First Name: Adam Last Name: Chen Student ID: _____

# Trigonometric Functions (1)

**1.** Convert the following radian measures to degrees and degree measures to radians.

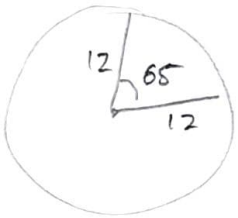
| Radian | Degree |
|---|---|
| $\frac{-5\pi}{6}$ | $-150^\circ$ |
| $\frac{2}{3}\pi$ | 120° |
| $8\pi$ | $1440^\circ$ |
| $-\frac{7}{4}$ | −315° |
| 4 | $229.18^\circ$ |
| $\frac{13}{4}\pi$ | 585° |

**2.** A sector has a radius of 12 cm and a central angle of 65°. Determine

a. the measure of the central angle in radians,

b. the area of the sector, and

c. the perimeter of the sector




a) $\frac{13}{36}\pi$

b) $\pi r^2 \cdot \frac{\frac{13}{36}\pi}{2\pi} = 26\pi \text{ cm}^2$

c) $2 \cdot 12 + 2\pi r \cdot \frac{\frac{13}{36}\pi}{2\pi} = 37.61 \text{ cm}$

**3.** Determine the principal angle for the following angles.

a. 540°

b. $\frac{13\pi}{6}$

c. $-\frac{19\pi}{4}$

a) 180 b) $\frac{1}{6}\pi$ c) $\frac{5}{4}\pi$

→ integer multiples

**4.** Determine all coterminal angles that lie in the interval $-4\pi \le \vartheta \le 4\pi$, for the following angles.

a. $\frac{3\pi}{2}$

b. $-\frac{5\pi}{3}$

a) $-\frac{5}{2}\pi, -\frac{1}{2}\pi, \frac{3\pi}{2}, \frac{7}{2}\pi$

b) $-\frac{11}{3}\pi, -\frac{5}{3}\pi, \frac{1}{3}\pi, \frac{7}{3}\pi$

**5.** Determine the exact value of the following

a. sin(300°)

$-\frac{\sqrt{3}}{2}$

b. tan(−135°)

1

c. csc(150°)

$= \frac{1}{\sin(150)} = 2$

d. sec(45°)

$= \frac{1}{\cos(45)} = \sqrt{2}$

e. $\cos(\frac{4\pi}{3})$

$-\frac{1}{2}$

f. $\sin(-\frac{3\pi}{4})$

$-\frac{\sqrt{2}}{2}$

g. $\cot(-\frac{11\pi}{6})$

$= \frac{\cos(-\frac{11\pi}{6})}{\sin(-\frac{11\pi}{6})} = \sqrt{3}$

h. $\cos(\frac{15\pi}{2})$

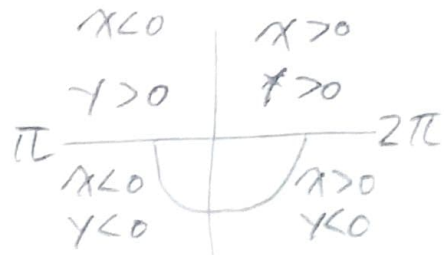
$= 0$

**6.** If $\tan(\theta) = \frac{1}{\sqrt{3}}$ and $\pi \le \theta \le 2\pi$, determine the values of $\sin(\theta)$ and $\sec(\theta)$.

$\theta = \tan^{-1}\left(\frac{1}{\sqrt{3}}\right) = \frac{1}{6}\pi$ Q3

$\frac{1}{6}\pi + \pi = \frac{7}{6}\pi$

$\sin\theta = -\frac{1}{2}$ $\cos\theta = -\frac{2\sqrt{3}}{3}$




tan>0 where sign of x,y are equal

**7.**

a. If $\csc(\theta) = 2$ and $\tan(\theta) < 0$, determine the exact value of $\cos(\theta)$.

b. If $\sec(\theta) = \frac{13}{5}$ and $0 \le \theta \le 2\pi$, determine the exact value(s) of $\sin(\theta)$.

a) $\sin\theta = \frac{1}{2}$ in Q 1, 2

$\tan\theta < 0$ in Q 2, 4

In Q 2, cos<0 because x<0

$\theta = \frac{1}{6}\pi + \pi = \frac{7}{6}\pi$

$\cos\theta = -\frac{\sqrt{3}}{2}$

b)

$\cos\theta = \frac{5}{13}$ in Q 1, 4

$\cos^2\theta + \sin^2\theta = 1$

$\sin^2\theta = 1 - \frac{25}{169}$ $\sin^2\theta = \frac{144}{169}$ $\sin\theta = \pm\frac{12}{13}$

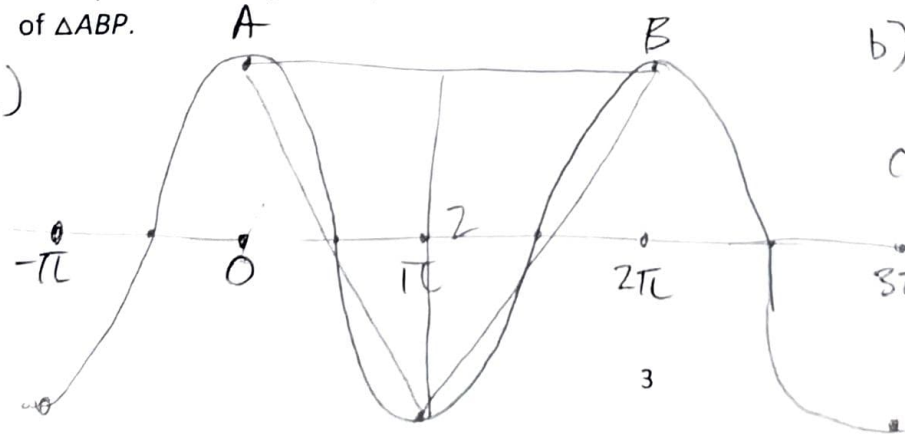
**8.**

a. Sketch the graph of $y=\cos(x)$ for $-\pi \le x \le 3\pi$.

b. Identify the two local maximum points on this graph. Label these two points *A* and *B*.

c. Let point *P* be any other point on the graph of $y=\cos(x)$. Determine the largest possible area of $\triangle ABP$.

a)




b) $A = (0, 1)$

$B = (2\pi, 1)$

c) $\overline{AB} = 2\pi$ $A = \frac{bh}{2}$

$h = 2$ $A = \frac{2\pi \cdot 2}{2}$

$= 2\pi$