Circle theorems: 10 practice questions

Year 10A · Free practice sheet from Tuterly · tuterly.com.au

Name: _____ Date: _____

Attempt all questions and show your working. Give a reason for each angle you find. Suggested time: 15 to 20 minutes.

Section A: Consolidating (Questions 1-4)

Question 1

AB is a diameter of a circle and C is another point on the circle. angle CAB = 35°.

(a) Find angle ACB.

(b) Find angle ABC.

Question 2

A circle has centre O and radius 5 cm. The line PT is a tangent to the circle at P, and PT = 12 cm. Find the length of OT.

Question 3

A, B and C are points on a circle with centre O. C lies on the major arc AB and angle AOB = 110°. Find angle ACB.

Question 4

PQRS is a cyclic quadrilateral (its vertices lie on a circle in that order). angle P = 72° and angle Q = 95°. Find angle R and angle S.

Section B: Standard (Questions 5-10)

Question 5

(a) A circle has radius 10 cm. A chord is drawn 6 cm from the centre. Find the length of the chord.

(b) A chord of length 24 cm is drawn in a circle of radius 13 cm. How far is the chord from the centre?

Question 6

From a point T outside a circle with centre O, two tangents are drawn, touching the circle at A and B. angle ATB = 50°.

(a) Find angle AOB.

(b) Find angle OAB.

(c) Explain why triangle TAB is isosceles, and find angle TAB.

Question 7

The line XY is a tangent to a circle at A. AB is a chord, and the angle between the chord AB and the tangent (on the side of Y) is angle BAY = 62°. Point C is on the circle, on the opposite side of AB from Y.

(a) Find angle ACB and name the theorem used.

(b) If angle CAB = 50°, find angle ABC.

Question 8

ABCD is a cyclic quadrilateral. The side AB is extended past B to a point E, and angle CBE = 80°.

(a) Find angle ABC.

(b) Find angle ADC.

(c) Complete this statement: the exterior angle of a cyclic quadrilateral equals the □ interior angle.

Question 9

A, B and C are points on a circle with centre O, and O lies inside triangle ABC. Join CO and extend it to a point D beyond O (so D is inside the angle AOB). Let angle OCA = x and angle OCB = y.

(a) Explain why angle OAC = x.

(b) Show that angle AOD = 2x.

(c) Hence prove that angle AOB = 2angle ACB.

Question 10

AB is a diameter of a circle with centre O, and C is any other point on the circle. Let angle OAC = a and angle OBC = b.

(a) Explain why triangles OAC and OBC are isosceles.

(b) Use the angle sum of triangle ABC to prove that angle ACB = 90°.

Circle theorems: answers

Year 10A · Free practice sheet from Tuterly · tuterly.com.au

Question 1

Answer: (a) 90° (angle in a semicircle) (b) 55° (180 - 90 - 35)

Question 2

Answer: 13 cm (tangent is perpendicular to radius, $\sqrt{(5^2 + 12^2)}$)

Question 3

Answer: 55° (angle at centre is twice the angle at the circumference)

Question 4

Answer: angle R = 108°, angle S = 85° (opposite angles of a cyclic quadrilateral add to 180°)

Question 5

Answer: (a) 16 cm ($2\sqrt{(10^2 - 6^2)}$) (b) 5 cm ($\sqrt{(13^2 - 12^2)}$; the perpendicular from the centre bisects the chord)

Question 6

Answer: (a) 130° (angle OAT = angle OBT = 90°, so 360 - 90 - 90 - 50) (b) 25° (OA = OB, (180 - 130)/(2)) (c) Tangents from an external point are equal in length, so TA = TB; angle TAB = 65° ((180 - 50)/(2))

Question 7

Answer: (a) 62°, alternate segment theorem (the angle between a tangent and a chord equals the angle in the alternate segment) (b) 68° (180 - 62 - 50)

Question 8

Answer: (a) 100° (angles on a straight line) (b) 80° (opposite angles of a cyclic quadrilateral, 180 - 100) (c) opposite

Question 9

Answer: (a) OA = OC (radii), so triangle OAC is isosceles and its base angles are equal. (b) angle AOD is an exterior angle of triangle OAC, so it equals the sum of the two opposite interior angles, x + x = 2x. (c) In the same way angle BOD = 2y, so angle AOB = 2x + 2y = 2(x + y) = 2angle ACB.

Question 10

Answer: (a) OA = OC = OB (all radii), so each triangle has two equal sides. (b) angle OCA = a and angle OCB = b, so angle ACB = a + b. Angle sum of triangle ABC: a + b + (a + b) = 180°, so a + b = 90°, giving angle ACB = 90°.