

Circles: Angles, Arcs, Chords and Tangents

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

Name: _____ Date: _____ Class: _____

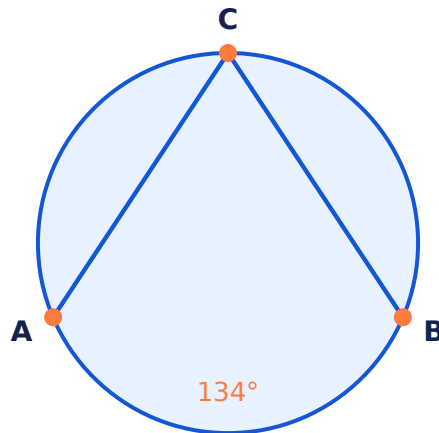
These problems link central, inscribed and tangent angles to the arcs they open onto (G-C.A.1 and G-C.A.2). Early problems apply one theorem; later ones combine arcs, algebra and right triangles. Clock faces, ponds and roundabouts supply the contexts.

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

Problem 1 Central Angle and Arc (easy)

In a circle with center O , arc AB measures 118° . Find $m\angle AOB$.

Problem 2 Inscribed Angle from an Arc (easy)



$\text{Arc } AB = 134^\circ$.

Find $m\angle ACB$.

Problem 3 Arc from an Inscribed Angle (easy)

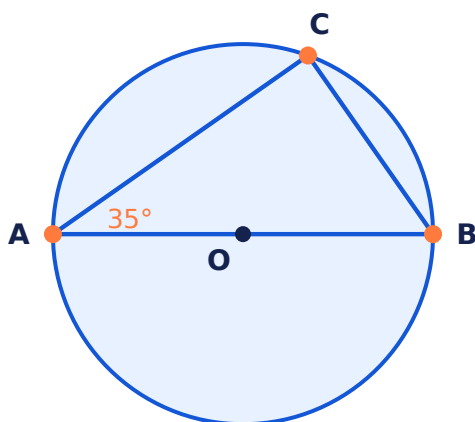
An inscribed angle measures 38° . How many degrees are in the arc it intercepts?

Problem 4 Why Circles Are Similar (medium)

Circle A has radius 6 inches and circle B has radius 15 inches. (a) Describe a transformation

sequence that maps circle A onto circle B . (b) Find the ratio of the circumferences and the ratio of the areas.

Problem 5 Angle in a Semicircle (medium)



AB is a diameter.

AB is a diameter and $\angle A = 35^\circ$. Find $m\angle C$ and $m\angle B$.

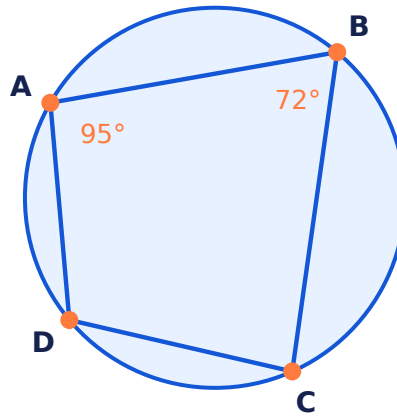
Problem 6 Tangent Length (medium)

Segment PT is tangent to a circle with center O at point T . The radius is 8 cm and $PT = 15$ cm. Find OP .

Problem 7 Angle Between Two Tangents (medium)

Tangent segments from P touch the circle at A and B . The central angle $\angle AOB$ is 118° . Find $m\angle P$.

Problem 8 Inscribed Quadrilateral Angles (medium)



Quadrilateral ABCD inscribed in a circle.

Quadrilateral $ABCD$ is inscribed in a circle with $\angle A = 95^\circ$ and $\angle B = 72^\circ$. Find $\angle C$ and $\angle D$.

Problem 9 Solving for x with an Arc (hard)

An inscribed angle measures $(4x + 3)^\circ$ and it intercepts an arc of $(12x - 18)^\circ$. Find x and the angle.

Problem 10 Angles on the Same Arc (hard)

Inscribed angles $\angle ACB$ and $\angle ADB$ intercept the same arc AB . Their measures are $(5x - 12)^\circ$ and $(3x + 14)^\circ$. Find x and the angle measure.

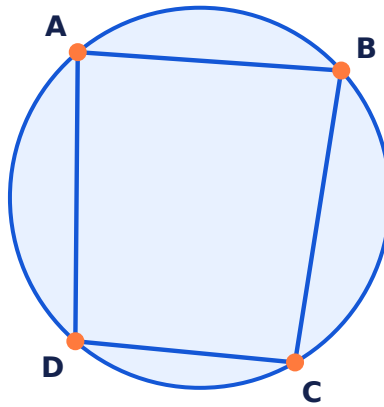
Problem 11 Congruent Chords (hard)

In one circle, chords AB and CD are congruent. Arc AB measures $(7x + 9)^\circ$ and arc CD measures $(9x - 17)^\circ$. Find x and the measure of each arc.

Problem 12 Distance from the Center to a Chord (hard)

A circle has radius 11 inches. A chord is 14 inches long. How far is the chord from the center, as an exact radical and as a decimal to the nearest tenth?

Problem 13 Four Arcs Around a Circle (hard)



$\text{Arcs } AB = 88^\circ, BC = 102^\circ, CD = 71^\circ.$

Arc $AB = 88^\circ$, arc $BC = 102^\circ$ and arc $CD = 71^\circ$. Find arc DA , then $\angle ABC$ and $\angle ADC$. What do the two angles add to?

Problem 14 Tangents with a Major Arc (hard)

Two tangents from point P touch a circle at A and B . The major arc AB measures 238° . Find the minor arc and $m\angle P$.

Problem 15 Guard at the Pond (hard)

A circular pond has a radius of 9 feet. A guard stands at point P , 22 feet from the center of the pond. Each of the two straight lines from P that just touch the pond is tangent to it. Find the length of one tangent segment and the angle between the two tangents. Round to the nearest tenth.

Problem 16 Triangle in a Window (hard)

An architect inscribes triangle ABC in a circular window of diameter 29 inches, with AB as a diameter and $AC = 20$ inches. (a) Explain why $\angle C = 90^\circ$. (b) Find BC . (c) Find $\angle A$ to the nearest tenth of a degree.

Problem 17 Lights on a Circular Track (hard)

Four stage lights A, B, C and D sit on a circular track and form a quadrilateral. $\angle A = (6x + 4)^\circ$, $\angle C = (4x + 16)^\circ$, $\angle B = (7y - 5)^\circ$ and $\angle D = (3y + 25)^\circ$. Find all four angles.

Problem 18 Roundabout Tangent Roads (hard)

Two straight roads are tangent to a circular roundabout of radius 60 feet and meet at point P , forming a 54° angle. Find the distance from P to the center of the roundabout and the length of each road from P to the roundabout. Round to the nearest tenth of a foot.

Problem 19 Clock Face Triangle (hard)

A triangle is drawn on a circular clock face by joining the 12, the 4 and the 9. Find the three angles of the triangle.

Problem 20 Triangle from Three Arcs (hard)

Triangle ABC is inscribed in a circle. Arc $AB = 100^\circ$, arc $BC = 150^\circ$ and arc $CA = 110^\circ$, none containing the third vertex. Find the three angles of the triangle and name its longest side.