

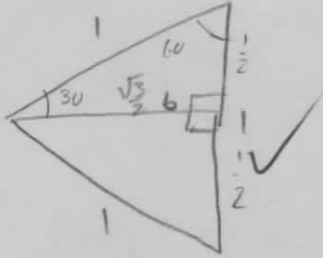
20/20 very good!

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## Mathematics 1613: Trigonometry Quiz #1

**Problem 1:** Derive the values for the sine and cosine of  $30^\circ$  and  $60^\circ$ . Justify and explain your steps.

Start with equilateral triangle due to all angles being equal. Split the triangle into two right triangles  $30^\circ, 60^\circ, 90^\circ$  triangles.  
Solve for "b."  
Solve for sine and cosine of  $30^\circ$  and  $60^\circ$



$$\begin{aligned} \sin 30 &= \frac{1}{2} \\ \cos 30 &= \frac{\sqrt{3}}{2} \\ \sin 60 &= \frac{\sqrt{3}}{2} \\ \cos 60 &= \frac{1}{2} \end{aligned}$$

$$1 = \frac{1}{2}^2 + b^2$$

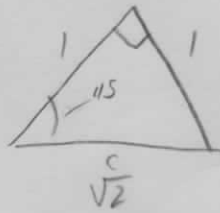
$$1 - \frac{1}{4} = b^2$$

$$\frac{3}{4} = b^2$$

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

**Problem 2:** Derive the values for the sine and cosine of  $45^\circ$ . Justify and explain your steps.

Start with a  $45^\circ, 45^\circ, 90^\circ$  triangle.  
Solve for the hypotenuse  
Solve for sine and cosine of  $45^\circ$



$$1 + 1 = c^2$$

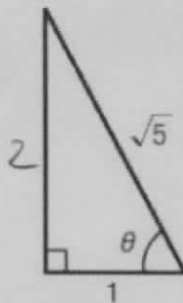
$$2 = c^2$$

$$\sqrt{2} = c$$

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

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

**Problem 3:** Find the sine, cosine, tangent, cosecant, secant, and cotangent of the indicated angle:



$$1 + b^2 = \sqrt{5}^2$$

$$1 + b^2 = 5$$

$$b^2 = 4$$

$$b = 2$$

$$\begin{aligned} \sin \theta &= \frac{2\sqrt{5}}{5} & \csc \theta &= \frac{\sqrt{5}}{2} \\ \cos \theta &= \frac{\sqrt{5}}{5} & \sec \theta &= \sqrt{5} \\ \tan \theta &= 2 & \cot \theta &= \frac{1}{2} \end{aligned}$$