8.2 TRIGONOMETRIC RATIOS

Key

Trigonometry Part 1: Finding Missing Sides

8.2.a.: Write trigonometric ratios for a right triangle.
8.2.b.: Use a calculator to find decimal trigonometric ratios.
8.2.c.: Use trigonometric ratios to find side lengths of a right triangle.

Part 1: Important Vocabulary

Trigonometric Ratio: A ratio of two sides of a right triangle.

SOH CAH TOA

sin = opposite / hypotenuse

cos = Adjacent / hypotenuse

tan = opposite / adjacent

Part 2: Trigonometric Ratios — 8.2.a.: Write trigonometric ratios for a right triangle.

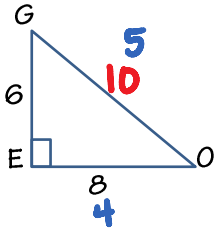
Directions: Write each trig ratio as a simplified fraction.

1) $\sin(G) = \frac{O}{H} = \frac{8}{10} = \frac{4}{5}$

$\cos(G) = \frac{A}{H} = \frac{6}{10} = \frac{3}{5}$

$\tan(O) = \frac{O}{A} = \frac{8}{6} = \frac{4}{3}$

(3,4,5)x2

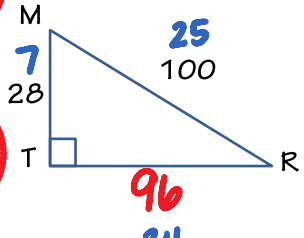


2) $\sin(M) = \frac{O}{H} = \frac{96}{100} = \frac{24}{25}$

$\cos(M) = \frac{A}{H} = \frac{28}{100} = \frac{7}{25}$

$\tan(R) = \frac{O}{A} = \frac{28}{96} = \frac{7}{24}$

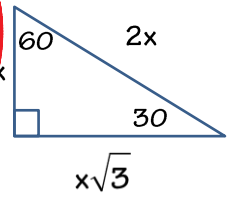
(7,24,25)x4



3) $\sin 30^\circ = \frac{O}{H} = \frac{x}{2x} = \frac{1}{2}$

$\cos 30^\circ = \frac{A}{H} = \frac{x\sqrt{3}}{2x} = \frac{\sqrt{3}}{2}$

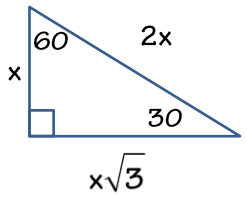
$\tan 30^\circ = \frac{A}{x\sqrt{3}} = \frac{1}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{1\sqrt{3}}{3}$



4) $\sin 30^\circ = \frac{x\sqrt{3}}{2x} = \frac{\sqrt{3}}{2}$

$\cos 60^\circ = \frac{x}{2x} = \frac{1}{2}$

$\tan 60^\circ = \frac{x\sqrt{3}}{x} = \sqrt{3}$



Part 3: Trigonometric Calculations — 8.2.b.: Use a calculator to find decimal trigonometric ratios.

Directions: Use your calculator to find each trigonometric ratio. Round to the nearest hundredth.
Make sure your calculator is in degree mode (not radians)

5) $\cos 76^\circ$ = .24

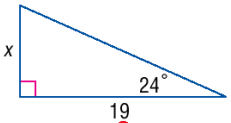
6) $\sin 8^\circ$ = .14

7) $\tan 82^\circ$ = 7.12

$S\frac{O}{H}C\frac{A}{H}T\frac{O}{A}$

Part 4: Using Trig Ratios to Find SIDES 8.2.c.: Use trigonometric ratios to find side lengths of a right triangle.

Directions: Find each length. Round to the nearest hundredth.

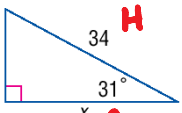
8) 

O, A

$19 \cdot \tan(24) = \frac{x}{19} \cdot 19$

$19\tan(24) = x$

$8.46 \approx x$

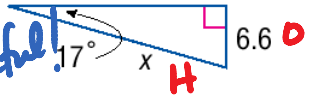
9) 

H, A

$\cos(31) = \frac{x}{34}$

$x = 34 \cdot \cos(31)$

$x \approx 29.14$

10) 

★ Be careful!

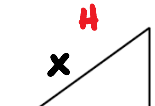
O, H

$\frac{\sin(17)}{1} = \frac{6.6}{x}$

$x \cdot \sin(17) = 6.6$

$\frac{x\sin(17)}{\sin(17)} = \frac{6.6}{\sin(17)}$

$x \approx 22.57$

11) 

★ Be careful!

H, A

$\frac{\cos(36)}{1} = \frac{43}{x}$

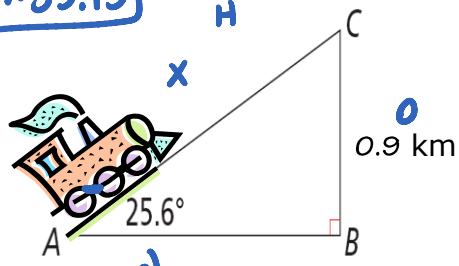
$x\cos(36) = 43$

$\frac{x\cos(36)}{\cos(36)} = \frac{43}{\cos(36)}$

$x \approx 53.15$

Real-Life Application

12) The Pilatusbahn in Switzerland is the world's steepest cog railway. Its steepest section makes an angle of about 25.6° with the horizon and rises about 0.9 km. To the nearest hundredth of a kilometer, how long is this section of the railway track?



H, O

$\frac{\sin(25.6)}{1} = \frac{.9}{x}$

$x \cdot \sin(25.6) = .9$

$\frac{x\sin(25.6)}{\sin(25.6)} = \frac{.9}{\sin(25.6)}$

$x \approx 2.08$ km

about 1.29 miles!

Part 5: Putting It All Together! 8.2.a, 8.2.b, 8.2.c: Trigonometry Fun! Whiteboard Practice Problems

Show work for #1-9 here!