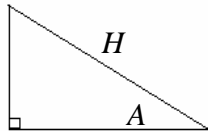


1. Simplify the following completely:

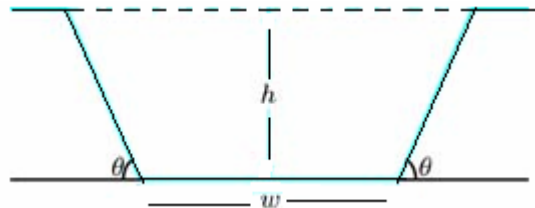
A.  $\frac{\cot^2 \theta}{\csc^2 \theta} + \frac{\tan^2 \theta}{\sec^2 \theta}$

B.  $\cos \beta + \tan \beta \sin \beta$

2. Express the area of the triangle in terms of angle  $A$  and hypotenuse  $H$ .



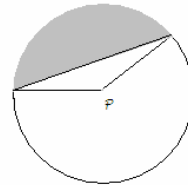
3. A cross-section of an irrigation canal is shown. Express the area of the trapezoidal cross-section in terms of  $w$ ,  $h$ , and  $\theta$ .



4. The point  $P$  is at the center of a circle of radius  $r$ . The radian measure of the central angle is  $\alpha$ .

A. Express the area of the triangle in terms of  $r$  and  $\alpha$ .

B. Express the area of the shaded in terms of  $r$  and  $\alpha$ .



5. Find an equation in the form  $y = A \sin(Bx)$  so that the first minimum of the graph to the right of the origin occurs at  $x = 5$  and has a value of  $-3$ .

6. The Bay of Fundy in Canada has the largest tides in the world. The difference between low and high water levels is 15 meters. At a particular point the depth of water,  $y$  meters, is given as a function of time,  $t$ , in hours since midnight by  $y = D + A \cos(B(t - C))$ .

A. What is the physical meaning of  $D$ ?

B. What is the value of  $A$ ?

C. What is the value of  $B$  if the time between successive high tides is 12.5 hours?

D. What is the physical meaning of  $C$ ?

7. Suppose  $\sin \theta = A$  where  $\theta$  is in quadrant II.

A. What are the possible values of  $\theta$  and  $A$ .

B. Find each in terms of  $A$ .

$$\sin\left(\frac{\pi}{2} - \theta\right) \quad \sin(\theta - \pi) \quad \sin^3 \theta \quad \sin(-\theta) \quad \cot \theta$$

8. The Statue of Liberty is 46 meters high and stands on a pedestal that is also 46 meters high. Express the viewing distance,  $d$ , in terms of  $\alpha$  and  $\beta$  where  $\theta = \beta - \alpha$ .

