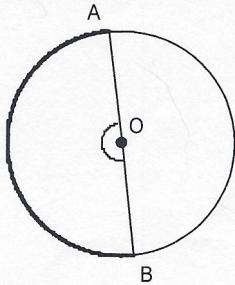


Grade 9 – Unit 8.3 Practice Questions - Answers

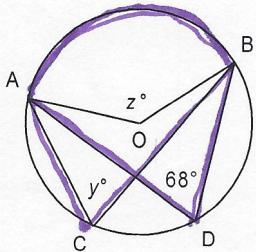
1. Point O is the centre of the circle. Arc AB is a semicircle.
What is the measure of $\angle AOB$?



- AB IS A DIAMETER SINCE IT GOES THROUGH THE CENTER, AND IT SPLITS THE CIRCLE IN 2 SEMI-CIRCLES.
- SINCE A CIRCLE HAS 360° ,

$$\frac{360^\circ}{2} = 180^\circ$$
 SO, $\boxed{\angle AOB = 180^\circ}$

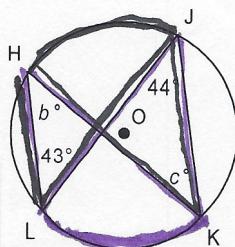
2. Point O is the centre of this circle.
Determine the values of y° and z° .



- $\angle ADB = 68^\circ$. WHICH MEANS IT "STARTS" OR COMES FROM A and B ("SUBTENDED FROM A and B")
- ANY INSCRIBED ANGLES THAT COME FROM A and B, THEN, WILL ALSO BE 68°
- $\boxed{y^\circ = \angle ACB = \angle ADB = 68^\circ}$
- SINCE $\angle AOB = z^\circ$ = CENTRAL ANGLE, AND IT "COMES FROM" A and B:

$$z^\circ = \angle AOB = 2 \times \text{INSCRIBED ANGLE} = 2 \times 68^\circ = 136^\circ$$

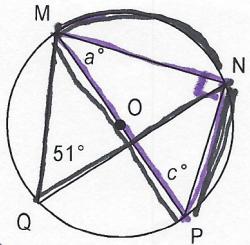
3. Point O is the centre of the circle.
Determine the values of b° and c° .



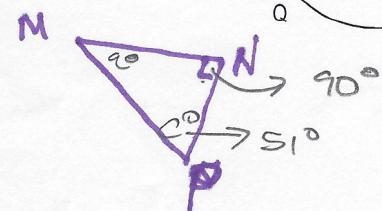
- START WITH THE NUMBERS given (ALWAYS A GOOD IDEA!)
- BACK TRACE 44° . IT IS SUBTENDED BY LK. ($\angle LJK = 44^\circ$)
- SINCE 6° IS ALSO SUBTENDED BY LK, then $\boxed{b^\circ = \angle LJK = 44^\circ}$
- $\angle HLJ = 43^\circ$ (comes from H and J)
- $\angle HKL = c^\circ$ also comes from H and J
 $SO = c^\circ = \angle HKL = \angle HLJ = 43^\circ$ ✓

$$\boxed{c^\circ = 43^\circ}$$

4. Point O is the centre of the circle.
Determine the values of a° and c° .

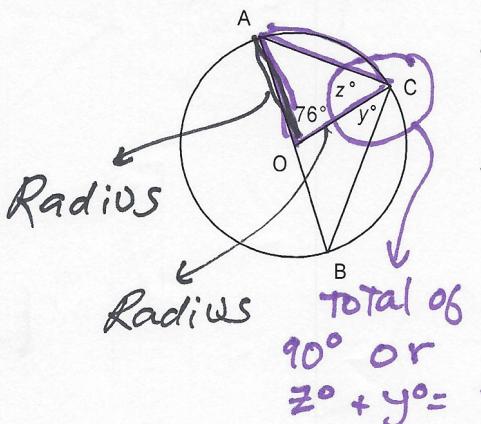


To find a°

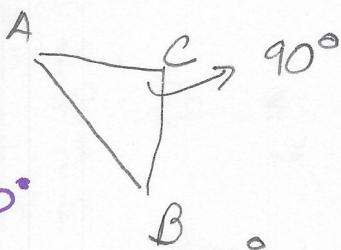


- Notice that the center, O, is given.
 - MN then goes through the center. This means that line MN is the diameter.
 - As we know, any INSCRIBED ANGLE SUBTENDED BY THE DIAMETER IS A RIGHT ANGLE (90°).
 - Therefore $\angle MNP = 90^\circ$
 - $\angle LMQN = 51^\circ$ (comes from M and N)
 - $\angle MPN = c^\circ$ Also comes from M and N.
- $$\begin{aligned} \triangle MNP: & MNP = 180^\circ \\ & 180^\circ = 90 + 51^\circ + a^\circ \\ \text{so } a^\circ = & 180^\circ - 90^\circ - 51^\circ = 39^\circ \end{aligned}$$
- $$\begin{aligned} \triangle MNP: & MNP = 180^\circ \\ & 180^\circ = 90 + 51^\circ + c^\circ \\ \text{so } c^\circ = & 180^\circ - 90^\circ - 51^\circ = 39^\circ \end{aligned}$$

5. Point O is the centre of the circle.
Determine the values of y° and z° .



- Because LINE AB goes through O, the center, it is the diameter.
- Therefore $\angle ACB = 90^\circ$

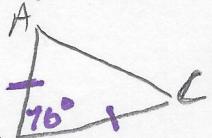


since
 $z^\circ + y^\circ = 90^\circ$ and
 $z^\circ = 52^\circ$ then
 $y^\circ = 90^\circ - 52^\circ = 38^\circ$

- BUT $\angle ACB$ is MADE of z° and y° together
 $\text{so } \angle ACB = 90^\circ = z^\circ + y^\circ$

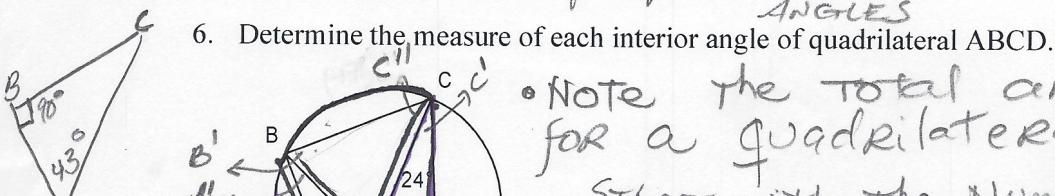
- $\angle AOC$ is the central angle for A and C, and it is 76° . BUT:
 $\overline{AO} = \text{Radius}$ and $\overline{CO} = \text{Radius}$, MAKING TRIANGLE AOC AN ISOSCELES TRIANGLE.

- In an isosceles triangle, 2 angles are equal, therefore $\angle A$ and $\angle C$ are equivalent.
- Since $\triangle AOC = 180^\circ$ and $\angle O = 76^\circ$, it means that $\angle A = \angle C = (180 - 76^\circ)/2 = 104^\circ/2 = 52^\circ$
- so $z^\circ = \angle C = 52^\circ$



Problem

*FOR OUR PURPOSE, I'M NAMING EACH PART OF THE ANGLES



6. Determine the measure of each interior angle of quadrilateral ABCD.

- Note the total amount of degrees for a quadrilateral is 360° .
- Start with the numbers you have (and) any other information:

- 1) 43° is subtended by \overarc{BC}
- 2) 24° is subtended by \overarc{AD}
- 3) Since O is the center, and \overline{CA} goes through it, then $\overline{CA} = \text{Diameter}$

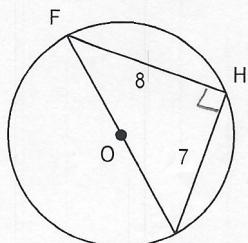
so: • Since \overline{CA} is the diameter:

$$B = \angle ACB = 90^\circ$$

- $\angle BAC = 43^\circ = \angle BDC = d' = 43^\circ$
- Since $\triangle ABC = 180^\circ$, then $\angle C'' = 180 - 90 - 43^\circ = 47^\circ$
- Since $\angle ACD = 24^\circ$, then $\angle ABD = B'' = 24^\circ$
- $\angle B = B' + B''$. And $\angle B = 90^\circ$, then $90^\circ = B' + B'' \Rightarrow B' = 90 - B'' = 90 - 24^\circ$
- Since $d'' = \angle ADB$ and $\angle ACB = C' = 47^\circ$, then $d'' = 47^\circ$ $B' = 66^\circ$

7. Point O is the centre of the circle.

Determine the radius of the circle to the nearest tenth.
What circle property did you use?



• WHAT DO YOU KNOW? :

\overline{FOG} (O is center, \overline{FOG} goes through it) = Diameter

- So $\angle H = 90^\circ$

• $\triangle FGH$ is a right triangle, so we can use the Pythagorean theorem

Since $\angle H = 90^\circ$, then

$$\overline{FOG} = \text{Hypotenuse} = \text{Diameter}$$

$$\overline{FOG} = \sqrt{8^2 + 7^2} = \sqrt{64 + 49} = \sqrt{113}$$

$$\overline{FOG} = 10.6$$

- $\overline{FOG} = \text{Diameter} = 10.6$, Therefore $\text{Radius} = \frac{\text{Diameter}}{2}$

$$\boxed{\text{Radius} = 10.6 / 2 = 5.3}$$

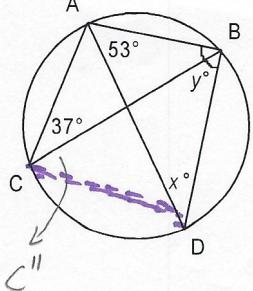
so

$$\begin{aligned} \angle C &= C' + C'' = 43^\circ + 47^\circ = 91^\circ \\ \angle B &= B' + B'' = 66^\circ + 24^\circ = 90^\circ \\ \angle A &= A' + A'' = 43^\circ + 66^\circ = 109^\circ \\ \angle D &= D' + D'' = 43^\circ + 47^\circ = 90^\circ \end{aligned}$$

so $\angle C + \angle B + \angle A + \angle D$ is $91^\circ + 90^\circ + 109^\circ + 90^\circ$ which is 360° !!

8. Determine the values of x° and y° .

What can you say about line segment AD?



- \overline{AD} goes through the middle, which makes it the diameter.

- Therefore $|y^\circ \text{ (at B)} = 90^\circ|$

- If $y^\circ = 90^\circ$, then for $\triangle ADB$,

$$x^\circ = 180^\circ - (90^\circ + 53^\circ) = 180^\circ - 143^\circ = 37^\circ$$

$$|x^\circ = 37^\circ|$$

- Since $\overline{AD} = \text{diameter}$, then $\angle C = 90^\circ$

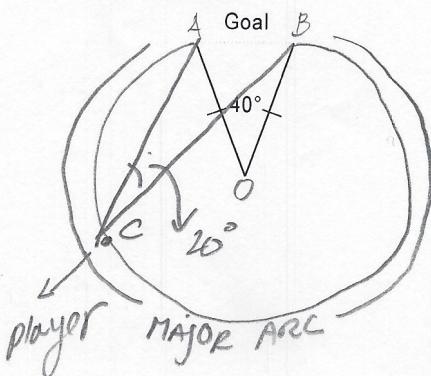
$$\angle C = 37^\circ + c'', \text{ OR } 90^\circ = 37^\circ + c''$$

$$|c'' = 90^\circ - 37^\circ = 53^\circ|$$

Additionally:

9. Sheila is planning a shooting drill for a soccer team. She wants the soccer players to practice shooting on a net with a shooting angle of 20° . She has sketched this diagram.

Complete Sheila's sketch to show the curve or line along which she should have the players stand so their shooting angle is 20° .



- If you label the posts of the goal A and B, and label O where A and B meet, the $\angle AOB = 40^\circ$ and it represents a central angle.

- So, theoretically, any inscribed angle along the major arc is

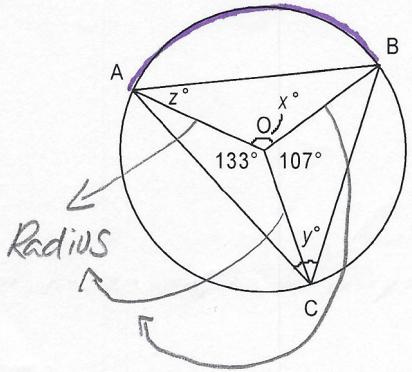
$$\text{Inscribed angle} = \frac{\text{central angle}}{2} = 20^\circ$$

- Therefore, Sheila can have players stand anywhere along the major arc

- Using "C" as an example above.

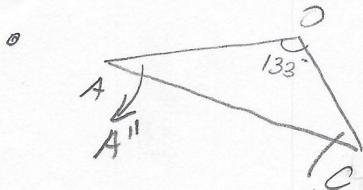
10. Point O is the centre of the circle.

Determine the values of x° , y° , and z° .



WRITE DOWN WHAT YOU KNOW :

- x° = central angle from \widehat{AB}
- OB is a radius
- AO is a radius
- CO is a radius
- $\triangle AOB$ is an isosceles triangle

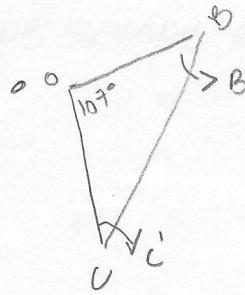


• Isosceles triangle, then $A'' = C'$

$$180^\circ - 133^\circ = 47^\circ$$

then 47° is divided among A' and C''

$$A'' = C'' = 23.5^\circ$$



• $\triangle COB$ then $C' = B'$
Because it is an isosceles triangle

$$180 - 107^\circ = 73^\circ \text{ so } C' = B' = \frac{73^\circ}{2} = 36.5^\circ$$

then $y^\circ = C' + C'' = 23.5^\circ + 36.5^\circ = 60^\circ$

• Since $y^\circ = \angle ACB$ and $x^\circ < \angle AOB$
then they are related, where x° is the central angle of \widehat{AB} , and y° is the inscribed angle of \widehat{AB}

$x^\circ = 2 \times y^\circ = 2 \times 60^\circ = 120^\circ$

ALTERNATIVELY In the center:

$$360^\circ = x^\circ + 240^\circ \quad \text{so} \quad 360^\circ = x^\circ + 133^\circ + 107^\circ \quad \Rightarrow \quad x^\circ = 360^\circ - 240^\circ = 120^\circ$$