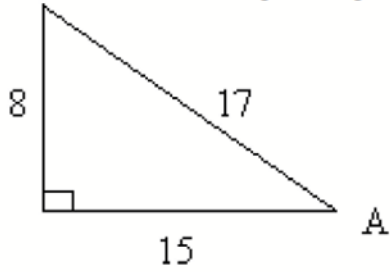
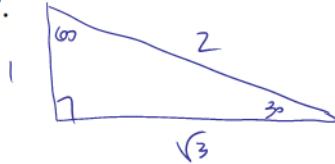


13. Given the following triangle, state the six trigonometric ratios for $\angle A$.



$$\begin{aligned} \sin A &= \frac{8}{17} & \csc A &= \frac{17}{8} \\ \cos A &= \frac{15}{17} & \sec A &= \frac{17}{15} \\ \tan A &= \frac{8}{15} & \cot A &= \frac{15}{8} \end{aligned}$$

14. Determine the exact value of $2 \sin^2 60^\circ \times \tan 30^\circ$.

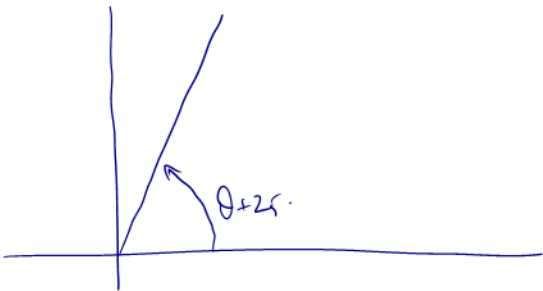


$$\begin{aligned} &2 \sin^2(60) \times \tan(30) \\ &= 2 \left(\frac{\sqrt{3}}{2}\right)^2 \left(\frac{1}{\sqrt{3}}\right) \\ &= 2 \left(\frac{3}{4}\right) \left(\frac{1}{\sqrt{3}}\right) = \frac{6}{4\sqrt{3}} = \frac{3}{2\sqrt{3}} \end{aligned}$$

acceptable to me \downarrow
 rationalizing the denominator \swarrow required by some people

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

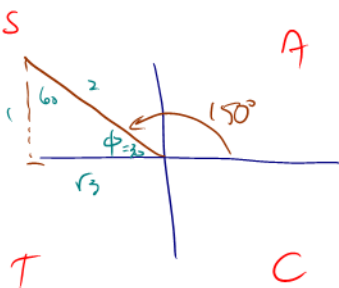
15. Given $\cos(\theta + 25^\circ) = 0.2237$, solve for θ to the nearest degree. Assume θ is in quadrant 1.



$$\begin{aligned} \cos(\theta + 25^\circ) &= 0.2237 \\ \Rightarrow \theta + 25^\circ &= \cos^{-1}(0.2237) \\ &= 77^\circ \\ \Rightarrow \theta &= 77 - 25 = 52^\circ \end{aligned}$$

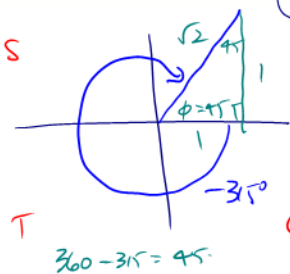
16. For each question, draw the angle of rotation and determine the EXACT trig ratio:

a) $\sin(150^\circ)$



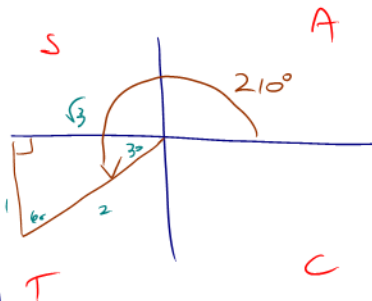
$$\sin(150^\circ) = +\frac{1}{2}$$

b) $\tan(-315^\circ)$



$$\tan(-315^\circ) = +1$$

c) $\sec(210^\circ)$



$$\sec(210) = -\frac{2}{\sqrt{3}} \left(= -\frac{2\sqrt{3}}{3} \right)$$

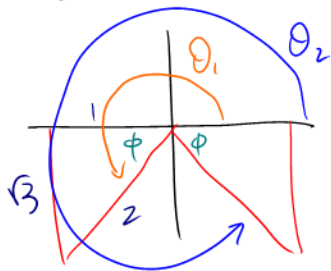
$\sec(210^\circ) = \frac{\text{hyp}}{\text{adj}}$
 \uparrow
 $\frac{1}{\cos(210^\circ)}$

acceptable.

17. Given the trig ratio determine **both possible** values for θ where $0^\circ \leq \theta \leq 360^\circ$:

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

Q3 or Q4



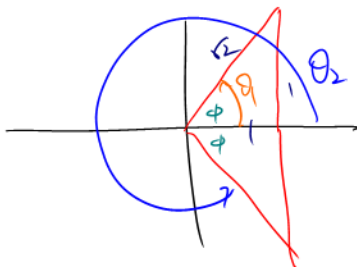
$\phi = 60^\circ$

$\theta_1 = 180 + \phi = 240^\circ$

$\theta_2 = 360 - \phi = 300^\circ$

b) $\cos(\theta) = \frac{1}{\sqrt{2}}$

Q1 or Q4



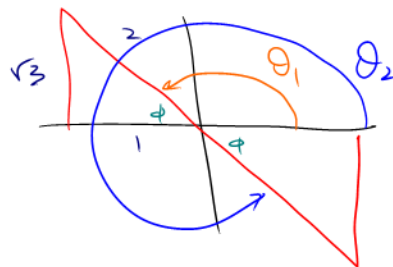
$\phi = 45^\circ$

$\theta_1 = 45^\circ$

$\theta_2 = 360 - \phi = 315^\circ$

c) $\tan(\theta) = -\sqrt{3}$

Q2 or Q4



$\phi = 60^\circ$

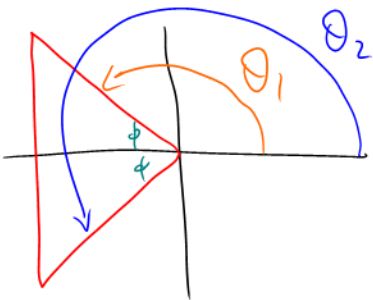
$\theta_1 = 180 - \phi = 120^\circ$

$\theta_2 = 360 - \phi = 300^\circ$

18. Given the (inexact!!) trig ratio, determine **both possible** values for θ where $0^\circ \leq \theta \leq 360^\circ$ (round to the nearest degree):

a) $\cos(\theta) = -0.3421$

tells us Q2 & Q3



IGNORE THE NEGATIVE and find ϕ !

$\cos(\phi) = +0.3421$

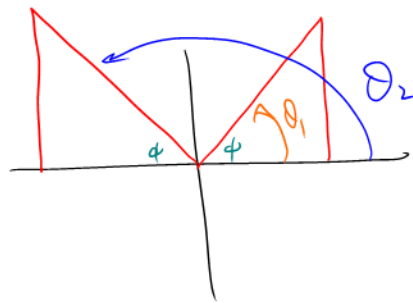
$\Rightarrow \phi = \cos^{-1}(0.3421) = 71^\circ$

$\theta_1 = 180 - \phi = 109^\circ$

$\theta_2 = 180 + \phi = 251^\circ$

reciprocal of SINE tells us Q1 & Q2

b) $\csc(\theta) = 1.512$



$\csc(\phi) = 1.512$

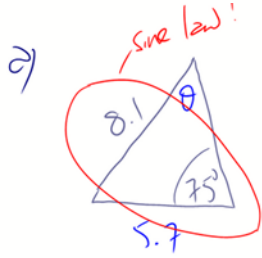
$\Rightarrow \sin(\phi) = \frac{1}{1.512} = 0.661$

$\Rightarrow \phi = \sin^{-1}(0.661) = 41^\circ$

$\theta_1 = 41^\circ$

$\theta_2 = 180 - \phi = 139^\circ$

19. A triangular plot of land is enclosed by a fence. One side of the fence is 8.1 m long with an opposite angle of 75° . An adjacent side of the fence is 5.7 m long with an opposite angle of θ .
- a) Make a sketch of the situation.
b) Determine θ to the nearest degree.



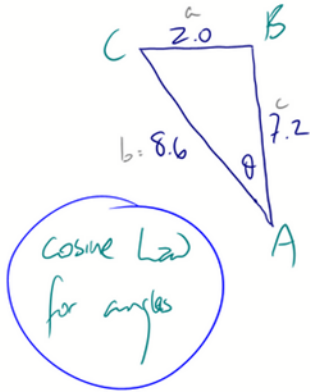
b)

$$\frac{\sin \theta}{5.7} = \frac{\sin 75}{8.1}$$

$$\Rightarrow \theta = \sin^{-1} \left(\frac{(5.7)(\sin(75))}{8.1} \right)$$

$$\doteq 43^\circ$$

20. The posts of a hockey goal are 2.0 m apart. A player attempts to score by shooting the puck along the ice from a point 7.2 m from one post and 8.6 m from the other. Within what angle θ must the shot be made? Round your answer to the nearest degree.



$$\cos A = \frac{b^2 + c^2 - a^2}{2bc}$$

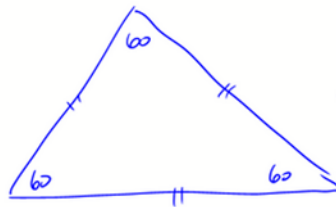
$$\Rightarrow \cos A = \frac{8.6^2 + 7.2^2 - 2.0^2}{2(8.6)(7.2)}$$

$$\Rightarrow A = \cos^{-1} \left(\frac{8.6^2 + 7.2^2 - 2.0^2}{2(8.6)(7.2)} \right) \doteq 10^\circ$$

\therefore The player needs to shoot within an angle of 10° .

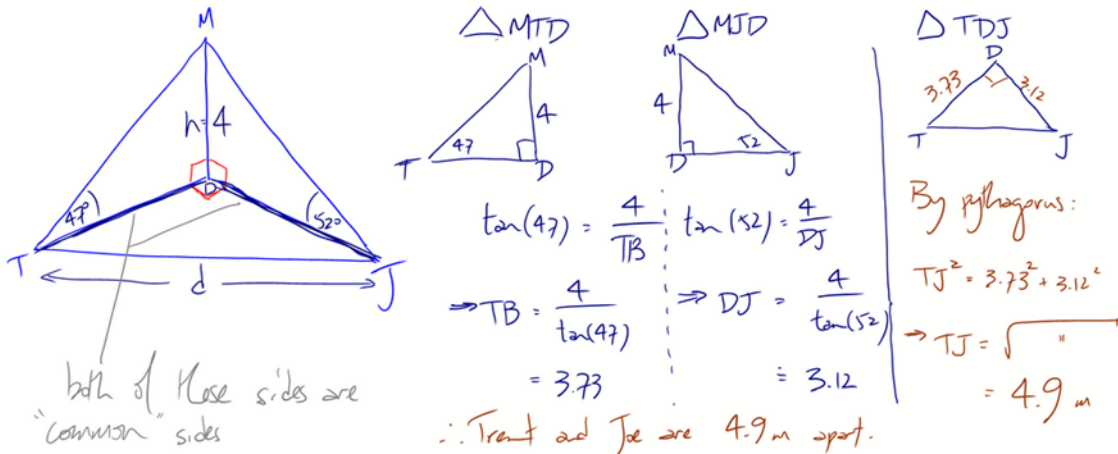
21. Given a triangle with 3 angles that sum to 180° , can the lengths of the sides be determined? Explain.

No - we need at least one side to determine the \triangle



\Leftarrow Different sized Δ s
with equal angles.
No way to calculate the sides.

22. Mary stands on a balcony. Joe is on the left of the balcony looking up at her at an angle of 52° with the ground. Trent is on the right of the balcony looking up at her at an angle of 47° with the ground. If the height, h , is 4 m, how far apart are Joe and Trent standing to the nearest tenth of a metre? Assume the angle the base of the balcony makes between Joe and Trent is 90° .



23. Doug is looking at a cliff. He determines that the angle of elevation to the top is 54° from where he is at. 50 m away from Doug, Gary estimates the angle between the base of the cliff, himself, and Doug to be 26° while Doug estimates the angle between the base of the cliff, himself, and Gary to be 70° . What is the height, h , of the cliff to the nearest tenth of a metre?

