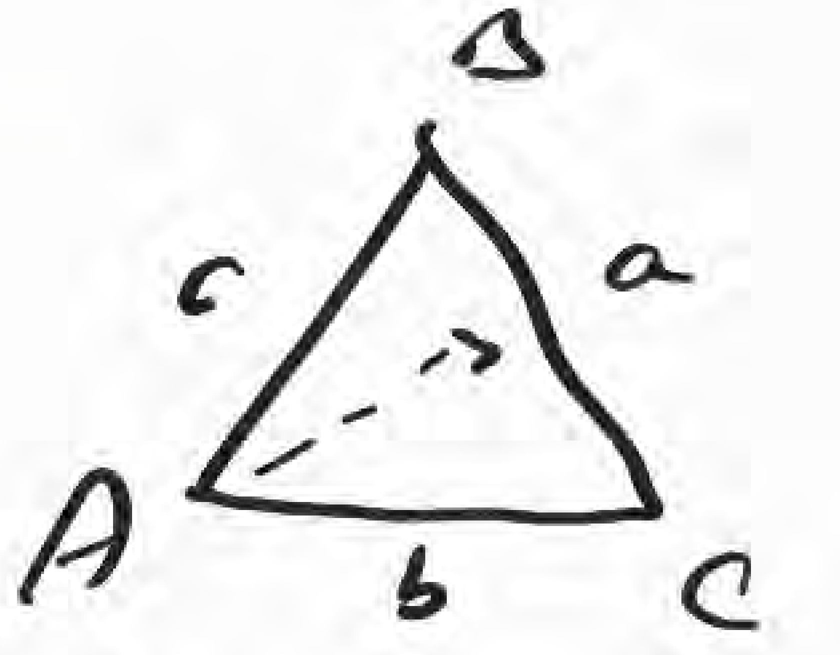
Lecture 6



triangle △ ABC  middle ↓

A, B, C angles

$\angle BAC$, $B\hat{A}C$, A angle A

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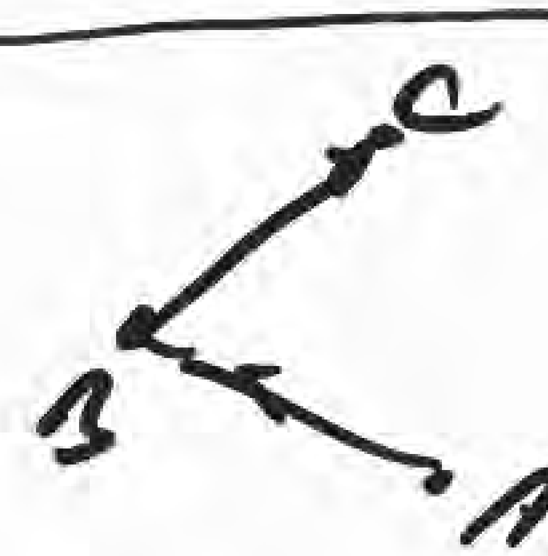
direction ABC



$$\begin{array}{rr} & 90^\circ \\ - & 20^\circ\ 10' \\ \hline \end{array} \qquad \begin{array}{rrr} & 89^\circ & 60' \\ - & 20 & 10' \\ \hline & 69^\circ & 50' \end{array}$$

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1 means 1 rad (rd)

1 deg " 1°
degree

deg/m

$360^\circ = 2\pi$ rad } Full rotation
1 rev.

$$\pi = 180^\circ$$

$$45^\circ = 45^\circ \cdot \frac{\pi}{180^\circ} = \frac{\pi}{4} \text{ rad}$$

$$249.8^\circ = \frac{2498^\circ}{10} \frac{\pi}{180^\circ}$$

$$= \frac{1249\pi}{900} \quad \frac{1249}{900}\pi$$

$$\approx 4.36 \text{ rad}$$

$$= \approx$$

$$1 \text{ rad} = 1 \cdot \frac{180^\circ}{\pi}$$

$$\approx 57.3^\circ$$

$$1^\circ \neq 1 \qquad \frac{180^\circ}{\pi}$$

$$\frac{4\pi}{3} = \frac{4(180^\circ)}{3}$$

$$= 240^\circ$$

Section 2.2

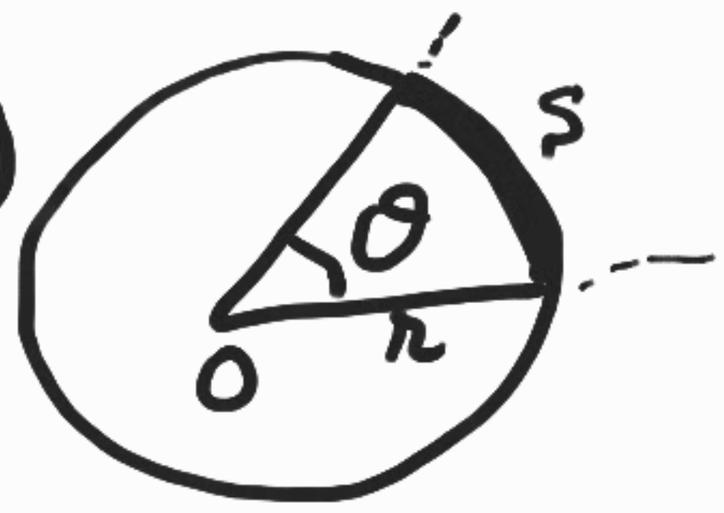
Arc length area / velocity

Defn

$S = r\theta \rightarrow$ (rad)

r: radius

θ: central angle



Ex $r = 3\text{ cm}, \quad S = 6\text{ cm}$

$S = r\theta$

$6 = 3\theta$

$\theta = 2 \text{ rad}$

$= 2\,\frac{180^\circ}{\pi} = \left(\frac{360}{\pi}\right)^\circ$

Ex $r = 18.20\text{ cm} \quad \theta = \frac{3\pi}{8}$

S?

$S = r\theta$

$= \frac{182}{10}\,\frac{3\pi}{8}$

$= \frac{273\pi}{40}\text{ cm}$

$\frac{273\pi}{40}$

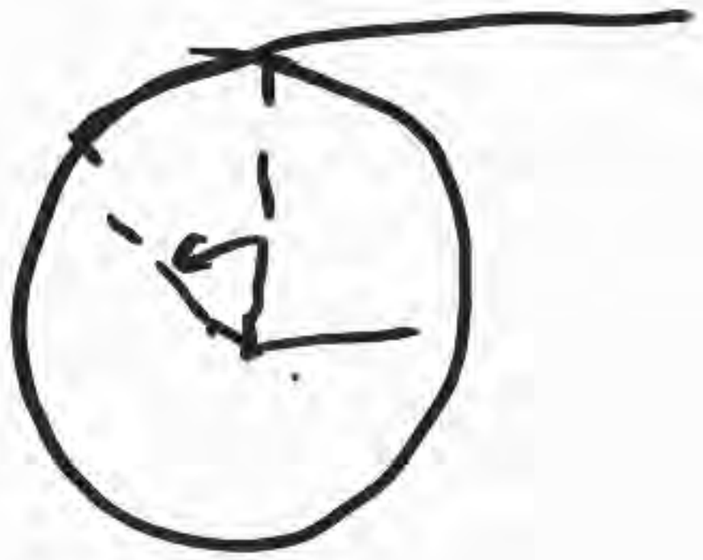
π

$\pi \approx 3.14$

$\theta = 39.72^\circ$

$= \frac{3972}{100}^\circ$

$r = .8725\ ft$



$$s = \frac{8725}{10^4} \cdot \frac{3972}{10^2}\ ft$$

$$= (8725)(3972)\ 10^{-6}\ ft$$

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ex $r = 6 \quad \theta = 60^\circ \quad s?$

$s = r\theta$

$= 6 \cdot 60^\circ \cdot \frac{\pi}{180^\circ}$

$= 2\pi$ unit

Area of a sector

$A = \frac{1}{2} r^2 \theta \rightarrow$ rad

Ex $\theta = \frac{14}{10}$, $r = \frac{21}{10}$

$$\text{Area} = \frac{1}{2}\left(\frac{21}{10}\right)^2 \frac{7}{5}$$

$$= \frac{9.7^3}{10^3}$$

$$= \frac{3,087}{10^3}\ m^2$$

9.7³

Ex $\theta = 90^0 = \frac{\pi}{2}$ $r = 30\ ft$

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

$$= \frac{1}{2}(30)^2 \frac{\pi}{2}$$

$$= \frac{900}{4}\pi$$

$$= 225\pi\ ft^2$$

$\theta = 45^0$ $r = 12$ A?

$$\text{Area} = \frac{1}{2} r^2 \theta$$

$$= \frac{1}{2}(12)^2 \frac{\pi}{4}$$

$$= 18\pi\ unit^2$$

$\frac{3}{8}$ 6
2 4

linear velocity (v) mi/hr

$$\text{speed} = |v| = \frac{\text{distance}}{\text{time}}$$

$$|v| = \frac{s}{t}$$

$$v = \frac{s}{t} \Rightarrow \boxed{\begin{aligned} s &= vt \\ r\theta &= vt \end{aligned}}$$

Ex $s = 5$ cm $t = 2$ sec

$$v = \frac{s}{t}$$

$$= \frac{5}{2} \text{ cm/sec}$$

Angular speed: ω

$$\left[\omega = \frac{\theta}{t} = \frac{vt}{r} \cdot \frac{1}{t} \qquad \theta = \frac{vt}{r}\right.$$

$$\left. = \frac{v}{r}\right]$$

$$\boxed{v = r\omega}$$

rpm : rev. per. minute.

$$\omega = 45 \text{ rpm}$$
$$= 45 \frac{1 \text{ rev}}{1 \text{ min}} \cdot \frac{2\pi \text{ rad}}{1 \text{ rev}}$$
$$= 90\pi \text{ rad/min}$$

6.2 2 on exam $\begin{cases} s = r\theta \\ A = \frac{1}{2} r^2 \theta \end{cases}$

Ex # 11

$$r_1 = 2.5 = \frac{25}{10}$$
$$r_2 = 4.8 = \frac{48}{10}$$
$$\theta_1 = 225^\circ$$

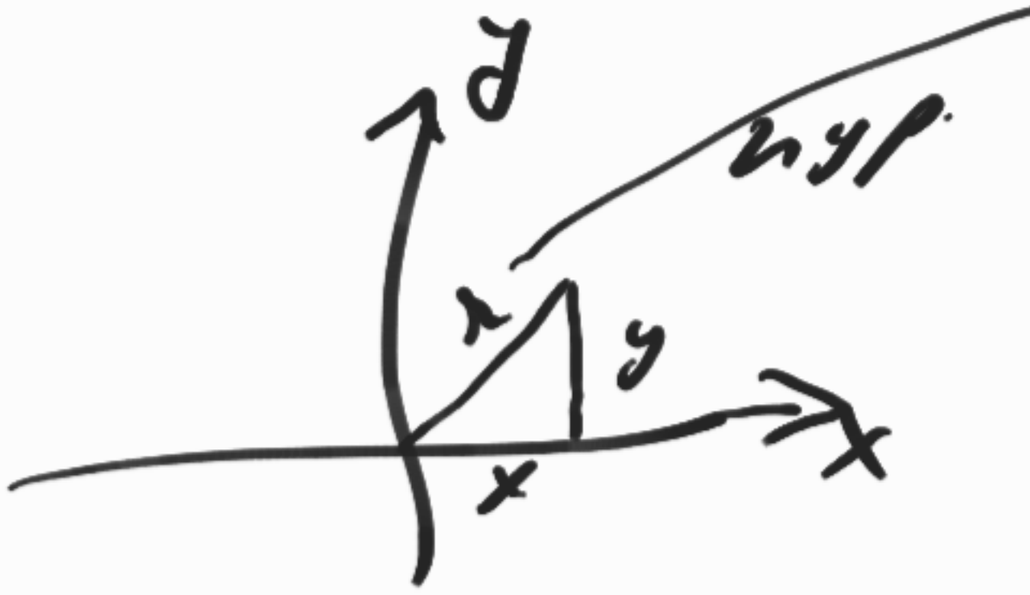
$$\frac{25}{9}$$

$$s = r_1\theta_1 = r_2\theta_2$$
$$\frac{5}{2}(225^\circ) = \frac{24}{5}\theta_2$$
$$\frac{5^4 \cdot 9}{10 \; 48}$$
$$\theta_2 = \left(\frac{3 \times 5^4}{16}\right)^\circ$$

#20 $r = 6$ in $\theta = 30° = \frac{\pi}{6}$

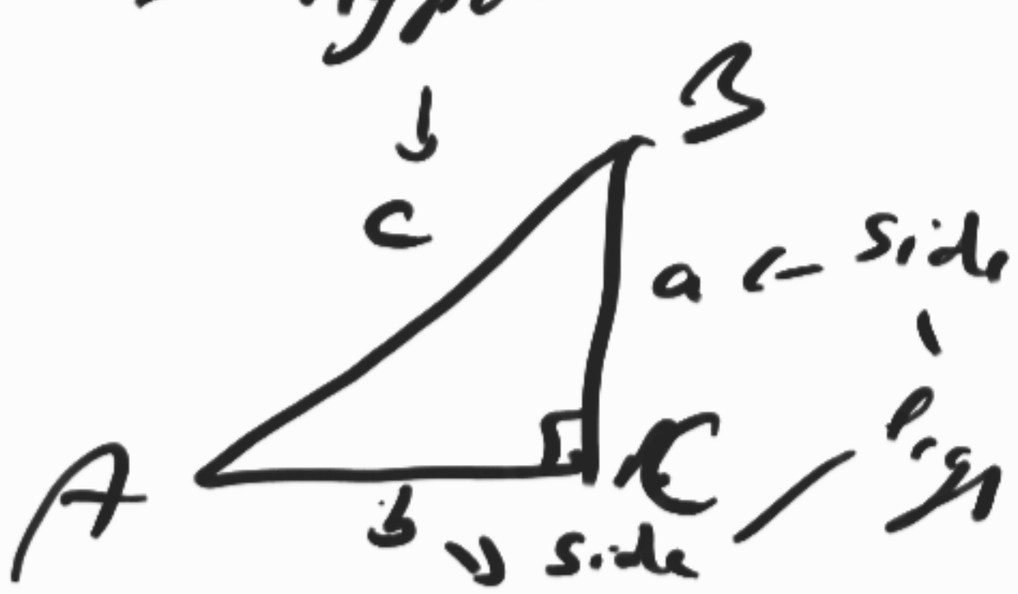
$30° \cdot \frac{\pi}{180°}$

$$s = r\theta$$
$$= 6 \cdot \frac{\pi}{6}$$
$$= \pi \text{ in}$$



$$r^2 = x^2 + y^2$$
$$r = \sqrt{x^2 + y^2}$$

hypothenuse



$$c^2 = a^2 + b^2$$
$$c = \sqrt{a^2 + b^2}$$

- 3, 4 → 5
- 5, 12 → 13
- 8, 15 → 17

7, 24 → 25

20, 21 → 29

Cosine cos (angle) =

Sine sin (angle) =

tangent tan θ =

Cotagent cot θ =

secant sec θ =

Cosecant csc θ =