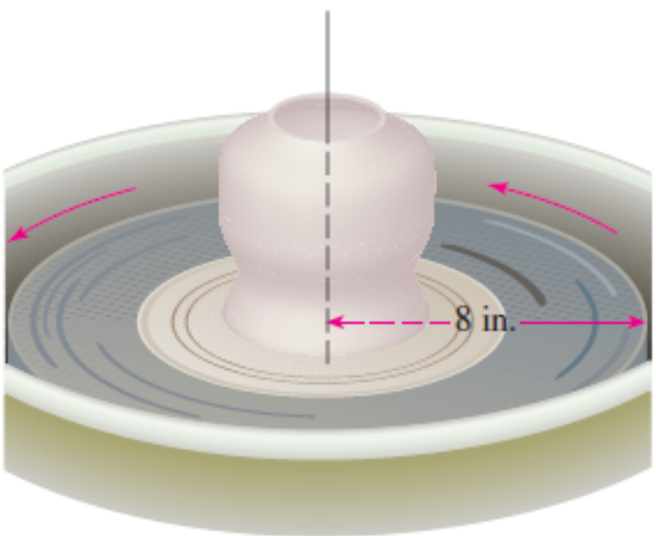
13. A potter's wheel with radius 8 in. spins at 150 rpm. Find the angular and linear speeds of a point on the rim of the wheel.



ang. sp

$$\frac{150 \text{ rev}}{1 \text{ min}}$$

$$\frac{2\pi}{1\,\cancel{\text{rev}}} \cdot \frac{150\,\cancel{\text{rev}}}{\text{min}} = 300\pi/\text{min}$$

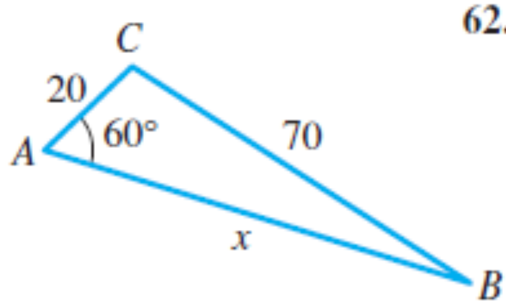
$$\frac{300\pi}{1\,\cancel{\text{min}}} \cdot \frac{1\,\cancel{\text{min}}}{60\text{ sec}} = 5\pi/\text{sec}$$

$$c = 2\pi r = 16\pi$$

$$\frac{\overset{8}{\cancel{16}}\pi\text{ in}}{1\,\cancel{\text{rev}}} \cdot \frac{\overset{5}{\cancel{150}}\,\cancel{\text{rev}}}{1\,\cancel{\text{min}}} \cdot \frac{1\,\cancel{\text{min}}}{\underset{2}{\cancel{60}}\text{ sec}}$$

$$40\pi \text{ in/sec}$$

61.



62.

Law of sines

$$\frac{70}{\sin 60^\circ} = \frac{20}{\sin B}$$

$$\sin B = \frac{20 \sin 60}{70}$$

$B = 14.3^\circ$, ~~165.7~~

$C = 105.7^\circ$

$$\frac{x}{\sin 105.7^\circ} = \frac{70}{\sin 60^\circ}$$

$x = 77.8$

L.C.

$70^2 = x^2 + 20^2 - 2 \cdot x \cdot 20 \cdot \cos 60^\circ$

$4900 = x^2 + 400 - 20x$

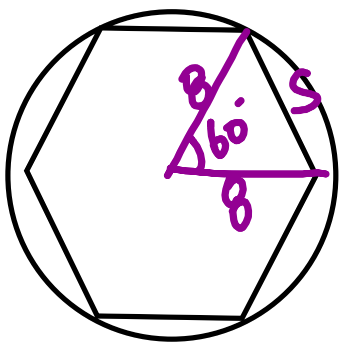
$0 = x^2 - 20x - 4500$

$$x = \frac{20 \pm \sqrt{400 + 4(4500)}}{2}$$

$= \underline{77.8}$

$c^2 = a^2 + b^2 - 2ab\cos C$

25. Find the perimeter of a regular hexagon that is inscribed in a circle of radius 8 m.

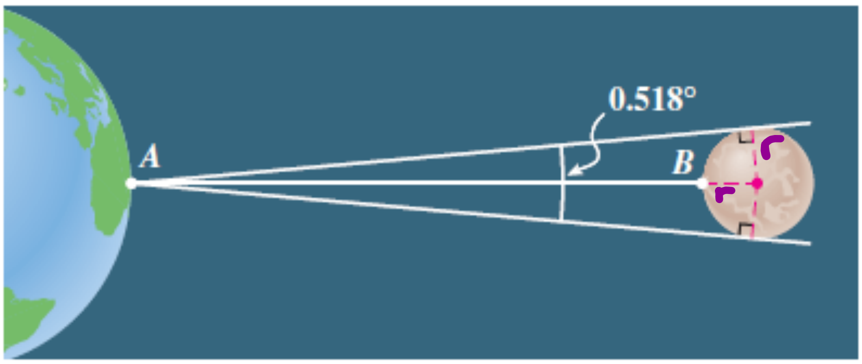


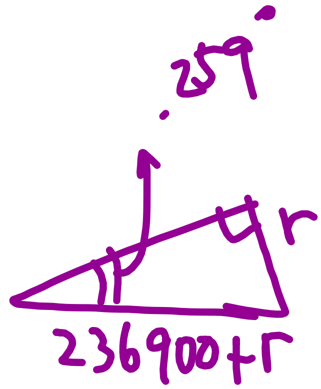
$s^2 = 8^2 + 8^2 - 2 \cdot 8 \cdot 8 \cos 60$

$s^2 = 8^2$, $s = 8$

$P = 6 \cdot 8 = 48$

27. As viewed from the earth, the angle subtended by the full moon is 0.518°. Use this information and the fact that the distance *AB* from the earth to the moon is 236,900 mi to find the radius of the moon.





$$\sin(.259^\circ) = \frac{r}{236900+r}$$

$$\sin(.259)\cdot 236900 = (1-\sin .259)r$$

$$r = \frac{\sin(259)\cdot 236900}{1-\sin(.259)}$$

7. A circular arc of length 100 ft subtends a central angle of 70°. Find the radius of the circle.

$s = \theta r$ if radian

$s = \frac{\theta}{360}(2\pi r)$ if deg.

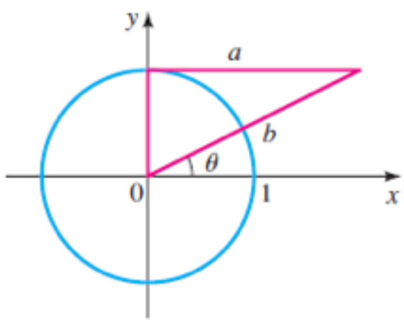
$100 = \frac{7\cancel{0}}{\cancel{360}_{18}} \cancel{2}\pi r$

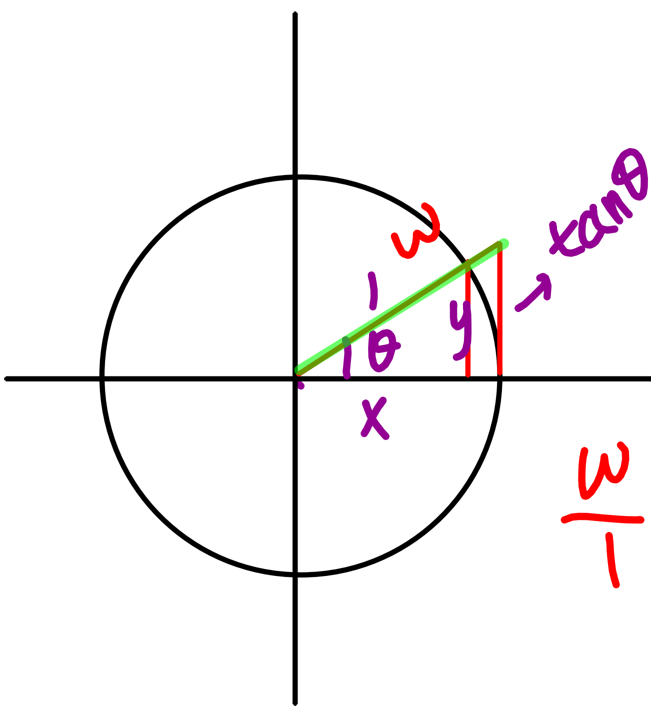
$r = \frac{1800}{7\pi}$

$$s = \theta r = \frac{\theta}{2\pi}(2\pi r)$$

$$A = \frac{\theta}{360}\pi r^2 \longrightarrow \frac{\theta}{2\pi}\pi r^2 = \frac{1}{2}\theta r^2$$

23. Express the lengths a and b in the figure in terms of the trigonometric ratios of θ.



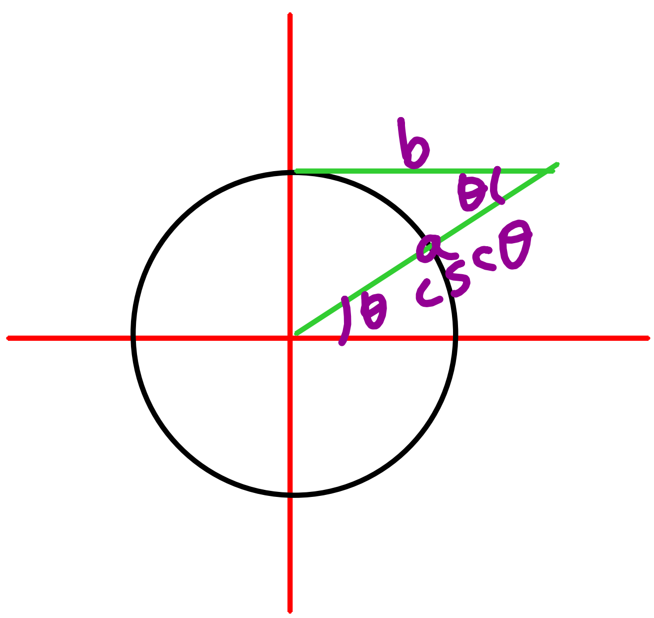


$x = \cos\theta$

$y = \sin\theta$

$\frac{w}{1} = \sec\theta$

December 3, 2019



$$\frac{a}{1} = \csc\theta$$

$$\frac{b}{1} = \cot\theta$$