HIGHER

8.8 Proof of the Circle Theorems: Test Pack

EDEXCEL 1MA1 · Calculator allowed · about 60 minutes

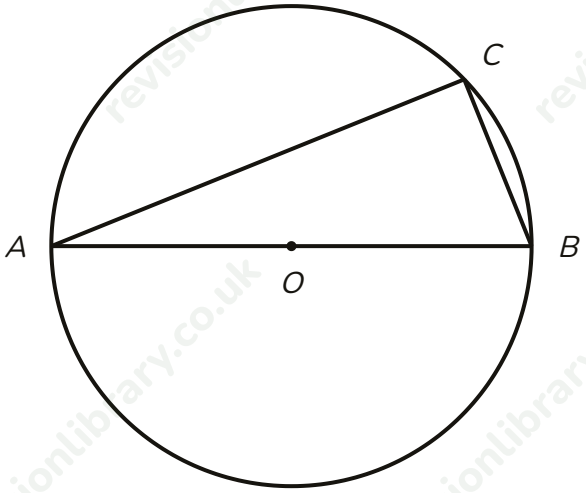
Total Marks

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 AB is a diameter of a circle with centre O. C is a point on the circumference. Work out the size of angle ACB. Give a brief reason.

Diagram NOT accurately drawn



(Total for Question 1 is 2 marks)

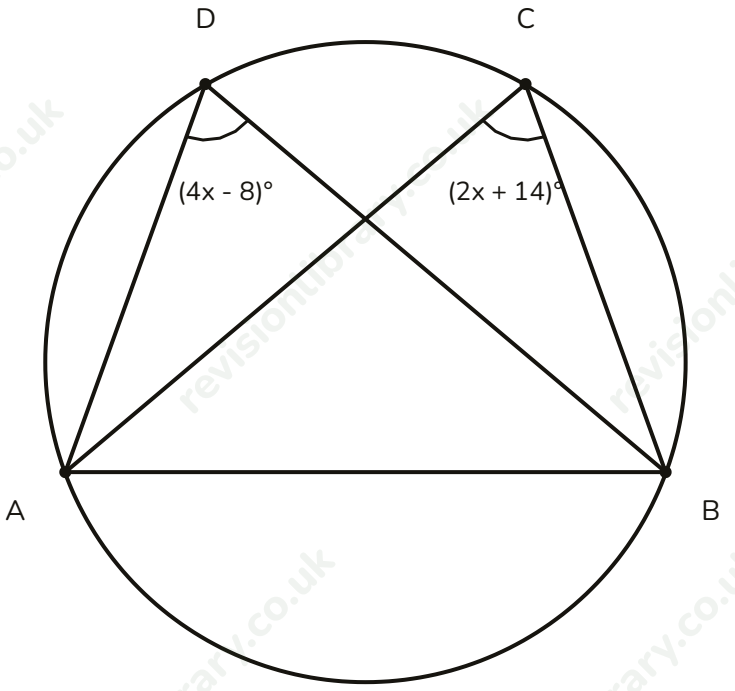
2 ABCD is a cyclic quadrilateral. Angle ABC = 68 degrees. Work out angle ADC and give a reason.

(Total for Question 2 is 3 marks)

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3 A, B, C and D are points on the circumference of a circle. C and D lie on the same segment relative to chord AB, so angle ADB and angle ACB are angles in the same segment. Angle ADB = (4x - 8) degrees and angle ACB = (2x + 14) degrees.

Diagram NOT accurately drawn



(a) State the reason why angle ADB = angle ACB, and hence find the value of x. **(3)**

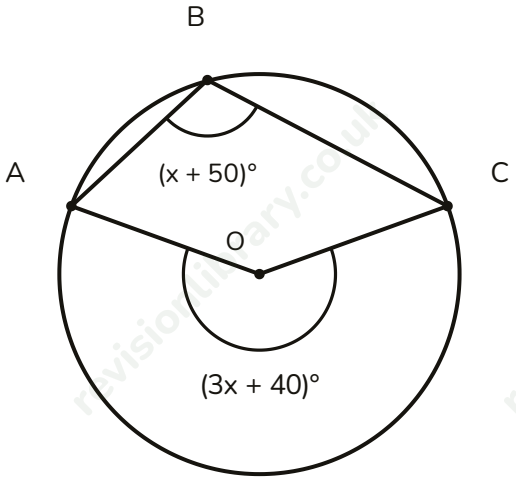
(b) Hence state the size of angle ACB. **(1)**

(Total for Question 3 is 4 marks)

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4 O is the centre of a circle. A, B and C are points on the circumference. The reflex angle AOC = (3x + 40) degrees, and the angle at the circumference ABC (standing on the same arc AC) = (x + 50) degrees.

Diagram NOT accurately drawn



(a) Using the circle theorem connecting the angle at the centre and the angle at the circumference, find the value of x. **(3)**

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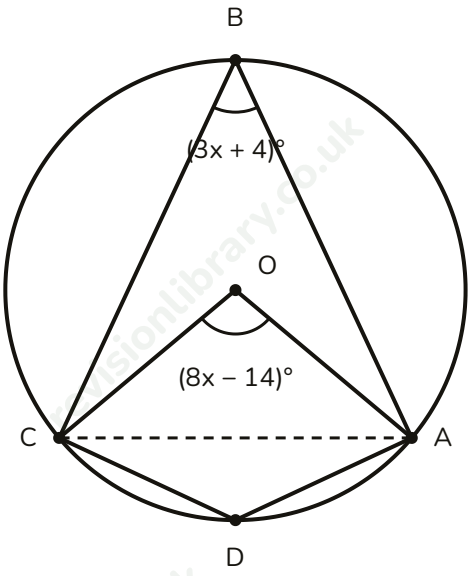
(b) Hence state the size of angle ABC. **(1)**

(Total for Question 4 is 4 marks)

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5 O is the centre of a circle. A, B and C are points on the circumference, with angle ABC = (3x + 4) degrees at the circumference. The angle AOC at the centre (standing on the same arc as angle ABC, on the side of the circle not containing B) = (8x - 14) degrees.

Diagram NOT accurately drawn



(a) Show that x = 11. **(3)**

(b) Hence find the size of angle ABC. **(1)**

.....

(c) D is a fourth point on the circle such that ABCD is a cyclic quadrilateral. Find the size of angle ADC. **(2)**

.....

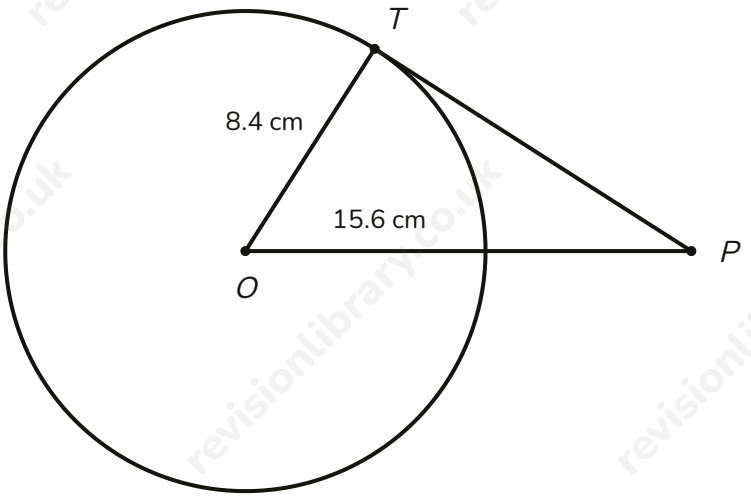
(Total for Question 5 is 6 marks)

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6 A circle has centre O and radius 8.4 cm. PT is a tangent to the circle at point T, and OP = 15.6 cm.

Calculate the length of PT, correct to 3 significant figures.

Diagram NOT accurately drawn

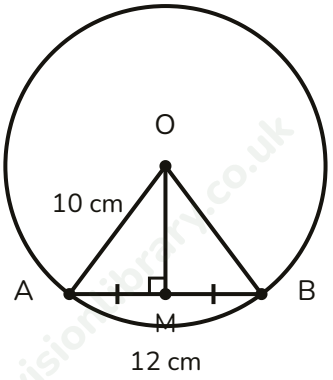


(Total for Question 6 is 4 marks)

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7 A circle has centre O and radius 10 cm. AB is a chord of length 12 cm. M is the midpoint of AB, and OM is perpendicular to AB.

Diagram NOT accurately drawn



(a) Calculate the length of OM, giving a reason for your method. **(3)**

.....

(b) Hence calculate the size of angle AOB, giving your answer correct to 1 decimal place. **(3)**

.....

(Total for Question 7 is 6 marks)

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8 A and B are points on a circle with centre O. C is a point on the major arc AB. Angle OAB = 24 degrees. Work out the size of angle ACB. Give a reason for each stage of your working.

(Total for Question 8 is 4 marks)

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9 A, B and C are points on the circumference of a circle with centre O. C is on the major arc AB. Angle AOB = (4x + 26) degrees and angle ACB = (3x - 3) degrees. Work out the value of x and the size of angle ACB, giving a reason for your equation.

(Total for Question 9 is 4 marks)

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10 The line TP is a tangent to a circle, centre O, at the point P. Angle PTO = 43 degrees. Work out the size of angle POT. Give a reason for each stage of your working.

(Total for Question 10 is 3 marks)

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11 A and B are points on a circle with centre O. C is a point on the major arc AB. Angle OAB = 11 degrees. Work out the size of angle ACB. Give a reason for each stage of your working.

(Total for Question 11 is 4 marks)

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Mark scheme · 8.8 Proof of the Circle Theorems: Test Pack

Question 1

90 degrees cao	**B1**
reason: angle in a semicircle is a right angle oe	**B1**

Answer: 90 degrees; angle in a semicircle is a right angle.

Question 2

state opposite angles in a cyclic quadrilateral sum to 180 degrees oe	**M1**
calculate 180 - 68 oe	**M1**
112 degrees cao	**A1**

Answer: 112 degrees; opposite angles in a cyclic quadrilateral sum to 180 degrees.

Question 3

(a) reason: angles in the same segment, subtended by the same arc AB, are equal	**B1**
(a) 4x - 8 = 2x + 14 oe	**M1**
(a) x = 11	**A1**

(a) Answer: x = 11

(b) 36 degrees, ft	**A1**

(b) Answer: 36 degrees

Question 4

(a) 3x + 40 = 2(x + 50) oe	**M1**
(a) 3x + 40 = 2x + 100 (oe rearranging)	**M1**
(a) x = 60	**A1**

(a) Answer: x = 60

(b) 110 degrees, ft	**A1**

(b) Answer: 110 degrees

Question 5

(a) 8x - 14 = 2(3x + 4) oe, using angle at centre = 2 x angle at circumference	**M1**
(a) 8x - 14 = 6x + 8, so 2x = 22 (oe rearranging)	**M1**
(a) x = 11 cso	**A1**

(a) Answer: x = 11 (shown)

(b) 37 degrees, ft	**A1**

(b) Answer: 37 degrees

(c) reason: opposite angles of a cyclic quadrilateral sum to 180 degrees	**B1**
(c) 143 degrees, ft (180 - their 37)	**A1**

(c) Answer: 143 degrees

Question 6

angle OTP = 90 degrees (tangent perpendicular to radius)	**B1**
$15.6^2 - 8.4^2$ oe	**M1**
$\sqrt{172.8}$	**M1**
awrt 13.1 cm	**A1**

Answer: PT = 13.1 cm (3 s.f.)

Question 7

(a) AM = 6 cm, reason: the perpendicular from the centre to a chord bisects the chord	**B1**
(a) $\sqrt{10^2 - 6^2}$ oe	**M1**
(a) 8 cm cao	**A1**

(a) Answer: OM = 8 cm

(b) sin(angle AOM) = 6/10 oe (or cos/tan ratio using triangle OMA)	**M1**
(b) angle AOM = 36.869...(degrees), then doubling	**M1**
(b) 73.7 degrees, awrt, ft	**A1**

(b) Answer: angle AOB = 73.7 degrees (1 d.p.)

Question 8

angle OBA = 24 degrees (OA = OB, radii, isosceles triangle)	**M1**
angle AOB = 180 - 2 x 24 = 132 degrees	**M1**
angle at the centre is twice the angle at the circumference	**B1**
66 degrees	**A1**

Answer: 66 degrees

Question 9

4x + 26 = 2(3x - 3) forming the equation	**M1**
reason: the angle at the centre is twice the angle at the circumference	**B1**
solves the equation	**M1**
x = 16, angle ACB = 45 degrees	**A1**

Answer: x = 16, angle ACB = 45 degrees

Question 10

angle OPT = 90 degrees (tangent perpendicular to radius)	**B1**
180 - 90 - 43	**M1**
47 degrees cao	**A1**

Answer: 47 degrees

Question 11

angle OBA = 11 degrees (OA = OB, radii, isosceles triangle)	**M1**
angle AOB = 180 - 2 x 11 = 158 degrees	**M1**
angle at the centre is twice the angle at the circumference	**B1**
79 degrees	**A1**

Answer: 79 degrees

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