HIGHER

8.8 Proof of the Circle Theorems: 1-hour Pack

Total Marks

EDEXCEL 1MA1 · Calculator allowed · about 60 minutes

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 PA and PB are tangents from the point P to a circle with centre O, touching the circle at A and B. Angle APB = 34 degrees. Work out the size of angle PAB. Give reasons for your working.

(Total for Question 1 is 3 marks)

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2 A, B and C are points on the circumference of a circle with centre O. C is on the major arc AB. Angle AOB = (5x + 19) degrees and angle ACB = (2x + 24) degrees. Work out the value of x and the size of angle ACB, giving a reason for your equation.

(Total for Question 2 is 4 marks)

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3 A and B are points on a circle with centre O. C is a point on the major arc AB. Angle OAB = 10 degrees. Work out the size of angle ACB. Give a reason for each stage of your working.

(Total for Question 3 is 4 marks)

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4 ABCD is a cyclic quadrilateral. Angle ABC = (6x + 24) degrees and angle ADC = (5x - 42) degrees. Work out the value of x and the size of each of the two angles. Give a reason for your equation.

(Total for Question 4 is 4 marks)

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5 The line TP is a tangent to a circle, centre O, at the point P. Angle PTO = 17 degrees. Work out the size of angle POT. Give a reason for each stage of your working.

(Total for Question 5 is 3 marks)

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6 A and B are points on a circle with centre O. C is a point on the major arc AB. Angle OAB = 15 degrees. Work out the size of angle ACB. Give a reason for each stage of your working.

(Total for Question 6 is 4 marks)

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7 PA and PB are tangents from the point P to a circle with centre O, touching the circle at A and B. Angle APB = 34 degrees. Work out the size of angle AOB. Give reasons for your working.

(Total for Question 7 is 3 marks)

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8 ABCD is a cyclic quadrilateral. Angle ABC = (4x + 5) degrees and angle ADC = (6x + 25) degrees. Work out the value of x and the size of each of the two angles. Give a reason for your equation.

(Total for Question 8 is 4 marks)

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9 A and B are points on a circle with centre O. C is a point on the major arc AB. Angle OAB = 42 degrees. Work out the size of angle ACB. Give a reason for each stage of your working.

(Total for Question 9 is 4 marks)

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10 A, B and C are points on the circumference of a circle with centre O. C is on the major arc AB. Angle AOB = (3x + 22) degrees and angle ACB = (2x - 4) degrees. Work out the value of x and the size of angle ACB, giving a reason for your equation.

(Total for Question 10 is 4 marks)

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11 The line TP is a tangent to a circle, centre O, at the point P. Angle PTO = 71 degrees. Work out the size of angle POT. Give a reason for each stage of your working.

(Total for Question 11 is 3 marks)

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12 ABCD is a cyclic quadrilateral. Angle ABC = (5x - 5) degrees and angle ADC = (4x + 5) degrees. Work out the value of x and the size of each of the two angles. Give a reason for your equation.

(Total for Question 12 is 4 marks)

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13 A and B are points on a circle with centre O. C is a point on the major arc AB. Angle OAB = 30 degrees. Work out the size of angle ACB. Give a reason for each stage of your working.

(Total for Question 13 is 4 marks)

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Mark scheme · 8.8 Proof of the Circle Theorems: 1-hour Pack

Question 1

PA = PB (tangents from a point are equal)	**B1**
180 - 34	**M1**
73 degrees	**A1**

Answer: 73 degrees

Question 2

5x + 19 = 2(2x + 24) forming the equation	**M1**
reason: the angle at the centre is twice the angle at the circumference	**B1**
solves the equation	**M1**
x = 29, angle ACB = 82 degrees	**A1**

Answer: x = 29, angle ACB = 82 degrees

Question 3

angle OBA = 10 degrees (OA = OB, radii, isosceles triangle)	**M1**
angle AOB = 180 - 2 x 10 = 160 degrees	**M1**
angle at the centre is twice the angle at the circumference	**B1**
80 degrees	**A1**

Answer: 80 degrees

Question 4

6x + 24 + 5x - 42 = 180	**M1**
reason: opposite angles of a cyclic quadrilateral add to 180 degrees	**B1**
solves the equation	**M1**
x = 18, angle ABC = 132 degrees, angle ADC = 48 degrees	**A1**

Answer: x = 18, angle ABC = 132 degrees, angle ADC = 48 degrees

Question 5

angle OPT = 90 degrees (tangent perpendicular to radius)	**B1**
180 - 90 - 17	**M1**
73 degrees cao	**A1**

Answer: 73 degrees

Question 6

angle OBA = 15 degrees (OA = OB, radii, isosceles triangle)	**M1**
angle AOB = 180 - 2 x 15 = 150 degrees	**M1**
angle at the centre is twice the angle at the circumference	**B1**
75 degrees	**A1**

Answer: 75 degrees

Question 7

angles OAP and OBP are 90 degrees (tangent perpendicular to radius)	**B1**
360 - 90 - 90 - 34	**M1**
146 degrees	**A1**

Answer: 146 degrees

Question 8

4x + 5 + 6x + 25 = 180	**M1**
reason: opposite angles of a cyclic quadrilateral add to 180 degrees	**B1**
solves the equation	**M1**
x = 15, angle ABC = 65 degrees, angle ADC = 115 degrees	**A1**

Answer: x = 15, angle ABC = 65 degrees, angle ADC = 115 degrees

Question 9

angle OBA = 42 degrees (OA = OB, radii, isosceles triangle)	**M1**
angle AOB = 180 - 2 x 42 = 96 degrees	**M1**
angle at the centre is twice the angle at the circumference	**B1**
48 degrees	**A1**

Answer: 48 degrees

Question 10

3x + 22 = 2(2x - 4) forming the equation	**M1**
reason: the angle at the centre is twice the angle at the circumference	**B1**
solves the equation	**M1**
x = 30, angle ACB = 56 degrees	**A1**

Answer: x = 30, angle ACB = 56 degrees

Question 11

angle OPT = 90 degrees (tangent perpendicular to radius)	**B1**
180 - 90 - 71	**M1**
19 degrees cao	**A1**

Answer: 19 degrees

Question 12

5x - 5 + 4x + 5 = 180	**M1**
reason: opposite angles of a cyclic quadrilateral add to 180 degrees	**B1**
solves the equation	**M1**
x = 20, angle ABC = 95 degrees, angle ADC = 85 degrees	**A1**

Answer: x = 20, angle ABC = 95 degrees, angle ADC = 85 degrees

Question 13

angle OBA = 30 degrees (OA = OB, radii, isosceles triangle)	**M1**
angle AOB = 180 - 2 x 30 = 120 degrees	**M1**
angle at the centre is twice the angle at the circumference	**B1**
60 degrees	**A1**

Answer: 60 degrees

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