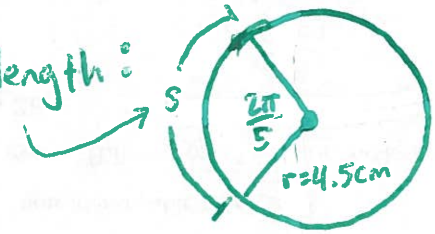
MATH 1540 FALL 2018 HW 2

§7.1

#24 Find arc length:



Soln: From $s = r\theta$ and given values $r = 4.5$ and $\theta = \frac{2\pi}{5}$, (in RADIANS) we see

$$\text{Arclength} = s = (4.5)\left(\frac{2\pi}{5}\right) = \frac{9\pi}{5}\ \text{cm}$$

#27 Convert $\frac{\pi}{9}$ rad to degrees.

Soln: $$\left(\frac{\pi}{9}\text{ rad}\right) = \left(\frac{\pi}{9}\ \cancel{\text{rad}}\right)\left(\frac{360^\circ}{2\pi\ \cancel{\text{rad}}}\right) = \left(\frac{360\cancel{\pi}}{(2\cancel{\pi})(9)}\right)^\circ = \left(\frac{180}{9}\right)^\circ = 20^\circ$$

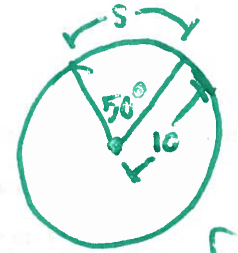
#34 Convert 100° to radians.

Soln: $$100^\circ = (100\cancel{^\circ})\left(\frac{2\pi\text{ rad}}{360\cancel{^\circ}}\right) = \frac{200\pi}{360}\text{ radians} = \frac{20\pi}{36} = \frac{10\pi}{18} = \frac{5\pi}{9}\text{ radians}$$

#43) Given: $r = 10\text{cm}$, $\theta = 50^\circ$

Goal: find arc length of an arc in such a circle

<u>Soln</u>: Draw:



We need to use formula $\boxed{s = r\theta}$,

BUT θ must be in radians, so first

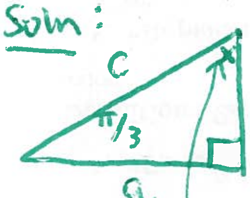
convert

$$50^\circ = (50^\circ)\left(\frac{2\pi \text{ rad}}{360^\circ}\right) = \frac{5\pi}{18} \text{ rad}$$

Now we can compute

$$\text{ArcLength} = s = (10)\left(\frac{5\pi}{18}\right) = \frac{50\pi}{18} = \frac{25\pi}{9} \text{ cm}$$

<u>§7.2</u> #7) <u>Soln</u>:



what angle here?

<u>The question</u>:

$$\cos\left(\frac{\pi}{3}\right) = \sin(\underline{\qquad})$$

<u>Find this</u>

$$\frac{\pi}{3} + \frac{\pi}{2} + x = \pi$$

$\frac{\pi}{3}$: known angle; $\frac{\pi}{2}$: 90°; x: unknown angle; π: 180°

$$\Rightarrow x = \pi - \frac{\pi}{2} - \frac{\pi}{3}$$

$$= \frac{\pi}{2} - \frac{\pi}{3}$$

$$= \frac{3\pi}{6} - \frac{2\pi}{6} = \frac{\pi}{6}$$

Thus,

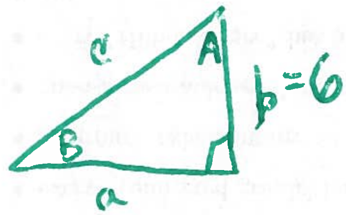
$$\cos\left(\frac{\pi}{3}\right) = \sin\left(\frac{\pi}{6}\right)$$

(both equal $\frac{a}{c}$ in my drawn triangle)

#12 Find missing sides

Given: $\tan(A) = \frac{5}{12}$, $b = 6$

<u>Soln</u>: Draw what is known:



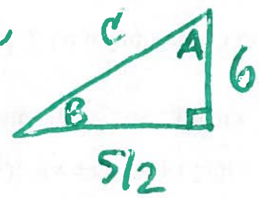
Compute

$$\underbrace{\frac{5}{12}}_{\text{given}} = \tan(A) = \underbrace{\frac{a}{6}}_{\text{from picture}}$$

This gives us

$$\frac{5}{12} = \frac{a}{6} \Rightarrow \boxed{a = \frac{5}{2}}$$

So now we know



By Pythagorean theorem,

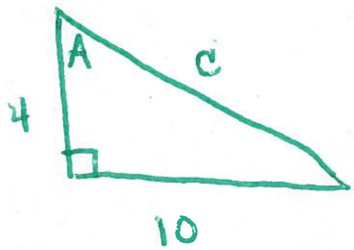
$$\left(\frac{5}{2}\right)^2 + 6^2 = c^2$$

$$\Rightarrow \frac{25}{4} + 36 = c^2$$

$$\Rightarrow \frac{25+144}{4} = c^2$$

$$\frac{169}{4} = c^2 \Rightarrow c = \sqrt{\frac{169}{4}} = \frac{13}{2}.$$

#17)



Use the given figure to compute sin(A).

Soln: First find c using the Pythagorean theorem:

$$10^2 + 4^2 = c^2$$

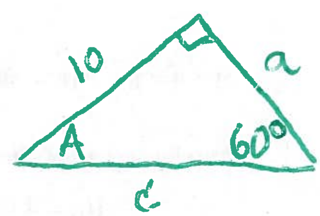
$$100 + 16 = c^2 \rightarrow 116 = c^2$$

$$\rightarrow c = \sqrt{116}$$

Now we may compute

$$\sin(A) = \frac{10}{\sqrt{116}}$$

#30) Solve for unknown sides:



Soln: Find c

$$\sin(60°) = \frac{10}{c}$$

Unit circle shows us that $\sin(60°) = \frac{\sqrt{3}}{2}$

Therefore,

$$\frac{\sqrt{3}}{2} = \frac{10}{c} \rightarrow c\,\frac{\sqrt{3}}{2} = 10$$

$$\rightarrow c = \frac{10}{\frac{\sqrt{3}}{2}} = \frac{20}{\sqrt{33}}$$ hypotenuse

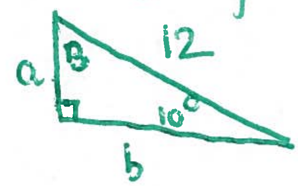
Find a

By Pythagorean theorem; $\left(\frac{20}{\sqrt{33}}\right)^2 = a^2 + 10^2$

$$\Rightarrow a^2 = 100 - \frac{400}{33} = \frac{3300 - 400}{33} = \frac{900}{33} = \frac{300}{11}$$

So, $a = \sqrt{\frac{300}{11}}$

#35 Solve + find length of each side to 4 decimal points:



Soln: Find a

$\sin(10^\circ) = \frac{a}{12} \rightarrow a = 12\sin(10^\circ)$

≈ 2.0838

Find b

$\cos(10^\circ) = \frac{b}{12} \rightarrow b = 12\cos(10^\circ)$

≈ 11.8177