

Circles: Angles, Arcs, Chords and Tangents

Grade 10 – Geometry math · Test Answer Key · Standards: G-C.A.1, G-C.A.2

Each solution shows the theorem, the equation and the final measure. The scoring notes show how partial credit is earned for the relationship, the algebra and the answer.

Standards: G-C.A.1, G-C.A.2 · **Level:** Grade 10 Geometry

Question 1 Central and Inscribed (2 points)

The inscribed angle is half the central angle on the same arc: $\frac{1}{2} \cdot 124^\circ = 62^\circ$.

$$m\angle ACB = 62^\circ$$

Scoring: 1 point for the relationship, 1 point for the answer.

Question 2 Semicircle with Algebra (2 points)

$\angle C = 90^\circ$, so the other two angles add to 90° : $6x + 12 = 90$, giving $x = 13$.

$\angle A = 35^\circ$ and $\angle B = 55^\circ$.

$$x = 13; A = 35^\circ, B = 55^\circ$$

Scoring: 1 point for the 90° sum, 1 point for x and the angles.

Question 3 Tangent Segment (2 points)

$\angle OTP = 90^\circ$, so $PT = \sqrt{(14^2 - 6^2)} = \sqrt{160} = 4\sqrt{10} \approx 12.65$.

$$PT = 4\sqrt{10}$$

Scoring: 1 point for the right triangle, 1 point for the simplified radical.

Question 4 Inscribed Quadrilateral (3 points)

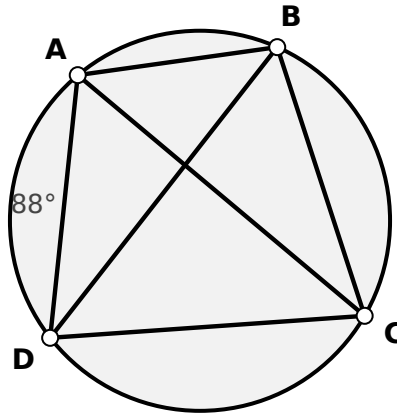
$(5x - 8) + (3x + 20) = 180$ gives $8x = 168$, so $x = 21$: $\angle A = 97^\circ$, $\angle C = 83^\circ$.

$(4y + 3) + (6y - 3) = 180$ gives $10y = 180$, so $y = 18$: $\angle B = 75^\circ$, $\angle D = 105^\circ$.

$$A = 97^\circ, B = 75^\circ, C = 83^\circ, D = 105^\circ$$

Scoring: 1 point for each of the two supplementary equations, 1 point for the four angles.

Question 5 Arcs and Inscribed Angles (3 points)



Arc DA = 88°.

- (a) $\text{Arc } DA = 360^\circ - (64^\circ + 96^\circ + 112^\circ) = 88^\circ$.
- (b) $\angle BAD$ intercepts arc $BCD = 96^\circ + 112^\circ = 208^\circ$, so $\angle BAD = 104^\circ$.
- (c) $\angle ACB$ intercepts arc $AB = 64^\circ$, so $\angle ACB = 32^\circ$.

(a) 88° (b) 104° (c) 32°

Scoring: 1 point per part.

Question 6 Congruent Chords with Algebra (3 points)

$6x + 4 = 8x - 22$, so $26 = 2x$ and $x = 13$.

$\text{Arc } AB = 6(13) + 4 = 82^\circ$. The inscribed angle is $\frac{1}{2} \cdot 82^\circ = 41^\circ$.

$x = 13$; arc = 82°; inscribed angle = 41°

Scoring: 1 point for the equation, 1 point for x and the arc, 1 point for the inscribed angle.

Question 7 Chord in a Fountain (3 points)

The perpendicular from the center bisects the chord, so half the chord is 12 ft. Then $d = \sqrt{(18^2 - 12^2)} = \sqrt{180} = 6\sqrt{5} \approx 13.42$.

$6\sqrt{5} \approx 13.4$ ft

Scoring: 1 point for bisecting the chord, 1 point for the Pythagorean equation, 1 point for the answer.

Question 8 Two Tangents (2 points)

$\angle OAP = \angle OBP = 90^\circ$, so $\angle AOB = 180^\circ - 44^\circ = 136^\circ$. The minor arc is 136° , so the major arc is $360^\circ - 136^\circ = 224^\circ$.

$\angle AOB = 136^\circ$; major arc = 224°

Scoring: 1 point for each answer.