

1. If A is a positive acute angle and $\sin A = \frac{\sqrt{5}}{3}$, what is $\cos 2A$?

1.

2. If θ is an acute angle such that $\sin \theta = \frac{5}{13}$, what is the value of $\sin 2\theta$?

2.

3. In the interval $0^\circ \leq x \leq 360^\circ$, solve for all values of A in the equation $\cos 2A = -3\sin A - 1$.

3.

4. An architect is using a computer program to design the entrance of a railroad tunnel. The outline of the opening is modeled by the function $f(x) = 8\sin x + 2$, in the interval $0 \leq x \leq \pi$, where x is expressed in radians. Solve algebraically for all values of x in the interval $0 \leq x \leq \pi$, where the height of the opening, $f(x)$, is 6. Express your answer in terms of π .
If the x -axis represents the base of the tunnel, what is the maximum height of the entrance of the tunnel?

4.

5. A student attaches one end of a rope to a wall at a fixed point 3 feet above the ground, as shown in the accompanying diagram, and moves the other end of the rope up and down, producing a wave described by the equation $y = a \sin bx + c$. The range of the rope's height above the ground is between 1.5 and 4.5 feet. The period of the wave is 14. Write the equation that represents this wave.



5.

6. If $(\sec x - 2)(2 \sec x - 1) = 0$, then x terminates in

- (1) Quadrant I, only
- (2) Quadrants I and II, only
- (3) Quadrants I and IV, only
- (4) Quadrants I, II, III, and IV

7. If θ is a positive acute angle and $\sin \theta = a$, which expression represents $\cos \theta$ in terms of a ?

- (1) \sqrt{a}
- (2) $\sqrt{1-a^2}$
- (3) $\frac{1}{\sqrt{a}}$
- (4) $\frac{1}{\sqrt{1-a^2}}$

6.

7.

8. The number of people, y , involved in recycling in a community is modeled by the function $y = 90\sqrt{3x} + 400$, where x is the number of months the recycling plant has been open.

Construct a table of values, sketch the function on the grid below, and find the number of people involved in recycling exactly 3 months after the plant opened.

After how many months will 940 people be involved in recycling?

