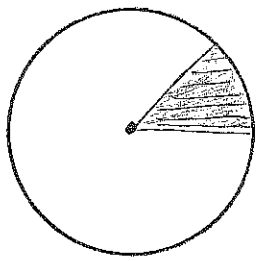
Key

7.2 CLASS NOTES **SECTOR OF A CIRCLE**



1) A sector represents a portion of the circle.

2) The arc measure represents part of circumference.

3) The area of the sector represents part of the area.

4) We can be given ϑ in terms of degrees or radians.

5) Circumference of a circle is $2\pi r$.

6) Area of a circle is πr^2.

Given: **Arc Length: s** **Area of a Sector: K**
Find formulas for the measure of the intercepted arc in terms of degrees and radians. Keep in mind that the sector will be proportional to the circle.

7) **Degrees** $s = \frac{\theta}{360} \cdot 2\pi r$

8) **Radians** $s = \frac{\theta}{2\pi} \cdot 2\pi r = r\theta$

Find Formulas for the Area of the sector in terms of degrees and radians.

9) **Degrees** $K = \frac{\theta}{360} \cdot \pi r^2$

10) **Radians** $K = \frac{\theta}{2\pi} \cdot \pi r^2 = \boxed{\frac{1}{2} r^2 \theta}$ **or** $\theta = \frac{s}{r}$ so $\frac{1}{2} r^2 \cdot \frac{s}{r} = \boxed{\frac{1}{2} rs}$

(** Note $360°$ is equivalent to 2π)

7.2 CLASS WORK EXAMPLES

Key

1) *A sector of a circle has a radius of 4 cm and a central angle of 6 radians. Find its arc length and area.*

$r = 4$
$\theta = 6$

$\theta = \frac{s}{r}$

$s = r\theta$

$\boxed{s = 24}$

$K = \frac{1}{2}rs$

$K = \frac{1}{2}(4)(24)$

$\boxed{K = 48\ cm^2}$

2) *A sector of a circle has arc length 3 cm and central ~~angle 0.5 radians~~. Find its radius and area.*

$s = 3$
$\theta = 50°$

$\frac{50°}{360°} = \frac{3}{2\pi r}$

$50 \cdot 2\pi r = 3 \cdot 360$

$(50°)$

$r = \frac{3 \cdot 360}{100\pi}$

$\boxed{r = 3.43\ cm}$

$K = \frac{\theta}{360} \cdot \pi r^2$

$K = \frac{50}{360}\pi(3.43)^2$

$\boxed{K = 5.13\ cm^2}$

3) *A sector of a circle has area 90 cm^2 and central angle 0.2 radians. Find its radius and arc length.*

$K = 90$
$\theta = .2$

$K = \frac{1}{2}r^2\theta$

$90 = \frac{1}{2}r^2(.2)$

$r^2 = 180/.2$

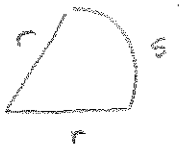
$\boxed{r = 30\ cm}$

$s = r\theta$

$s = 30(.2)$

$\boxed{s = 6\ cm}$

4) *A sector of a circle has perimeter 14 cm and area $6cm^2$. Find all possible radii.*



$2r + s = 14 \rightarrow s = 14 - 2r$

$K = 6$

$K = \frac{1}{2}rs$

$6 = \frac{1}{2}r(14 - 2r)$

$6 = 7r - r^2$

$r^2 - 7r + 6 = 0$

$(r - 6)(r - 1) = 0$

$\boxed{r = 6 \text{ or } 1\ cm}$

(Handout: Apparent Size Lab # 5)

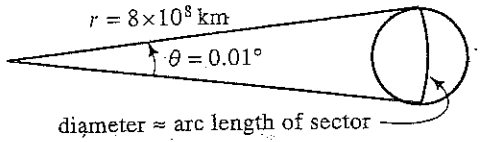
Apparent Size

Objects appear smaller when they are further away and based upon the angle with which we are looking at them.

Apparent Size: The measure of the angle when looking at the object

Example

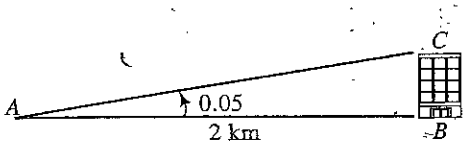
5) Jupiter has an apparent size of 0.01° when it is 8×10^8 km from Earth. Find the approximate diameter of Jupiter.



$\frac{\theta}{360} = \frac{s}{2\pi r}$ $\quad \frac{.01}{360} = \frac{s}{2\pi(8\cdot10^8)}$ $\quad \frac{360\,s}{360} = \frac{(.01\cdot2\pi\cdot8\cdot10^8)}{360}$

$s = 139626.34$ km

6) The apparent size of a tall building 2 km away is 0.05 radians. What is the building's approximate height?



$\theta = \frac{s}{r}$

$s = r\theta$

$s = 2(.05)$

$s = .1$ km