Properties of Chords in Circles

Grade Level: Grade 9 | **Date:** 2025-11-17 16:38:56

Instructions: Answer all questions. Show your work where applicable.

Question 1: What is the definition of a circle?

A) A collection of points forming a straight line.
B) A collection of all points in a plane equidistant from a fixed point in the plane.
C) A collection of points forming a square.
D) A collection of points forming a triangle.

Question 2: If two chords of a circle are equal in length, what can be said about the angles they subtend at the center?

A) The angles are complementary.
B) The angles are supplementary.
C) The angles are equal.
D) The angles are always 90 degrees.

Question 3: A chord AB of a circle has a length of 10 cm. If a perpendicular is drawn from the center O to the chord AB, what is the length of the segment AM, where M is the point where the perpendicular meets AB?

Answer: _____

Question 4: If a line drawn from the center of a circle bisects a chord, what is the relationship between the line and the chord?

A) The line is parallel to the chord.
B) The line is perpendicular to the chord.
C) The line is twice the length of the chord.
D) The line forms an acute angle with the chord.

Question 5: In a circle, if two chords are equal in length, what can be said about their distances from the center?

A) They are at different distances.
B) They are equidistant from the center.

C) One is twice as far as the other.
D) Their distances depend on the radius.

Question 6: Two chords in a circle are 4 cm and 6 cm away from the center, respectively. Which chord is longer?

Answer: _____

Question 7: A chord of a circle is 16 cm long. The radius of the circle is 10 cm. Calculate the distance of the chord from the center of the circle.

Answer: _____

Question 8: A chord is 24 cm long and is 5 cm away from the center of a circle. What is the radius of the circle?

A) 10 cm
B) 12 cm
C) 13 cm
D) 15 cm

Question 9: In a circle with center O, if chord PQ subtends an angle of 70° at the center, and chord RS is equal in length to chord PQ, what angle does chord RS subtend at the center?

Answer: _____

Question 10: Two circles are congruent if they have the same radii. If two congruent circles have chords that subtend equal angles at their respective centers, what can be concluded about the lengths of these chords?

A) The chords are perpendicular.
B) The chords are parallel.
C) The chords are equal in length.
D) The chords are diameters.

Question 11: A circle has a radius of 5 cm. A chord AB is 8 cm long. Another chord CD is also 8 cm long. What is the distance of chord CD from the center of the circle?

Answer: _____

Question 12: In a circle, chord XY is 10 cm long and is 3 cm away from the center. If chord UV is also 3 cm away from the center, what is the length of chord UV?

A) 5 cm

B) 6 cm
C) 10 cm
D) 13 cm

Question 13: If two chords of a circle are equal, and one chord subtends an angle of (2x + 10)° at the center, while the other subtends an angle of (3x - 20)° at the center, find the value of x.

Answer: _____

Question 14: A chord of a circle is equal to its radius. What is the measure of the angle subtended by this chord at the center of the circle?

A) 30°
B) 45°
C) 60°
D) 90°

Question 15: In a circle, a line segment from the center O to the midpoint M of a chord AB is drawn. If OA = 13 cm and AM = 5 cm, what is the length of OM?

Answer: _____

Question 16: What is the mathematical definition of the distance of a line from a point?

A) The length of any line segment connecting the point to the line.
B) The length of the longest line segment connecting the point to the line.
C) The length of the perpendicular from the point to the line.
D) The length of the line segment that bisects the line.

Question 17: A chord of a circle is 20 cm long. The distance of this chord from the center is 7 cm. Find the diameter of the circle.

Answer: _____

Question 18: If a chord of a circle passes through the center, what is its distance from the center?

A) Equal to the radius.
B) Half the radius.
C) Zero.
D) Twice the radius.

Question 19: In a circle with center O, chords AB and CD are equal in length. If the perpendicular distance from O to AB is 8 cm, what is the perpendicular distance from O to

CD?

Answer: _____

Question 20: Consider two congruent circles. If a chord in the first circle subtends an angle of 50° at its center, and a chord in the second circle subtends an angle of 50° at its center, what can be said about the lengths of these two chords?

A) They are unequal.
B) They are equal.
C) Their lengths cannot be compared.
D) One is a diameter, the other is not.

Answer Key

Question 1: B

Explanation: A circle is defined as the collection of all points in a plane that are equidistant from a fixed point, which is called the center.

Question 2: C

Explanation: Theorem 9.1 states that equal chords of a circle subtend equal angles at the center.

Question 3: 5 cm

Explanation: Theorem 9.3 states that the perpendicular from the center of a circle to a chord bisects the chord. Therefore, M is the midpoint of AB, so AM = AB/2 = 10/2 = 5 cm.

Question 4: B

Explanation: Theorem 9.4 states that the line drawn through the center of a circle to bisect a chord is perpendicular to the chord.

Question 5: B

Explanation: Theorem 9.5 states that equal chords of a circle are equidistant from the center.

Question 6: The chord 4 cm away from the center.

Explanation: Theorem 9.6 states that chords equidistant from the center are equal in length. Conversely, a chord closer to the center is longer. Therefore, the chord 4 cm away is longer than the chord 6 cm away.

Question 7: 6 cm

Explanation: The perpendicular from the center bisects the chord, so half the chord length is 16/2 = 8 cm. Using the Pythagorean theorem (radius^2 = (half-chord)^2 + (distance from center)^2): 10^2 = 8^2 + d^2 => 100 = 64 + d^2 => d^2 = 36 => d = 6 cm.

Question 8: C

Explanation: The perpendicular from the center bisects the chord, so half the chord length is 24/2 = 12 cm. Using the Pythagorean theorem: radius^2 = (half-chord)^2 + (distance from center)^2 => r^2 = 12^2 + 5^2 => r^2 = 144 + 25 => r^2 = 169 => r = 13 cm.

Question 9: 70°

Explanation: According to Theorem 9.1, equal chords of a circle subtend equal angles at the center. Since PQ = RS, ∠ROS = ∠POQ = 70°.

Question 10: C

Explanation: Exercise 9.1, Question 2 states that if chords of congruent circles subtend equal angles at their centers, then the chords are equal.

Question 11: 3 cm

Explanation: First, find the distance of chord AB from the center. Half of AB is 8/2 = 4 cm. Using Pythagorean theorem: $5^2 = 4^2 + d^2 => 25 = 16 + d^2 => d^2 = 9 => d = 3$ cm. Since chord CD is equal in length to chord AB, by Theorem 9.5, it must be equidistant from the center. So, the distance of CD from the center is also 3 cm.

Question 12: C

Explanation: Theorem 9.6 states that chords equidistant from the center of a circle are equal in length. Since both chords XY and UV are 3 cm away from the center, they must be equal in length. Therefore, UV = 10 cm.

Question 13: 30

Explanation: Equal chords subtend equal angles at the center. So, 2x + 10 = 3x - 20. Subtract 2x from both sides: 10 = x - 20. Add 20 to both sides: x = 30.

Question 14: C

Explanation: If a chord is equal to the radius, then the triangle formed by the two radii and the chord is an equilateral triangle. All angles in an equilateral triangle are 60°.

Question 15: 12 cm

Explanation: Since M is the midpoint and OM is drawn from the center, by Theorem 9.4, OM is perpendicular to AB. Thus, triangle OMA is a right-angled triangle with hypotenuse OA. Using Pythagorean theorem: $OA^2 = OM^2 + AM^2 => 13^2 = OM^2 + 5^2 => 169 = OM^2 + 25 => OM^2 = 144 => OM = 12$ cm.

Question 16: C

Explanation: The text defines the distance of a line from a point as the length of the perpendicular from the point to the line, which is the least length among all possible segments.

Question 17: 2√149 cm

Explanation: The perpendicular from the center bisects the chord, so half the chord length is 20/2 = 10 cm. Using the Pythagorean theorem to find the radius (r): $r^2 = 10^2 + 7^2 => r^2 = 100 + 49 => r^2 = 149 => r = \sqrt{149}$ cm. The diameter is $2r = 2\sqrt{149}$ cm.

Question 18: C

Explanation: A chord passing through the center is a diameter. Since it passes through the center, the perpendicular distance from the center to this chord is 0.

Question 19: 8 cm

Explanation: Theorem 9.5 states that equal chords of a circle are equidistant from the center. Since AB and CD are equal chords, their distances from the center must be the same.

Question 20: B

Explanation: Summary point 3 states that if the angles subtended by two chords of congruent circles at the corresponding centers are equal, the chords are equal.