Today's Learning Goal(s):

Date: _____

By the end of the class, I will be able to:

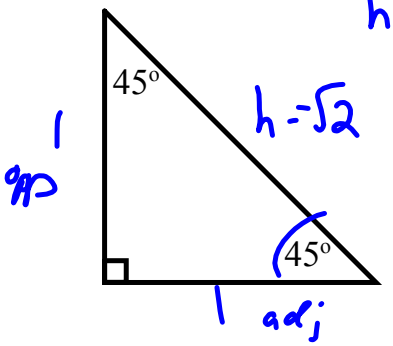
a) determine the trig ratios for 30^0, 60^0 and 90^0 using the special triangles.

Last day's work: pp. 280-282 #1 – 12, 14 [18, 20]

9a
11
8b

5.2 Evaluating Trigonometric Ratios of Special Angles

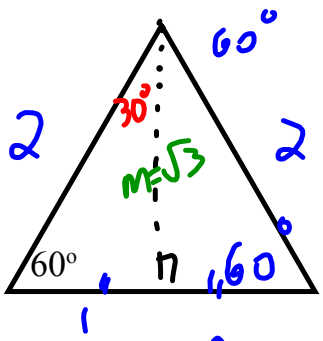
Date: NOV. 12/15



$h^2 = 1^2 + 1^2$

$= 2$

$h = \sqrt{2}$



$m^2 = 2^2 - 1^2$

$= 4 - 1$

$= 3$

$m = \sqrt{3}$

2^1

$\sin 45° = \frac{1}{\sqrt{2}} = \frac{\sqrt{2}}{2}$

$\cos 45° = \frac{1}{\sqrt{2}} = \frac{\sqrt{2}}{2}$

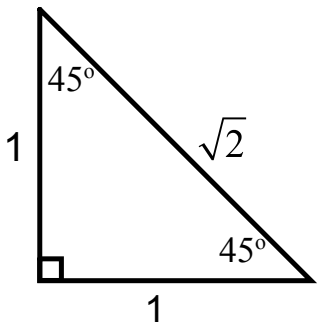
$\tan 45° = 1$

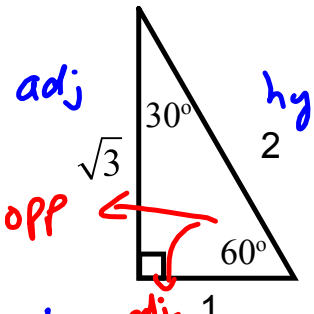
$\csc 45° = \sqrt{2}$

$\sec 45° = \sqrt{2}$

$\cot 45° = 1$

These triangles need to be memorized and are used to calculate the exact values for angles 30°, 60°, 45° and their multiples.





$\sin 30° = \frac{1}{2}$

$\cos 30° = \frac{\sqrt{3}}{2}$

$\tan 30° = \frac{1}{\sqrt{3}} = \frac{\sqrt{3}}{3}$

$\csc 30° = 2$

$\sec 30° = \frac{2}{\sqrt{3}} = \frac{2\sqrt{3}}{3}$

$\cot 30° = \sqrt{3}$

$\sin 60° = \frac{\sqrt{3}}{2}$

$\cos 60° = \frac{1}{2}$

$\tan 60° = \sqrt{3}$

$\csc 60° = \frac{2}{\sqrt{3}} = \frac{2\sqrt{3}}{3}$

$\sec 60° = 2$

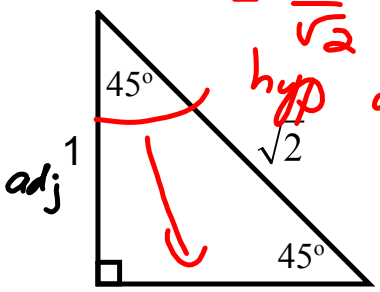
$\cot 60° = \frac{1}{\sqrt{3}} = \frac{\sqrt{3}}{3}$

Ex.1 Draw the special triangles for the following and determine the **exact** value.

Have students draw triangles from memory.

a) $\sin 45°$ $= \frac{1}{\sqrt{2}}$

list all 6 for each

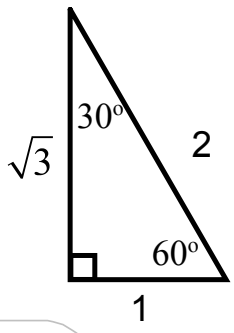


hyp or $\frac{\sqrt{2}}{2}$

adj

opp

b) $\sec 30° = \frac{2}{\sqrt{3}}$



$\cos 45° = \frac{1}{\sqrt{2}}$

$\tan 45° = 1$

$\csc 45° = \sqrt{2}$

$\sec 45° = \sqrt{2}$

$\cot 45° = 1$

$\sin 30° = \frac{1}{2}$

$\cos 30° = \frac{\sqrt{3}}{2}$

$\tan 30° = \frac{1}{\sqrt{3}}$

$\csc 30° = 2$

$\sec 30° = \frac{2}{\sqrt{3}} = \frac{2\sqrt{3}}{3}$

$\cot 30° = \sqrt{3}$

Ex.2 Determine the exact values of:

Have students draw triangles from memory?

a) $\sin^2(60^\circ)+\cos^2(60^\circ)$

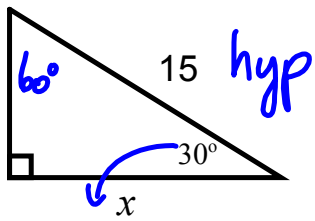
$= (\sin 60^\circ)^2 + (\cos 60^\circ)^2$

$= \left(\frac{\sqrt{3}}{2}\right)^2 + \left(\frac{1}{2}\right)^2$

$= \frac{3}{4} + \frac{1}{4}$

$= 1$

b)



$\sin 30^\circ = \frac{1}{2}$

$\cos 30^\circ = \frac{\sqrt{3}}{2}$

$\cos 30^\circ = \frac{x}{15}$

$\frac{15}{30}\left(\frac{\sqrt{3}}{2}\right) = \frac{30}{30}\left(\frac{x}{15}\right)$

$\frac{15\sqrt{3}}{2} = \frac{2x}{2}$

$\frac{15\sqrt{3}}{2} = x$

$\frac{\sqrt{3}}{2} = \frac{2x}{15}$

$\frac{2x}{2} = \frac{15\sqrt{3}}{2}$

$x = \frac{15\sqrt{3}}{2}$

$\frac{\sqrt{3}}{2} = \frac{x}{15}$

$x = \frac{15\sqrt{3}}{2}$

Ex.3 Use the appropriate special triangle to determine the value of θ, if $0 \leq \theta \leq 90^{o}$. **Have students draw triangles from memory?**

a) $\tan\theta = \frac{1}{\sqrt{3}}$ b) $\cos\theta = \frac{1}{2}$ c) $\cos\theta = \frac{\sqrt{2}}{2}$

$\theta = 30^{\circ}$ $\theta = 60^{\circ}$ $\theta = 45^{\circ}$

30^{o} 60^{o} 45^{o}

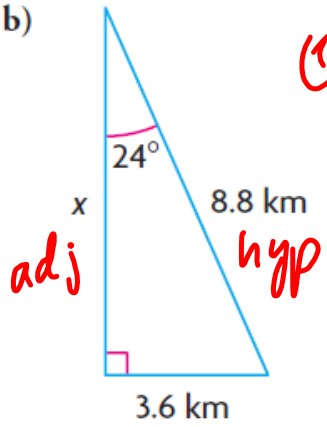
Are there any Homework Questions you would like to see on the board?

Last day's work: pp. 280-282 #1 – 12, 14 [18, 20]

Today's Homework Practice includes:

pp. 286-287 # 1 – 9 [13 – 15]

b)



1 dec.

adj hyp opp

① $x^2 = 8.8^2 - 3.6^2$

$x \doteq 8.02$

$\doteq 8.0$ km

② $\tan 24^\circ = \frac{3.6}{x}$

$x = \frac{3.6}{\tan 24^\circ}$

$\doteq 8.08$

$\doteq 8.1$ km

③ $\cos 24^\circ = \frac{x}{8.8}$

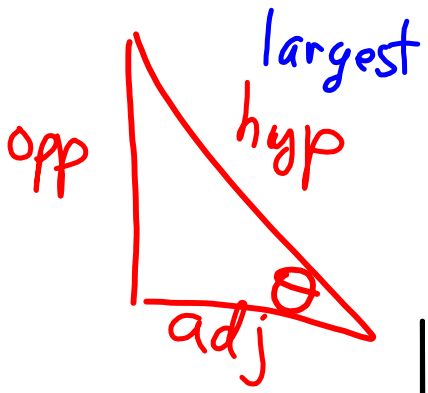
$x = 8.8 \cos 24^\circ$

$\doteq 8.03$

$\doteq 8.0$ km

9. Given any right triangle with an acute angle θ,

a) explain why csc θ is always greater than or equal to 1



$\csc\theta = \frac{hyp}{opp}$

$= \frac{largest}{smaller}$

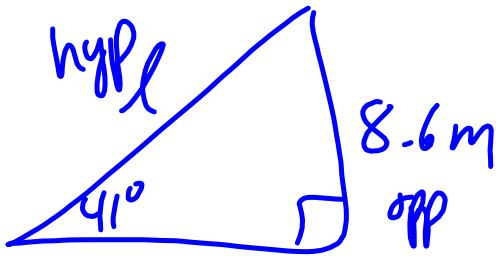
> 1

11. A kite is flying 8.6 m above the ground at an angle of elevation of 41°.

A Calculate the length of string, to the nearest tenth of a metre, needed to fly the kite using

a) a primary trigonometric ratio

b) a reciprocal trigonometric ratio



a) SOH

$\sin 41^\circ = \frac{8.6}{\ell}$

$\ell \sin 41^\circ = 8.6$

$\ell = \frac{8.6}{\sin 41^\circ}$

$= 8.6 \times \frac{1}{\sin 41^\circ}$

b)

$\csc 41^\circ = \frac{\ell}{8.6}$

$\ell = 8.6 \csc 41^\circ$

$= 8.6 \times \left(\frac{1}{\sin 41^\circ}\right)$

or $8.6 \times (\sin 41^\circ)^{-1}$

$\doteq 13.108$

$\doteq 13.1$ m