p. 274 # 1 – 8

pp. 280-282 #1 – 12, 14 [18, 20]

1, 3a, 14

Today's Learning Goal(s):

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

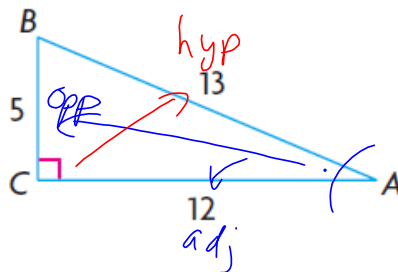a) determine the trig ratios for 30^0, 60^0 and 90^0 using the special triangles.

p. 280   **1.** Given $\triangle ABC$, state the six trigonometric ratios for $\angle A$.

$$\sin A = \frac{opp}{hyp}$$

$$= \frac{5}{13}$$

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

$$= \frac{13}{5}$$

$$\cos A = \frac{adj}{hyp}$$

$$= \frac{12}{13}$$

$$\sec A = \frac{hyp}{adj}$$

$$= \frac{13}{12}$$

$$\tan A = \frac{opp}{adj}$$

$$= \frac{5}{12}$$

$$\cot A = \frac{adj}{opp}$$

$$= \frac{12}{5}$$

3. For each primary trigonometric ratio, determine the corresponding reciprocal ratio.

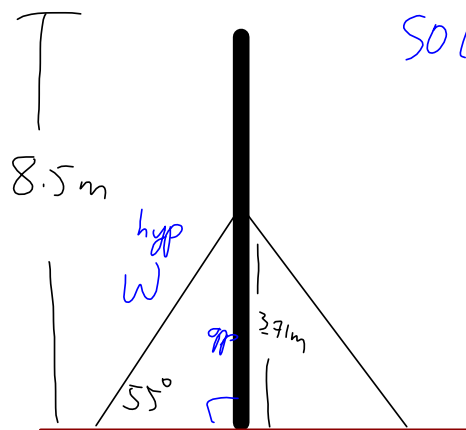a) $\sin \theta = \dfrac{1}{2}$

c) $\tan \theta = \dfrac{3}{2}$

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

$$\csc \theta = 2$$

$$\frac{3}{4} = \frac{x}{8}$$

$$\frac{y}{3} = \frac{8}{x}$$

p. 282   **14.** The two guy wires supporting an 8.5 m TV antenna each form an angle
of 55° with the ground. The wires are attached to the antenna 3.71 m above
ground. Using a reciprocal trigonometric ratio, calculate the length of each
wire to the nearest tenth of a metre. What assumption did you make?
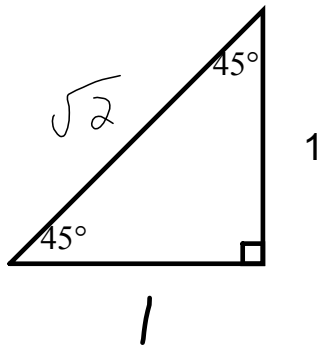
$$SOH$$

$$\sin 55° = \frac{3.71}{w}$$

$$\csc 55° = \frac{w}{3.71}$$

$$w = 3.71 \csc 55°$$

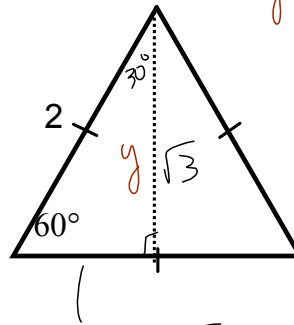$$= 3.71 \left(\frac{1}{\sin 55°} \right)$$

$$\doteq 4.52$$

$$\doteq 4.5 \, m$$

each wire is 4.5 m in length

*Assumption: the TV antenna is perpendicular to the ground, and the ground is level.
thereby creating a right angle.*

5.2　Evaluating Trigonometric Ratios of Special Angles

Date: $Nov-8/19$

$$y^2 = 2^2 - 1^2$$
$$= 4 - 1$$
$$= 3$$
$$\therefore y = \sqrt{3}$$

$45°$ triangle with sides $\sqrt{2}$, 1, 1 and angles $45°$, $45°$.

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

Triangle with sides 2, 2, base 1 and 1, angles $30°$, $60°$, height $y = \sqrt{3}$.

$$\sin 60° = \frac{\sqrt{3}}{2}$$

$$\sin 30° = \frac{1}{2}$$

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

Triangle with sides $\sqrt{2}$, 1, 1 and angles $45°$, $45°$.

Triangle with sides $\sqrt{3}$, 2, 1 and angles $30°$, $60°$.

$\sin 45° = \dfrac{1}{\sqrt{2}}$ or $\dfrac{\sqrt{2}}{2}$　$\csc 45° = \sqrt{2}$

$\cos 45° = \dfrac{\sqrt{2}}{2}$　$\sec 45° = \sqrt{2}$

$\tan 45° = 1$　$\cot 45° = 1$
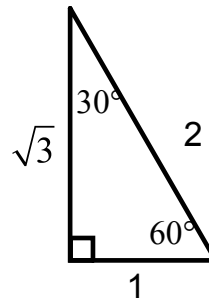
$\sin 30° = \dfrac{1}{2}$　$\csc 30° = 2$

$\cos 30° = \dfrac{\sqrt{3}}{2}$　$\sec 30° = \dfrac{2}{\sqrt{3}}$ or $\dfrac{2\sqrt{3}}{3}$

$\tan 30° = \dfrac{1}{\sqrt{3}}$ or $\dfrac{\sqrt{3}}{3}$　$\cot 30° = \sqrt{3}$

$\sin 60° = \dfrac{\sqrt{3}}{2}$　$\csc 60° = \dfrac{2}{\sqrt{3}}$ or $\dfrac{2\sqrt{3}}{3}$

$\cos 60° = \dfrac{1}{2}$　$\sec 60° = 2$

$\tan 60° = \sqrt{3}$　$\cot 60° = \dfrac{1}{\sqrt{3}}$ or $\dfrac{\sqrt{3}}{3}$

$$\frac{1}{\sqrt{2}} \times \frac{\sqrt{2}}{\sqrt{2}}$$

$$= \frac{\sqrt{2}}{\sqrt{4}}$$

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

$$\frac{1}{\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}}$$

$$= \frac{1\sqrt{3}}{\sqrt{9}}$$

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

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

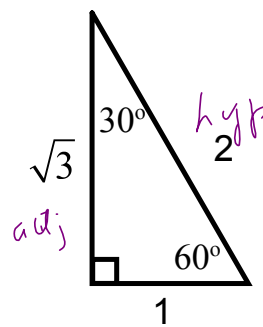**Have students draw triangles from memory.**

a) $\sin 45°$

list all 6 for each

b) $\sec 30° = \dfrac{1}{\cos 30°}$

$\sin 45° = \dfrac{1}{\sqrt{2}}$

$\sec \theta = \dfrac{h}{a}$

$\sec 30° = \dfrac{2}{\sqrt{3}}$

hyp $\sqrt{2}$, 45°, 45°, 1, 1, opp, adj

30°, hyp, 2, $\sqrt{3}$, adj, 60°, 1
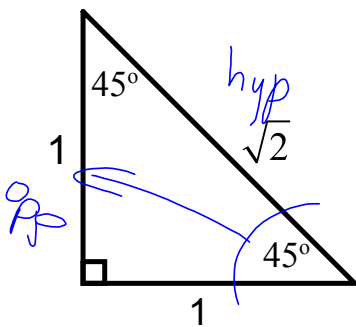
$\sin 45° = \dfrac{1}{\sqrt{2}}$ or $\dfrac{\sqrt{2}}{2}$ $\csc 45° = \sqrt{2}$

$\cos 45° = \dfrac{\sqrt{2}}{2}$ $\sec 45° = \sqrt{2}$

$\tan 45° = 1$ $\cot 45° = 1$

$\sin 30° = \dfrac{1}{2}$ $\csc 30° = 2$

$\cos 30° = \dfrac{\sqrt{3}}{2}$ $\sec 30° = \dfrac{2}{\sqrt{3}}$ or $\dfrac{2\sqrt{3}}{3}$

$\tan 30° = \dfrac{1}{\sqrt{3}}$ or $\dfrac{\sqrt{3}}{3}$ $\cot 30° = \sqrt{3}$

Ex.2　Determine the exact values of:

Have students draw triangles from memory?

a)　$\sin^2\left(60°\right)+\cos^2\left(60°\right)$

$= \left(\sin 60°\right)^2 + \left(\cos 60°\right)^2$

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

$= \dfrac{(\sqrt{3})^2}{2^2} + \dfrac{1^2}{2^2}$

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

$= 1$

1

b)

hyp
15
30°
x adj
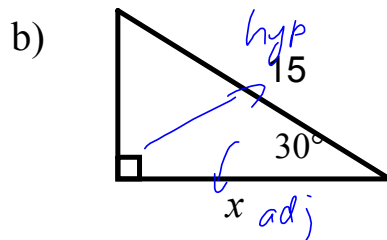
$\cos 30° = \dfrac{x}{15}$

$x = 15\cos 30°$

$= 15\left(\dfrac{\sqrt{3}}{2}\right)$

$= \dfrac{15\sqrt{3}}{2}$

$\dfrac{15\sqrt{3}}{2}$

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

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

$\theta = 30°$ $\theta = 60°$ $\theta = 45°$

30°   60°   45°

θ	30°	45°	60°
sin θ	$\dfrac{1}{2}$	$\dfrac{1}{\sqrt{2}}$ or $\dfrac{\sqrt{2}}{2}$	$\dfrac{\sqrt{3}}{2}$
cos θ	$\dfrac{\sqrt{3}}{2}$	$\dfrac{1}{\sqrt{2}}$ or $\dfrac{\sqrt{2}}{2}$	$\dfrac{1}{2}$
tan θ	$\dfrac{1}{\sqrt{3}}$	1	$\sqrt{3}$

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]

Ex.2   Determine the exact values of:

c) $(\cos 30)(\cos 60) + (\sin 45)(\tan 45)$

$\sin\theta$

90
60
45
30
0

👉 over 2
👉 square root sign
👉 fingers away from 0

$\sin\theta$		
0	$\dfrac{\sqrt{0}}{2}$	0
30	$\dfrac{\sqrt{1}}{2}$	$\dfrac{1}{2}$
45	$\dfrac{\sqrt{2}}{2}$	
60	$\dfrac{\sqrt{3}}{2}$	
90	$\dfrac{\sqrt{4}}{2}$	1