Occidental College Department of Mathematics
Gateway – Basic Trigonometry
Help Sheet

This sheet is to provide you with further information as you work toward achieving 90% proficiency on this gateway about **trigonometry**. As you look through the key ideas below, try to create a realistic picture of what you understand and what you don't — the first attempt at the gateway should help you with this. While preparing for the second attempt, you should take full advantage of working with your peers, seeking help from other students (both in this course and others), seeing the peer counselors and professional staff at the Center for Teaching and Learning, and talking with your professors.

1. Remember that there are 2π radians and 360° in a circle. Thus $\text{RADIANS} = \frac{2\pi}{360}\text{DEGREES}$ or $\text{DEGREES} = \frac{360}{2\pi}\text{RADIANS}$. Ex: Convert $\frac{3\pi}{2}$ radians to degrees.

2. An angle of 0 radians would be two line segments on top of each other (no angle between them). An angle of $\pi/2$ radians would be two line segments at a right angle. Other angles fall somewhere inbetween there. (Converting to degrees may work better for you, but you should eventually feel as comfortable working with radians!) Ex: Sketch an angle of $\frac{\pi}{3}$.

3. You need to find a table or chart and "know" the values for the basic trig functions (sin, cos, tan) of the basic angles $(0, \pi/6, \pi/4, \pi/3, \pi/2)$.

4. If you are asked to show an angle bigger than $\pi/2$, then the angle is bigger than a right angle. We usually begin on the positive x-axis and then draw the second line segment so that a certain angle is swept out. Ex: Sketch an angle of $\frac{2\pi}{3}$.

5. To find the values of sin, cos, and tan for an angle greater than $\pi/2$, you need to know in which quadrant these functions are positive and negative, and also the relationship between the given angle and the "fundamental" angles given in 3 above. Ex: $\sin(\frac{2\pi}{3}) =$

6. To find the value of sin, cos, or tan of an angle in a right triangle, you need to know the relationship between the length of the sides and the trig function of the angle. For instance, $\sin\theta = \dfrac{\text{Opposite Side}}{\text{Hypotenuse}}$.

7. Sometimes not all the information will be given for you to do 6 above. You may have to use the Pythagorean Theorem to find the length of one of the sides: $(\text{One Leg})^2 + (\text{Other Leg})^2 = (\text{Hypotenuse})^2$.

8. And sometimes we give you the angle and ask for the sides. You still use the same relationships you learned for 6. The unknown is just on the other side of the equation.

9. An example: What values of x, $0 \le x < 2\pi$, satisfy: $\sin(2x) = 1$? You must know that the sin function has value 1 when the angle is $\pi/2$, $5\pi/2$, $9\pi/2$, etc. Thus set $2x = \pi/2$ or $2x = 5\pi/2$ or $2x = 9\pi/2$, etc. Which of these x values fall in the given interval? $x = \pi/4$, $5\pi/4$. Only these first two values are in the given interval.

10. You need to know the graphs of $\sin(x)$ and $\cos(x)$ in any interval. Remember that it is important to know key values and show them on your graphs (e.g. x- and y- intercepts).