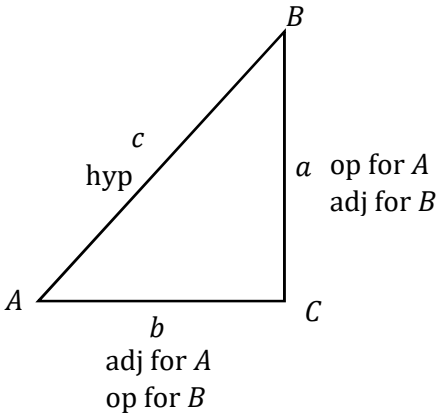
Key Concepts to Understand for Test 2

1. Understand angles in degrees or radians
2. Understand degrees, minutes, seconds
3. Be able to convert angle in degrees, minutes, seconds to an angle in degrees in decimal form.
   $D\ M'S" = D + \frac{M}{60} + \frac{S}{3600}$
4. Calculate arc length s, radius r, or angle θ using $s = r\theta$, $\boldsymbol{\theta\ must\ be\ in\ radians}$!
5. Calculate arc area A, radius r, or angle θ using $A = \frac{1}{2}r^2\theta$, $\boldsymbol{\theta\ must\ be\ in\ radians}$!
6. Be able to convert radians to degrees and degrees to radians.
   $A\ radians\ to\ degrees: A\ \cancel{radians} \times \frac{180\ degrees}{\pi\ \cancel{radians}} = \frac{A(180)}{\pi}$ degrees

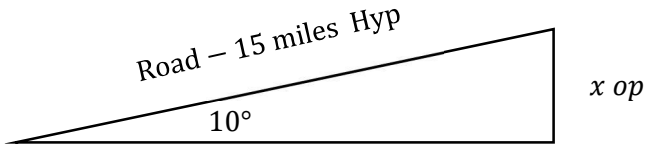
   $B\ degrees\ to\ radians: B\ \cancel{degrees} \times \frac{\pi\ radians}{180\ \cancel{degrees}} = \frac{\pi B}{180\pi}$ radians
7. Solve right triangle problems given a, b, c, A, B, C and calculate trig functions. Always label the triangle to keep sides and angles correctly associated. **Do not start a problem without drawing a good accurate sketch!**.



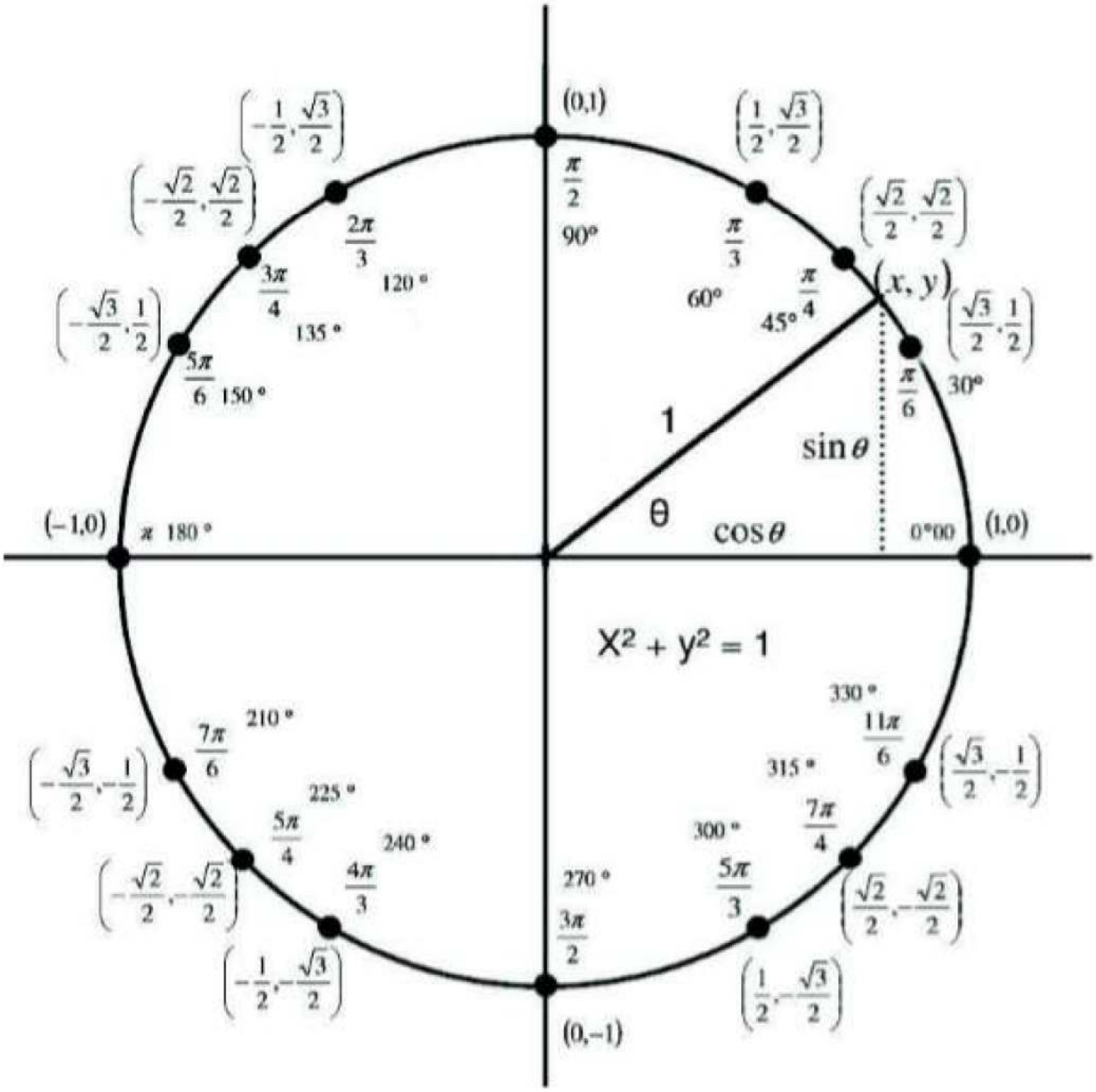
8. Understand SOHCAHTOA and never forget $c^2 = a^2 + b^2\ for\ a\ right\ triangle\ where\ c\ is\ hyp$
9. 180 degrees in any triangle. $A + B + C = 180°$, accute angles A & B sum $to\ 90°$
10. For a point (x, y) on the unit circle: $x^2 + y^2 = 1$
    $\sin\theta = y, \cos\theta = x, and\ \tan\theta = \frac{y}{x}$ $\csc\theta = \frac{1}{y}, \sec\theta = \frac{1}{x} and\ \cot\theta = \frac{x}{y}$
11. For a point (x, y) on a circle with radius r, $x^2 + y^2 = r^2$, $r = \sqrt{x^2 + y^2}$
    $\sin\theta = \frac{y}{r}, \cos\theta = \frac{x}{r}, and\ \tan\theta = \frac{y}{x}$ $\csc\theta = \frac{r}{y}, \sec\theta = \frac{r}{x} and\ \cot\theta = \frac{x}{y}$
12. Note: $\csc\theta = \frac{1}{\sin\theta}$, $\sec\theta = \frac{1}{\cos\theta}$ $and\ \cot\theta = \frac{1}{tan\theta}$
13. Be able to substitute variables and given constants into a trig function and perform required calculation.
14. Understand that a periodic function $f(x)$ with period T repeats itself
    $f(x) = f(x \pm T) = f(x \pm 2T) = f(x \pm nT)$, where n is an integer
15. Use a calculator to calculate trig functions making sure that you have the **calculator in the correct mode (radians or degrees).**

16. Be able to graph trig functions such as $A\sin\omega x + B \; and \; A\cos\omega x + B$
    Amplitude = $|A|$, always positive, Period $T = \frac{2\pi}{|\omega|}$ always positive
17. Understanding the amplitude and period of a sinusoidal function can provide clues on what the graph should look like.
18. When calculating the phase shift of a function $f(kx + B)$, rewrite as $f[k\left(x + \frac{B}{k}\right)]$
    The phase shift will be $\frac{B}{k}$, shifted to the left if positive, and shifted to the right if negative.
19. Solve a right triangle application problem using the appropriate trig function. Draw a picture, label the picture (known/unknown), and decide on a trig function to use that will use your unknown and known values. Solve for the unknown.

Example: A 15 mile road up a mountain is inclined 10 degrees. Calculate the total rise in elevation at the end of the road.



$\frac{x}{15} = \frac{\sin 10°}{1}$, $x = 15\sin 10°$ = 2.60 miles



$$s = r\theta$$

$$A = \frac{1}{2}r^2\theta$$ Remember SOHCAHTOA

$$T = \frac{2\pi}{\omega}$$