

Notes: 2-Dimensional Figures

$$\text{Circumference of a circle} = C = \pi d = 2\pi r$$

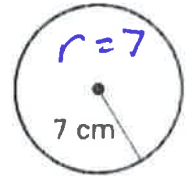
$$\text{Area of a circle} = A = \pi r^2$$

CIRCLES

For "exact" and "leave in terms of π ", do not multiply by 3.14 or any other value for π . Answers will be left with " π " symbol.

Ex 1: Find the circumference and area of the given circle. Write answer in exact value by leaving it in terms of pi. Then, estimate the answer by using $\pi = 3.14$.

$$\begin{aligned} \text{Circumference} &= \frac{\text{Exact } 14\pi \text{ cm}}{2\pi r = 2\pi 7} \approx \frac{\text{Estimate } 43.96 \text{ cm}}{14(3.14)} \\ \text{Area} &= \frac{49\pi \text{ cm}^2}{\pi r^2 = \pi 7^2} \approx \frac{153.86 \text{ cm}^2}{49(3.14)} \end{aligned}$$



Find the circumference and area of each circle:

	exact value	estimate
Ex.2 $r = 5$	$C = 2\pi 5 = 10\pi$ $A = \pi 5^2 = 25\pi$	$C = 10(3.14) = 31.4$ $A = 25(3.14) = 78.5$
Ex.3 $d = 7$ $r = 3.5$	$C = 7\pi$ $A = \pi 3.5^2 = 12.25\pi$	$C = 7(3.14) = 21.98$ $A = 12.25(3.14) = 38.465$

use $\pi = 3.14$

Ex.4 If a bicycle tire has a diameter of 20 in, how far will Sarah ride in 12 revolutions? Estimate the distance she traveled to the nearest tenth of an inch.

tire $d = 20$
 $r = 10$ 1 revolution = 1 circumference

$$\begin{aligned} C &= \pi d = 20\pi \\ &\times 12 \text{ revolutions} \rightarrow = 20\pi(12) \\ &= 240\pi \\ &\approx 240(3.14) = 753.6 \text{ inches} \end{aligned}$$

Ex.5 Find the area of the circle with circumference 22π . Leave answer in terms of π

Area = πr^2
need radius

$$\begin{aligned} C &= 22\pi \\ C &= 2\pi r \end{aligned} \Rightarrow \begin{aligned} 2\pi r &= 22\pi \\ 2r &= 22 \\ r &= 11 \end{aligned} \rightarrow \begin{aligned} A &= \pi r^2 \\ &= \pi 11^2 \\ &= 121\pi \end{aligned}$$

Ex.6 A radio tower has a transmission of 100 km. How much of the city's area will it cover? Leave answer in terms of π and then estimate the area to the nearest tenth of a kilometer.

100 km
 $r = 100$

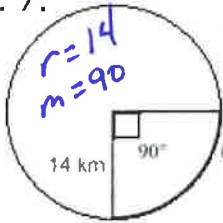
$$\begin{aligned} A &= \pi r^2 \\ &= \pi (100)^2 \\ &= 10,000\pi \text{ exact} \end{aligned} \xrightarrow{\text{estimate}} \begin{aligned} &10,000(3.14) \\ &= 31,415.9 \text{ km}^2 \text{ estimate} \end{aligned}$$

The **length of an arc** is a fraction of the circumference of the circle.

Term:	Diagram:	Formula:
<p>Arc Length: the distance along the arc of a circle, between two radii.</p> <p>*A Portion (FRACTION) of the Circumference</p>		<p>Arc length = $2\pi r \left(\frac{m^\circ}{360^\circ}\right)$</p>

Find each arc length. Give your answer in terms of π & rounded to the nearest hundredth.

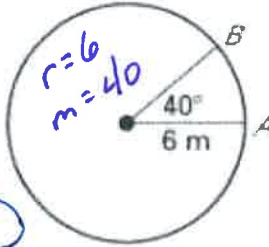
Ex. 7:



arc length = $2\pi r \left(\frac{m}{360}\right)$
 $= 2\pi \cdot 14 \left(\frac{90}{360}\right)$

calc: $2 \cdot 14 \cdot 90 / 360 \Rightarrow 7$
 $= 7\pi \text{ km}$
 $\sim 7(3.14) = 21.98$

Ex. 8:



arc length = $2\pi r \left(\frac{40}{360}\right)$

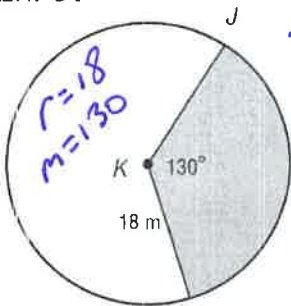
calc: $2 \cdot 6 \cdot 40 / 360 = 1.\bar{3} = \frac{4}{3}$
 $= \frac{4}{3}\pi = 1.\bar{3}\pi$
 $\sim \frac{4}{3}(3.14) = 4.19$

The **area of a sector** is a fraction of the area of the circle.

Term:	Diagram:	Formula:
<p>Area of a Sector: a region bounded by two radii and their intercepted arc.</p> <p>*A Portion (FRACTION) of the Area</p>		<p>Area of Sector = $\pi r^2 \left(\frac{m^\circ}{360^\circ}\right)$</p>

Find the area each sector. Give answers in terms of π and to the nearest hundredth.

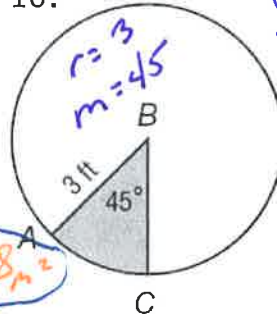
Ex. 9:



Area sector = $\pi r^2 \left(\frac{m}{360}\right)$
 $= \pi \cdot 18^2 \left(\frac{130}{360}\right)$

calc: $18^2 \cdot 130 / 360 = 117$
 $= 117\pi \text{ m}^2$
 $\sim 117(3.14) = 367.38 \text{ m}^2$

Ex. 10:



Sector Area = $\pi \cdot 3^2 \left(\frac{45}{360}\right)$

$= 1.125\pi$
 or $\frac{9}{8}\pi$
 ~ 3.53

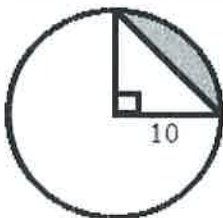
A **segment of a circle** is a region bounded by an arc and its chord.

Segment of a Circle



area of segment = area of sector - area of triangle

Ex. 11: Find the area of the shaded region.



Area of sector
 $= \pi \cdot 10^2 \left(\frac{90}{360}\right)$
 $= 25\pi \text{ units}^2$

Area of triangle
 $= \frac{bh}{2}$
 $= \frac{10(10)}{2}$
 $= 50 \text{ units}^2$

Shaded Area
 $= 25\pi - 50$
 $\approx 25(3.14) - 50$
 $\approx 28.5 \text{ units}^2$