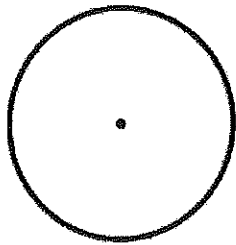


UNIT 6 NOTES 7 - Arc Length

Name SUDO

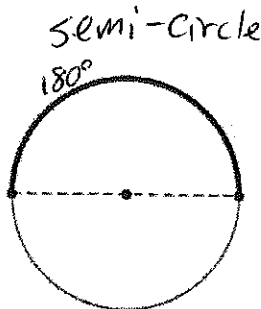
The length of an arc, or ARC LENGTH is part (or a fraction) of the circumference of the circle.

Find the missing measures in terms of Pi. L = arc length



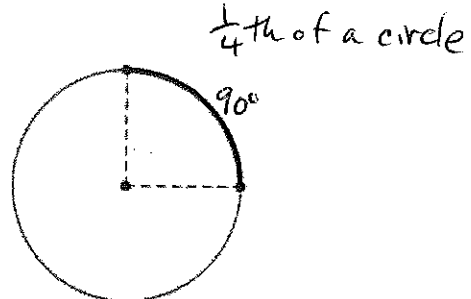
$r = 8 \text{ cm}$

$C = 2\pi(8)$
 $= 16\pi \text{ cm}$



$r = 8 \text{ cm}$

$L = \frac{1}{2} \cdot 2\pi(8)$
 $= 8\pi \text{ cm}$



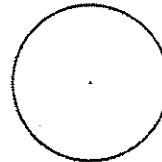
$r = 8 \text{ cm}$

$L = \frac{1}{4} \cdot 2\pi(8)$
 $= 4\pi \text{ cm}$

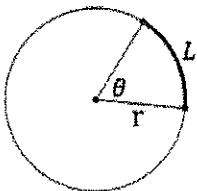
Familiar "parts" of a circle

$\frac{180^\circ}{360^\circ} = \frac{1}{2}$	$\frac{45^\circ}{360^\circ} = \frac{1}{8}$	$\frac{20^\circ}{360^\circ} = \frac{1}{18}$
$\frac{120^\circ}{360^\circ} = \frac{1}{3}$	$\frac{40^\circ}{360^\circ} = \frac{1}{9}$	$\frac{60^\circ}{360^\circ} = \frac{1}{6}$
$\frac{90^\circ}{360^\circ} = \frac{1}{4}$	$\frac{36^\circ}{360^\circ} = \frac{1}{10}$	$\frac{10^\circ}{360^\circ} = \frac{1}{36}$
$\frac{72^\circ}{360^\circ} = \frac{1}{5}$	$\frac{30^\circ}{360^\circ} = \frac{1}{12}$	$\frac{\quad}{360^\circ} = \quad$

To find out what fraction of a circle each arc represents, divide the arc measure by 360°



Arc Length Formula:

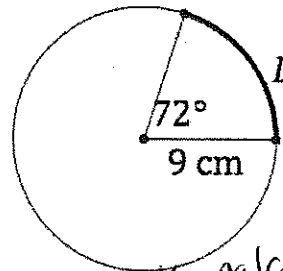


Arc Length $L = \frac{\theta}{360} \times 2\pi r$

Arc Measure in degrees Circumference

Arc Length = $\frac{\text{degrees}}{360} \cdot 2\pi r$

Example:



$L = \frac{72}{360} \cdot 2\pi(9)$

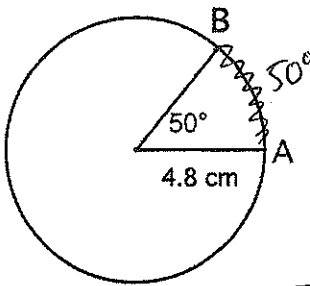
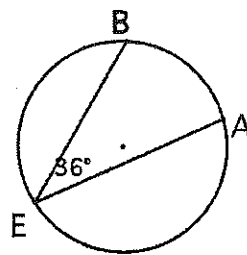
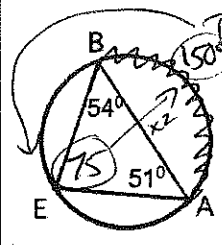
on the calculator do this
 $(72/360) * 2 * 9 = 3.6$
 then put π at the end

$L = 3.6\pi \text{ cm}$

STEPS FOR FINDING ARC LENGTH:

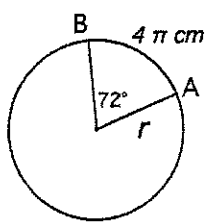
<p>STEP 1 Find what <i>fraction</i> of a circle the arc represents. You can find this by comparing the <i>arc measure in degrees</i> to the <i>whole circle (360°)</i></p> <p>In other words divide: fraction = $\frac{\text{degrees}}{360}$</p>	<p>STEP 2 Find the circumference of the whole circle. Use:</p> <p>$C = \pi d$ or $C = 2\pi r$</p>	<p>STEP 3 Find the <u>arc length</u> by <u>multiplying the fraction</u> of the circle that the arc represents <u>times the circumference</u> of the whole circle.</p>
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$$\text{Arc Length} = \frac{\boxed{\begin{array}{c} \text{arc measure} \\ \text{degrees} \end{array}}}{\boxed{360}} \times \boxed{\begin{array}{c} \text{circumference} \\ 2\pi r \end{array}}$$

<p>1. Find the length of \widehat{AB} in terms of π</p>  <p>length of $\widehat{AB} = 1.3\pi \text{ cm}$ $\text{Length}_{\widehat{AB}} = \frac{50}{360} \cdot 2\pi(4.8)$</p>	<p>2. The radius is 24 in Find the length of \widehat{AB} in terms of π</p>  <p>length of $\widehat{AB} = 9.6\pi \text{ in}$ $\text{Length}_{\widehat{AB}} = \frac{36}{360} \cdot 2\pi(24)$</p>	<p>3. The radius is 16 in Find the length of \widehat{AB} in terms of π</p>  <p>length of $\widehat{AB} = 13.3\pi \text{ m}$ $\text{Length}_{\widehat{AB}} = \frac{150}{360} \cdot 2\pi(16)$</p> <p><i>Triangle sum</i> $180 - 54 - 51 = 75$</p>
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4. Work BACKWARDS to find the radius of the circle.

The length of \widehat{AB} is $4\pi \text{ cm}$
Find the length of the radius.



$r = 10 \text{ cm}$

$$\frac{4\pi}{\pi} = \frac{72}{360} \cdot \frac{2\pi r}{\pi}$$

$$4 = \frac{72}{360} \cdot 2r$$

$$2 = \frac{72}{360} \cdot r$$

$$\div \frac{72}{360} \quad \div \frac{72}{360}$$

$$10 \text{ cm} = r$$

Start with 4π
 $\div \pi$
 $\div 2$
 $\div \frac{72}{360}$

 $r = 10 \text{ cm}$