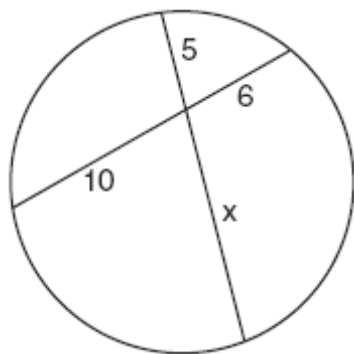


NAME: _____

G.G.53: Investigate, justify, and apply theorems regarding segments intersected by a circle: along two tangents from the same external point; along two secants from the same external point; along a tangent and a secant from the same external point; along two intersecting chords of a given circle

1. 010908b, P.I. G.G.53

The accompanying diagram shows two intersecting paths within a circular garden.

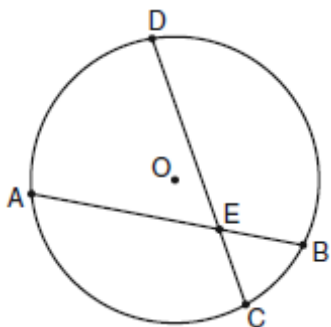


What is the length of the portion of the path marked x ?

- [A] $8\frac{1}{3}$ [B] 11 [C] 3 [D] 12

2. 080923ge, P.I. G.G.53

In the diagram of circle O below, chord \overline{AB} intersects chord \overline{CD} at E , $DE = 2x + 8$, $EC = 3$, $AE = 4x - 3$, and $EB = 4$.

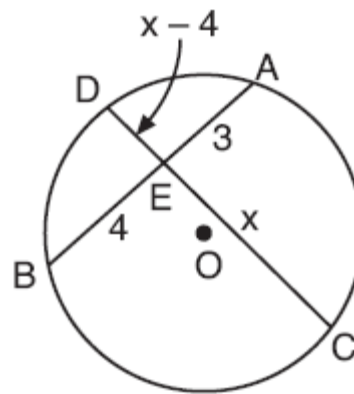


What is the value of x ?

- [A] 10.25 [B] 3.6 [C] 5 [D] 1

3. 060723b, P.I. G.G.53

In the accompanying diagram of circle O , chords \overline{AB} and \overline{CD} intersect at E . If $AE = 3$, $EB = 4$, $CE = x$, and $ED = x - 4$, what is the value of x ?



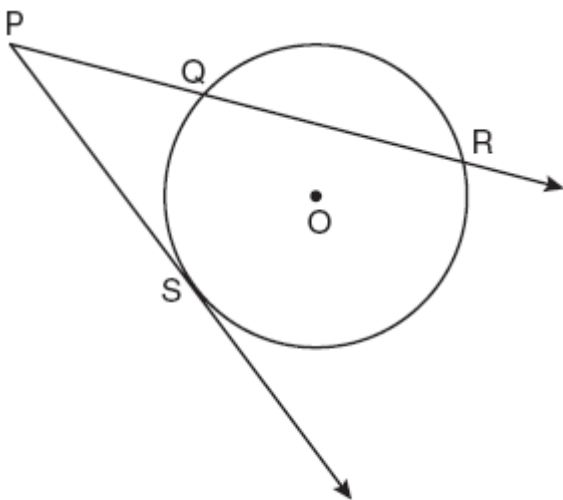
4. 080225b, P.I. G.G.53

A toy truck is located within a circular play area. Alex and Dominic are sitting on opposite endpoints of a chord that contains the truck. Alex is 4 feet from the truck, and Dominic is 3 feet from the truck. Meira and Tamara are sitting on opposite endpoints of another chord containing the truck. Meira is 8 feet from the truck. How many feet, to the nearest tenth of a foot, is Tamara from the truck? Draw a diagram to support your answer.

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5. fall0817ge, P.I. G.G.53

In the diagram below, \overline{PS} is a tangent to circle O at point S , \overline{PQR} is a secant, $PS = x$, $PQ = 3$, and $PR = x + 18$.



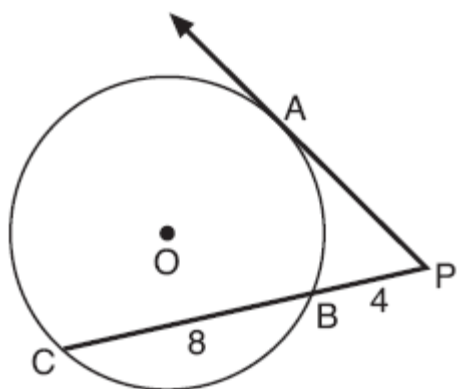
(Not drawn to scale)

What is the length of \overline{PS} ?

- [A] 6 [B] 27 [C] 9 [D] 3

6. 080719b, P.I. G.G.53

In the accompanying diagram, \overline{PA} is tangent to circle O at A , \overline{PBC} is a secant, $PB = 4$, and $BC = 8$.

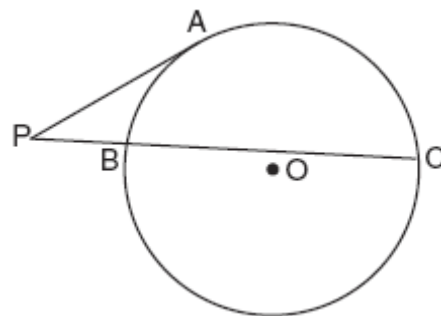


What is the length of \overline{PA} ?

- [A] $4\sqrt{6}$ [B] 4 [C] $4\sqrt{3}$ [D] $4\sqrt{2}$

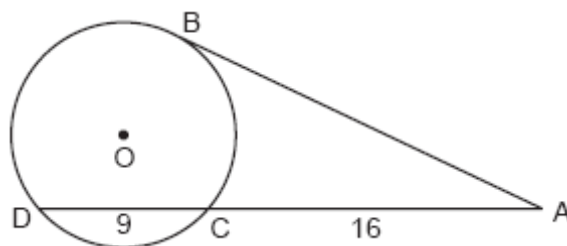
7. 010623b, P.I. G.G.53

In the accompanying diagram, \overline{PA} is tangent to circle O at A , secant \overline{PBC} is drawn, $PB = 4$, and $BC = 12$. Find PA .



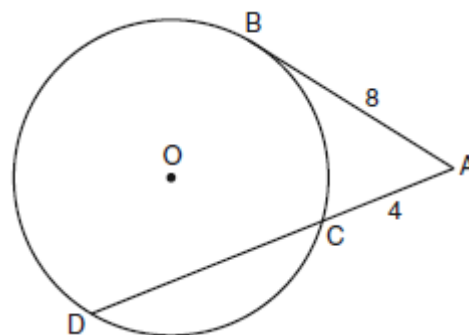
8. 010821b, P.I. G.G.53

In the accompanying diagram, \overline{AB} is tangent to circle O at B . If $AC = 16$ and $CD = 9$, what is the length of \overline{AB} ?



9. 060916ge, P.I. G.G.53

In the diagram below, tangent \overline{AB} and secant \overline{ACD} are drawn to circle O from an external point A , $AB = 8$, and $AC = 4$.



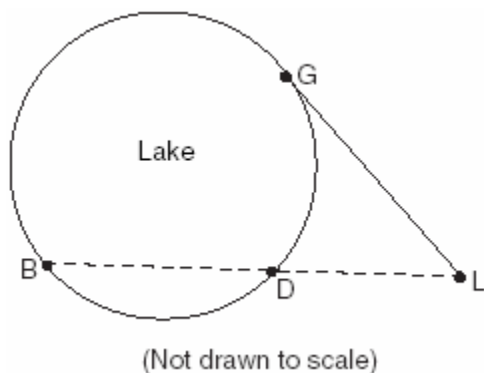
What is the length of \overline{CD} ?

- [A] 10 [B] 12 [C] 13 [D] 16

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10. 080103b, P.I. G.G.53

In the accompanying diagram, cabins B and G are located on the shore of a circular lake, and cabin L is located near the lake. Point D is a dock on the lake shore and is collinear with cabins B and L . The road between cabins G and L is 8 miles long and is tangent to the lake. The path between cabin L and dock D is 4 miles long.



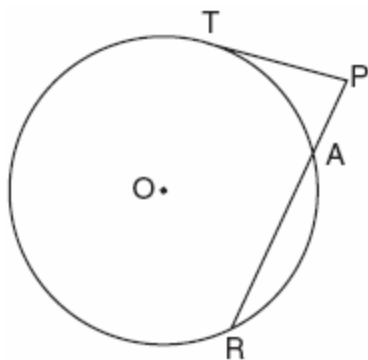
What is the length, in miles, of \overline{BD} ?

- [A] 8 [B] 24 [C] 4 [D] 12

11. 060433b, P.I. G.G.53

The accompanying diagram shows a circular machine part that has rods \overline{PT} and \overline{PAR} attached at points T , A , and R , which are located on the circle;

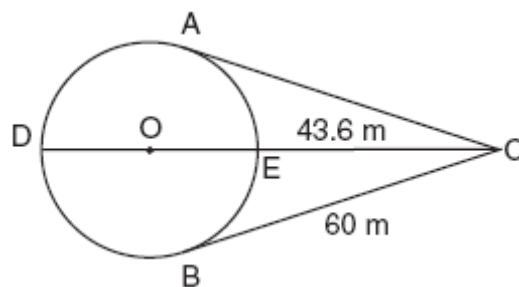
$m\widehat{TA} : m\widehat{AR} : m\widehat{RT} = 1 : 3 : 5$; $RA = 12$ centimeters; and $PA = 5$ centimeters.



Find the measure of $\angle P$, in degrees, and find the length of rod \overline{PT} , to the nearest tenth of a centimeter.

12. 060534b, P.I. G.G.53

An architect is designing a park with an entrance represented by point C and a circular garden with center O , as shown in the accompanying diagram. The architect plans to connect three points on the circumference of the garden, A , B , and D , to the park entrance, C , with walkways so that walkways \overline{CA} and \overline{CB} are tangent to the garden, walkway \overline{DOEC} is a path through the center of the garden, $m\widehat{ADB} : m\widehat{AEB} = 3 : 2$, $BC = 60$ meters, and $EC = 43.6$ meters. Find the measure of the angle between walkways \overline{CA} and \overline{CB} . Find the diameter of the circular garden, to the nearest meter.



[1] D

[2] B

[2] 6, and appropriate work is shown.

[1] Appropriate work is shown, but one computational error is made.

or [1] Appropriate work is shown, but one conceptual error is made.

or [1] Appropriate work is shown, but the negative root is not rejected.

or [1] A correct equation is written, but no further correct work is shown.

or [1] An incorrect equation of equal difficulty is solved appropriately.

or [1] 6, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[3] incorrect procedure.

[2] 1.5 and a correct diagram is drawn, and appropriate work is shown.

[1] Appropriate work is shown and a correct answer is found, but an incorrect diagram is drawn.

or [1] A correct diagram is drawn, but no further correct work is shown.

or [1] An incorrect diagram is drawn, but an appropriate answer is found.

or [1] 1.5, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[4] incorrect procedure.

[5] C

[6] C

[2] 8, and appropriate work is shown, such as $(PA)^2 = 4 \times 16 = 64$.

[1] Appropriate work is shown, but one computational error is made.

or [1] Appropriate work is shown, but one conceptual error is made, such as failing to reject the negative root.

or [1] 8, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[7] incorrect procedure.

[2] 20, and appropriate work is shown.

[1] Appropriate work is shown, but one computational error is made.

or [1] Appropriate work is shown, but one conceptual error is made.

or [1] A correct equation is written, but no further correct work is shown.

or [1] 20, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[8] incorrect procedure.

[9] B

[10] D

- [6] 80 and 9.2, and appropriate work is shown.
- [5] Appropriate work is shown, but one computational or rounding error is made.
- [4] Appropriate work is shown, but two or more computational or rounding errors are made.
- or [4] Appropriate work is shown, but one conceptual error is made in solving for one of the values.
- or [4] 80, and appropriate work is shown, but the length of \overline{PT} is not found or is found incorrectly.
- or [4] The measure of all three arcs and the length of \overline{PT} are found correctly, but the measure of $\angle P$ is not found or is found incorrectly.
- [3] Appropriate work is shown, but one conceptual error and one computational or rounding error are made.
- [2] Appropriate work is shown, but one conceptual error is made in solving for each value.
- or [2] 80 and 9.2, but no work is shown.
- or [2] 9.2, and appropriate work is shown, but no further correct work is shown.
- or [2] The measures of all three arcs are found correctly, but no further correct work is shown.
- [1] 80 or 9.2, but no work is shown.
- [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
- [11] incorrect procedure.
- [6] $m\angle ACB = 36$ and $DOE = 39$, and appropriate work is shown. [If trigonometry is used to find that $m\angle ACB = 35.98138002$, allow full credit for the full display of the calculator or any correctly rounded response.]
- [5] Appropriate work is shown, but one computational or rounding error is made.
- [4] Appropriate work is shown, but two or more computational or rounding errors are made.
- [3] Appropriate work is shown, but one conceptual error is made.
- or [3] $m\angle ACB = 36$, and appropriate work is shown, but no further correct work is shown.
- or [3] $DOE = 39$, and appropriate work is shown, but no further correct work is shown.
- [2] Appropriate work is shown, but one conceptual error and one computational or rounding error are made.
- or [2] $m\angle ACB = 36$ and $DOE = 39$, but no work is shown.
- [1] The measures of the arcs are found correctly, but no further correct work is shown.
- or [1] $m\angle ACB = 36$ or $DOE = 39$, but no work is shown.
- [0] 36 and 39, but no work is shown and the answers are not labeled.
- or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
- [12] obviously incorrect procedure.