

# ALGEBRA 2H

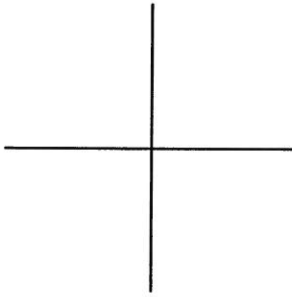
## Section 13.3: Trigonometric Functions of Any Angle

### NOTES

#### I. Special Triangles in all 4 Quadrants:

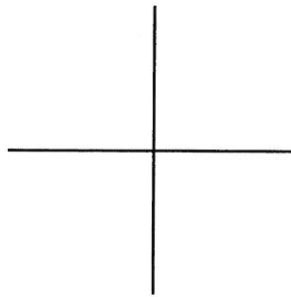
1.  $30^\circ - 60^\circ - 90^\circ$ : Find the exact value of each trig function using special triangles.

(a)  $\sin 60^\circ$



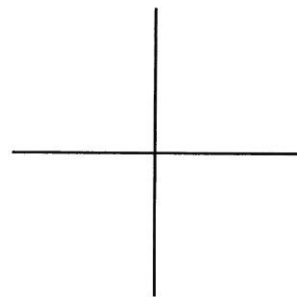
(a) \_\_\_\_\_

(b)  $\cos 120^\circ$



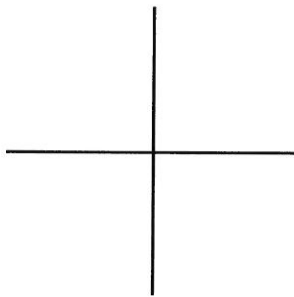
(b) \_\_\_\_\_

(c)  $\tan 210^\circ$



(c) \_\_\_\_\_

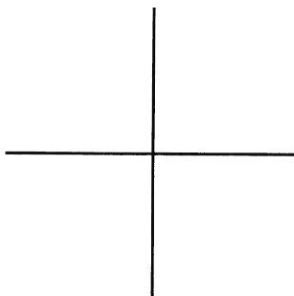
(d)  $\sin 690^\circ$



(d) \_\_\_\_\_

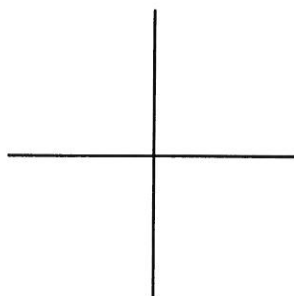
2.  $45^\circ - 45^\circ - 90^\circ$ : Find the exact value of each trig function using special triangles.

(a)  $\sin 135^\circ$



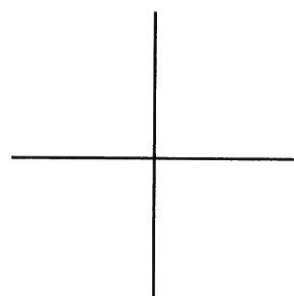
(a) \_\_\_\_\_

(b)  $\cos 225^\circ$



(b) \_\_\_\_\_

(c)  $\tan 315^\circ$

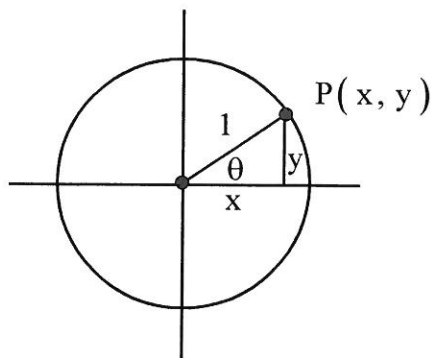


(c) \_\_\_\_\_



### III. The Unit Circle:

1. **Definition:** The unit circle is the circle centered at the origin with a radius of \_\_\_\_\_.



$$\sin \theta = \underline{\hspace{2cm}}$$

solve for y: \_\_\_\_\_

$$\cos \theta = \underline{\hspace{2cm}}$$

solve for x: \_\_\_\_\_

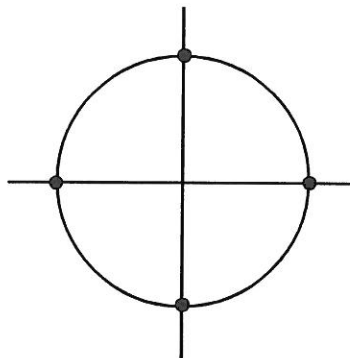
$$\tan \theta = \underline{\hspace{2cm}}$$

Therefore the coordinates of point P are \_\_\_\_\_.

2. The **unit circle** can be used to find the trig value at any angle, even  $0^\circ$ ,  $90^\circ$ ,  $180^\circ$ , and  $270^\circ$ .

- (a) Fill in the coordinates of each point on the circle that is on the x or y axis.

<p><b>Note:</b> <math>\sin \theta = y</math></p> <p><math>\cos \theta = x</math></p>
--



- (b) Now use the unit circle to evaluate each of the following trig functions.

$$\sin 0^\circ = \underline{\hspace{2cm}}$$

$$\cos 0^\circ = \underline{\hspace{2cm}}$$

$$\sin 90^\circ = \underline{\hspace{2cm}}$$

$$\cos 90^\circ = \underline{\hspace{2cm}}$$

$$\sin 180^\circ = \underline{\hspace{2cm}}$$

$$\cos 180^\circ = \underline{\hspace{2cm}}$$

$$\sin 270^\circ = \underline{\hspace{2cm}}$$

$$\cos 270^\circ = \underline{\hspace{2cm}}$$

The coordinates of all the points on the unit circle that line up with any angle that is a multiple of 30 or 45 can be calculated and used to evaluate trig functions. The unit circle on the next page has all this information on it.

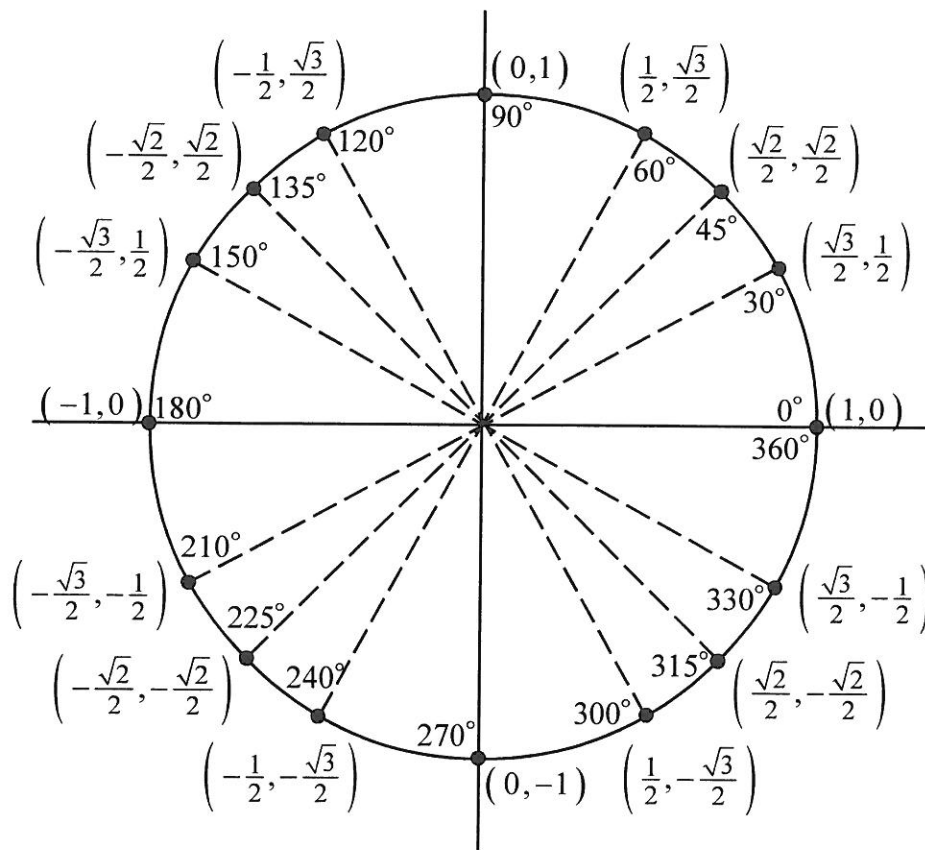
#### IV. The Unit Circle:

Notes: The coordinates at any point on the unit circle are  $(\cos \theta, \sin \theta)$ .

$$x = \cos \theta$$

$$y = \sin \theta$$

$$\tan \theta = \frac{y}{x}$$



Examples: Use the unit circle to find the exact values of each trig function.

(a)  $\sin 60^\circ =$  \_\_\_\_\_

(b)  $\cos 150^\circ =$  \_\_\_\_\_

(c)  $\tan 30^\circ =$  \_\_\_\_\_

(d)  $\sin 210^\circ =$  \_\_\_\_\_

(e)  $\cos 405^\circ =$  \_\_\_\_\_

(f)  $\tan 180^\circ =$  \_\_\_\_\_

(g)  $\sin 315^\circ =$  \_\_\_\_\_

(h)  $\cos 300^\circ =$  \_\_\_\_\_

(i)  $\tan 90^\circ =$  \_\_\_\_\_

(j)  $\tan 225^\circ =$  \_\_\_\_\_