Day 13

Review: pg 508 #13 in textbook

Car expenses. Car uses 6 L of gas per 100 km driven. Average cost is \$1.23 per litre of gasoline.

a) Write FN, $g(d)$, relating distance in km, d, to amount of gas in litres, g, used.

b) Write FN, $c(g)$, relating amount of gas in litres, g, to average cost in \$, c, of a litre of gas.

c) Write composite FN that shows cost of gas in terms of distance driven.
How much would it cost to drive 200 km?

d) Write composite FN that shows distance driven in terms of cost of gasoline.
How far could you go on \$40?

Sol'n: a) $g = d\,\cancel{km} \times \frac{6L}{100\cancel{km}} = 0.06d$ (in litres) $\therefore$ $\boxed{g(d) = 0.06d}$

b) $c = \frac{\$1.23}{1\cancel{\ell}} \times g\cancel{\ell} = 1.23g$ (in \$) $\therefore$ $\boxed{c(g) = 1.23g}$

c) $\underbrace{(c \circ g)(d)}_{\text{in terms of distance}} = c(g(d)) = c\left(\frac{3d}{50}\right) = 1.23\left(\frac{3d}{50}\right) = 0.0738d$ (in \$)

$\boxed{\therefore C(d) = 0.0738d}$ when $d = 200$ km, $C(200) = 0.0738(200) = \$14.76$

d) Need $d(c)$ ... so use $\frac{g(d)}{0.06} = \frac{0.06d}{0.06} \longrightarrow d(g) = 16.\bar{6}g$

and $\frac{c(g)}{1.23} = \frac{1.23g}{1.23} \longrightarrow g(c) \approx 0.813c$

$\therefore (d \circ g)(c) = (d(g(c)) = d(0.813c) = 16.\bar{6}(0.813c) \approx 13.55c$

Long way if you didn't have c)

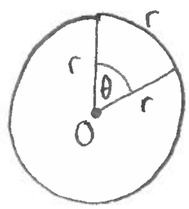
$\boxed{\therefore d(c) = 13.55c}$ when $c = \$40$, $d(40) = 13.55(40) = 542$ km

OR Simply use c) $\frac{C(d)}{0.0738} = \frac{0.0738d}{0.0738} \longrightarrow \boxed{d(c) = 13.55c}$ FAST WAY!

Test Review: ch3 p155/6: #1-5, 6ac, 7ac, 8, 10 ch9 p470/1 #1-8, 11, 12, 15 ch10 p512/3 #1-5, 9, 10

Unit 3: Trigonometry

4.1 Angular Measure & Angles



$\angle\theta$ measures one radian

$\angle\theta = 1$ rad

This is the def^n of radian

O for "origin"

Since the circumference of any circle is $2\pi r$, there are 2π sectors of length r in one revolution

$\therefore$ $\boxed{2\pi \text{ rad} = 360°}$

$\boxed{\pi \text{ rad} = 180°}$

$$1° = \frac{\pi}{180}\text{ rad} \qquad 1\text{ rad} = \frac{180°}{\pi}$$

ex. express 75° in radians (leave in terms of π)*

$$\frac{75°}{1} \times \frac{\pi}{180°} = \frac{75\pi}{180} = \frac{5\pi}{12}\text{ rad}$$

unit analysis ☺

often the angular measure is assumed to be rad unless otherwise stated

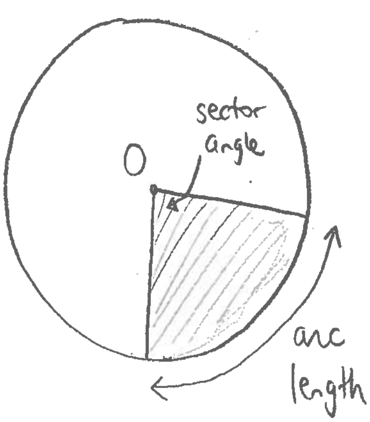
* using proportions also works:

$$\frac{x}{75°} = \frac{\pi}{180°}$$

"x is to 75° as π is to 180°"

ex express $-\frac{7\pi}{6}$ rad in degrees.

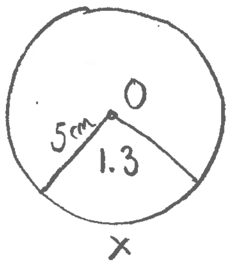
$$-\frac{7\pi}{\cancel{6}_1} \times \frac{\cancel{180°}^{30°}}{\cancel{\pi}} = -7 \cdot 30° = -210°$$



$$\frac{\text{arc length}}{\text{circumference}} = \frac{\text{sector angle}}{\text{one revolution}}$$

ex Find the indicated arc length or sector angle.

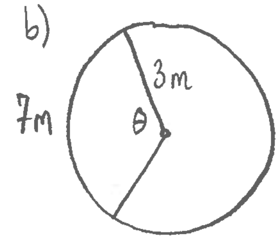
a)



$$\frac{1.3}{2\pi} = \frac{x}{2(5)\pi}$$

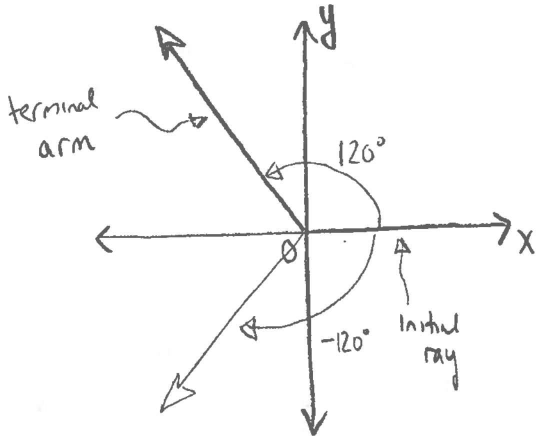
$\therefore\ x = 6.5$ cm

b)



$$\frac{7m}{2(3)\pi} = \frac{\theta}{2\pi}$$

$\therefore\ \theta = 2.\overline{3}$ rad.

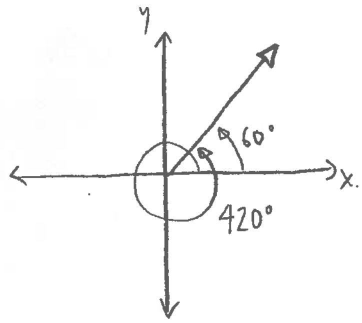


An angle is in standard position when its vertex is at the origin & its initial ray is on the positive x-axis.

Counterclockwise rotation is $\oplus$

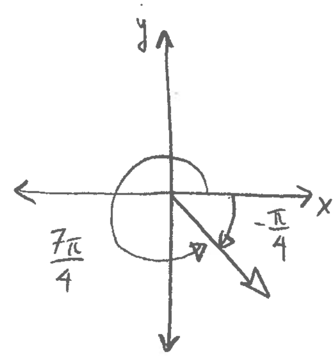
clockwise rotation is $\ominus$

- Angles w/ same terminal arm are coterminal.
- The least of the positive coterminal angles is called the principal angle



60° + 420° are coterminal.

60° is the principal angle.



$-\frac{\pi}{4}$ + $\frac{7\pi}{4}$ are coterminal.

$\frac{7\pi}{4}$ is the principal angle.

In general, if θ_p is the principal angle, then:

in radians: $\theta = \theta_p \pm 2\pi$ is a coterminal angle of θ_p

in degrees: $\theta = \theta_p \pm 360°$ is a coterminal angle of θ_p

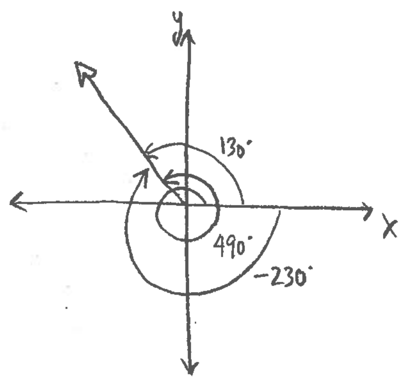
ex Find one positive & one negative coterminal angle for each

a) $130°$

b) $\frac{5\pi}{3}$

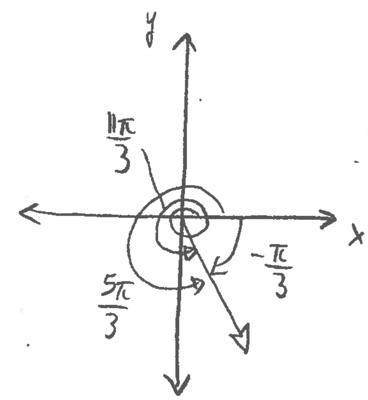
Positive: $130° + 360° = 490°$

negative: $130° - 360° = -230°$



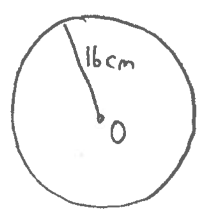
positive: $\frac{5\pi}{3} + 2\pi = \frac{5\pi}{3} + \frac{6\pi}{3} = \frac{11\pi}{3}$

negative: $\frac{5\pi}{3} - 2\pi = \frac{5\pi}{3} - \frac{6\pi}{3} = -\frac{\pi}{3}$



<u>Angular speed</u> — the rate at which the central angle is changing.

ex A pottery wheel w/ radius 16 cm makes 30 revolutions in 10s. Find the average speed of the wheel in <u>radians per second</u>.



30 turns in 10s
or 3 turns/s

we want speed as rad/s or $\frac{\text{rad}}{\text{s}}$

$$\text{speed} = \frac{\text{distance}}{\text{time}}$$
$$= \frac{30 \text{ revolutions} \times 2\pi \text{ rad}}{10\text{s}}$$
$$= \frac{60\pi}{10\text{s}}$$
$$= 6\pi \text{ rad/s}$$

HWR: p 175-179 #(1-5)a, (6-9)a,b; 11a,d, 13-15, 22