HIGHER

3.5 Circle Theorems: Angle Properties: 1-hour Pack

Total Marks

EDEXCEL 4MA1 · Calculator allowed · about 60 minutes

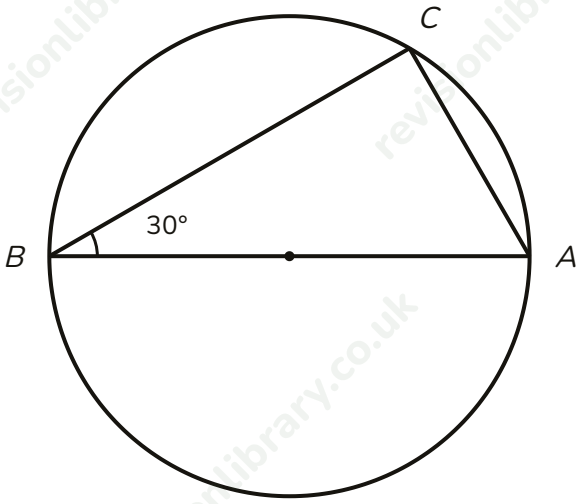
Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 A, B and C are points on a circle. DA is a tangent to the circle at A. C lies on the arc AB on the opposite side of the chord AB from D.
Angle DAB = 69 degrees. Find angle ACB. Give a reason.

(Total for Question 1 is 3 marks)

2 AB is a diameter of a circle. C is a point on the circle.
Angle ABC = 30 degrees. Find angle BAC. Give reasons.



(Total for Question 2 is 3 marks)

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3 K, L and M are points on a circle with centre O. M lies on the major arc KL.
Angle KOL = 76 degrees.
Find angle KML. Give a reason for your answer.

(Total for Question 3 is 3 marks)

4 ABCD is a cyclic quadrilateral. Angle ABC = (5x + 7) degrees and angle ADC = (3x + 61) degrees.
Find the value of x and the size of angle ABC. Give a reason.

(Total for Question 4 is 4 marks)

5 W and X are points on a circle with centre O. Angle WOX = 100 degrees.
Find angle OWX. Give a reason.

(Total for Question 5 is 3 marks)

6 W, X, Y and Z are points on a circle, with Y and Z on the same side of the chord WX.
Angle WYX = (3x + 7) degrees and angle WZX = (2x + 21) degrees.
Find the value of x and the size of angle WYX. Give a reason.

(Total for Question 6 is 4 marks)

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7 O is the centre of a circle. QR is a tangent to the circle at Q, and RO is a straight line.
Angle ORQ = 44 degrees. Find angle QOR. Give a reason.

(Total for Question 7 is 3 marks)

8 GE and GF are tangents from the point G to a circle with centre O, touching the circle at E and F.
Angle EGF = 38 degrees.
Find angle OEF. Give reasons.

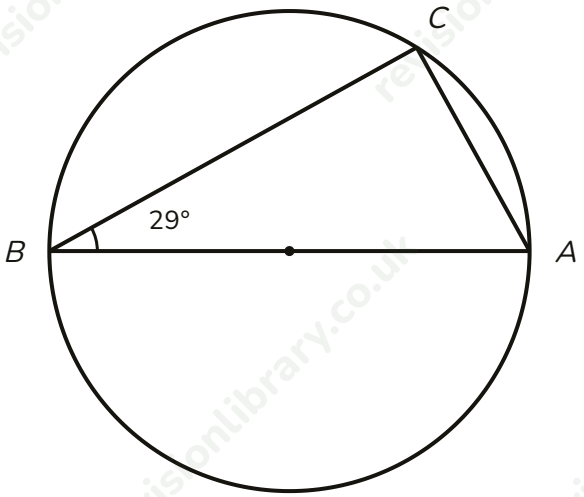
(Total for Question 8 is 4 marks)

9 E, F and G are points on a circle. HE is a tangent to the circle at E. G lies on the arc EF on the opposite side of the chord EF from H.
Angle EGF = 42 degrees. Find angle HEF. Give a reason.

(Total for Question 9 is 3 marks)

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10 AB is a diameter of a circle. C is a point on the circle.
Angle ABC = 29 degrees. Find angle BAC. Give reasons.



(Total for Question 10 is 3 marks)

11 P, Q and R are points on a circle with centre O. R lies on the major arc PQ.
Angle PRQ = 74 degrees.
Find angle POQ. Give a reason for your answer.

(Total for Question 11 is 3 marks)

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12 PQRS is a cyclic quadrilateral. Angle PQR = (5x + 1) degrees and angle PSR = (2x - 3) degrees. Find the value of x and the size of angle PQR. Give a reason.

(Total for Question 12 is 4 marks)

13 W and X are points on a circle with centre O. Angle OWX = 66 degrees. Find angle WOX. Give a reason.

(Total for Question 13 is 3 marks)

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Mark scheme · 3.5 Circle Theorems: Angle Properties: 1-hour Pack

Question 1

uses the alternate segment theorem	**M1**
angle ACB = 69 degrees	**A1**
reason: the angle between a tangent and a chord equals the angle in the alternate segment	**B1**

Answer: Angle ACB = 69 degrees

Question 2

angle ACB = 90 degrees (angle in a semicircle)	**B1**
angles in a triangle add to 180: 180 - 90 - 30	**M1**
angle BAC = 60 degrees	**A1**

Answer: Angle BAC = 60 degrees

Question 3

angle at the circumference is half the angle at the centre: 76 / 2	**M1**
angle KML = 38 degrees	**A1**
reason: the angle at the centre is twice the angle at the circumference (standing on the same arc)	**B1**

Answer: Angle KML = 38 degrees

Question 4

opposite angles of a cyclic quadrilateral add up to 180 degrees	**B1**
(5x + 7) + (3x + 61) = 180	**M1**
x = 14	**A1**
angle ABC = 77 degrees	**A1**

Answer: x = 14; angle ABC = 77 degrees

Question 5

OW = OX (radii), so triangle OWX is isosceles	**B1**
(180 - 100) / 2	**M1**
angle OWX = 40 degrees	**A1**

Answer: Angle OWX = 40 degrees

Question 6

angles in the same segment are equal	**B1**
3x + 7 = 2x + 21	**M1**
x = 14	**A1**
angle WYX = 49 degrees	**A1**

Answer: x = 14; angle WYX = 49 degrees

Question 7

angle OQR = 90 degrees (the tangent is perpendicular to the radius)	**B1**
180 - 90 - 44	**M1**
angle QOR = 46 degrees	**A1**

Answer: Angle QOR = 46 degrees

Question 8

GE = GF (tangents from a point are equal) so angle GEF = (180 - 38)/2 = 71 degrees	**B1**
angle OEG = 90 degrees (tangent perpendicular to radius)	**B1**
90 - 71	**M1**
angle OEF = 19 degrees	**A1**

Answer: Angle OEF = 19 degrees

Question 9

uses the alternate segment theorem	**M1**
angle HEF = 42 degrees	**A1**
reason: the angle between a tangent and a chord equals the angle in the alternate segment	**B1**

Answer: Angle HEF = 42 degrees

Question 10

angle ACB = 90 degrees (angle in a semicircle)	**B1**
angles in a triangle add to 180: 180 - 90 - 29	**M1**
angle BAC = 61 degrees	**A1**

Answer: Angle BAC = 61 degrees

Question 11

angle at the centre is twice the angle at the circumference: 2 x 74	**M1**
angle POQ = 148 degrees	**A1**
reason: the angle at the centre is twice the angle at the circumference (standing on the same arc)	**B1**

Answer: Angle POQ = 148 degrees

Question 12

opposite angles of a cyclic quadrilateral add up to 180 degrees	**B1**
(5x + 1) + (2x - 3) = 180	**M1**
x = 26	**A1**
angle PQR = 131 degrees	**A1**

Answer: x = 26; angle PQR = 131 degrees

Question 13

OW = OX (radii), so triangle OWX is isosceles with equal base angles	**B1**
180 - 2 x 66	**M1**
angle WOX = 48 degrees	**A1**

Answer: Angle WOX = 48 degrees

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