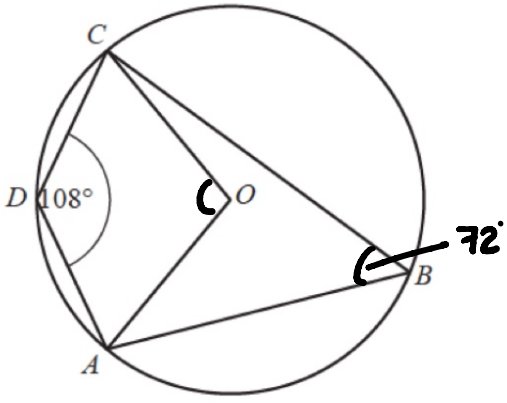
(a) angle OCA, [2]

32°

(b) angle DCA. [2]

35°

Question 5



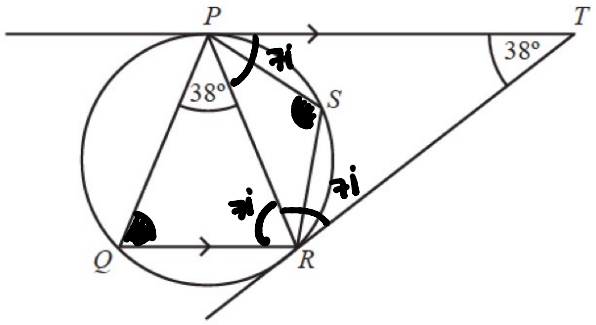
NOT TO SCALE

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

Work out the obtuse angle AOC. [2]

144°

Question 6



NOT TO SCALE

In the diagram PT and QR are parallel. TP and TR are tangents to the circle $PQRS$.
Angle PTR = angle RPQ = 38°.

(a) What is the special name of triangle TPR. Give a reason for your answer. [1]

isosceles Δ.

PT = TR

(b) Calculate

(i) angle PQR, [1]

71°

(ii) angle PSR. [1]

109°