Online Exam 2 Review

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Trigonometry Checkup

This activity is intended to remind you of key ideas from high school trigonometry.

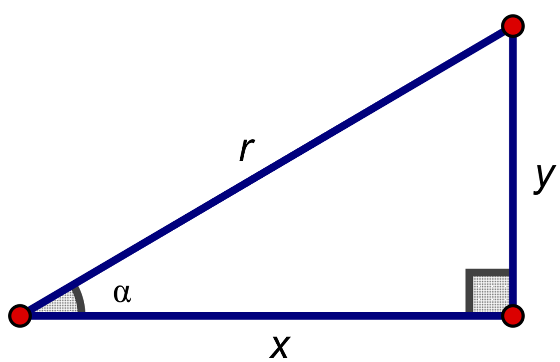
Problem 1 *What are the ratios of side lengths in a* $45°$*-*$45°$*-*$90°$ *triangle from shortest to longest?* $1 : \boxed{?} : \boxed{?}$.

Explain where the ratios come from, including why they work for any such triangle, no matter what size.

Problem 2 *What are the ratios of side lengths in a* $30°$*-*$60°$*-*$90°$ *triangle, from shortest to longest?* $1 : \boxed{?} : \boxed{?}$.

Explain where the ratios come from.

Problem 3 *Consider the right triangle below with an angle of* α*, sides of length* x *and* y*, and hypotenuse of length* r*, as labeled.*



(a) *If we imagine angle* α *is fixed, why are ratios of pairs of side lengths the same, no matter the size of the triangle?*

(b) *Using the triangle above (and your memory of Precalculus), write down the side-length ratios for sine, cosine, and tangent:*

$$\sin\alpha = \boxed{?}, \quad \cos\alpha = \boxed{?}, \quad \tan\alpha = \boxed{?}$$

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(c) *What values of* α *make sense in* right triangle trigonometry*?* $\boxed{?}$ *degrees* $\leq \theta <$ $\boxed{?}$ *degrees. (We overcome these bounds for circular trigonometry.)*

(d) *What does it mean to say that these ratios depend upon the angle* α*?*

(e) *Why is only one of the triangle's three angles necessary in defining these ratios?*

Problem 4 *Use your work so far to find the following trigonometric ratios:*

(a) $\sin 30° = \boxed{?}$, $\cos 30° = \boxed{?}$, $\tan 30° = \boxed{?}$

(b) $\sin 45° = \boxed{?}$, $\cos 45° = \boxed{?}$, $\tan 45° = \boxed{?}$

(c) $\sin 60° = \boxed{?}$, $\cos 60° = \boxed{?}$, $\tan 60° = \boxed{?}$

(d) $\sin 0° = \boxed{?}$ $\cos 0° = \boxed{?}$ $\tan 0° = \boxed{?}$

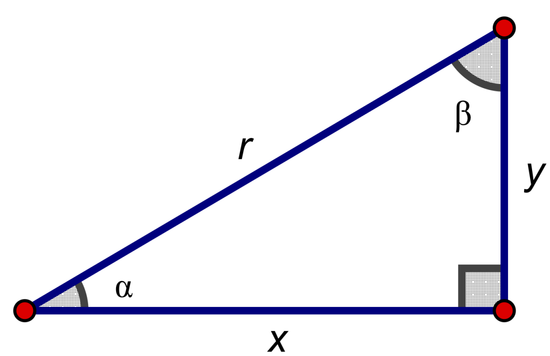
Problem 5 *You may recall the identity* $\sin^2\theta + \cos^2\theta = 1$.

(a) *Explain why the equation is true.*

(b) *Why is it called an identity?*

(c) *Why is it called a Pythagorean identity?*

Problem 6 *In right triangle trigonometry, there are indeed two acute angles, as shown in the figure below.*



(a) *How are the angles* α *and* β *related? Explain why.*

(b) *Using lengths in the above triangle, find the following ratios:*

$$\sin\alpha = \boxed{?} \qquad \cos\alpha = \boxed{?}$$

$$\sin\beta = \boxed{?} \qquad \cos\beta = y/r$$

(c) *We have shown, regarding the sine and cosine of complementary angles* α *and* β, $\sin\alpha = \boxed{?}$ *and* $\cos\alpha = \boxed{?}$.

(d) *Explain why the result makes sense.*

Given an angle and a side length of a right triangle, you can find the missing side lengths. This is called "solving the right triangle." And given the sine, cosine, or tangent of an angle, you can find the other two ratios.

Problem 7 *Suppose* $\sin\alpha = \dfrac{3}{5}$. *Then* $\cos\alpha = \boxed{?}$, $\tan\alpha = \boxed{?}$.

Problem 8 *A straight wire to the top of a flagpole meets the ground at a* 25° *angle 30 feet from the base of the flag pole (on a flat lawn).*

How high is the flagpole? $\boxed{?}$

How long is the wire? $\boxed{?}$