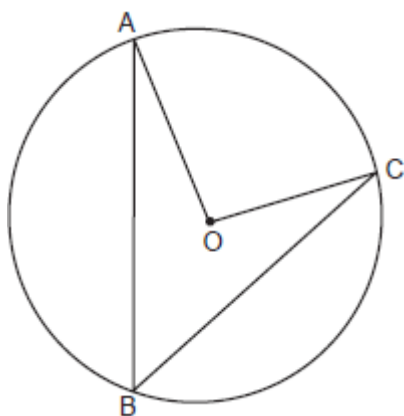


NAME: _____

G.G.51: Investigate, justify, and apply theorems about the arcs determined by the rays of angles formed by two lines intersecting a circle when the vertex is: inside the circle (two chords); on the circle (tangent and chord); outside the circle (two tangents, two secants, or tangent and secant)

1. 060802b, P.I. G.G.51

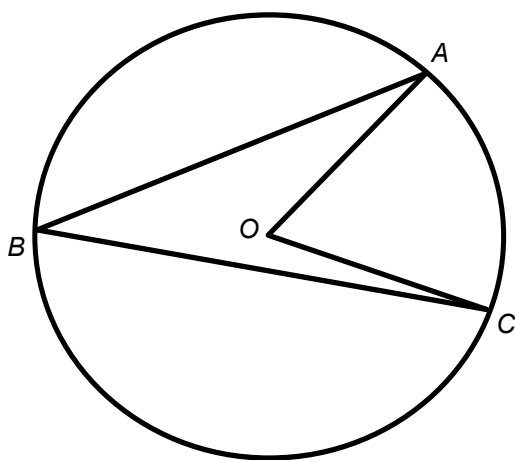
In the accompanying diagram of circle O , \overline{AB} and \overline{BC} are chords and $m\angle AOC = 96$. What is $m\angle ABC$?



- [A] 96 [B] 48 [C] 192 [D] 32

2. fall9914b, P.I. G.G.51

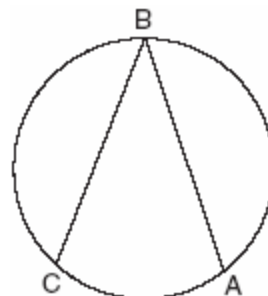
In the diagram below, circle O has $m\angle ABC = z$. What is $m\angle AOC$?



- [A] z^2 [B] z [C] $2z$ [D] $\frac{1}{2}z$

3. 080107b, P.I. G.G.51

The new corporate logo created by the design engineers at Magic Motors is shown in the accompanying diagram.

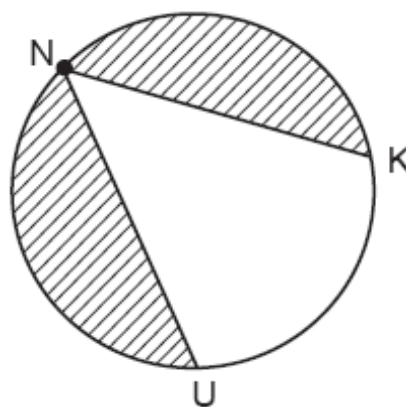


If chords \overline{BA} and \overline{BC} are congruent and $m\widehat{BC} = 140$, what is $m\angle B$?

- [A] 40 [B] 280 [C] 80 [D] 140

4. 080803b, P.I. G.G.51

The NUK Energy Company is designing a new logo, as shown in the accompanying diagram, with $m\widehat{NK} = 130$ and $m\widehat{NK} = m\widehat{NU}$.



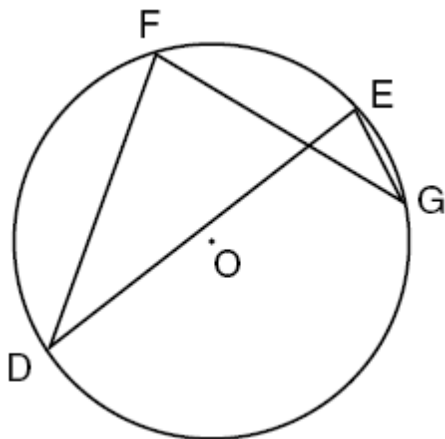
What is the measure of $\angle KNU$?

- [A] 65° [B] 100° [C] 80° [D] 50°

NAME: _____

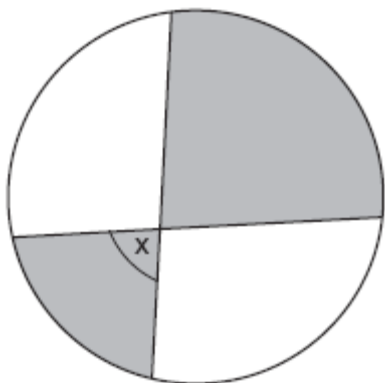
5. fall0836ge, P.I. G.G.51

In the diagram below of circle O , chords \overline{DF} , \overline{DE} , \overline{FG} , and \overline{EG} are drawn such that $m\widehat{DF} : m\widehat{FE} : m\widehat{EG} : m\widehat{GD} = 5 : 2 : 1 : 7$. Identify one pair of inscribed angles that are congruent to each other and give their measure.



6. 080408b, P.I. G.G.51

The accompanying diagram shows a child's spin toy that is constructed from two chords intersecting in a circle. The curved edge of the larger shaded section is one-quarter of the circumference of the circle, and the curved edge of the smaller shaded section is one-fifth of the circumference of the circle.



What is the measure of angle x ?

- [A] 108° [B] 81° [C] 72° [D] 40°

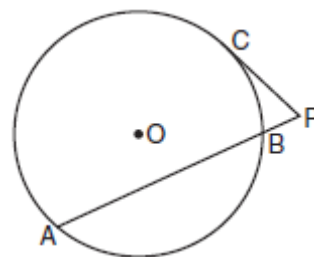
7. 080629b, P.I. G.G.51

A machine part consists of a circular wheel with an inscribed triangular plate, as shown in the accompanying diagram. If $\overline{SE} \cong \overline{EA}$, $SE = 10$, and $m\widehat{SE} = 140$, find the length of \overline{SA} to the nearest tenth.



8. 080925b, P.I. G.G.51

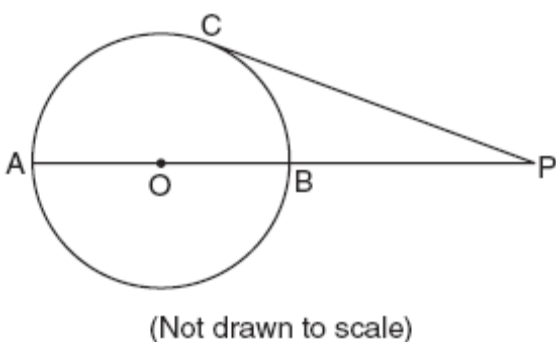
In the accompanying diagram of circle O , \overline{PC} is a tangent, \overline{PBA} is a secant, $m\widehat{AB} = 132$, and $m\widehat{CB} = 46$. Find $m\angle P$.



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9. 010721b, P.I. G.G.51

In the accompanying diagram of circle O , diameter \overline{AOB} is extended through B to external point P , tangent \overline{PC} is drawn to point C on the circle, and $m\widehat{AC} : m\widehat{BC} = 7 : 2$. Find $m\angle CPA$.



10. 060132b, P.I. G.G.51

Point P lies outside circle O , which has a diameter of \overline{AOC} . The angle formed by tangent \overline{PA} and secant \overline{PBC} measures 30° . Sketch the conditions given above and find the number of degrees in the measure of minor arc CB .

11. 010510b, P.I. G.G.51

A small fragment of something brittle, such as pottery, is called a shard. The accompanying diagram represents the outline of a shard from a small round plate that was found at an archaeological dig.

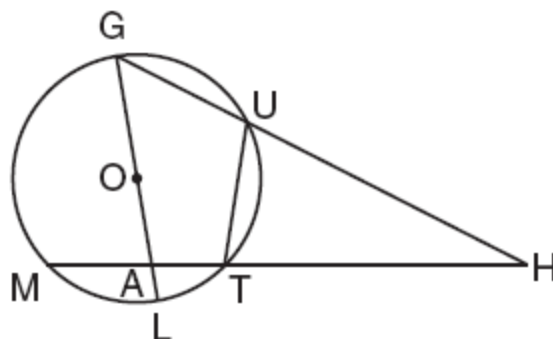


If \overline{BC} is a tangent to \widehat{AB} at B and $m\angle ABC = 45^\circ$, what is the measure of \widehat{AB} , the outside edge of the shard?

[A] 135° [B] 45° [C] 225° [D] 90°

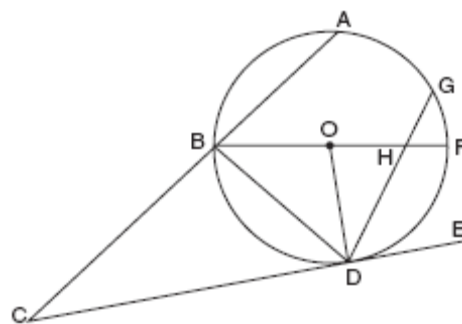
12. 080333b, P.I. G.G.51

Given circle O with diameter \overline{GOAL} ; secants \overline{HUG} and \overline{HTAM} intersect at point H ; $m\widehat{GM} : m\widehat{ML} : m\widehat{LT} = 7 : 3 : 2$; and chord $\overline{GU} \cong$ chord \overline{UT} . Find the ratio of $m\angle UGL$ to $m\angle H$.



13. 080633b, P.I. G.G.51

In the accompanying diagram, circle O has radius \overline{OD} , diameter \overline{BOHF} , secant \overline{CBA} , and chords \overline{DHG} and \overline{BD} ; \overline{CE} is tangent to circle O at D ; $m\widehat{DF} = 80$; and $m\widehat{BA} : m\widehat{AG} : m\widehat{GF} = 3 : 2 : 1$. Find $m\widehat{GF}$, and $m\angle BHD$, $m\angle BDG$, $m\angle GDE$, $m\angle C$, and $m\angle BOD$.



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[1] B

[2] C

[3] A

[4] D

[4] $\angle D$ and $\angle G$ and 24, or $\angle E$ and $\angle F$ and 84, and appropriate work is shown.

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

or [3] The measure of at least one inscribed angle is found correctly, and appropriate work is shown, but a pair of angles is not identified or is identified incorrectly.

[2] Appropriate work is shown, but two or more computational errors are made.

or [2] Appropriate work is shown, but one conceptual error is made.

or [2] Appropriate work is shown to find the measures of all four arcs, but no further correct work is shown.

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

or [1] One pair of inscribed angles is correctly identified, but no further correct work is shown.

or [1] Appropriate work is shown to find $x = 24$, the measure of \widehat{EG} , but no further correct work is shown.

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

[5] incorrect procedure.

[6] B

[4] 6.8, and appropriate work is shown, such as using the Law of Cosines or the Law of Sines or right triangle trigonometry.

[3] Appropriate work is shown, but one computational or rounding error is made.

or [3] 3.4, and appropriate work is shown, such as $\cos 70 = \frac{x}{10}$ or $\sin 20 = \frac{x}{10}$.

[2] Appropriate work is shown, but two or more computational or rounding errors are made.

or [2] Appropriate work is shown, but one conceptual error is made, such as using an incorrect trigonometric function.

or [2] Correct substitution is made into the Law of Sines or the Law of Cosines, but no further correct work is shown.

[1] Appropriate work is shown, but one conceptual error and one computational or rounding error are made.

or [1] The measures of \widehat{EA} and \widehat{SA} are found correctly, but no further correct work is shown.

or [1] The measures of the three angles of triangle SEA are found correctly, but no further correct work is shown.

or [1] 6.8, 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] 68, 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] 68, 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.

[2] 50, and appropriate work is shown, such as $m\widehat{AC} = 140$, $m\widehat{BC} = 40$, and

$$m\angle CPA = \frac{1}{2}(140 - 40).$$

[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] $m\widehat{AC}$ and $m\widehat{BC}$ are found correctly, but no further correct work is shown.

or [1] 50, 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

[9] incorrect procedure.

[4] 60° , and an appropriate sketch is drawn, and appropriate work is shown.

[3] A correct sketch is shown, and $m\widehat{AB}$ is correct.

or [3] A correct sketch is shown, but one computational error is made, leading to an incorrect $m\widehat{AB}$, but $m\widehat{CB}$ is appropriate, based on the incorrect $m\widehat{AB}$.

[2] A correct sketch is shown, but an incorrect procedure is used to find either the correct or incorrect $m\widehat{AB}$, but $m\widehat{CB}$ is appropriate,

based on the incorrect $m\widehat{AB}$.

or [2] An incorrect sketch is shown, but an appropriate $m\widehat{CB}$ is found, based on the incorrect sketch.

[1] Only a correct sketch is shown.

or [1] 60° , 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

[10] incorrect procedure.

[11] D

[6] $\frac{2}{1}$ or 2:1 or an equivalent ratio, and

appropriate work is shown.

[5] Appropriate work is shown, but one computational error is made, but an appropriate ratio is found.

or [5] Appropriate work is shown, but the answer is not written as a ratio.

or [5] Appropriate work is shown, but the ratio is reversed or is simplified incorrectly.

[4] Appropriate work is shown, but two or more computational errors are made, but an appropriate ratio is found.

or [4] Correct measures are found for all the arcs and the angles, and appropriate work is shown, but no ratio is found.

or [4] Correct measures are found for all the arcs, but the measure of one angle is found incorrectly, but an appropriate ratio is found.

[3] One conceptual error is made, but appropriate work is shown, and an appropriate ratio is found.

or [3] Correct measures are found for all the arcs, but the measures of both angles are found incorrectly, but an appropriate ratio is found.

[2] Correct measures are found for all the arcs, but no further correct work is shown.

[1] Only the value of x is found correctly, and appropriate work is shown.

or [1] $\frac{2}{1}$ or 2:1 or an equivalent ratio, 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

[12] incorrect procedure.

[6] $m\widehat{GF} = 30$, $m\angle BHD = 65$,
 $m\angle BDG = 75$, $m\angle GDE = 55$, $m\angle C = 35$,
and $m\angle BOD = 100$, and appropriate work is
shown.

[5] $m\widehat{GF}$ is determined correctly, but $m\widehat{BD}$
is determined incorrectly, but all five of the
angle measures are determined appropriately.

or [5] $m\widehat{GF}$ is determined incorrectly, but all
five of the angle measures are determined
appropriately, based on the incorrect arc
measure.

or [5] $m\widehat{GF}$ is determined correctly, but only
four of the angle measures are determined
correctly.

[4] $m\widehat{GF}$ is determined incorrectly, and only
four of the angle measures are determined
appropriately, based on the incorrect arc
measure.

or [4] $m\widehat{GF}$ is determined correctly, but only
three of the angle measures are determined
correctly.

[3] $m\widehat{GF}$ is determined incorrectly, and only
three of the angle measures are determined
appropriately, based on the incorrect arc
measure.

or [3] $m\widehat{GF}$ is determined correctly, but only
two of the angle measures are determined
correctly.

[2] $m\widehat{GF}$ is determined incorrectly, and only
two of the angle measures are determined
appropriately, based on the incorrect arc
measure.

or [2] $m\widehat{GF}$ is determined correctly, but only
one angle measure is determined correctly.

[1] $m\widehat{GF}$ is determined incorrectly, and only
one angle measure is determined
appropriately.

or [1] $m\widehat{GF}$ is determined correctly, but no
further correct work is shown.

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

[13] incorrect procedure.
