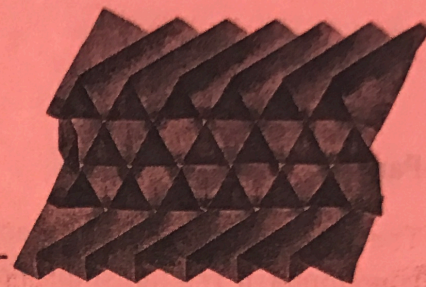


6.9 Relationships with Meaning

A Solidify Understanding Task



Part I

1. Use the information from the given triangle to write the following trigonometric ratios:

$$\sin(A) = \frac{\text{opposite}}{\text{hypotenuse}} = \frac{6}{10} = \frac{3}{5} = 0.6$$

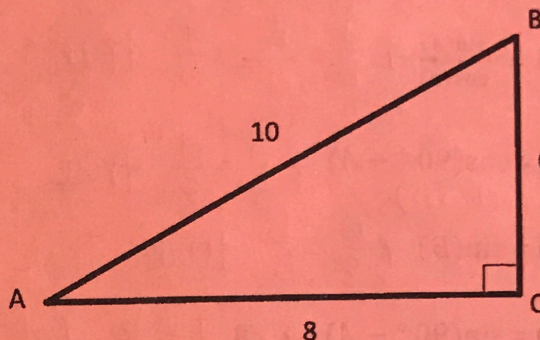
$$\cos(A) = \frac{\text{adjacent}}{\text{hypotenuse}} = \frac{8}{10} = \frac{4}{5} = 0.8$$

$$\tan(A) = \frac{\text{opposite}}{\text{adjacent}} = \frac{6}{8} = \frac{3}{4} = 0.75$$

$$\sin(B) = \frac{8}{10} = \frac{4}{5} = 0.8$$

$$\cos(B) = \frac{6}{10} = \frac{3}{5} = 0.6$$

$$\tan(B) = \frac{8}{6} = \frac{4}{3} = 1.\bar{3}$$



2. Do the same for this triangle:

$$\sin(A) = \frac{a}{c}$$

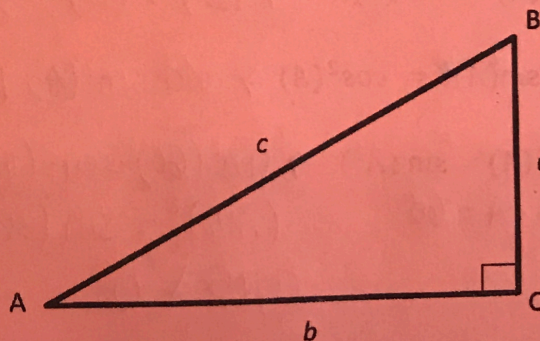
$$\cos(A) = \frac{b}{c}$$

$$\tan(A) = \frac{a}{b}$$

$$\sin(B) = \frac{b}{c}$$

$$\cos(B) = \frac{a}{c}$$

$$\tan(B) = \frac{b}{a}$$



3. Use the information above to write observations you notice about the relationships of trigonometric ratios.

$$\sin(A) = \cos(B), \cos(A) = \sin(B), \tan(A) = \frac{1}{\tan(B)}$$

4. Do you think these observations will always hold true? Why or why not?

Yes, for any right triangle.

Part 2

The following is a list of conjectures made by students about right triangles and trigonometric relationships. For each, state whether you think the conjecture is true or false. Justify your answer.

5. $\cos(A) = \sin(A) \rightarrow \frac{b}{c} \neq \frac{a}{c}$ false

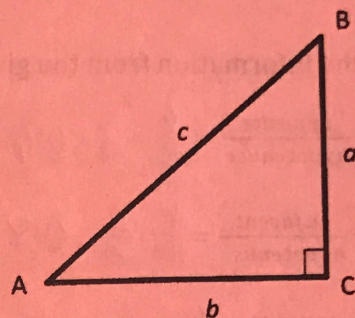
6. $\tan(A) = \frac{\sin(A)}{\cos(A)} \rightarrow \frac{a}{b} = \frac{\frac{a}{c}}{\frac{b}{c}} = \frac{a}{b}$ true

7. $\sin(A) = \cos(90^\circ - A) \rightarrow \frac{a}{c} = \frac{b}{c}$ true

8. $\cos(A) = \sin(B) \rightarrow \frac{b}{c} = \frac{b}{c}$ true

9. $\cos(B) = \sin(90^\circ - A) \rightarrow \frac{a}{c} \neq \frac{b}{c}$ false

10. $\tan(A) = \frac{1}{\tan(B)} \rightarrow \frac{a}{b} = \frac{1}{\frac{b}{a}} = \frac{a}{b}$ true



$$90^\circ - A = B$$

Note the following convention used to write: $[\sin(A)]^2 = \sin^2(A)$

11. $\sin^2(A) + \cos^2(A) = 1 \rightarrow \left(\frac{a}{c}\right)^2 + \left(\frac{b}{c}\right)^2 = \frac{a^2}{c^2} + \frac{b^2}{c^2} = \frac{a^2+b^2}{c^2} = \frac{c^2}{c^2} = 1$ true

12. $1 - \sin^2(A) = \cos^2(A) \rightarrow$ add $\sin^2(A)$ to both sides $\rightarrow 1 = \sin^2(A) + \cos^2(A)$ true

13. $\sin^2(A) = \sin(A^2) \rightarrow \sin^2(60) = \sin(60^2)$ false
 say $\angle A = 60^\circ$ $(.86)^2 = \sin(3600)$

Part III

14. Given: A right triangle with the following trigonometric ratio: $\sin(30^\circ) = \frac{1}{2}$ find all trigonometric ratios for this triangle. How do you know these values are always going to be true when given this angle?

$$\sin(30) = \frac{1}{2}$$

$$\cos(30) = \frac{\sqrt{3}}{2}$$

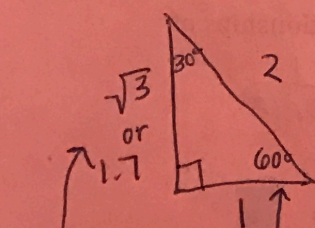
$$\tan(30) = \frac{1}{\sqrt{3}}$$

$$\sin(60) = \frac{\sqrt{3}}{2}$$

$$\cos(60) = \frac{1}{2}$$

$$\tan(60) = \frac{\sqrt{3}}{1} = \sqrt{3}$$

opp.
hyp.



$$2^2 - 1^2 = 3$$

$$\sqrt{3} \approx 1.7$$

$$180^\circ - 90^\circ - 30^\circ = 60^\circ$$

© 2013 Mathematics Vision Project | MVP

In partnership with the Utah State Office of Education

Licensed under the Creative Commons Attribution-NonCommercial-ShareAlike 3.0 Unported license