10.1
Notes

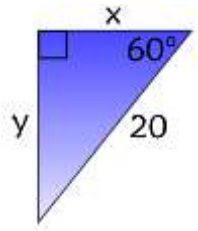
(PART 1) RIGHT TRIANGLE APPLICATIONS

OBJECTIVES: 1) Solve a right triangle using trig (in the context of a word problem).
2) Find the area of a triangle and other regular shapes.

SOLVE A RIGHT TRIANGLE

Solve the right triangle. (Find the missing side lengths or angles.)

1)



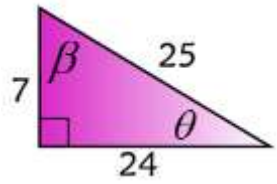
$\sin 60° = \frac{y}{20}$ $\cos 60° = \frac{x}{20}$

$20\sin 60° = y$ $20\cos 60° = x$

$20\frac{\sqrt{3}}{2} = y$ $20 \cdot \frac{1}{2} = x$

$10\sqrt{3} = y$ $10 = x$

2)



$\sin\theta = \frac{7}{25}$ or $\cos\theta = \frac{24}{25}$ or $\tan\theta = \frac{7}{24}$

Any trig function is fine!

$\theta = \tan^{-1}\left(\frac{7}{24}\right)$

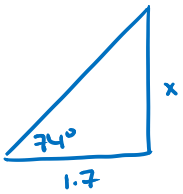
$\beta = 90° - \tan^{-1}\left(\frac{7}{24}\right)$

(OR)

$\beta = \tan^{-1}\left(\frac{24}{7}\right)$

RIGHT TRIANGLE APPLICATIONS

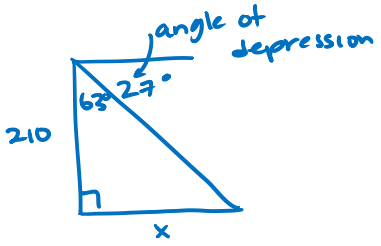
3) A ladder leaning against a wall. The base of the ladder is 1.7 meters from the base of the building and the ladder makes an angle of 74° with the ground. How far from the ground is the top of the ladder?



$\tan 74° = \frac{x}{1.7}$

$1.7\tan 74° = x$

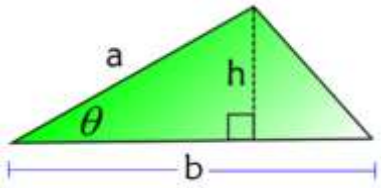
4) From the top of a lighthouse 210 feet high, the angle of depression of a boat is 27°. Find the distance from the boat to the foot of the lighthouse. Assume that the lighthouse was built at sea level.



$\tan 63° = \frac{x}{210}$

$210\tan 63° = x$

FORMULA FOR THE AREA OF A TRIANGLE



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

$A = \frac{1}{2}b \cdot a\sin\theta$

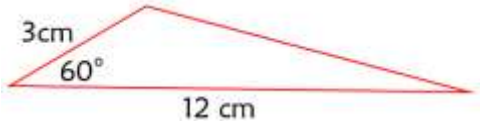
$\sin\theta = \frac{h}{a}$

$a\sin\theta = h$

If a and b are lengths of two sides of a triangle and θ is the angle included between those sides, then the area of the triangle is given by:

$$A = \frac{1}{2}ab\sin\theta$$

5) Find the area of the triangle:



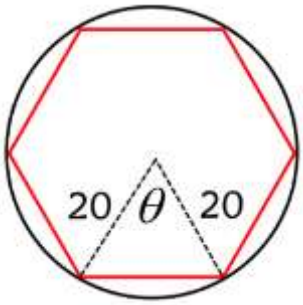
$A = \frac{1}{2}(3)(12)\sin 60°$

$A = 18\sin 60°$

$= 18\frac{\sqrt{3}}{2}$

$= \boxed{9\sqrt{3}\ cm^2}$

6) Find the area of the regular hexagon.



$\theta = 60° \Rightarrow \frac{360°}{6} = 60°$

$A_\Delta = \frac{1}{2}(20)(20)\sin 60°$

$= \frac{1}{2}(400)\frac{\sqrt{3}}{2}$

$= 200\frac{\sqrt{3}}{2}$

$= \boxed{100\sqrt{3}}\ u^2$