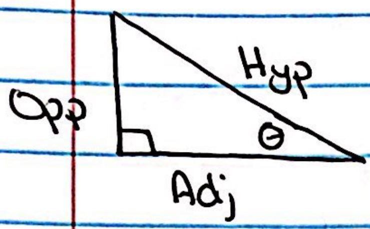
9.1 Solving Right △'s

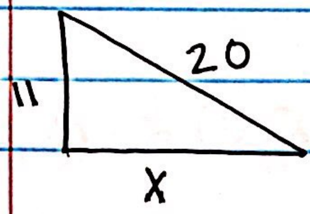


Use the 3 trig functions

$\cos\theta = \frac{adj}{hyp}$ $\sin\theta = \frac{opp}{hyp}$ $\tan\theta = \frac{opp}{adj}$

Pythagorean Theorem: $a^2+b^2=c^2$

1)

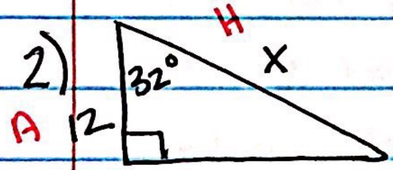


$11^2+x^2=20^2$

$x^2=279$

$x=16.7$

2)

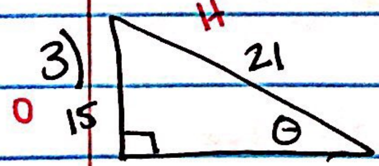


$\cos 32° = \frac{12}{x}$

$x = \frac{12}{\cos 32°}$

$x = 14.2$

3)

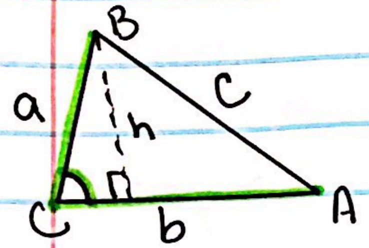


$\sin\theta = \frac{15}{21}$

$\theta = \sin^{-1}\left(\frac{15}{21}\right)$

$\theta = 45.6°$

9.2 Areas of Δ's



$A = \frac{1}{2}bh$

$\sin C = \frac{h}{a}$

$h = a\sin C$

$K = \frac{1}{2}ab\sin C$

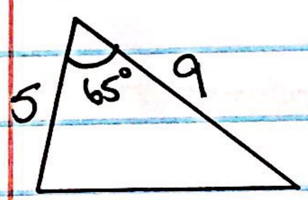
$K = \frac{1}{2}ac\sin B$

$K = \frac{1}{2}bc\sin A$

$K = \frac{1}{2}ba\sin C$

$K = \frac{1}{2}(\text{leg})(\text{leg})\sin(\text{included}\measuredangle)$

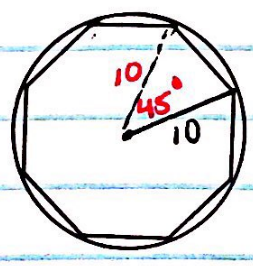
1) 2 sides of a Δ have lengths 9" and 5". the $\measuredangle$ between them is 65°. Find the area of the Δ.



$K = \frac{1}{2}(5)(9)\sin(65°)$

$= 20.4 \text{ in}^2$

2) Find the <u>exact</u> area of a regular octagon inscribed in a circle of radius 10cm.



$K = \frac{1}{2}(10)(10)\sin 45°$

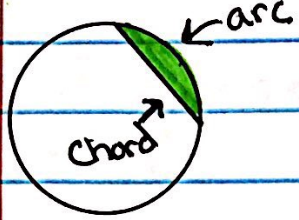
$K = 50\left(\frac{\sqrt{2}}{2}\right)$

$K = 25\sqrt{2}$

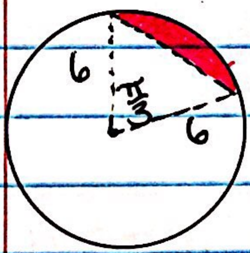
$\times \quad 8$

$200\sqrt{2} \text{ cm}^2$

Segment of a Circle - The region bounded by an arc and a chord.



1) Find the area of a segment of a circle with radius 6 in if the central angle is $\frac{\pi}{3}$.



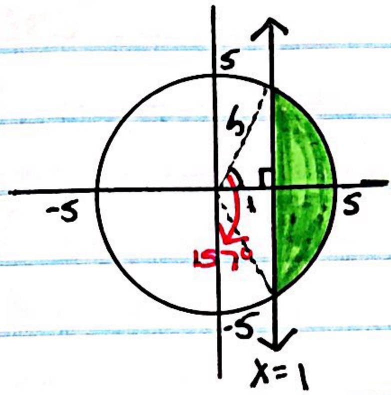
Area(Sector) - Area(Δ)

$K(\text{sector}) = \frac{1}{2} r^2 \theta$
$= \frac{1}{2}(6)^2\left(\frac{\pi}{3}\right)$
$= 6\pi$

$K(\Delta) = \frac{1}{2}(6)(6)\sin\frac{\pi}{3}$
$= 18\left(\frac{\sqrt{3}}{2}\right)$
$= 9\sqrt{3}$

$K(\text{segment of the circle}) = 6\pi - 9\sqrt{3}$ in^2

2) Ex: Graph the region satisfying both inequalities and find its area.



$x^2 + y^2 \leq 25$

$x \geq 1$

$\cos\theta = \frac{1}{5}$

$\theta = \cos^{-1}\left(\frac{1}{5}\right)$

$\theta = 78.5°$

x 2

157°

$K(\text{sector}) = \left(\frac{\theta}{360}\right)\pi r^2$

$= \left(\frac{157}{360}\right)\pi(5)^2$

$= 34.3$

$K(\Delta) = \frac{1}{2}(5)(5)\sin 157°$

$= 4.9$

$K(\text{segment}) = 34.3 - 4.9$

$= 29.4\ u^2$

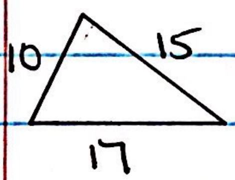
Heron's Formula

- when given 3 sides
- s: semi-perimeter

$$K=\sqrt{s(s-a)(s-b)(s-c)}$$

where $s=\frac{1}{2}(a+b+c)$

Find the area of a Δ with sides 10 m, 15m, and 17m.



$s=\frac{1}{2}(10+15+17)$

$s=21$

$$K=\sqrt{21(21-10)(21-15)(21-17)}$$

$$K=\sqrt{21(11)(6)(4)}$$

$K=74.5\,m^2$