12

P, Q and R lie on a circle.
QR is a diameter.

Find angle PRQ.
Give geometrical reasons for your answer.

Angle PRQ = ... because ....

.... [2]
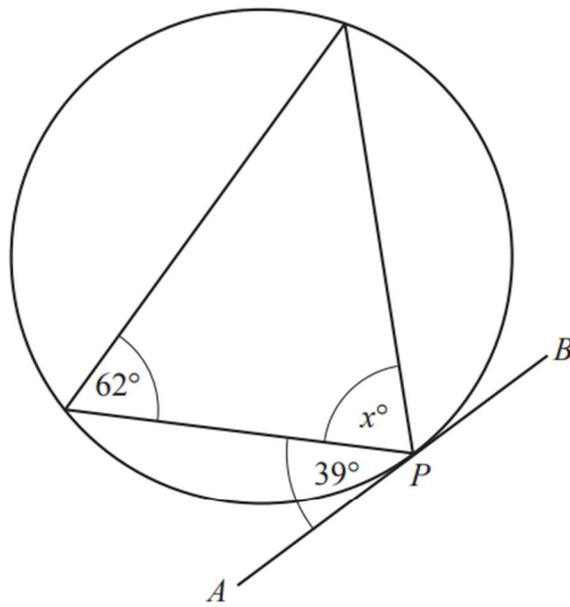
13
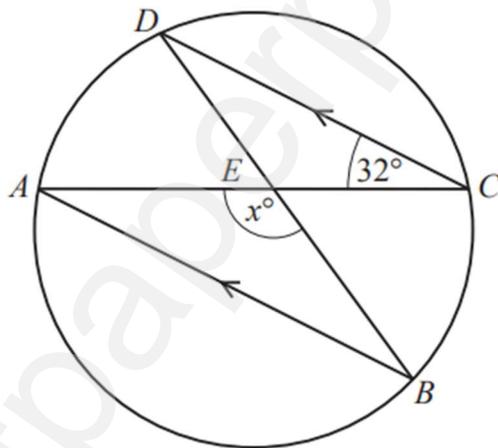
A, B, C and D are points on a circle.
AB is parallel to DC and angle $ACD = 32°$.
Chords AC and DB intersect at E.

Find the value of x.

$x =$ .... [2]

10

NOT TO SCALE

APB is a tangent to the circle at P.

Work out the value of x.

$x =$ .... [2]

15
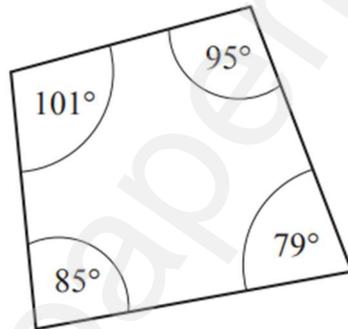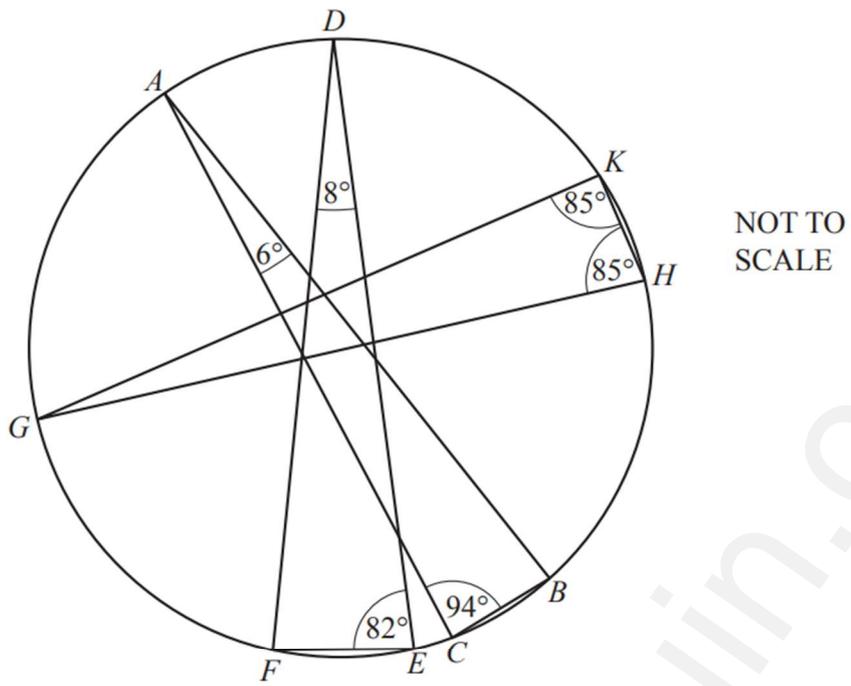

NOT TO SCALE

The diagram shows a quadrilateral.

Give a geometrical reason why this is a cyclic quadrilateral.

.... [1]
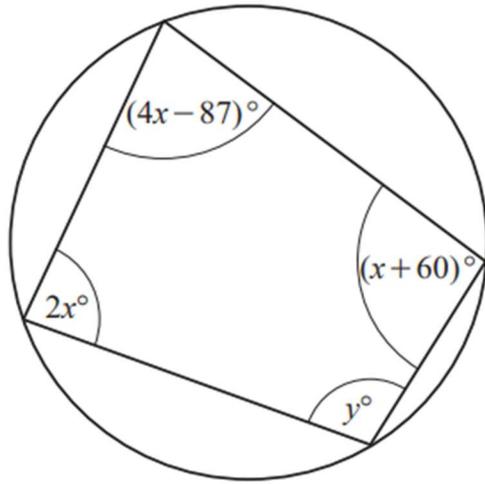
11 *ABC*, *DEF* and *GHK* are triangles with all vertices on the circumference of a circle.

From the list, draw a ring around the line that is a diameter of the circle.

    AB   *AC*   *DE*   *DF*   *GH*   *GK*
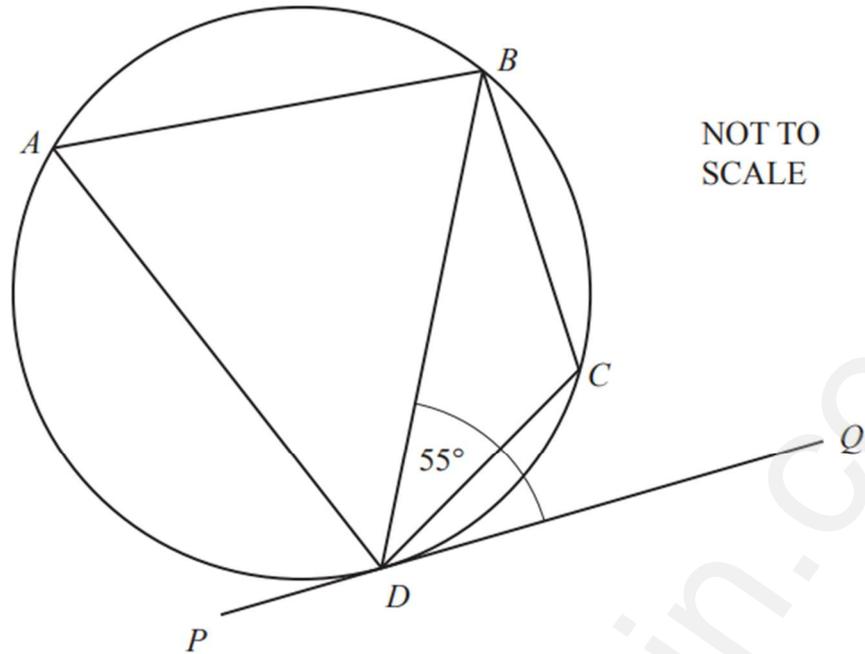
                                                                       [1]

NOT TO
SCALE

The diagram shows a cyclic quadrilateral.

Find the value of y.
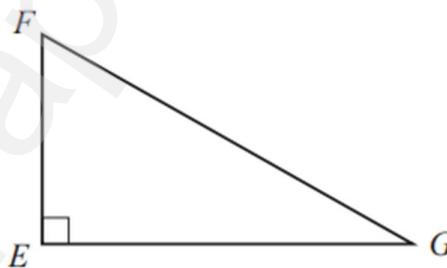
$y =$ .... [4]

A, B, C and D are points on the circle.
PQ is a tangent to the circle at D.
Angle BDQ = 55°.

Complete these statements giving a reason for each answer.

(a) Angle BAD = ... because ....

    .... [2]

(b) Angle BCD = ... because ....

    .... [2]
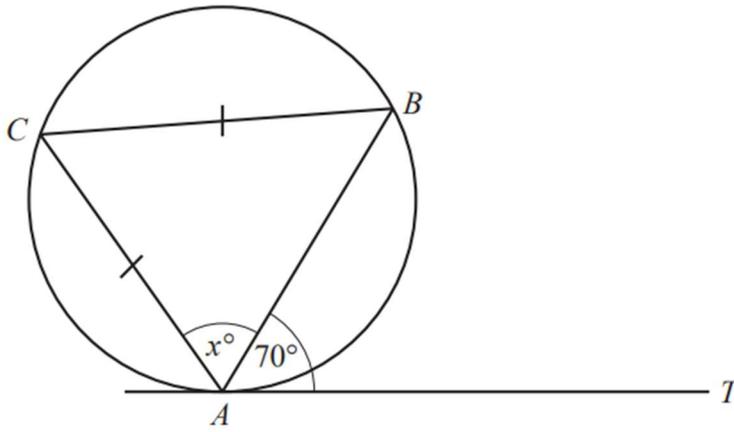
(b)

EFG is a right-angled triangle.
A circle can be drawn that passes through the three vertices of the triangle.

On the diagram, mark the position of the centre of the circle with a cross.
Explain how you decide.

    ....

    .... [2]

9

A, *B* and *C* are points on a circle.
TA is a tangent to the circle at *A*.
CA = *CB* and angle *BAT* = 70°.

Work out the value of *x*.

x = ... [2]

13
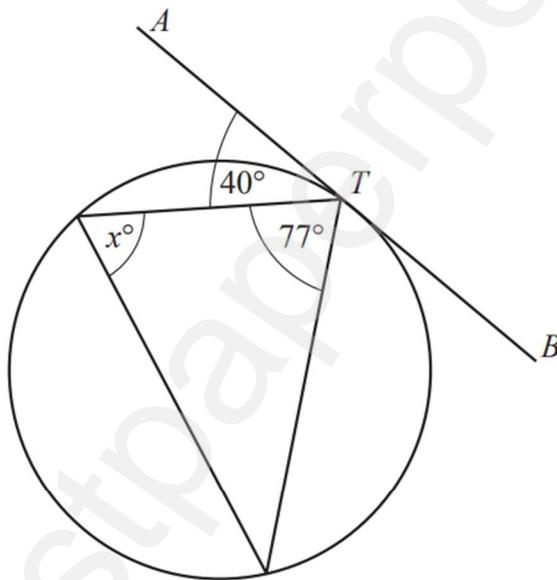
NOT TO SCALE

AB is a tangent to the circle at *T*.

Find the value of *x*.

x = ... [2]

12 (a)
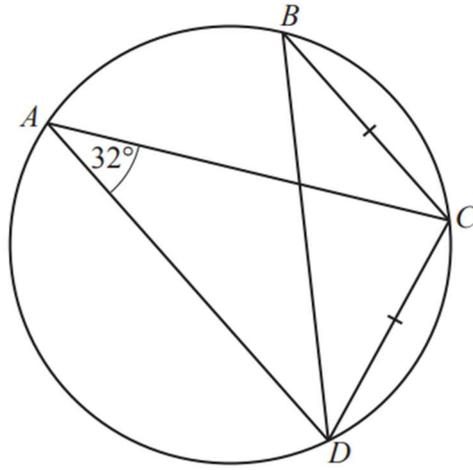
A, B, C, and D are points on a circle.
Angle $DAC = 32°$.
$BC = DC$.

Find angle BCD.

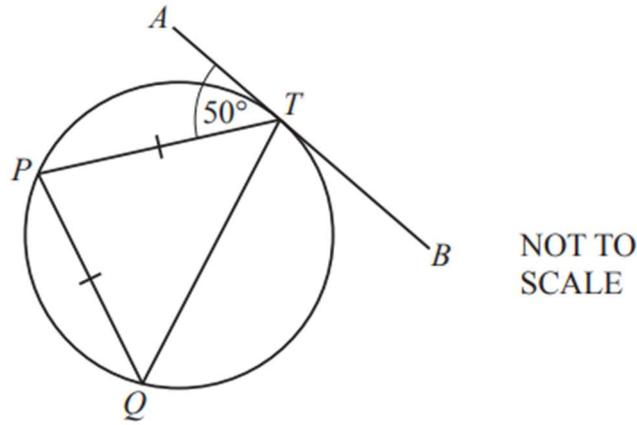Angle $BCD =$ .... [2]

(b)
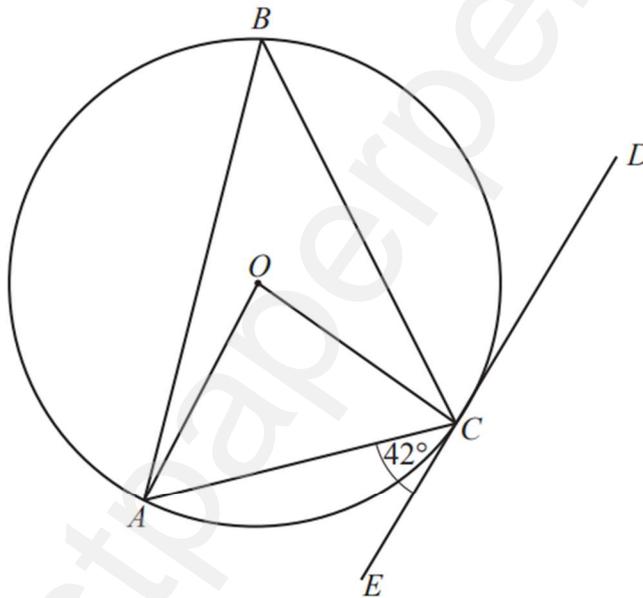
NOT TO
SCALE

A, B and C are points on the circle centre O.
ECD is a tangent to the circle at C.
Angle $ACE = 42°$.

Find angle AOC.

Angle $AOC =$ .... [2]

19 (a)

NOT TO SCALE

P, Q and T are points on a circle.
ATB is a tangent to the circle at T and $PT = PQ$.

Find angle TPQ.

Angle $TPQ =$ .... [2]

(b)
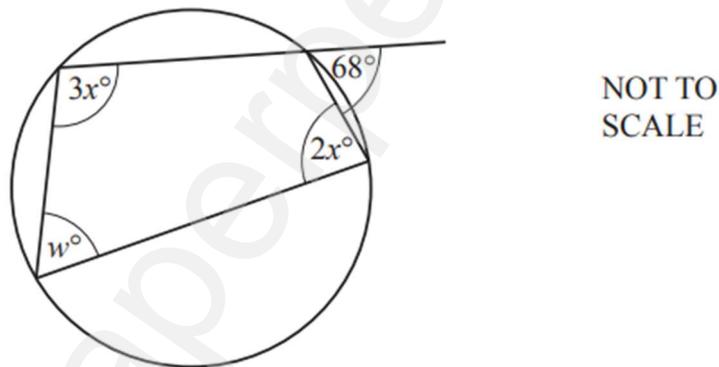
NOT TO SCALE

The diagram shows a cyclic quadrilateral with an exterior angle of 68°.

Find the value of w and the value of x.

$w =$ ....

$x =$ .... [3]

17 (a)

A, B and C are points on a circle, centre O.
Angle OBA = 28°.

Find angle ACB.

Angle ACB = ... [2]

(b)

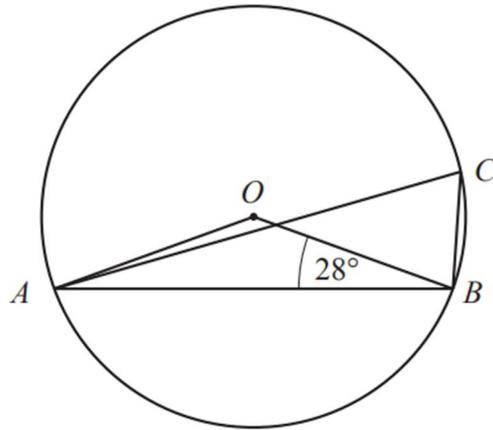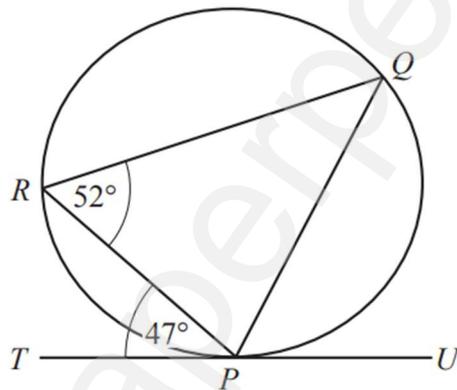P, Q and R are points on a circle.
TU is a tangent to the circle at P.
Angle TPR = 47° and angle PRQ = 52°.

Find angle RPQ.

Angle RPQ = ... [2]

10
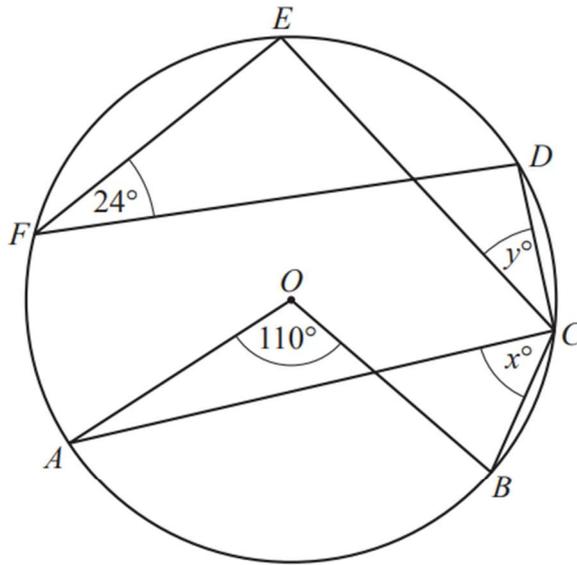
Points *A*, *B*, *C*, *D*, *E* and *F* lie on the circle, centre *O*.

Find the value of *x* and the value of *y*.

$x = $ ....

$y = $ .... [2]

15
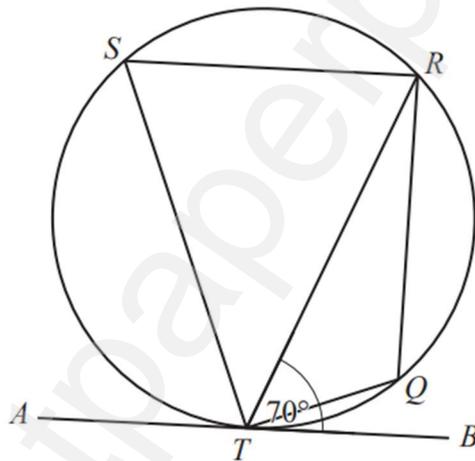
Points *Q*, *R*, *S* and *T* lie on the circle.
AB is a tangent to the circle at *T*.
Angle *RTB* = 70°.

Find angle *RQT*.

Angle *RQT* = ... [2]

2   (a)
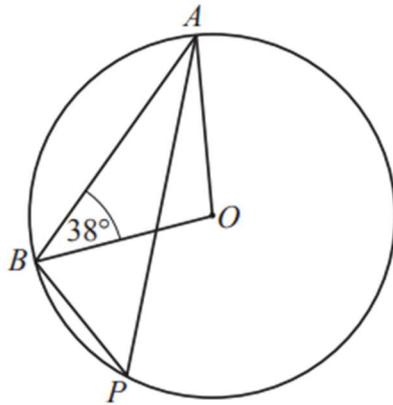
A, *B* and *P* are points on a circle, centre *O* and angle *OBA* = 38°.

Find angle *APB*.

Angle *APB* = ... [3]

(b)
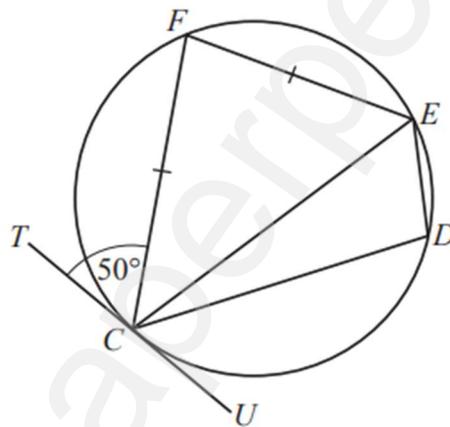
NOT TO
SCALE

CDEF is a cyclic quadrilateral and *FC* = *FE*.
TU is a tangent to the circle at *C* and angle *TCF* = 50°.

Find

(i)   angle *EFC*,

Angle *EFC* = ... [2]

(ii)   angle *CDE*.

Angle *CDE* = ... [1]

9 **(a)**
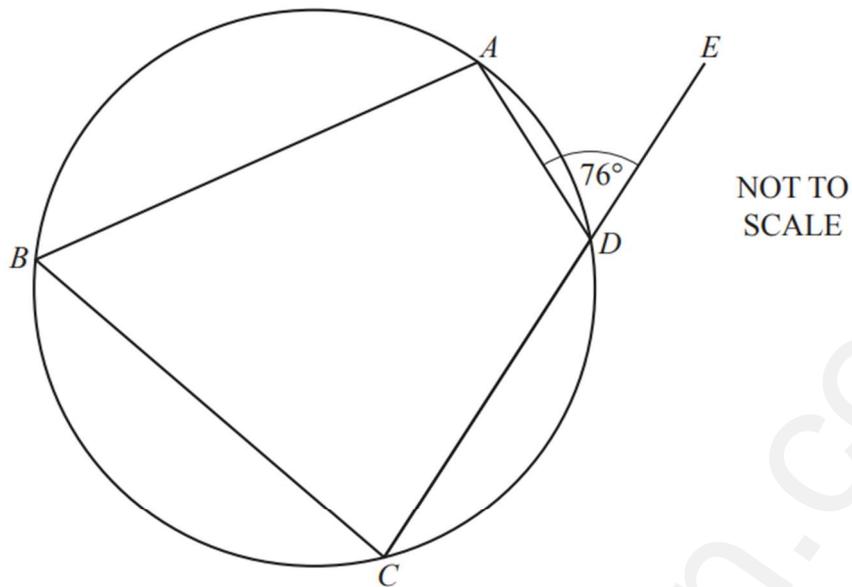
A, B, C, and D are points on a circle.
CDE is a straight line.

Find angle ABC .

Angle $ABC =$ .... [1]

(b)
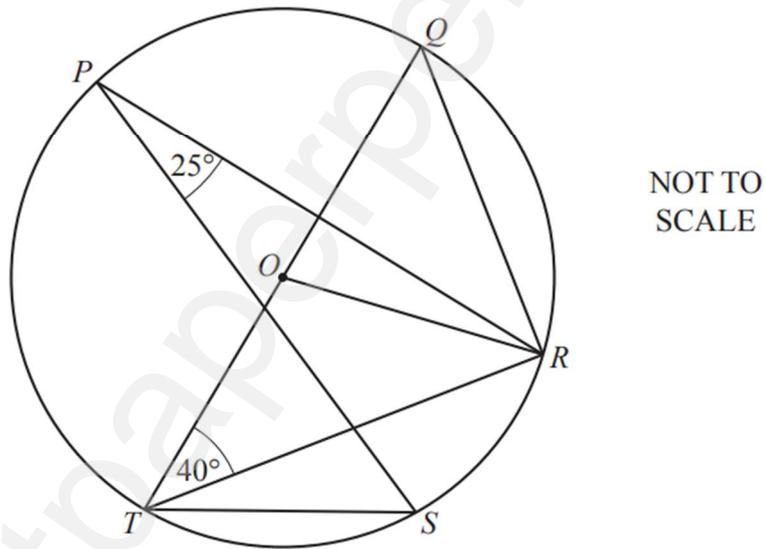
NOT TO
SCALE

P, Q, R, S and T are points on the circle centre O.
TOQ is a straight line.

(i) Find angle STR.

Angle $STR =$ .... [1]

(ii) Find angle QOR.

Angle $QOR =$ .... [1]
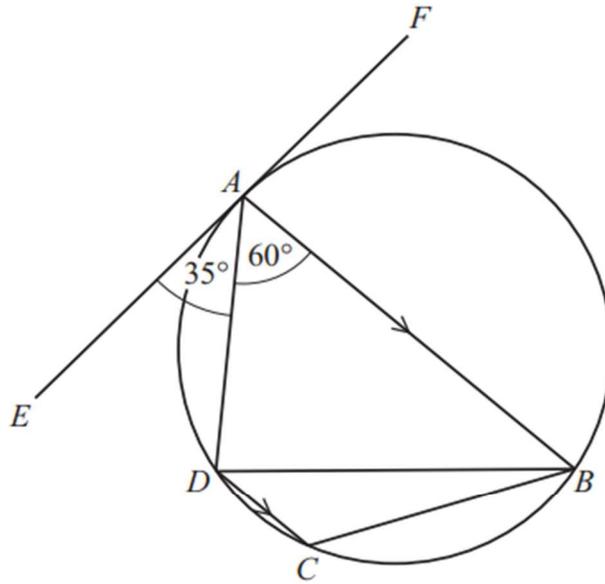
NOT TO
SCALE

A, *B*, *C* and *D* are points on a circle.
EF is a tangent to the circle at *A*.
AB is parallel to *DC*.

(a) Find angle *DCB*, giving a geometrical reason.

Angle *DCB* = ... because ....

.... [2]

(b) Find angle *DBC*.

Angle *DBC* = ... [2]

D ———————————————— A ——— E
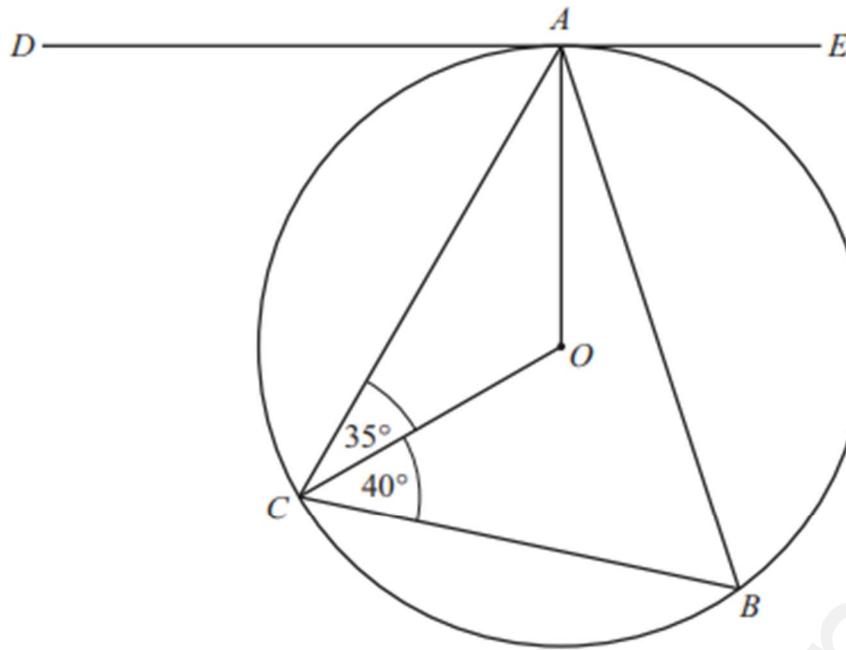
NOT TO SCALE

A, B and C are three points on a circle, centre O.
DE is a tangent to the circle at A.
Angle $ACO = 35°$ and angle $BCO = 40°$.

Find

(a) angle AOC

Angle $AOC =$ .... [1]

(b) angle ABC

Angle $ABC =$ .... [1]

(c) angle DAC

Angle $DAC =$ .... [1]

(d) angle OAB.

Angle $OAB =$ .... [1]
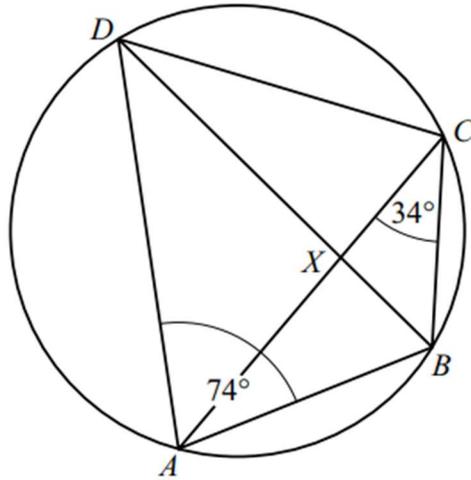
The diagram shows a cyclic quadrilateral *ABCD*.
BD and *AC* intersect at *X*.

(a) Angle *BAD* = 74° and angle *BCA* = 34°.

Find

(i) angle *BDA*

Angle *BDA* = ... [1]

(ii) angle *BCD*

Angle *BCD* = ... [1]

(iii) angle *ABD*.

Angle *ABD* = ... [1]

(b) In the diagram, triangle *ADX* is similar to triangle *BCX*.
BC = 4.5 cm, *AD* = 9 cm and *CX* = 3.3 cm.

Work out *XD*.

XD = ... cm [2]
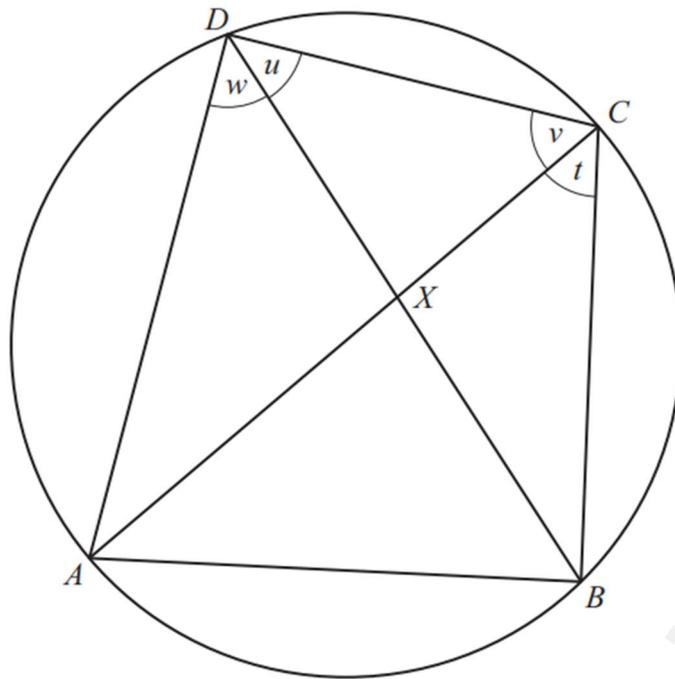
NOT TO SCALE

ABCD is a cyclic quadrilateral and the diagonals *AC* and *BD* intersect at *X*.

(a) Complete the statement using two of *t*, *u*, *v* and *w*.

Angle .... is equal to angle .... [1]

(b) Angle *DAB* = 75°.

Find angle *DCB*.

Angle *DCB* = ... [1]

(c) *AB* = 8 cm, *AX* = 6 cm, *BX* = 4 cm and *DC* = 5 cm.

Work out *CX*.

CX = ... cm [2]

13
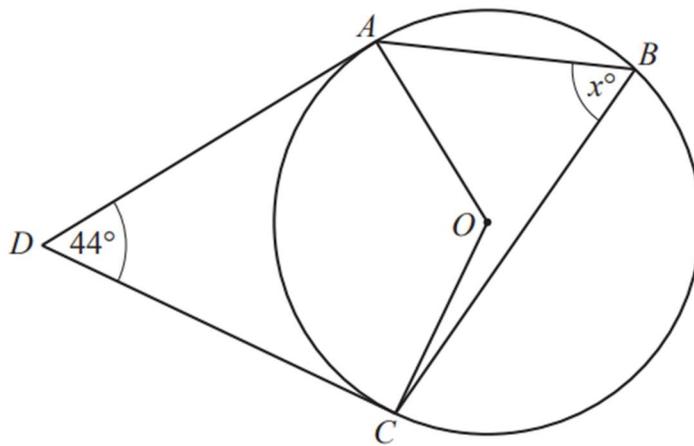
A, B and C are points on a circle, centre O.
DA and DC are tangents.
Angle ADC = 44°.

Work out the value of x.

x = ... [3]

15
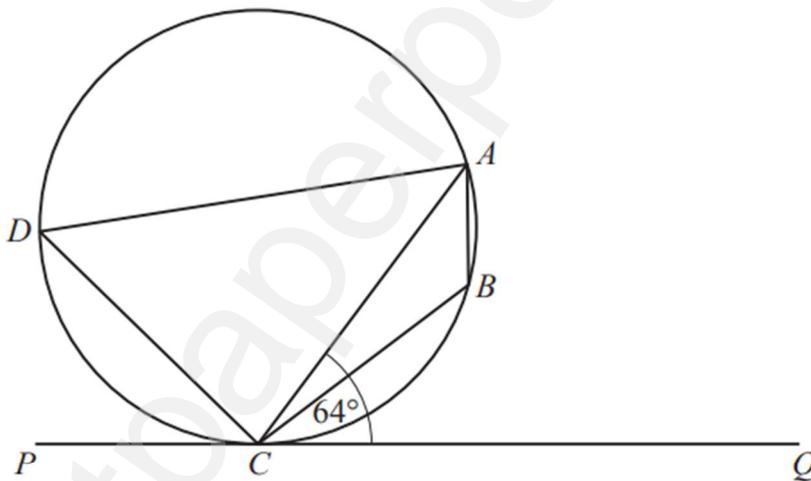
A, B, C and D lie on the circle.
PCQ is a tangent to the circle at C.
Angle ACQ = 64°.

Work out angle ABC, giving reasons for your answer.

Angle ABC = ... because ....

....

.... [3]

15
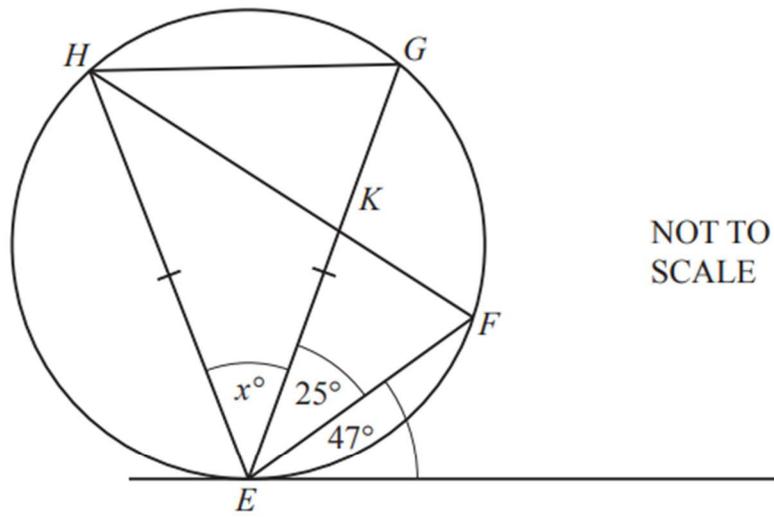
NOT TO SCALE

Points E, F, G and H lie on the circle and $EG = EH$.

HF and EG intersect at K.

ET is a tangent to the circle at E.

Angle $FET = 47°$ and angle $FEG = 25°$.

Find the value of x.

$x =$ .... [2]

NOT TO
SCALE

B

35°

C

E

22°

A

D

F
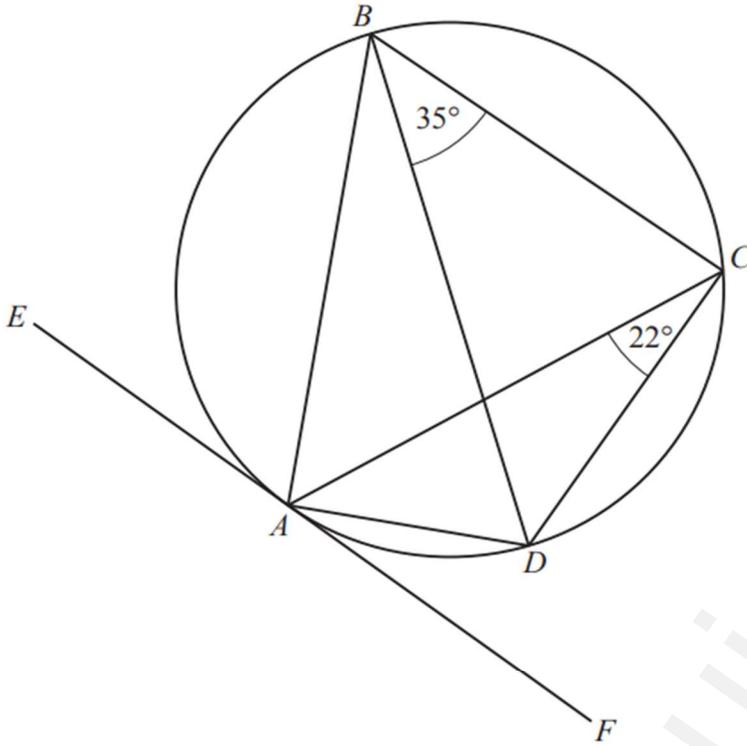
A, *B*, *C* and *D* are points on the circle.
EF is a tangent to the circle at *A*.
Angle *DBC* = 35° and angle *ACD* = 22°.

Find

(a) angle *ABD*

Angle *ABD* = ... [1]

(b) angle *ADC*

Angle *ADC* = ... [1]

(c) angle *CAF*.

Angle *CAF* = ... [1]
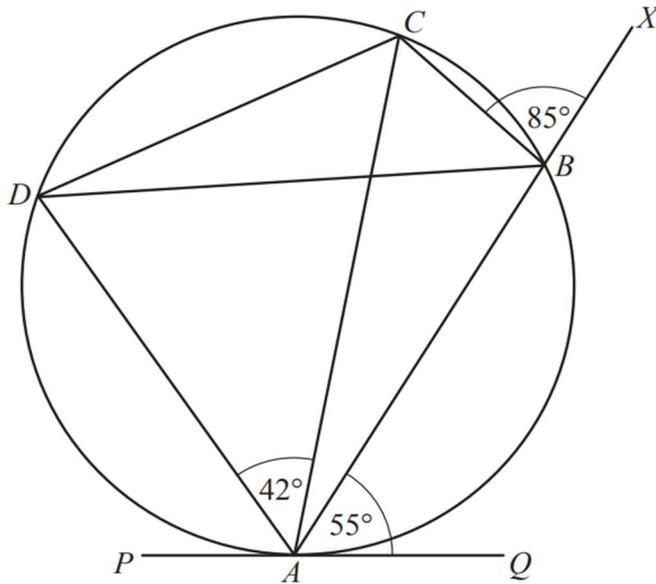
ABCD is a cyclic quadrilateral, *ABX* is a straight line and *PQ* is a tangent to the circle at *A*.
Angle *CBX* = 85°, angle *BAQ* = 55° and angle *CAD* = 42°.

Find

(a) angle *CBD*

Angle *CBD* = ... [1]

(b) angle *ACB*

Angle *ACB* = ... [1]

(c) angle *ADC*

Angle *ADC* = ... [1]

(d) angle *BCD*

Angle *BCD* = ... [2]

(e) angle *PAD*.

Angle *PAD* = ... [1]
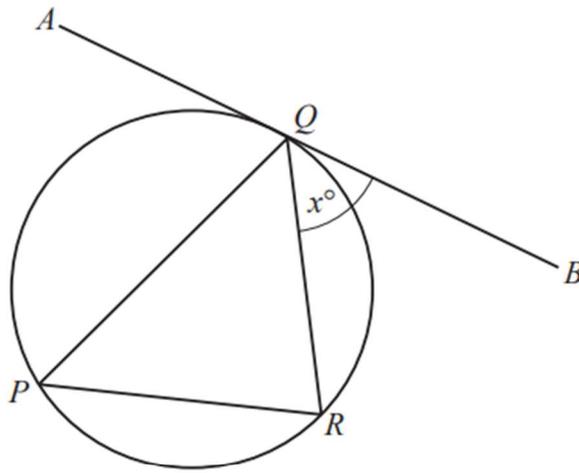
NOT TO SCALE

P, *R* and *Q* are points on the circle.
AB is a tangent to the circle at *Q*.
QR bisects angle *PQB*.
Angle *BQR* = $x°$ and $x < 60$.

Use this information to show that triangle *PQR* is an isosceles triangle.
Give a geometrical reason for each step of your work.

[3]

(b)
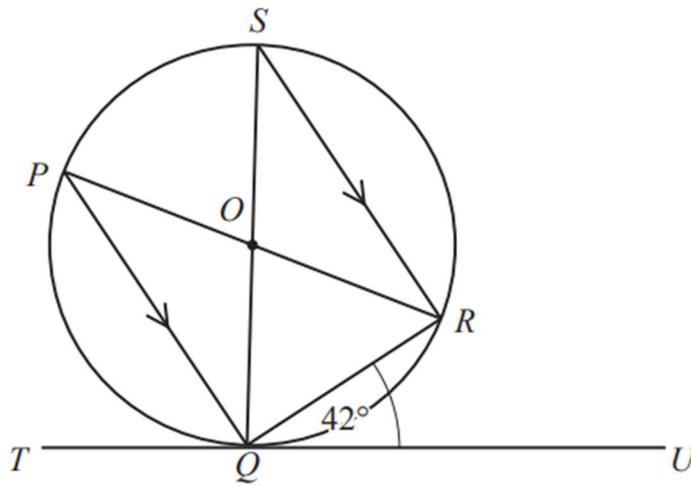
NOT TO
SCALE

P, Q, R and S are points on the circle and TQU is a tangent to the circle at Q.
PR and SQ intersect at the centre of the circle, O, and PQ is parallel to SR.
Angle $RQU = 42°$.

Calculate

(i) angle QSR

Angle $QSR =$ .... [1]

(ii) angle PQS

Angle $PQS =$ .... [1]

(iii) angle POS.

Angle $POS =$ .... [1]
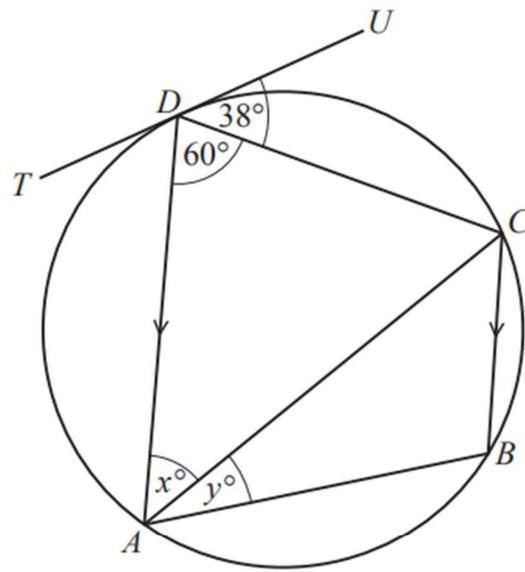
NOT TO SCALE

A, B, C and D are points on a circle.
TU is a tangent to the circle at D.
DA is parallel to CB.

Find the value of x and the value of y.

$x = $ ....

$y = $ .... [3]
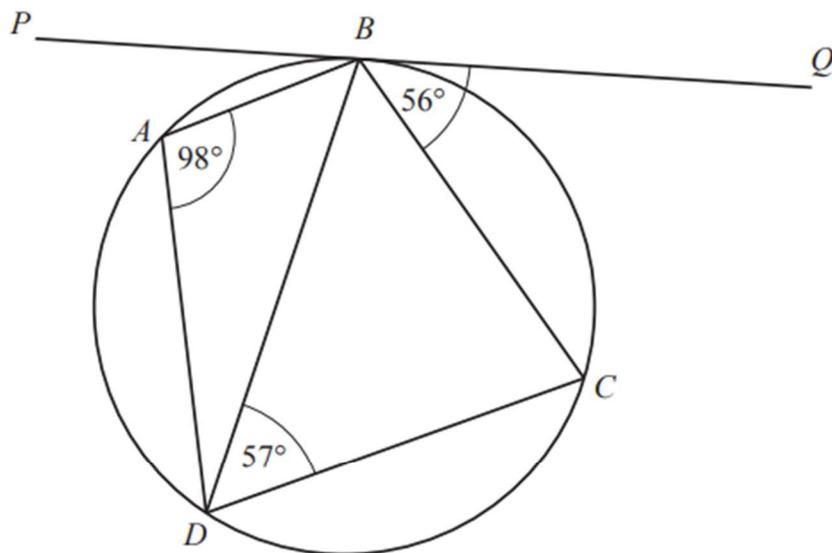
NOT TO SCALE

A, B, C and D are points on the circle.
PBQ is a straight line.

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

Angle $DCB =$ .... because ....

.... [2]

(b) Is PBQ a tangent to the circle?
Give a reason for your answer.

.... because ....

.... [1]
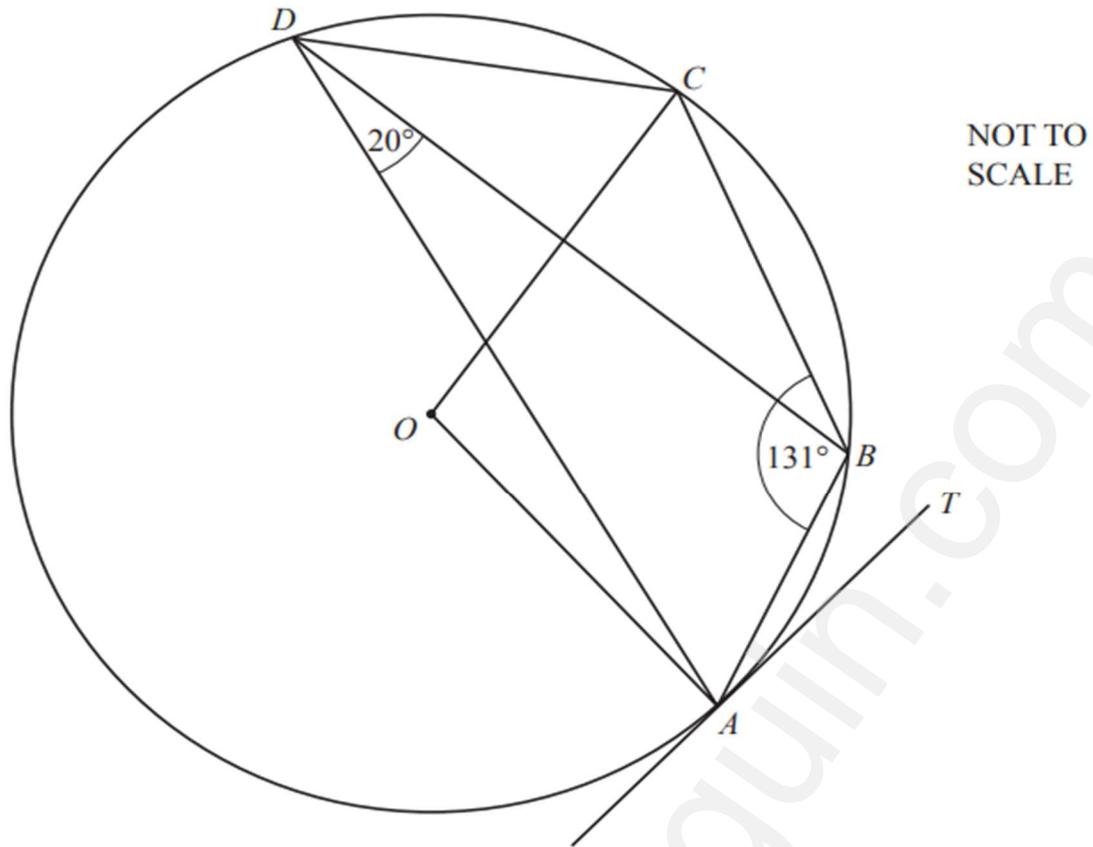
A, *B*, *C* and *D* lie on the circle, centre *O*.
TA is a tangent to the circle at *A*.
Angle *ABC* = 131° and angle *ADB* = 20°.

Find

(a) angle *ADC*,

Angle *ADC* = ... [1]

(b) angle *AOC*,

Angle *AOC* = ... [1]

(c) angle *BAT*,

Angle *BAT* = ... [1]

(d) angle *OAB*.

Angle *OAB* = ... [1]
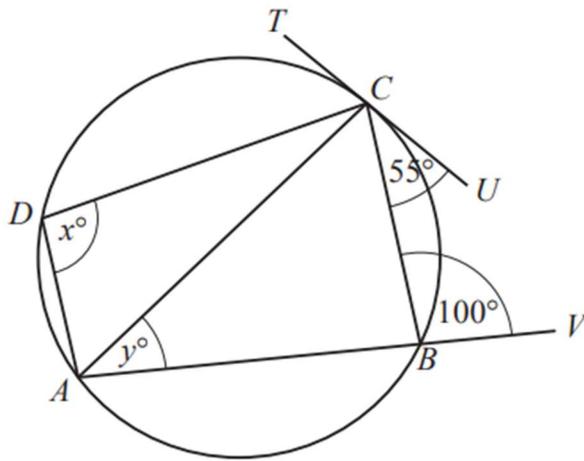
NOT TO SCALE

ABCD is a cyclic quadrilateral.
ABV is a straight line and TU is a tangent to the circle at C.

Find the value of x and the value of y.

$x =$ ....

$y =$ .... [2]

(d)
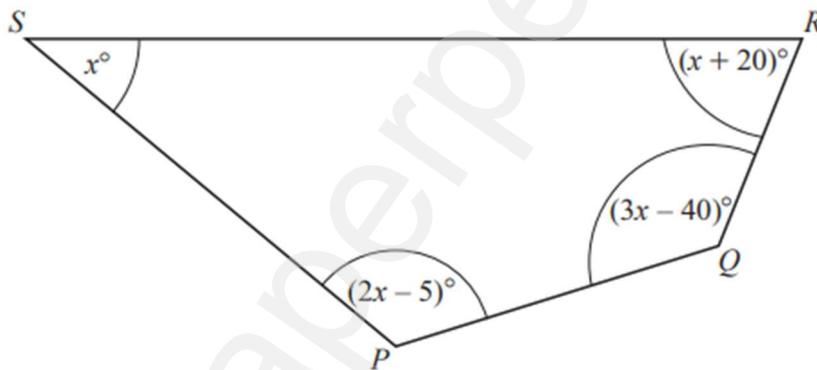
NOT TO SCALE

Show that PQRS is a cyclic quadrilateral.

[5]

NOT TO SCALE
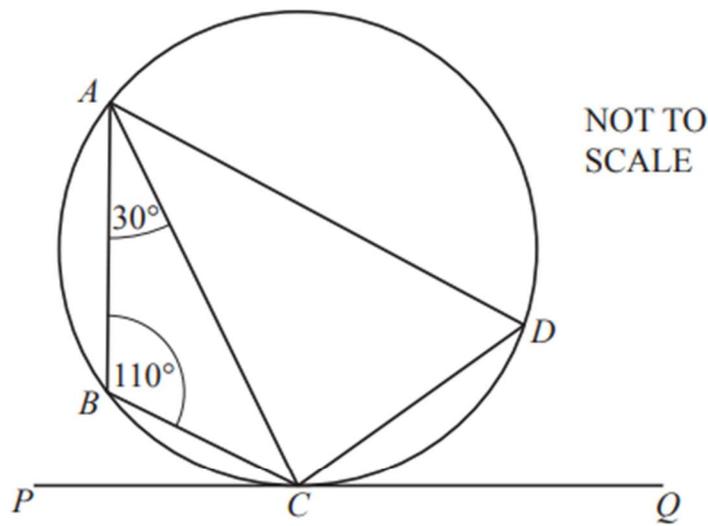
The points A, B, C and D lie on a circle.
PCQ is a tangent to the circle at C.
Angle $ABC = 110°$ and angle $BAC = 30°$.

Find

(a) angle ADC,

Angle $ADC = $ .... [1]

(b) angle ACP,

Angle $ACP = $ .... [1]

(c) angle PCB.

Angle $PCB = $ .... [1]

NOT TO SCALE
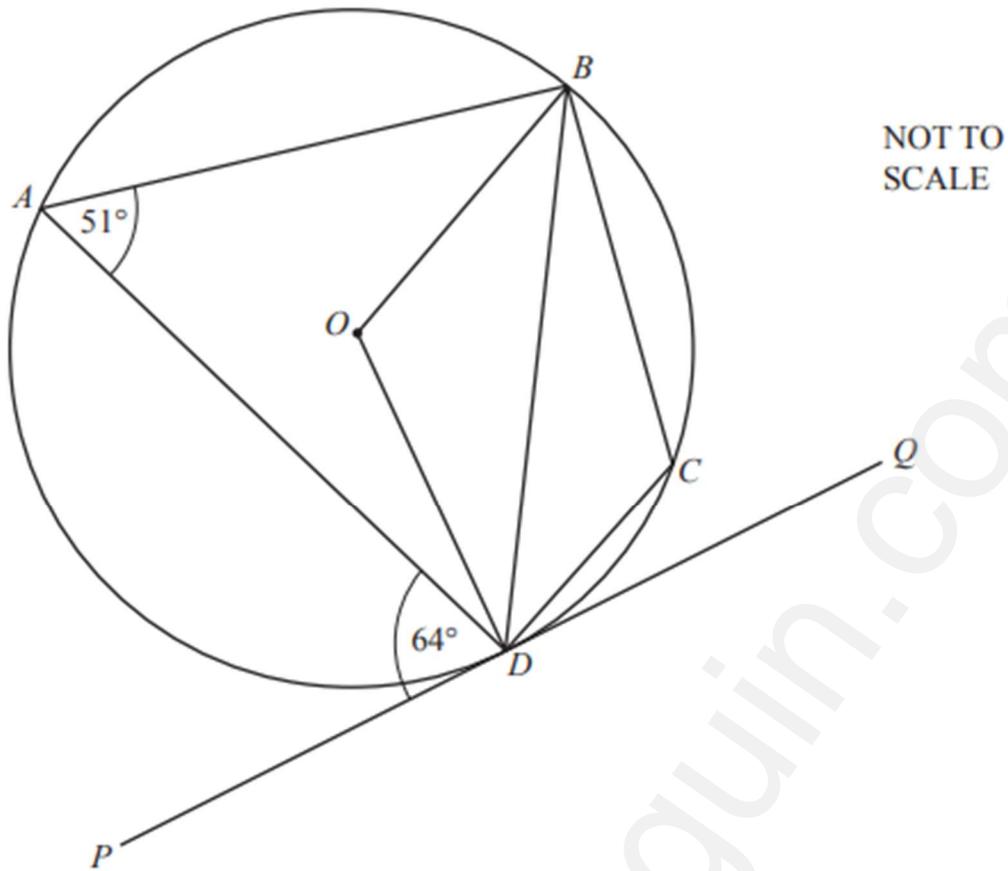
A, *B*, *C* and *D* are points on the circle centre *O*.
PDQ is a tangent to the circle at *D*.
Angle *BAD* = 51° and angle *PDA* = 64°.

Find

(a) angle *BCD*

Angle *BCD* = ... [1]

(b) angle *ABD*

Angle *ABD* = ... [1]

(c) the obtuse angle *BOD*.

Angle *BOD* = ... [1]
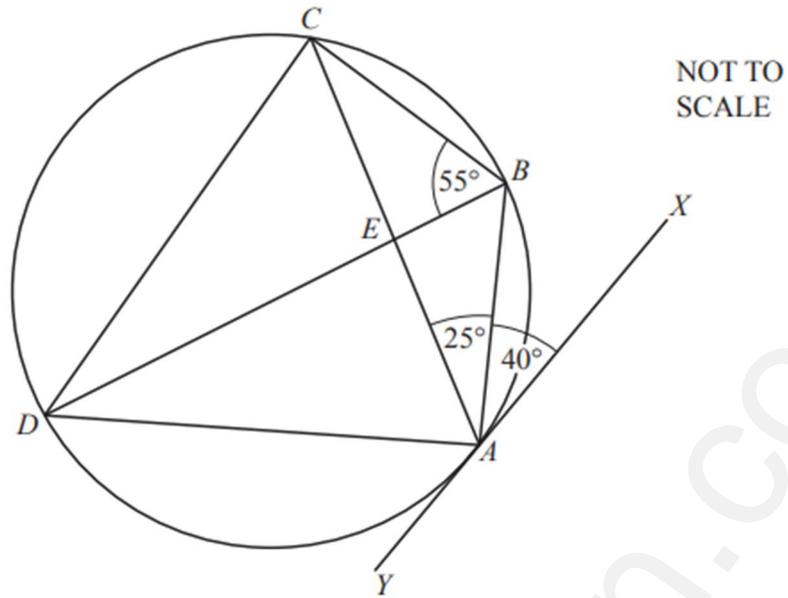
NOT TO SCALE

A, *B*, *C* and *D* are four points on a circle.
AC and *BD* meet at *E*.
XAY is a tangent to the circle at *A*.

Find

(a) angle *CDB*,

Angle *CDB* = ... [1]

(b) angle *ACB*,

Angle *ACB* = ... [1]

(c) angle *DCE*,

Angle *DCE* = ... [1]

(d) angle *YAD*.

Angle *YAD* = ... [1]
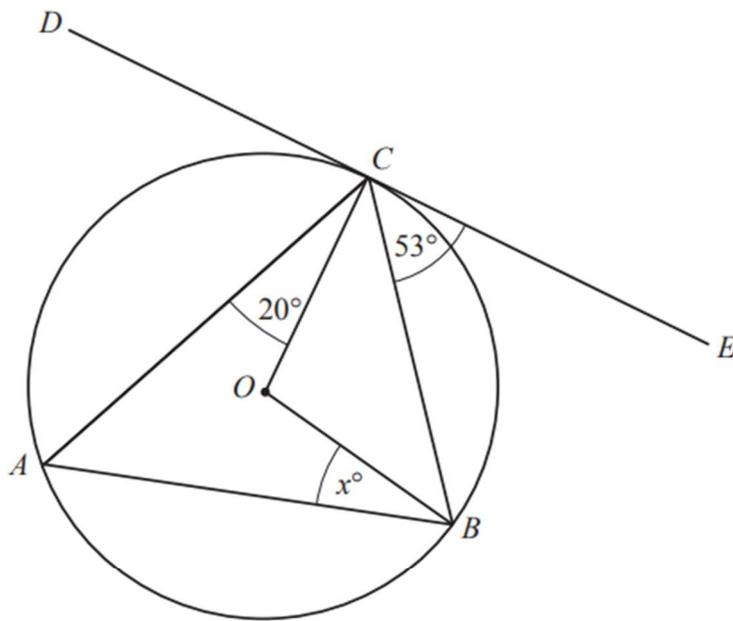
NOT TO SCALE

A, *B* and *C* are points on the circumference of a circle, centre *O*.
Tangent *DE* touches the circle at *C*.
Angle *BCE* = 53° and angle *ACO* = 20°.

Find the value of *x*.

x = ... [3]

(b)
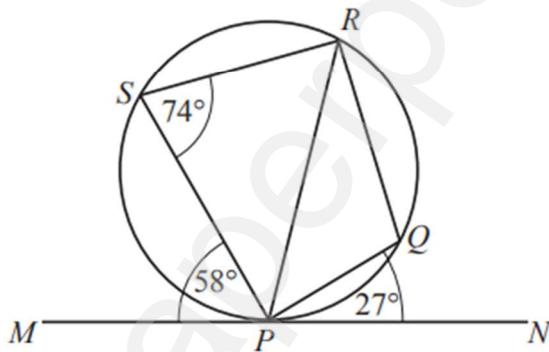
NOT TO SCALE

P, *Q*, *R* and *S* lie on a circle.
MPN is a tangent to the circle at *P*.
Angle *MPS* = 58°, angle *PSR* = 74° and angle *QPN* = 27°.

(i) Find angle *PRS*.

Angle *PRS* = ... [1]

(ii) Find angle *PQR*.

Angle *PQR* = ... [1]

(iii) Find angle *RPQ*.

Angle *RPQ* = ... [2]
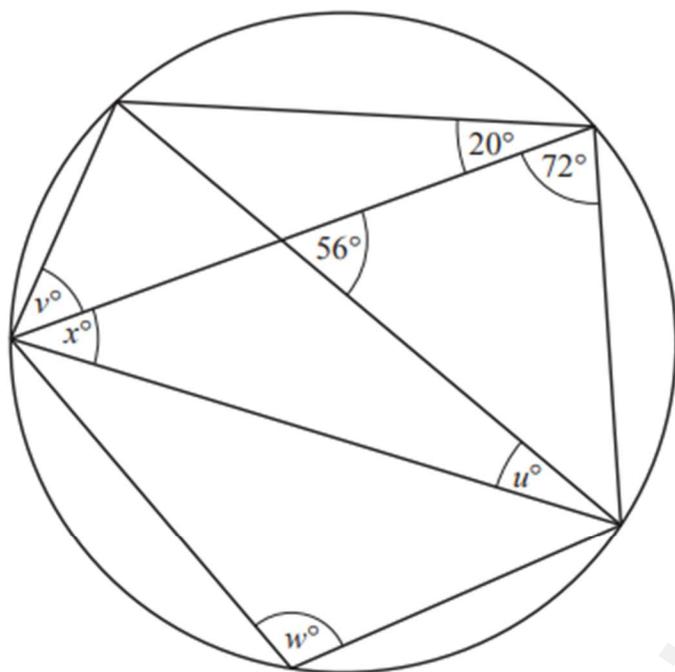
NOT TO SCALE

The diagram shows a circle and eight chords.

Calculate the values of *u*, *v*, *w* and *x*.

u = ...

v = ...

w = ...

x = ... [4]
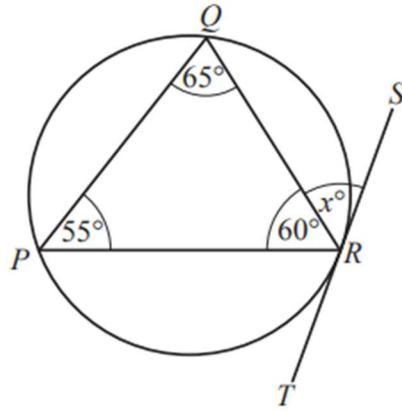
NOT TO
SCALE

P, Q and R are points on a circle.
ST is a tangent to the circle at R.

(a) Write down the value of x.
Give a geometrical reason for your answer.

$x =$ .... because..

.... [2]

(b) Another tangent from the point S touches the circle at V.

Give a geometrical reason why triangle SVR is isosceles.

....

.... [1]

5 (a)
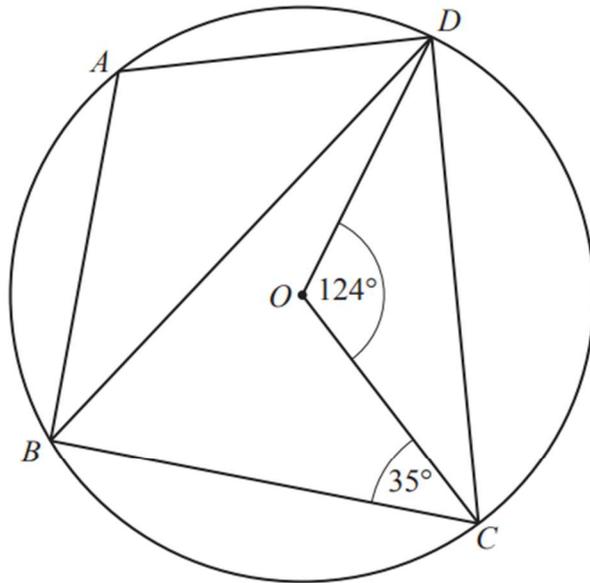
NOT TO SCALE

A, B, C and D are points on a circle, centre O.
Angle $COD = 124°$ and angle $BCO = 35°$.

(i) Work out angle CBD.
Give a geometrical reason for your answer.

Angle CBD = ... because ....

.... [2]

(ii) Work out angle BAD.
Give a geometrical reason for each step of your working.

Angle BAD = ... because ....

....

.... [4]
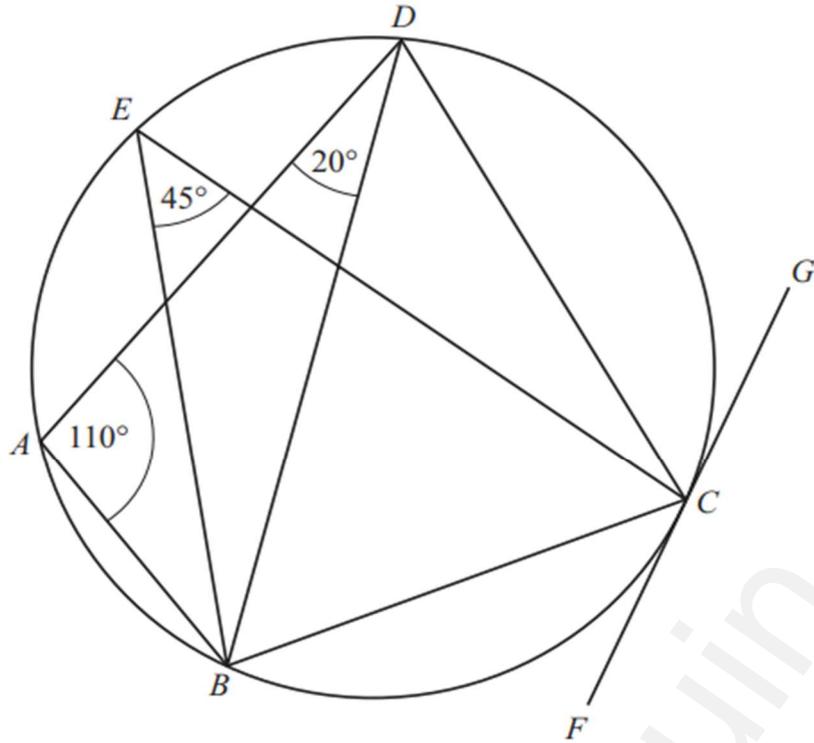
NOT TO SCALE

A, B, C, D and E lie on a circle.
FG is a tangent to the circle at C.
Angle $BAD = 110°$, angle $ADB = 20°$ and angle $BEC = 45°$.

(a) Find angle BCD.
Give a geometrical reason for your answer.

Angle $BCD =$ .... because ....

.... [2]

(b) (i) Find angle DBC.

Angle $DBC =$ .... [2]

(ii) Find angle DCG.

Angle $DCG =$ .... [1]