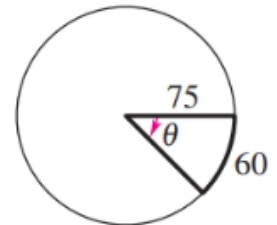


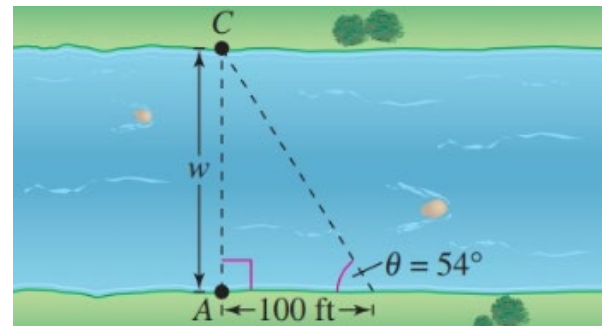
Do all your work on plain, white, letter-sized (A4) paper or use RocketBook or some other e-paper solution, and make a one-file, multi-page PDF of your work. Then upload it to the appropriate place in Assignments on D2L (the course shell on online.aims.edu).

1. An 8-inch circular power saw blade rotates at 5000 revolutions per minute.
 - a. Find the angular speed of the saw blade in radians. Leave your answer in π radians.
 - b. Find the linear speed (in feet per minute) of the saw teeth as they contact the wood being cut.



2. Find the radian measure of the central angle for the sector of a circle shown on the right.
3. A car's rear windshield wiper rotates 125° . The length of the wiper *mechanism* is 25 inches and the length of the wiper blade is 14 inches. Find the area wiped by the blade.

4. A scientist wants to know the width w of a river. From point A , the biologist walks downstream 100 feet and sights to point C (See figure on right.). From this sighting, it is determined that $\theta = 54^\circ$. How wide is the river?



5. Find the exact values of the remaining trigonometric functions of θ satisfying $\sec \theta = \frac{4}{3}$ and $\sin \theta < 0$.

6. Suppose $\csc \theta = \frac{2\sqrt{3}}{3}$.

- a. Find two *exact* solutions θ to the equation in degrees ($0^\circ \leq \theta \leq 360^\circ$) and radians ($0 \leq \theta \leq 2\pi$).
- b. Find *all* solutions in degrees and radians. Your answers should be exact.

7. Let $f(x) = 10 \sin\left(\frac{\pi}{6}x - \frac{7\pi}{3}\right) + 5$.

- a. Sketch one period of the graph of $f(x)$. Label the midline and all max and min points.
- b. Bonus – Find and label the x -intercepts and y -intercept of $f(x)$

8. Sketch the graph of $g(x) = -4 \csc\left(3x - \frac{\pi}{2}\right)$. Show and clearly label the max/min points and all asymptotes.

9. Consider the equation $\tan(2x) = \sqrt{3}$.

- a. Find all solutions $x \in [-2\pi, 2\pi]$. Answers must be exact.
- b. Find all solutions $x \in (-\infty, \infty)$. Report your solutions as a *set*.

10. Write an algebraic expression that is equivalent to $\cos(\arcsin(3x))$.

11. Fire tower A is 40 km due west of fire tower B . A fire is spotted from the towers and the bearings from A and B are $N 76^\circ E$ and $N 56^\circ W$, respectively. Find the distance d of the fire from the line segment AB . See figure.

