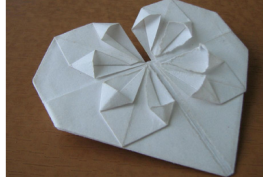


SIMILARITY & RIGHT TRIANGLE TRIGONOMETRY - 6.9

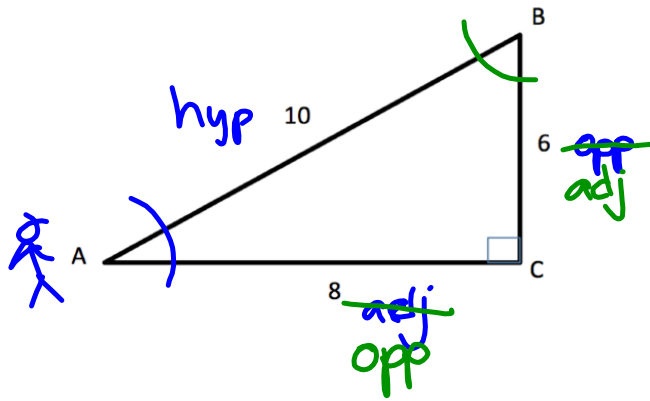
6.9 Relationships with Meaning



Part I

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

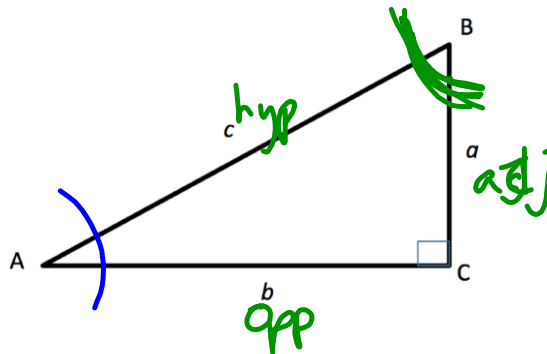
$$\begin{aligned} \sin A &= \frac{\text{opposite}}{\text{hypotenuse}} = \frac{6}{10} \\ \cos(A) &= \frac{\text{adjacent}}{\text{hypotenuse}} = \frac{8}{10} \\ \tan(A) &= \frac{\text{opposite}}{\text{adjacent}} = \frac{6}{8} \\ \sin(B) &= \frac{8}{10} \\ \cos(B) &= \frac{6}{10} \\ \tan(B) &= \frac{8}{6} \end{aligned}$$



2. Do the same for this triangle:

$$\begin{aligned} \sin(A) &= \frac{a}{c} \\ \cos(A) &= \frac{b}{c} \\ \tan(A) &= \frac{a}{b} \\ \sin(B) &= \frac{b}{c} \\ \cos(B) &= \frac{a}{c} \\ \tan(B) &= \frac{b}{a} \end{aligned}$$

FLIP →



3. Use the information above to write observations you notice about the relationships between trigonometric ratios of the two different reference angles in these right triangles.

$$\sin A = \cos B$$
$$\cos A = \sin B$$

$$\tan A = (\tan B)^{-1} \leftarrow \text{reciprocal}$$

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

Yes, it's the same numbers
just a different perspective.

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. $\cos(A) = \sin(A)$ false

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

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

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

9. $\cos(B) = \sin(90^\circ - A)$ sin B
false


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

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

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

12. $1 - \sin(A)^2 = \cos^2(A)$ true

13. $\sin^2(A) = \sin(A^2)$

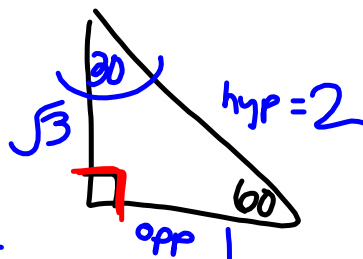
 $\left(\frac{3}{5}\right)^2 = A^2$?
 $\left(\frac{3}{5}\right)^2 = (30)^2$
 $\frac{9}{25} \neq 900$

Squaring the ratio doesn't square the angle.
false.

Part 3

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

$$\sin 30^\circ = \frac{1}{2} \frac{\text{opp}}{\text{hyp}}$$



$$1^2 + x^2 = 2^2$$

$$1 + x^2 = 4$$

$$-1 \quad -1$$
$$\sqrt{x^2} = \sqrt{3}$$

$$x = \sqrt{3}$$

SECONDARY MATH II // MODULE 6
SIMILARITY & RIGHT TRIANGLE TRIGONOMETRY - 6.9

6.9

READY, SET, GO!

Name

Period



Date

READY

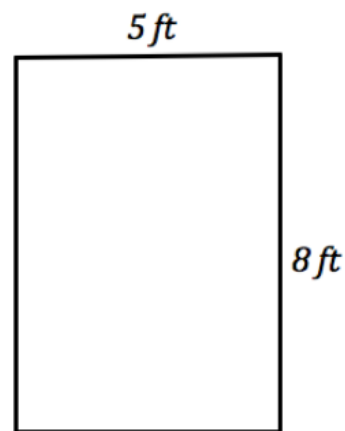
Topic: Geometric Formulas for Perimeter, Area and Volume

State the area and volume formulas that are required below.

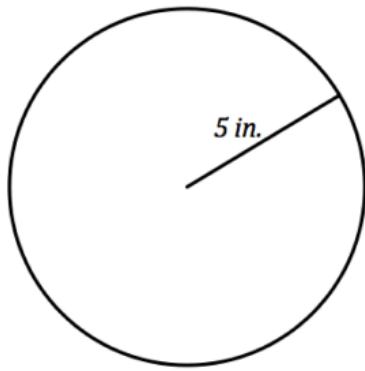
1.

- a. Area of a circle: πr^2
- b. Volume of a rectangular prism:  $l \cdot w \cdot h$
- c. Volume of a cylinder:  $\pi r^2 \cdot h$ $\frac{l \cdot w \cdot h}{\text{base}}$
- d. Area of a rectangle: $l \cdot w$
- e. Perimeter of a rectangle: $2l + 2w$
- f. Circumference of a circle: $2\pi r$ or $d\pi$

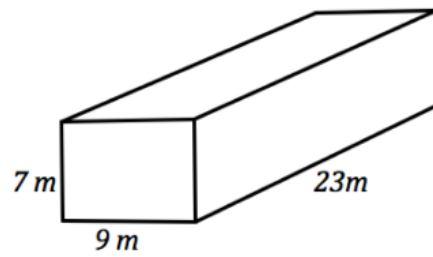
3. Find the perimeter and area for the rectangle.



2. Find the circumference and area for the circle.



4. Find the volume and surface area of the prism.



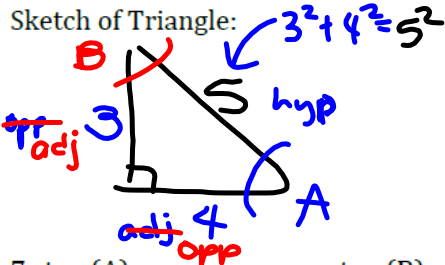
SET

Topic: Trigonometric Ratios and Connections between them.

Based on the given trigonometric ratio, sketch a triangle and find a possible value for the missing side as well as the other missing trig ratios. Angles A and B are the two non-right angles in a right triangle. **HINT** You pick which angle is A and B, doesnt matter.**

5. $\tan(A) = \frac{3}{4}$ $\tan(B) = \frac{4}{3}$
 $\sin(A) = \frac{3}{5}$ $\sin(B) = \frac{4}{5}$
 $\cos(A) = \frac{4}{5}$ $\cos(B) = \frac{3}{5}$

Sketch of Triangle:

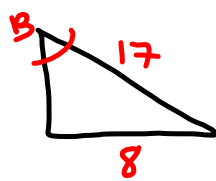


7. $\tan(A) =$ $\tan(B) =$
 $\sin(A) =$ $\sin(B) =$
 $\cos(A) = \frac{12}{13}$ $\cos(B) =$

Sketch of Triangle:

6. $\tan(A) =$ $\tan(B) =$
 $\sin(A) =$ $\sin(B) = \frac{8}{17}$ **IT**
 $\cos(A) =$ $\cos(B) =$

Sketch of Triangle:



8. $\tan(A) =$ $\tan(B) =$
 $\sin(A) =$ $\sin(B) = \frac{1}{\sqrt{2}}$
 $\cos(A) =$ $\cos(B) =$

Sketch of Triangle:

HINT look at True/ False Section in class notes**

Given a right triangle with angles A and B as the non-right angles. Determine if the statements below are true or false. Justify your reasoning and show your argument.

9. $\cos(A) = \frac{1}{\sin A}$

10. $\tan(B) = \tan(90^\circ - A)$

11. $\tan(A) \cdot \cos(A) = \sin(A)$

GO

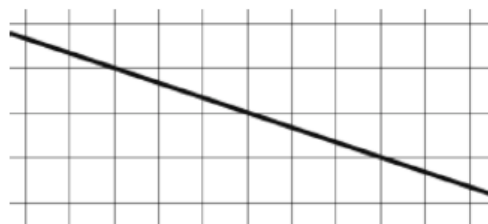
Topic: Slope as a ratio

Find the slope of each line and write it as a ratio of rise to run.

12.



13.

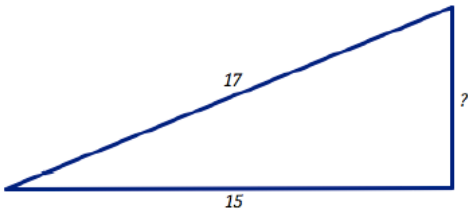


14.

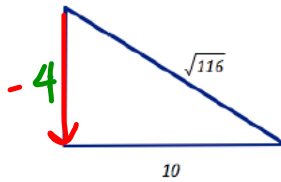


Find the missing length in each right triangle. Then determine the slope of the hypotenuse.

15.



16.



$$\begin{aligned}
 10^2 + x^2 &= (\sqrt{116})^2 \\
 100 + x^2 &= 116 \\
 \underline{-100} \quad \underline{-100} & \\
 x^2 &= 16 \\
 x &= 4 \\
 \text{Slope} &= \frac{\text{rise}}{\text{run}} = \frac{-4}{10}
 \end{aligned}$$

17.

