# A guided review of basic trigonometry

1. Make a neat sketch of a right triangle and label its side-lengths using any convenient notation. Pick one of the acute angles and call it $\theta$. Define the following trigonometric quantities with reference to the labels on your right triangle

$$\sin\theta = \qquad\qquad \cos\theta = \qquad\qquad \tan\theta =$$

2. Define each of the following trigonometric quantities in terms of $\sin\theta$ and $\cos\theta$. In each case, also define the quantity as the reciprocal of one of the other trig. quantities. E.g., $\tan\theta = \frac{\sin\theta}{\cos\theta} = \frac{1}{\cot\theta}$

$$\cot\theta = \qquad\qquad \sec\theta = \qquad\qquad \csc\theta =$$

3. A major source of confusion when working with trigonometric functions is the notation, which is often non-intuitive. Explain the difference between the trig. quantities shown in each of the following groups
   (a) $\sin^2\theta,\quad \sin\theta^2,\quad (\sin\theta)^2,\quad \sin(\theta^2)$
   (b) $\sin^{-1}\theta,\quad (\sin\theta)^{-1},\quad \sin(\theta^{-1})$

4. Refer back to your previous sketch of the right triangle and its labels. Compute the value of $(\sin^2\theta + \cos^2\theta)$ in terms of the side-lengths of your triangle.

5. The most useful and general way to define the sine and cosine function is via the unit circle. Make a neat sketch of an $x$-$y$ coordinate system with a large unit circle centered at the origin. Pick any point, say $P$, on the circle. Let $\theta$ denote the angle of $P$'s orientation with respect to the positive $x$-axis. (Show $P$ and $\theta$ on your sketch.) Define $\sin\theta$ and $\cos\theta$ in terms of the $(x, y)$ coordinates of $P$.

6. To get a brief glimpse of how/why the unit circle perspective can help you, find answers to the following questions
   (a) What is the value of: $\sin(0), \cos(0), \sin(\pi/2), \cos(\pi/2), \sin(\pi), \cos(\pi),$ $\sin(3\pi/2), \cos(3\pi/2), \sin(2\pi), \cos(2\pi), \sin(27\pi)$.
   (b) Solve the equation: $\cos^2\theta - 1 = 0$.