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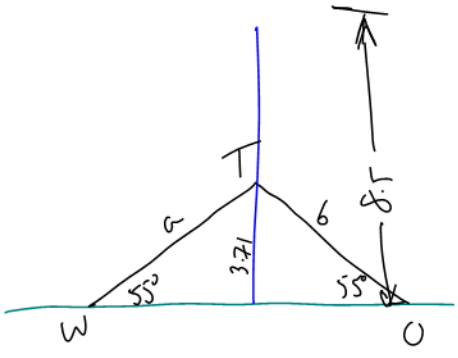
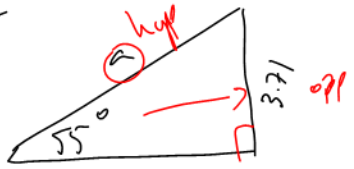
14. The two guy wires supporting an 8.5 m TV antenna each form an angle of 55° with the ground. The wires are attached to the antenna 3.71 m above ground. Using a ~~reciprocal~~ trigonometric ratio, calculate the length of each wire to the nearest tenth of a metre. What assumption did you make?



$a = b$ $\triangle WTO$ is isosceles

Consider



$\sin(55) = \frac{3.71}{a}$

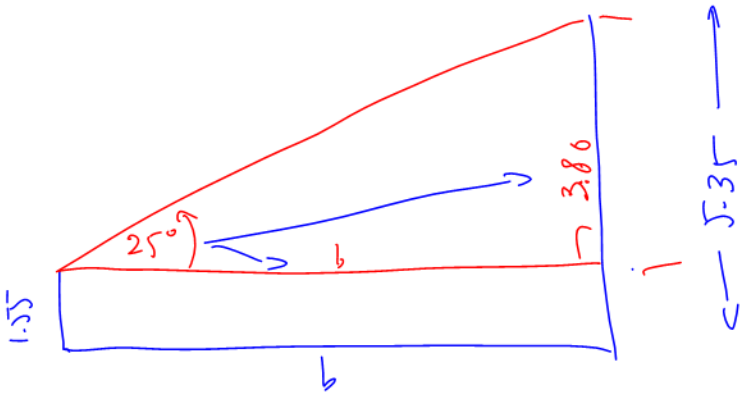
$\rightarrow a = \frac{3.71}{\sin(55)} = 4.53$ m.

∴ The wires are 4.53 m in length.

15. From a position some distance away from the base of a flagpole, Julie estimates that the pole is 5.35 m tall at an angle of elevation of 25°. If Julie is 1.55 m tall, use a ~~reciprocal~~ trigonometric ratio to calculate how far she is from the base of the flagpole, to the nearest hundredth of a metre.

$\tan(25) = \frac{3.80}{b}$

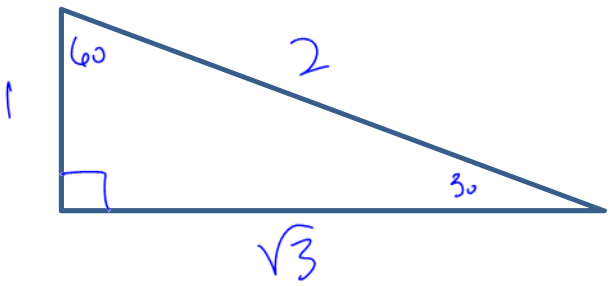
$\Rightarrow b = \frac{3.80}{\tan(25)} = 8.14$ m

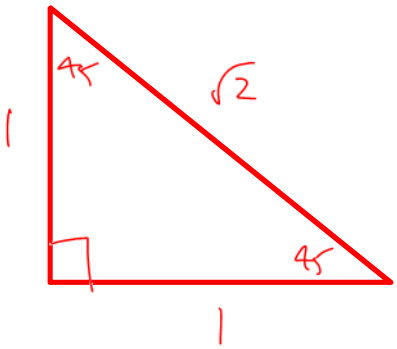


Chapter 5 – Trigonometric Ratios

5.2 – Trigonometric Ratios and Special Triangles

There are two "**Special Triangles**"





MEMORIZE THESE!

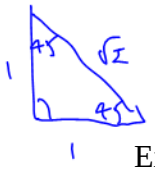
rationalizing the denominator

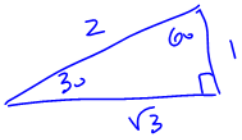
The Primary Trigonometric Ratios of the Special Angles

$\sin(30^\circ) = \frac{1}{2}$ $\quad \sin(60^\circ) = \frac{\sqrt{3}}{2}$ $\quad \sin(45^\circ) = \frac{1}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{\sqrt{2}}{2}$

$\cos(30^\circ) = \frac{\sqrt{3}}{2}$ $\quad \cos(60^\circ) = \frac{1}{2}$ $\quad \cos(45^\circ) = \frac{1}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{\sqrt{2}}{2}$

$\tan(30^\circ) = \frac{1}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{\sqrt{3}}{3}$ $\quad \tan(60^\circ) = \frac{\sqrt{3}}{1} = \sqrt{3}$ $\quad \tan(45^\circ) = \frac{1}{1} = 1$





Example 5.2.1

Evaluate exactly → use special Δ's, no calculator

a) $\sin(45)\cdot\cos(60)$

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

$= \frac{1}{2\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{\sqrt{2}}{4}$

b) $\cos^2(30)+\sin^2(30)$

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

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

c) $\tan(60)\cdot\cos(60)-\sin(60)$

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

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

$= 0$

d) $\tan(30)\cdot\frac{\sin(60)}{\cos(45)}$

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

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

$= \left(\frac{1}{\sqrt{3}}\right)\left(\frac{\sqrt{6}}{2}\right) = \frac{\sqrt{2}}{2}$

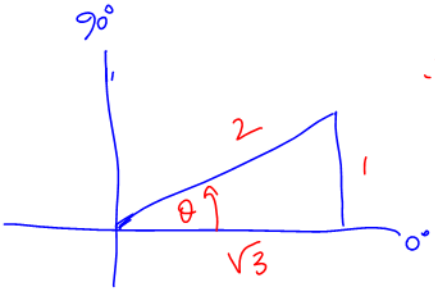
Example 5.2.2

Determine the angle θ (where $0 \le \theta \le 90^\circ$) given:

a) $\sec(\theta) = \frac{2}{\sqrt{3}}$

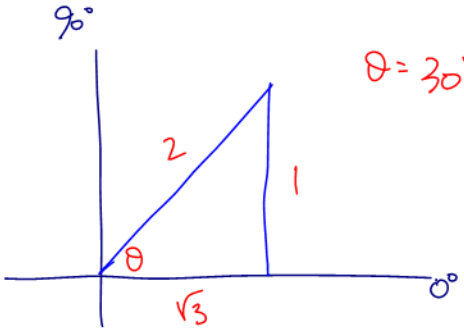
$\Rightarrow \cos(\theta) = \frac{\sqrt{3}}{2}$

$\therefore \theta = 30^\circ$



b) $\tan(\theta) = \frac{\sqrt{3}}{3} = \frac{1}{\sqrt{3}}$

$\theta = 30^\circ$



Algorithm

① Use a primary trig ratio

② Draw a picture!

Class/Homework

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