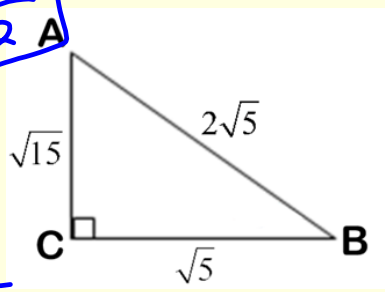
Warm-Up

SOH-CAH-TOA

Use the triangle below to find sin, cos, and tan of each angle. NO DECIMALS!



1. sin A = $\frac{\sqrt{5}}{2\sqrt{5}} = \frac{1}{2}$

2. sin B = $\frac{\sqrt{15}}{2\sqrt{5}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{\sqrt{3}}{2}$

3. cos A = $\frac{\sqrt{15}}{2\sqrt{5}} = \frac{\sqrt{3}}{2}$

4. cos B = $\frac{\sqrt{5}}{2\sqrt{5}} = \frac{1}{2}$

5. tan A = $\frac{\sqrt{5}}{\sqrt{15}} = \frac{1}{\sqrt{3}}$

6. tan B = $\frac{\sqrt{15}}{\sqrt{5}} = \sqrt{3}$

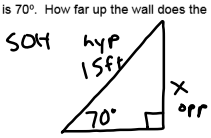
$\frac{1}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{\sqrt{3}}{3}$

12.1 Trigonometric Ratios Day 2 - Inverse Trigonometric Functions

A. I can define the sine, cosine, and tangent ratios
B. I can explain and use the relationship between the sine and cosine of complementary angles

(From yesterday's notes)

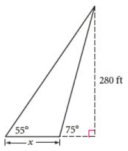
18. A 15-foot ladder leans against a wall. The **angle of elevation** (the angle between the ladder and ground) is 70º. How far up the wall does the ladder reach?



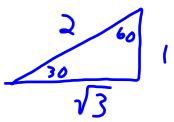
$\sin 70 = \frac{x}{15}$

(From yesterday's notes)

19. Find the value of x.



You can use your calculator to find acute angle measurements in right triangles when you know the measure of at least two of its sides. The operations you will use are called **inverse trigonometric functions**. They are designated by $\sin^{-1}$, $\cos^{-1}$, and $\tan^{-1}$. To access them, press the 2nd key on your calculator, then the trig function you want to use.



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

$\sin X = \frac{1}{2}$

Examples:

1. $X = \sin^{-1}.3256$ 19.00°

2. $U = \cos^{-1}\frac{4}{9}$ 63.61°

3. $S = \tan^{-1}\frac{8}{6}$ 53.13°

You try! Solve for the angle using the inverse trigonometric functions.

4. sin X = .9231

$X = \sin^{-1}(.9231)$

$X \approx 67.38°$

5. $\cos X = \frac{3}{8}$

$X = \cos^{-1}\left(\frac{3}{8}\right)$

$X \approx 67.98°$

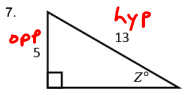
6. $\tan X = \frac{8}{5}$

$X = \tan^{-1}\left(\frac{8}{5}\right)$

$X \approx 57.99°$

Solve for each variable.

7.



SOH

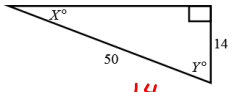
$\sin Z = \frac{5}{13}$

$Z = \sin^{-1}\left(\frac{5}{13}\right)$

$Z \approx 22.62°$

Solve for each variable.

8.



$\sin X = \frac{14}{50}$ $\cos Y = \frac{14}{50}$

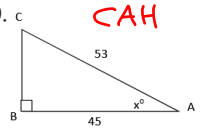
$X = \sin^{-1}\left(\frac{14}{50}\right)$ $Y = \cos^{-1}\left(\frac{14}{50}\right)$

$X \approx 16.26°$ $Y = 73.74°$

$Y = 90 - 16.26 = 73.74°$

You Try! Find the value of x in each right triangle. If necessary, round to the nearest tenth.

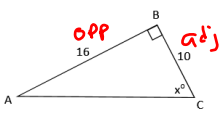
9. C



CAH

$\cos X = \frac{45}{53}$

10.



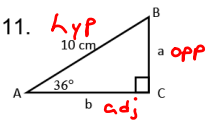
TOA

$\tan X = \frac{16}{10}$

Solving Right Triangles

"Solve the right triangle" means to find all missing parts on the right triangle, be it sides or angles. You will use a combination of trigonometric functions and inverse trigonometric functions. Don't forget that the **two acute angles** of a right triangle must be **complementary**.

Solve the right triangle by finding all the missing angles and side lengths. SOH

11. 

$m\angle B = 90 - 36 = 54°$

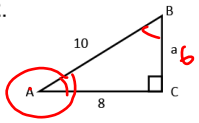
$\sin 36 = \frac{a}{10}$ $\cos 36 = \frac{b}{10}$

$10\sin 36 = a$ $10\cos 36 = b$

$5.88 \approx a$ $8.09 \approx b$

Solve the right triangle by finding all the missing angles and side lengths.

12.



$8^2 + a^2 = 10^2$

$64 + a^2 = 100$

$a^2 = 36$

$a = 6$

$\cos A = \frac{8}{10}$ $\sin B = \frac{8}{10}$

$A = \cos^{-1}\left(\frac{8}{10}\right)$ $B = \sin^{-1}\left(\frac{8}{10}\right)$

$A \approx 36.87°$

$m\angle B = 90 - 36.87 = 53.13°$

13. A 16-foot ladder is propped against the side of a building. The angle it forms with the ground measures 55°. How far up the side of the building does the ladder reach?

14. The walking surface of a treadmill is 5 feet long. A trainer raises the end of the treadmill 6 inches to create an incline. Approximately what angle does the incline of the treadmill form with the ground?

15. A wheelchair ramp has an incline which forms a $6°$ angle with the ground and has a height of 32 centimeters. Find the length of the ramp to the nearest tenth centimeter.

Assignment: 12.1 Day 2 Inverse Trigonometric Functions Practice Sheet