8.2 – The Unit Circle and Finding Exact Value (using the UC)

– **unit circle** → a circle with a radius of 1 and centered at (0 , 0) and has equation of $x^2 + y^2 = 1$

- **reference angle** → an acute angle formed between a drawn angle θ and the x-axis.
- **terminal point** → a point (x , y) that falls on the Unit Circle.
- **cosine function** → represents the x-coordinate of the terminal point of an angle on the Unit Circle.
- **sine function** → represents the y-coordinate of the terminal point of an angle on the Unit Circle.

Refer to **TRIG CHART / UNIT CIRCLE SHEET** to label parts of the Unit Circle:

1.) Complete the TRIG CHART → Use the 45 – 45 – right Δ and the 30 – 60 – right Δ
For quadrant angles (0° and 90°), use your calculator

2.) Label the degree measure ABOVE each pt on the Unit Circle (only use increments of 30°, 45°, 60°)

3.) Label the radian measure BELOW each pt on the Unit Circle (convert degree measure to radians)

4.) Draw diagonal lines through pairs of points that have the same reference number (angle):

a.) 30° and 210°, 150° and 330° } Ref Angle = 30°

b.) 45° and 225°, 135° and 315° } Ref Angle = 45°

c.) 60° and 240°, 120° and 300° } Ref Angle = 60°

5.) Label the terminal point (x , y) of each degree/radian measure → (x = cos θ , y = sin θ)

6.) Write in Quadrant #'s and where trig functions are positive (ALL SENIORS TAKE CALCULUS)

Example 1: Using your TC/UC Sheet, answer each question.

a.) What is the reference angle for the angle of 240°?	b.) What is the reference angle for the angle of $\frac{3\pi}{4}$?	c.) What is the reference angle for the angle of – 750°
d.) What is the terminal point for the angle of 510°?	e.) What is the terminal point for the angle of $-\frac{9\pi}{4}$?	f.) If you are at terminal pt (– 1 , 0) and move $\frac{7\pi}{4}$ CW, what angle did you stop at that is on the UC?

Steps to Find Exact Value of an Angle: Some answers contain radicals (**NO decimal answers**)

1.) Find the reference angle B – Use the "Coloring Coding key" to help determine this.
2.) Use Trig Chart to look up value using reference angle B.
3.) Use "Signs" Diagram of Trigonometric Functions to determine is value is positive or negative
* If finding the exact value of a quadrant angle (90°, 180°, 270°, or 360°) → use values in terminal points

Example 2: Using your TC/UC Sheet, find the exact value. Remember – NO DECIMALS!!!!

a.) sin 135° = _____	b.) cos 210° = _____	c.) cos 360° = _____	d.) tan – 780° = _____
e.) sin 390° = _____	f.) tan 270° = _____	g.) tan 150° = _____	h.) cos 315° = _____
i.) $\tan\left(\frac{7\pi}{6}\right)$ = _____	j.) $\cos\left(\frac{2\pi}{3}\right)$ = _____	k.) $\sin(-3\pi)$ = _____	l.) $\tan\left(\frac{15\pi}{4}\right)$ = _____