IGCSE · Cambridge (CIE) · Maths

1 hour 20 questions

Non-Calculator Questions

Circle Theorems

Angles at Centre & Circumference / Angle in a Semicircle / Theorems with Chords & Tangents / Angles in Cyclic Quadrilaterals / Angles in the Same Segment / The Alternate Segment Theorem

Medium (6 questions)	/11
Hard (9 questions)	/31
Very Hard (5 questions)	/22
Total Marks	**/64**

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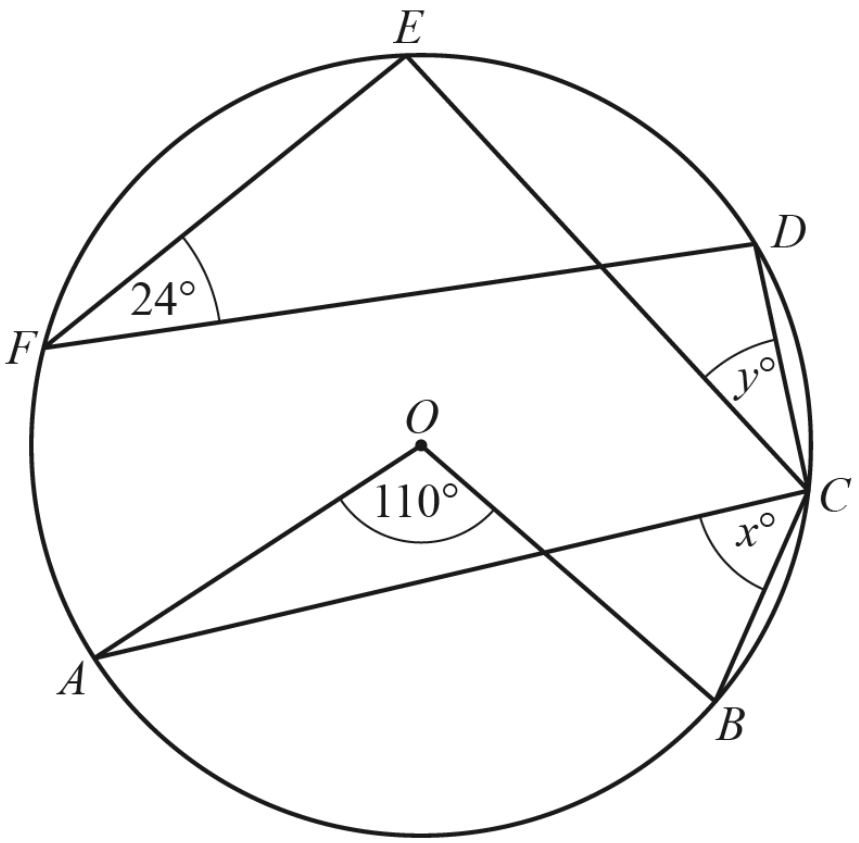
Medium Questions

1



NOT TO SCALE

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

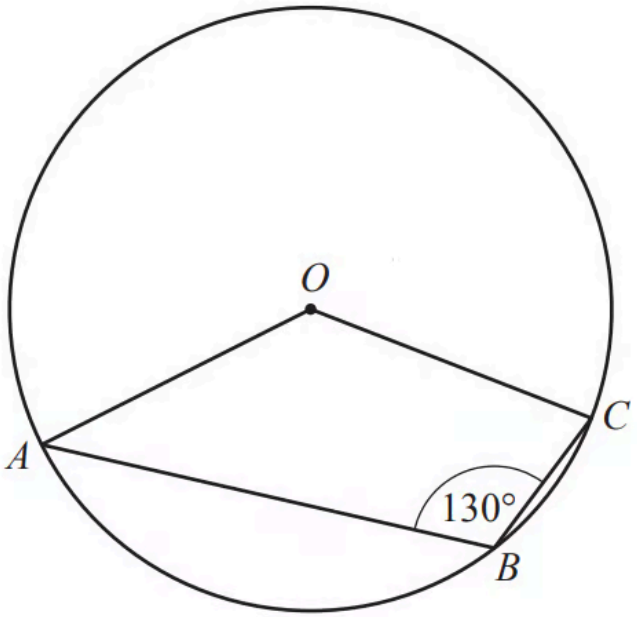
Find the value of x and the value of y.

$x =$ .....

$y =$ .....

(2 marks)

2



NOT TO SCALE

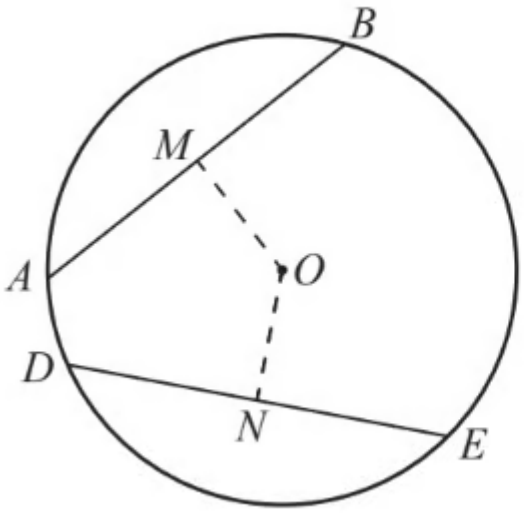
A, *B* and *C* are points on the circle, centre *O*.

Find the obtuse angle *AOC*.

Angle *AOC* = ...

(2 marks)

3



NOT TO SCALE

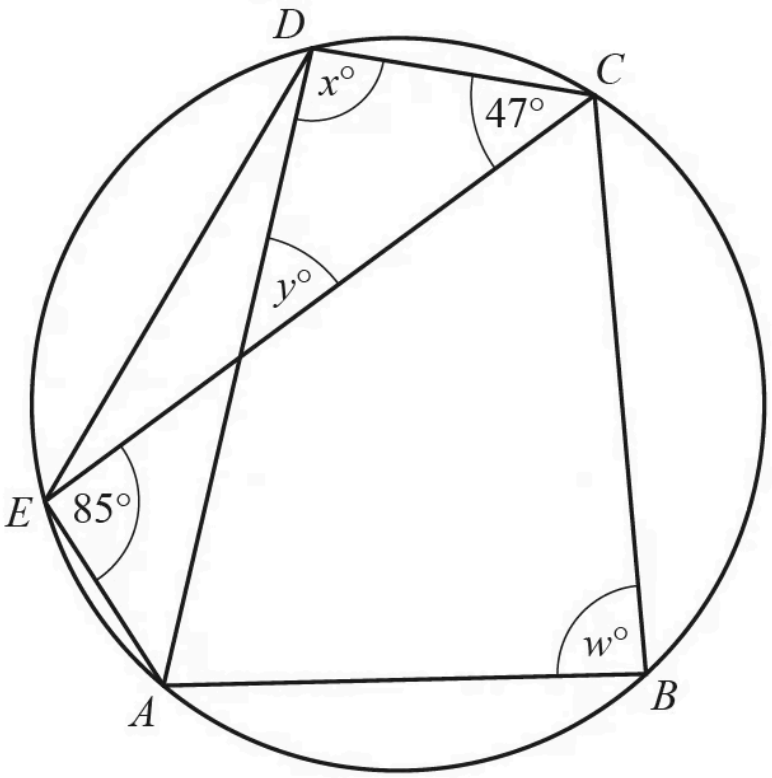
The diagram shows a circle, centre O.
AB and DE are chords of the circle.
M is the mid-point of AB and N is the mid-point of DE.
$AB = DE = 9$ cm and $OM = 5$ cm.

Find ON.

ON = ... cm

(1 mark)

4



NOT TO SCALE

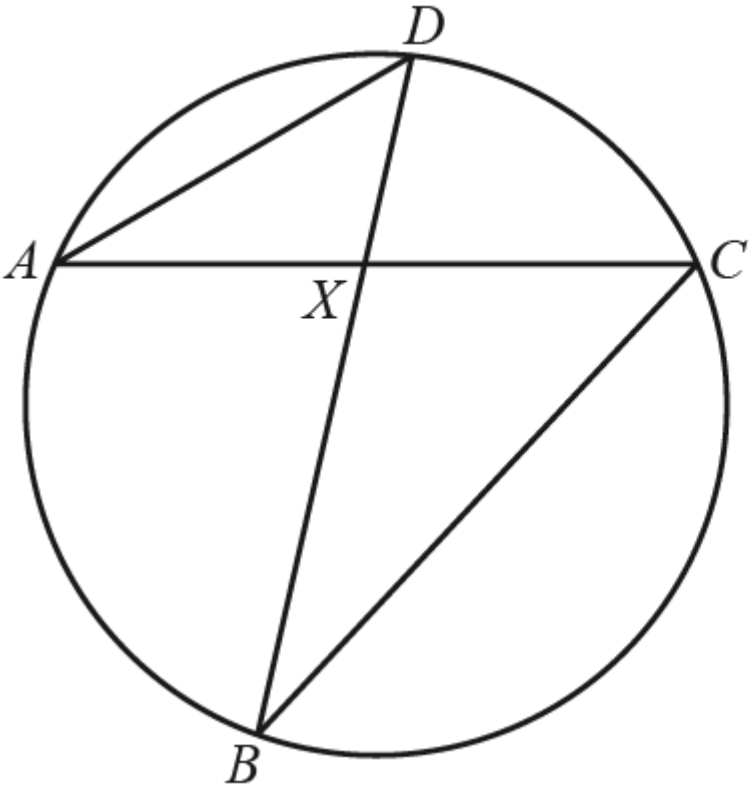
The points A, B, C, D and E lie on the circumference of the circle.
Angle $DCE = 47°$ and angle $CEA = 85°$.

Find the values of w, x and y.

$w =$ ..... .
$x =$ ....
$y =$ .....

(3 marks)

5



NOT TO SCALE

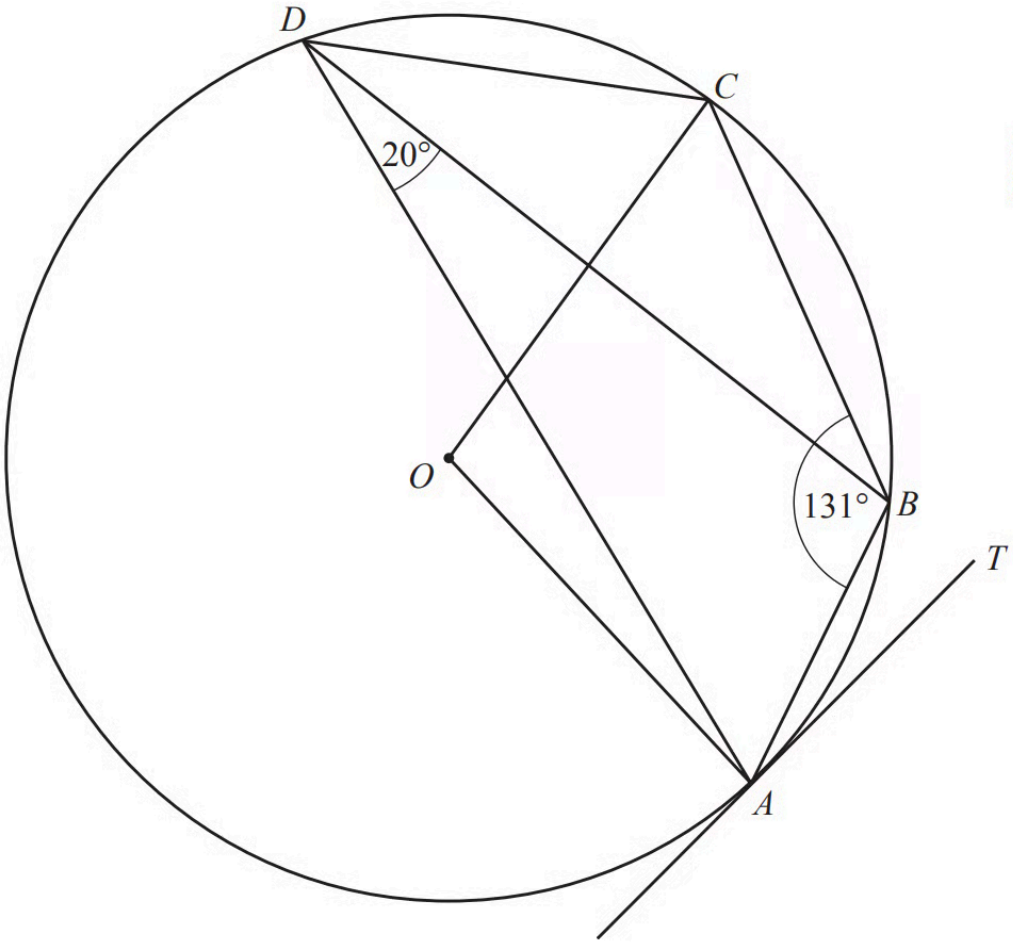
A, *B*, *C* and *D* are points on the circumference of the circle.
AC and *BD* intersect at *X*.

Complete the statement.

Triangle *ADX* is ..... to triangle *BCX*.

(1 mark)

6 (a)



A, B, C and D lie on the circle, centre O. Angle $ABC = 131°$.

Find angle ADC.

Angle $ADC =$ .....

(1 mark)

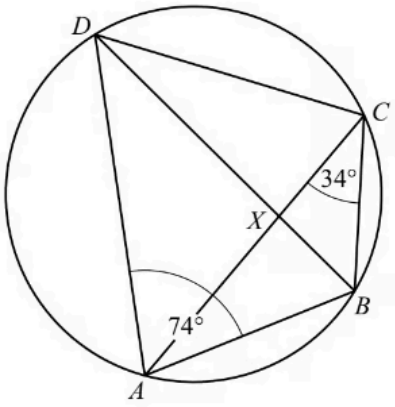
(b) Find angle AOC.

Angle $AOC =$ .....

(1 mark)

Hard Questions

1 (a)



NOT TO SCALE

The diagram shows a cyclic quadrilateral $ABCD$.
BD and AC intersect at X.

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]

(3 marks)

(b) In the diagram, triangle ADX is similar to triangle BCX.

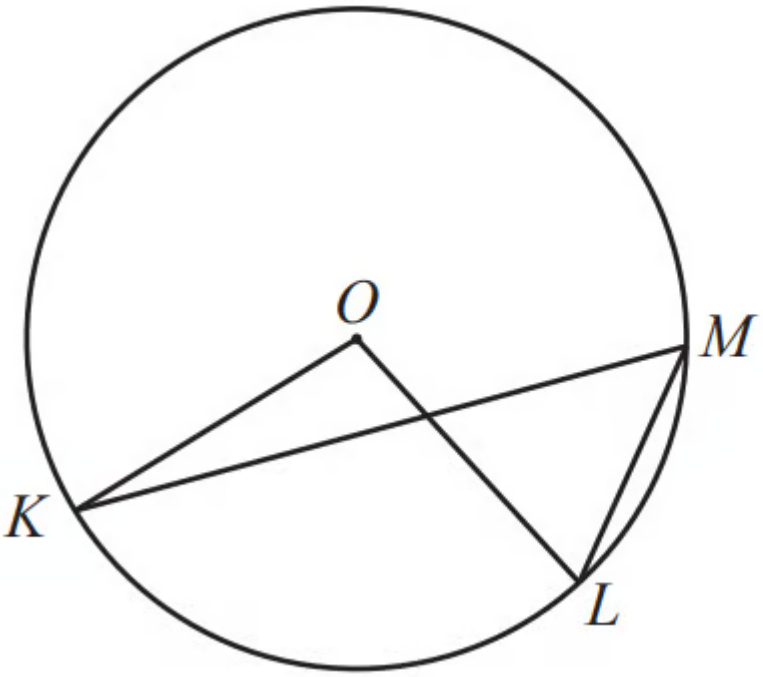
$BC = 4.5$ cm, $AD = 9$ cm and $CX = 3.3$ cm.

Work out XD.

XD = ... cm

(2 marks)

2



NOT TO SCALE

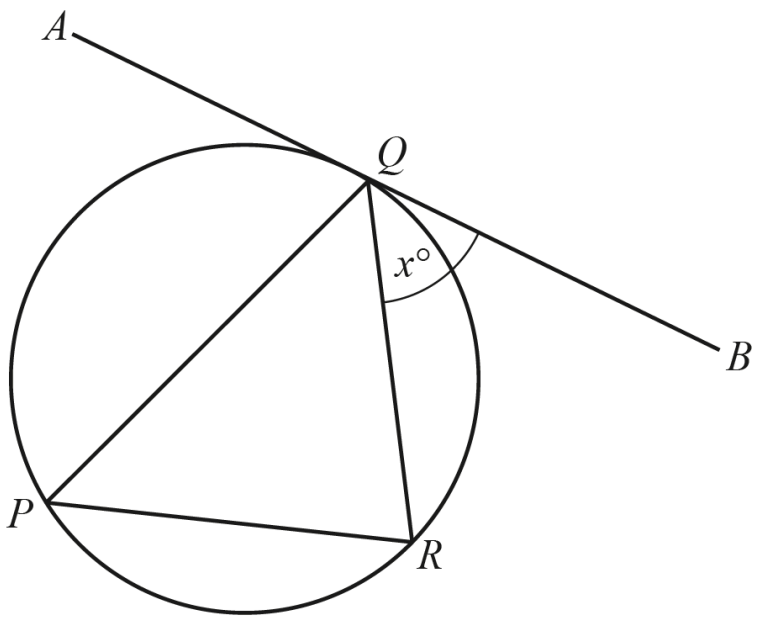
In the diagram, *K*, *L* and *M* lie on the circle, centre *O*.
Angle *KML* = $2x°$ and reflex angle *KOL* = $11x°$.

Find the value of x.

x = ...

(3 marks)

3



NOT TO SCALE

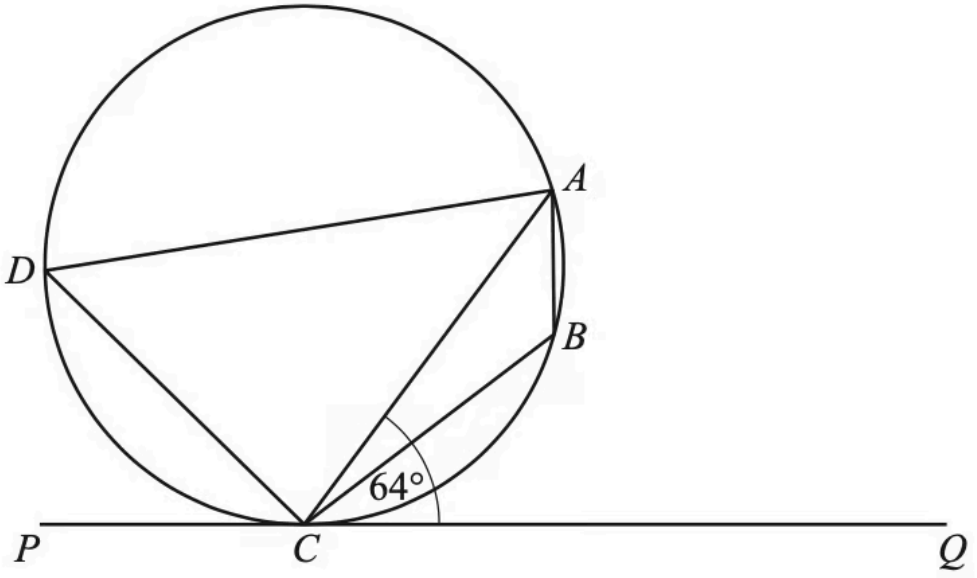
P, R and Q are points on the circle.
AB is a tangent to the circle at Q.
QR bisects angle PQB therefore
Angle $BQR = x°$ and $x < 60$.

Use this information to show that triangle PQR is an isosceles triangle.

Give a geometrical reason for each step of your work.

(3 marks)

4



NOT TO SCALE

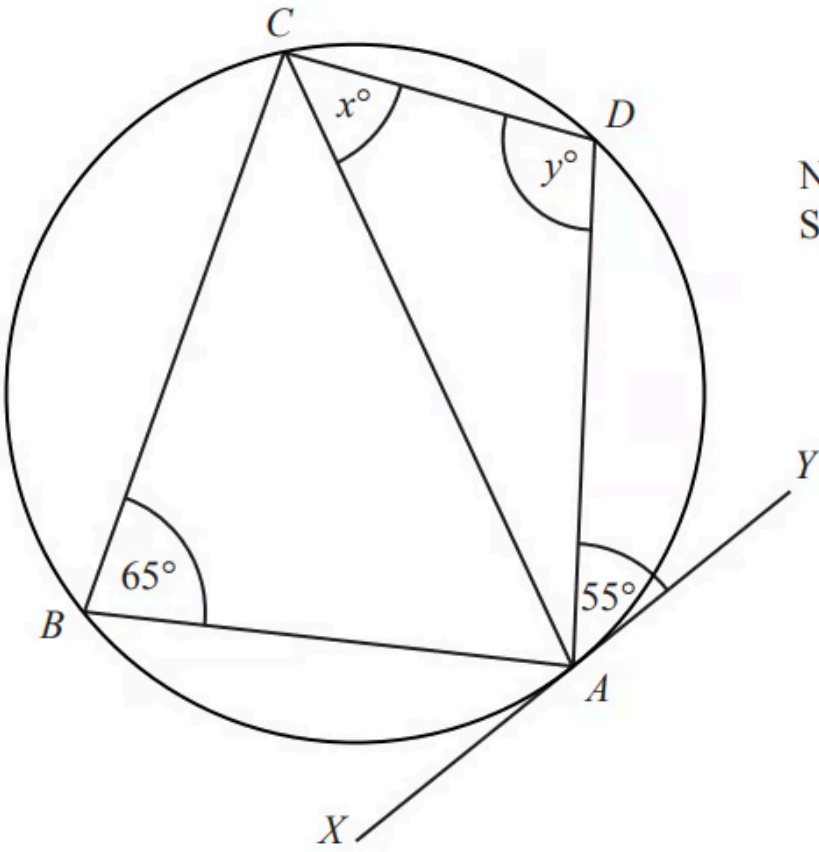
A, B, C and D lie on the circle.
PCQ is a tangent to the circle at C.
Angle ACQ = 64°.

Work out angle ABC, giving reasons for your answer.

Angle ABC = ... because .....

(3 marks)

5 (a)



A, B, C and D are points on the circumference of the circle.
The line XY is a tangent to the circle at A.

Find the value of x, giving a reason for your answer.

x = ... because .....

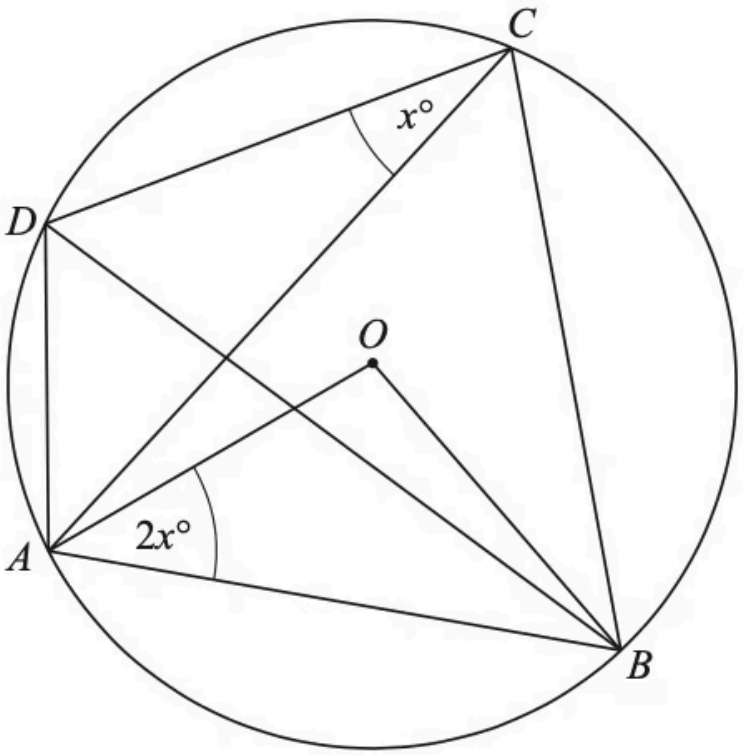
(2 marks)

(b) Find the value of y, giving a reason for your answer.

y = ... because .....

(2 marks)

6 (a)



NOT TO SCALE

In the diagram, *A, B, C* and *D* lie on the circumference of a circle, centre *O*.
Angle *ACD* = $x°$ and angle *OAB* = $2x°$.

Find an expression, in terms of x, in its simplest form for angle *AOB* .

Angle *AOB* = ...

(1 mark)

(b) Find an expression, in terms of x, in its simplest form for angle *ACB*.

Angle *ACB* = ...

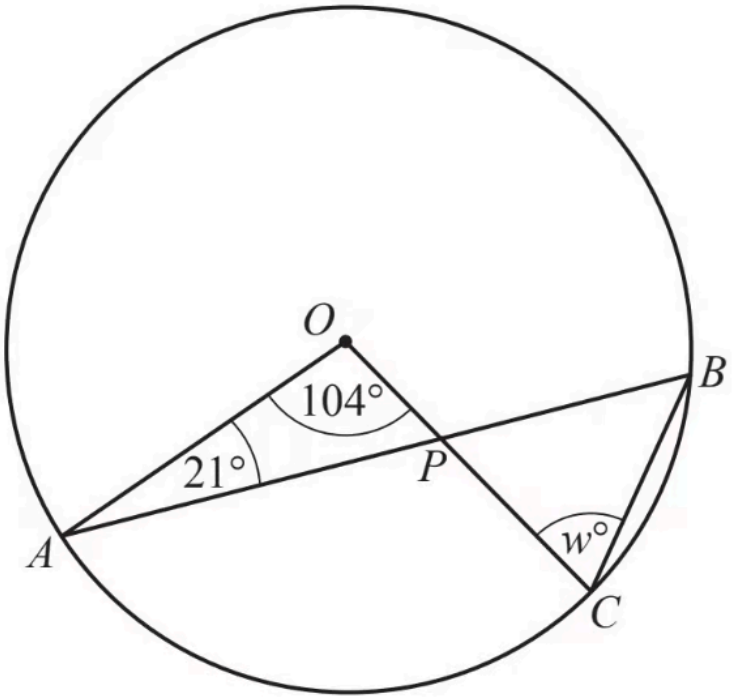
(1 mark)

(c) Find an expression, in terms of x, in its simplest form for angle *DAB*.

Angle *DAB* = ...

(2 marks)

7



NOT TO SCALE

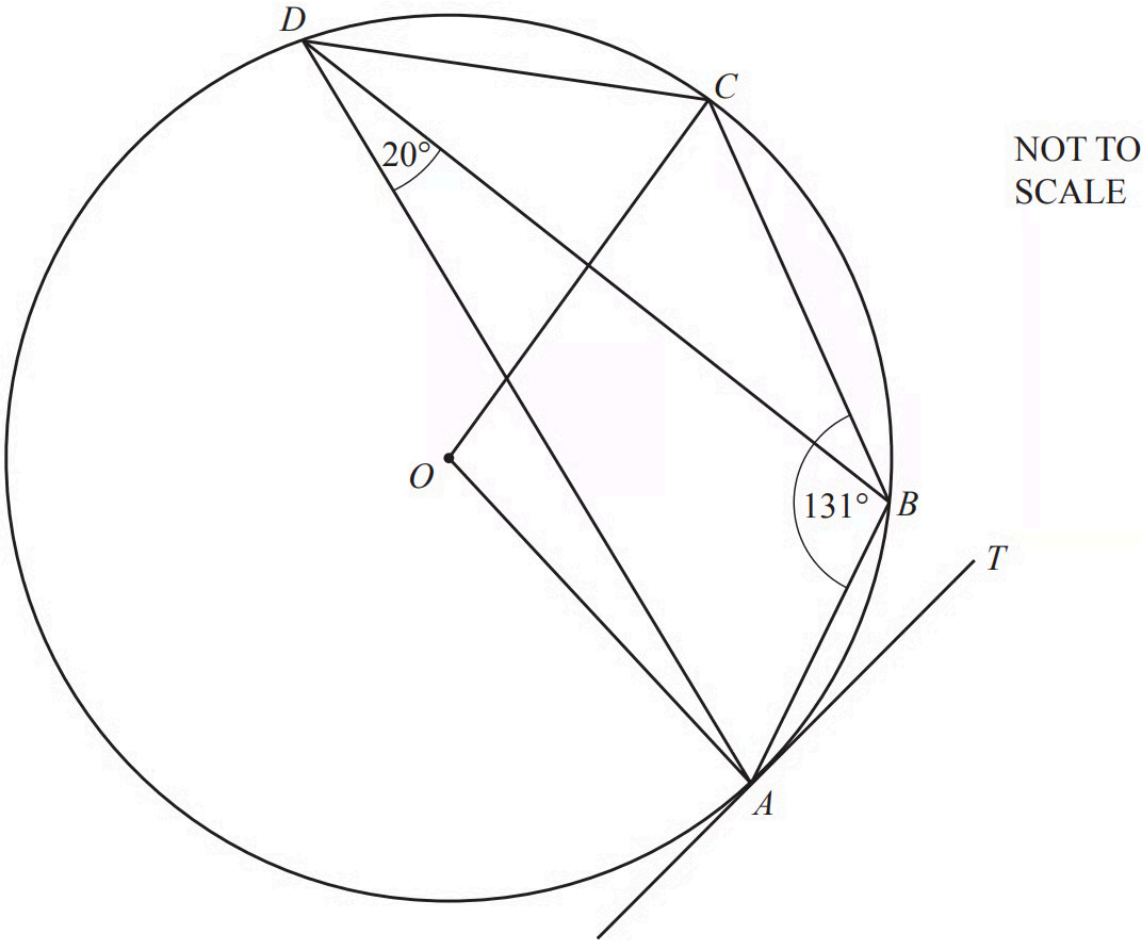
A, *B* and *C* are points on the circle, centre *O*.
AB and *OC* intersect at *P*.

Find the value of w.

$w =$ .....

(3 marks)

8 (a)



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 angle BAT.

Angle $BAT =$ .....

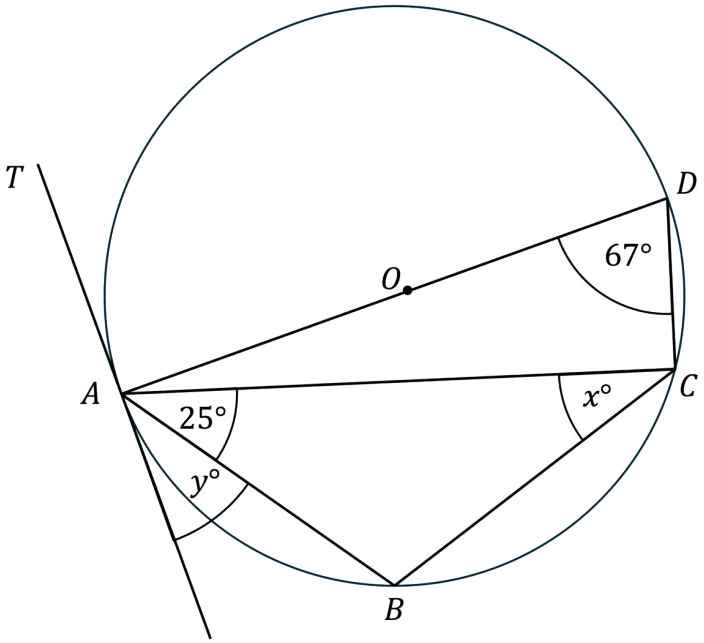
(1 mark)

(b) Find angle OAB.

Angle $OAB =$ .....

(1 mark)

9 (a)



A, B, C, and D are points on a circle, centre O.

The straight line going through T and A is a tangent to the circle at A.

Find the angle x.

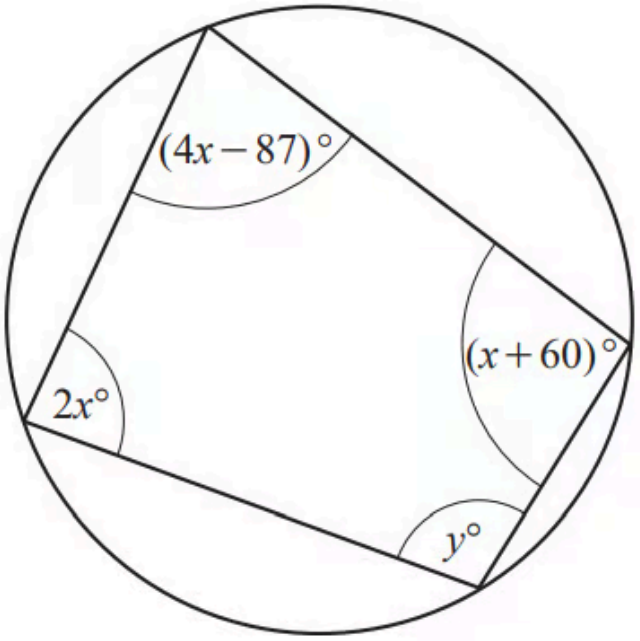
(3 marks)

(b) Find the value of y.

(1 mark)

Very Hard Questions

1



NOT TO SCALE

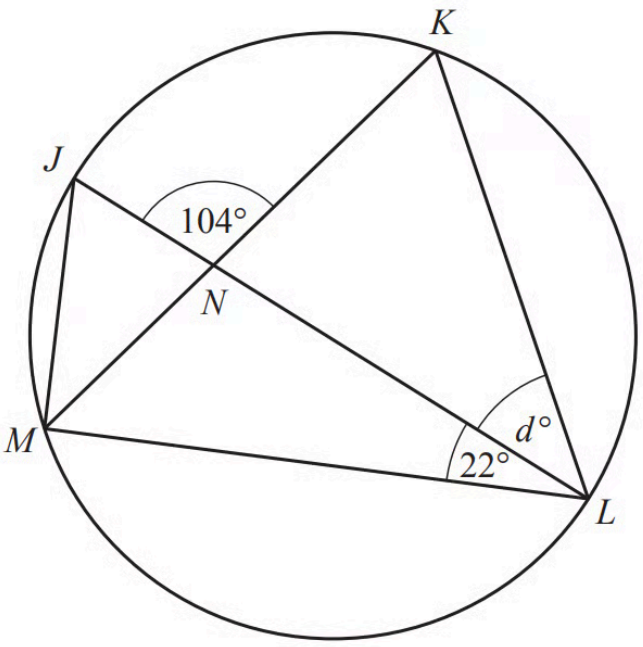
The diagram shows a cyclic quadrilateral.

Find the value of y.

y = ...

(4 marks)

2



NOT TO SCALE

J, K, L and M are points on the circumference of a circle with diameter JL.
JL and KM intersect at N.
Angle $JNK = 104°$ and angle $MLJ = 22°$.

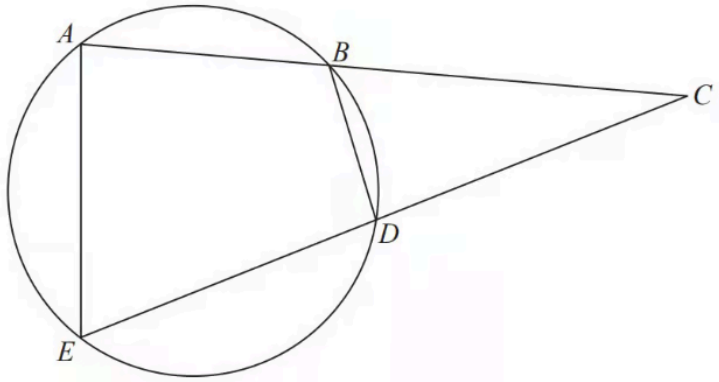
Work out the value of d.

d = ...

(4 marks)

3

Diagram **NOT** accurately drawn



A, B, D and E are points on a circle.
ABC and EDC are straight lines.

Prove that triangle BCD is similar to triangle ECA.
You must give reasons for your working.

(5 marks)

4

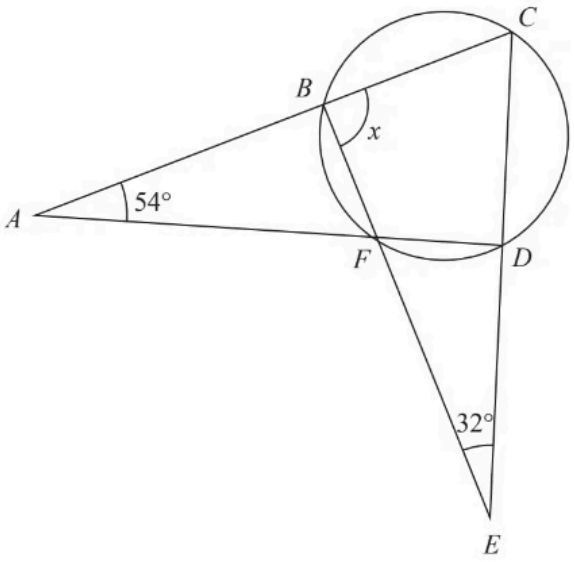


Diagram **NOT** accurately drawn

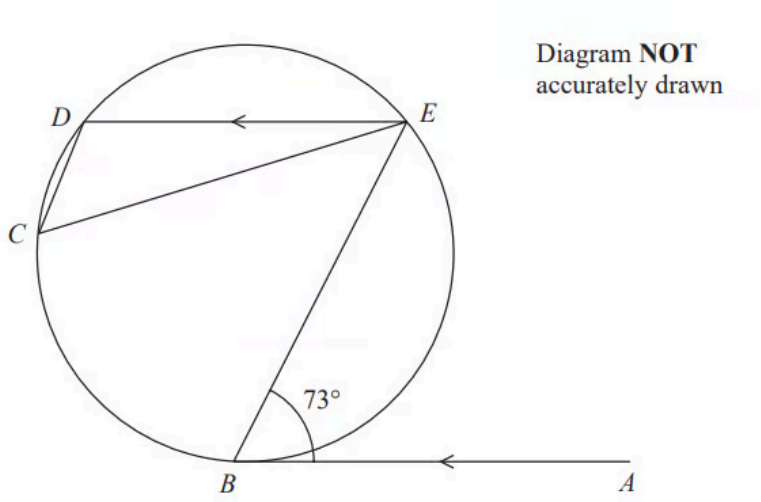
B, C, D and F are points on a circle.
ABC, AFD, BFE and CDE are straight lines.

Work out the size of angle x.
Show your working clearly.

x = ...

(4 marks)

5



B, C, D and E are points on a circle.

AB is the tangent at B to the circle.
AB is parallel to ED.
Angle $ABE = 73°$

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

(5 marks)