Circle Theorems: exam questions

10 questions · 24 marks · mark schemes at the end

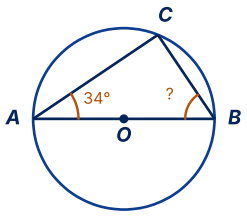
Name _____ Date _____ Score / 24

- Calculators are allowed on both 4MA1 Higher papers (1H and 2H). Show your working: most marks are for method.
- Mark schemes start after the questions. M marks are for a correct method, A marks for an accurate answer that follows a correct method, and B marks for a correct result on its own.
- Online, with more practice: igcsemathrevision.com/igcse-frontend/4ma1/exam-questions/circle-theorems

1. **2 marks**

AB is a diameter of a circle. C is a point on the circle. Angle $CAB = 34°$.

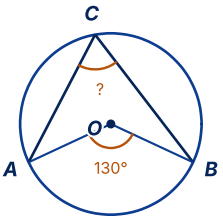
Work out the size of angle ABC. Give a reason for each stage of your working.



2. **2 marks**

A, B and C are points on a circle, centre O. C is on the major arc AB. Angle $AOB = 130°$.

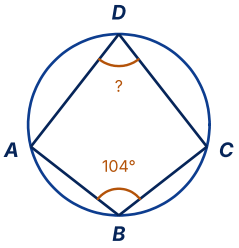
Work out the size of angle ACB. Give a reason.



3. 2 marks

$ABCD$ is a cyclic quadrilateral. Angle $ABC = 104°$.

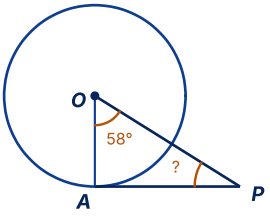
Work out the size of angle ADC. Give a reason.



4. 2 marks

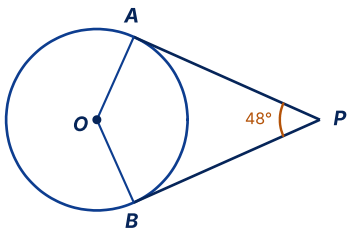
PA is a tangent to a circle, centre O, at the point A. Angle $AOP = 58°$.

Work out the size of angle APO. Give reasons.



5. 3 marks

PA and PB are tangents from the point P to a circle, centre O. Angle $APB = 48°$.



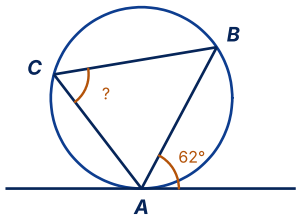
(a) Work out the size of angle AOB. Give a reason. **(2)**

(b) Work out the size of angle OAB. **(1)**

6. 2 marks

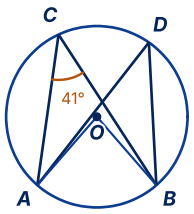
A tangent to a circle at A makes an angle of $62°$ with the chord AB. C is a point on the major arc AB.

Work out the size of angle ACB. Give a reason.



7. **2 marks**

A, B, C and D are points on a circle, centre O. C and D are on the same side of AB, on the major arc. Angle $ACB = 41°$.



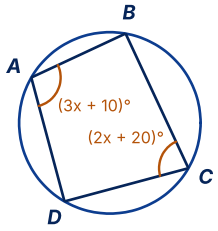
(a) Write down the size of angle ADB. **(1)**

(b) Write down the size of angle AOB. **(1)**

8. **3 marks**

$ABCD$ is a cyclic quadrilateral. Angle $A = (3x + 10)°$ and angle $C = (2x + 20)°$.

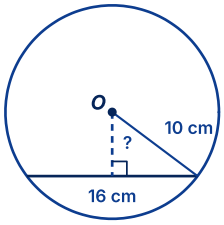
Work out the value of x.



9. **3 marks**

A chord of a circle is 16 cm long. The radius of the circle is 10 cm.

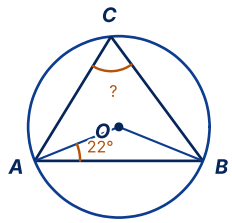
Work out the distance from the centre of the circle to the chord.



10. **3 marks**

A, B and C are points on a circle, centre O, with C on the major arc AB. Angle $OAB = 22°$.

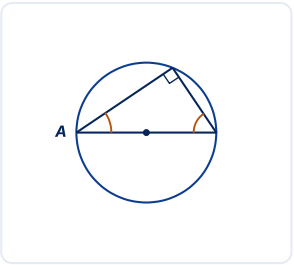
Work out the size of angle ACB. Give reasons.



Answers and worked solutions

Question 1

2 marks



B1 angle $ACB = 90°$ (the angle in a semicircle is a right angle)

B1 angle $ABC = 56°$ (angles in a triangle add to $180°$)

Answer: $56°$

Question 2

2 marks

B1 $65°$

B1 the angle at the centre is twice the angle at the circumference

Answer: $65°$

Question 3

2 marks

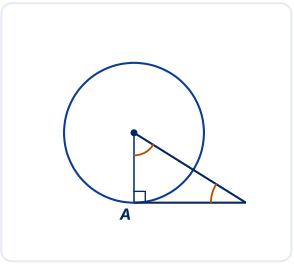
B1 $76°$

B1 opposite angles of a cyclic quadrilateral add to $180°$

Answer: $76°$

Question 4

2 marks



B1 angle $OAP = 90°$ (a tangent is perpendicular to the radius)

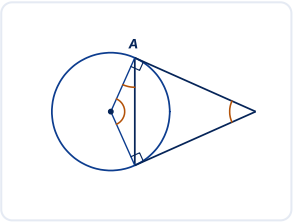
B1 angle $APO = 32°$ (angles in a triangle add to $180°$)

Answer: $32°$

Question 5

3 marks

(a)



B1 $132°$

B1 the angles OAP and OBP are $90°$ (tangent meets radius at right angles), and the angles of quadrilateral $OAPB$ add to $360°$

(b)

B1 $24°$

Answer: (a) $132°$; (b) $24°$

Question 6

2 marks

B1 $62°$

B1 alternate segment theorem

Answer: $62°$

Question 7

2 marks

(a)

B1 $41°$ (angles in the same segment are equal)

(b)

B1 $82°$

Answer: (a) $41°$; (b) $82°$

Question 8

3 marks

M1 $3x + 10 + 2x + 20 = 180$

M1 $5x = 150$

A1 $x = 30$

Answer: $x = 30$

Question 9

3 marks

M1 the perpendicular from the centre bisects the chord: 8 cm

M1 $\sqrt{10^2 - 8^2}$

A1 6 cm

Answer: 6 cm

Question 10

3 marks

M1 triangle OAB is isosceles ($OA = OB$, radii), so angle $AOB = 180 - 2 \times 22 = 136°$

A1 angle $ACB = 68°$

B1 the angle at the centre is twice the angle at the circumference

Answer: $68°$

Online, with every solution: igcsemathrevision.com/igcse-frontend/4ma1/exam-questions/circle-theorems
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