

1. Convert between degrees and radians:

(a) $180^\circ =$ (b) $135^\circ =$ (c) $\frac{3\pi}{2} =$

(d) $30^\circ =$ (e) $\frac{\pi}{4} =$ (f) $\frac{11\pi}{6} =$

2. Review the unit circle:

(a) $\sin(3\pi) =$ (b) $\cos\left(\frac{5\pi}{4}\right) =$ (c) $\tan\left(\frac{7\pi}{6}\right) =$

(d) $\sin\left(-\frac{\pi}{6}\right) =$ (e) $\sec\left(\frac{5\pi}{3}\right) =$ (f) $\tan\left(-\frac{3\pi}{2}\right) =$

3. Review the inverse trig functions:

(a) $\arcsin\left(-\frac{\sqrt{3}}{2}\right) =$ (b) $\arccos(-1) =$ (c) $\tan^{-1}(\sqrt{3}) =$

(d) $\arctan(-1) =$ (e) $\sec^{-1}(2) =$ (f) $\arccos\left(\frac{3}{2}\right) =$

4. Review trig identities: match each expression on the left with all expressions on the right that produce a trig identity.

(1) $\cos^2 x =$

(2) $\sin(2x) =$

(3) $\cos(2x) =$

(4) $\sin^2 x =$

(a) $1 - \sin^2 x$

(b) $\frac{1}{2}(1 - \cos 2x)$

(c) $\cos^2 x - \sin^2 x$

(d) $\frac{1}{2}(1 + \cos 2x)$

(e) $2 \sin x \cos x$

(f) $1 - \cos^2 x$

(g) $1 - 2 \sin^2 x$

(h) $2 \cos^2 x - 1$

(i) $\cos^2 x + \sin^2 x$

Now we will apply our knowledge of basic trigonometric functions (and inverse trigonometric functions) to some real-world problems. You will need these skills later in the semester.

5. A 15-foot long ladder is leaning against a wall with its base 2 feet from the wall. Find the angle the ladder makes with the floor. Use a calculator to compute the answer in radians and in degrees.

6. The bottom of the ladder in the previous problem starts to slide away from the wall at the constant rate of 1 foot per second.

When will the ladder make a 60° angle with the ground?

Practice solving some trigonometric equations:

7. Find all solutions to the equation $2\sin x + 1 = 0$

8. Use technology to help you find at least two approximate solutions to the equation $\tan 2x = 20$.

More practice with applications:

9. On the shore sits Sea Lion Rock. A lighthouse stands off-shore, 100 yards east of Sea Lion Rock. Due north of Sea Lion Rock is the exclusive See Sea Lion Motel. The lighthouse light rotates twice a minute. If the beam of light from the lighthouse takes 5 seconds to travel along the shore from Sea Lion Rock to the motel, how far is the motel from the rock?

10. While staring out the window, you notice
- a) that it is a warm and sunny day,
 - b) that your line of sight to the top of a nearby tree makes an angle of 45 degrees above the horizontal, and
 - c) that your line of sight to the base of the tree makes an angle of 30 degrees below the horizontal.

Taking advantage of a), you go outside and measure that it is 40 feet from the building to the base of the tree. How tall is the tree?

11. The red stripe on a barber pole makes one complete revolution around the pole. If the pole is 50 inches tall and has the amazingly precise radius of $\frac{25}{\pi\sqrt{3}}$ inches, what angle does the stripe make with base of the pole, and how long is the stripe? (Assume the stripe is a thin line.)