

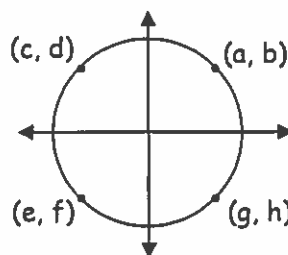
Part A: Place the letter of the correct response in the space provided.

1. Convert to radian measure: $214''$ 1. _____
 (A) 0.59 (B) 1.19 (C) 3.73 (D) 12261.30

2. Convert to degree measure: 5 radians 2. _____
 (A) 900° (B) 286.5° (C) 0.087° (D) $5\pi''$

3. In the following diagram of the unit circle, which coordinate would represent $\sin\left(-\frac{5\pi}{4}\right)$? 3. _____

- (A) c (B) d (C) e (D) f



4. Which angle is **coterminal** to 800° ? 4. _____
 (A) -80° (B) -280° (C) 240° (D) 360°

5. Which of the following represents the **reference angle** for a 240° rotation? 5. _____
 (A) 30° (B) 45° (C) 60° (D) 90°

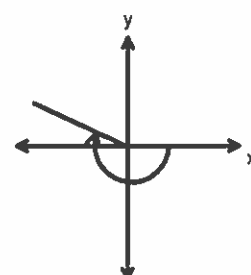
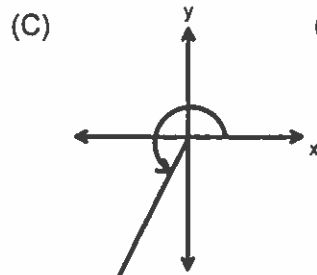
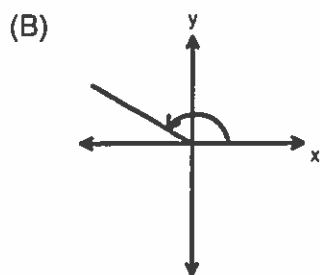
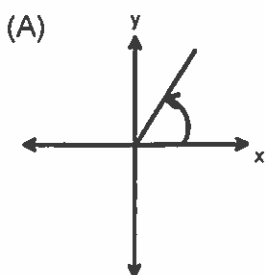
6. In the unit circle, the sines of θ are **positive** in which quadrants? 6. _____
 (A) I and II (B) I and IV (C) II and III (D) III and IV

7. Find the **exact coordinates** of the point on the terminal arm of an angle of $\frac{17\pi}{6}$ which is in standard position in the unit circle. 7. _____

- (A) $\left(\frac{-\sqrt{3}}{2}, \frac{-1}{2}\right)$ (B) $\left(\frac{-\sqrt{3}}{2}, \frac{1}{2}\right)$ (C) $\left(\frac{-1}{2}, \frac{-\sqrt{3}}{2}\right)$ (D) $\left(\frac{1}{2}, \frac{-\sqrt{3}}{2}\right)$

8. In the unit circle, the cosines of θ are **negative** in which quadrants? 8. _____
 (A) I & II (B) I & IV (C) II & III (D) III & IV

9. Which of the following graphs represents the angle of $\frac{5\pi}{6}$ drawn in standard position? 9. _____



10. What is the exact value of $\sin^2 \frac{5\pi}{4} + \cos \frac{2\pi}{3}$? 10. _____
- (A) 0 (B) $\frac{1+\sqrt{3}}{2}$ (C) 1 (D) $\frac{1-\sqrt{3}}{2}$
11. Solve $4\cos^2 x = 3$, $x \in [0, 2\pi)$? 11. _____
- (A) $\frac{\pi}{6}, \frac{11\pi}{6}$ (B) $\frac{\pi}{3}, \frac{5\pi}{3}$
 (C) $\frac{\pi}{6}, \frac{5\pi}{6}, \frac{7\pi}{6}, \frac{11\pi}{6}$ (D) $\frac{\pi}{3}, \frac{2\pi}{3}, \frac{4\pi}{3}, \frac{5\pi}{3}$
12. What is the arc length of a 230° angle in a circle with a diameter of 6 cm? 12. _____
- (A) $\frac{23\pi}{3}$ cm (B) 16π cm (C) $\frac{23\pi}{6}$ cm (D) 390 cm
13. If $\cos x = -\frac{\sqrt{3}}{2}$, then find x . ($0^\circ \leq x < 360^\circ$) 13. _____
- (A) $30^\circ, 330^\circ$ (B) $30^\circ, 150^\circ$ (C) $210^\circ, 330^\circ$ (D) $150^\circ, 210^\circ$
14. Solve: $9\tan^2 x = 3$, $x \in [0, 2\pi)$ 14. _____
- (A) $\frac{\pi}{6}, \frac{7\pi}{6}$ (B) $\frac{\pi}{3}, \frac{4\pi}{3}$
 (C) $\frac{\pi}{6}, \frac{5\pi}{6}, \frac{7\pi}{6}, \frac{11\pi}{6}$ (D) $\frac{\pi}{3}, \frac{2\pi}{3}, \frac{4\pi}{3}, \frac{5\pi}{3}$
15. Solve $3\tan x - 2 = 0$ for x , where $0^\circ \leq x < 360^\circ$ 15. _____
- (A) $34^\circ, 326^\circ$ (B) $34^\circ, 146^\circ$ (C) $34^\circ, 214^\circ$ (D) $214^\circ, 326^\circ$
16. Solve for ALL values of x : $2\sin x = 1$ 16. _____
- (A) $x = \begin{cases} 30^\circ + 360^\circ k, k \in I \\ 150^\circ + 360^\circ k, k \in I \end{cases}$ (B) $x = \begin{cases} 60^\circ + 360^\circ k, k \in I \\ 120^\circ + 360^\circ k, k \in I \end{cases}$
 (C) $x = \begin{cases} 30^\circ + 180^\circ k, k \in N \\ 150^\circ + 180^\circ k, k \in N \end{cases}$ (D) $x = \begin{cases} 30^\circ + 180^\circ k, k \in I \\ 60^\circ + 180^\circ k, k \in I \end{cases}$
17. Solve $2\sin^2 x - 1 = 0$ for x , where $0 \leq x < 2\pi$. 17. _____
- (A) $\frac{\pi}{4}, \frac{3\pi}{4}$ (B) $\frac{5\pi}{4}, \frac{7\pi}{4}$ (C) $\frac{\pi}{4}, \frac{3\pi}{4}, \frac{5\pi}{4}, \frac{7\pi}{4}$ (D) $\frac{\pi}{6}, \frac{5\pi}{6}$
18. Solve $2\sin x \cos x + \cos x = 0$ for x , where $0^\circ \leq x < 360^\circ$ 18. _____
- (A) $90^\circ, 270^\circ, 210^\circ, 330^\circ$ (B) $90^\circ, 270^\circ, 150^\circ, 30^\circ$
 (C) $0^\circ, 180^\circ, 210^\circ, 330^\circ$ (D) $0^\circ, 180^\circ, 150^\circ, 30^\circ$

19. In which quadrant are the values of cotangent negative and the cosecants positive? 19. _____
 (A) I (B) II (C) III (D) IV
20. If $\cos x = -0.483$, then a value of x could be _____. 20. _____
 (A) 61° (B) 299° (C) 241° (D) -0.483
21. What is the measure of the radius of a circle if an arclength of 42 ft. is subtended by an angle of $\frac{7\pi}{4}$? 21. _____
 (A) 7.64 ft. (B) 230.91 ft (C) 315 ft (D) 7.5 ft
22. Which of the following expressions will generate all angles which are coterminal with an angle of $\frac{2\pi}{3}$? 22. _____
 (A) $-\frac{2\pi}{3} + 2\pi n, n \in \mathbb{N}$ (B) $-\frac{2\pi}{3} + 2\pi n, n \in \mathbb{I}$
 (C) $\frac{2\pi}{3} + 2\pi n, n \in \mathbb{I}$ (D) $\frac{\pi}{3} + 2\pi n, n \in \mathbb{I}$
23. Determine the equation of the circle whose centre is at $(0,0)$ with a radius of $2\sqrt{3}$. 23. _____
 (A) $x^2 + y^2 = 2\sqrt{3}$ (B) $x^2 + y^2 = 6$ (C) $x^2 + y^2 = 12$ (D) $x^2 + y^2 = 1$
24. Determine which of the points lies on the circle with equation $x^2 + y^2 = 49$. 24. _____
 (A) $P(1,7)$ (B) $P(6, \sqrt{13})$ (C) $P(-1,7)$ (D) $P(0,49)$
25. Given that $P\left(\frac{1}{4}, y\right)$ is a point on the unit circle, what are the possible value(s) for y ? 25. _____
 (A) $\frac{15}{16}$ (B) $\frac{\sqrt{15}}{4}$ (C) $\pm \frac{\sqrt{15}}{4}$ (D) $\pm \frac{\sqrt{15}}{16}$

Part B:

26. Find the exact value of each of the following expressions:

A)
$$\frac{\cos^2 \frac{3\pi}{4} + 3 \sin \frac{\pi}{2}}{\cos \frac{4\pi}{3}}$$

B)
$$4 \sin^2 \frac{2\pi}{3} + \cos \frac{4\pi}{3} \sin \left(-\frac{\pi}{6}\right)$$

C)
$$4 \cot^2 \frac{7\pi}{6}$$

D)
$$\csc \left(\frac{\pi}{3}\right) + \cot \left(\frac{11\pi}{4}\right)$$

27. Solve each trigonometric equation for ALL values of x .

a) $2 \cos^2 x + \cos x = 1$

b) $\sin x = \sqrt{3} \cos x$

c) $4 \sin^2 x - 3 = 0$

d) $2 \cos x - 1 = 3 \cos x$

28. Solve for x , where $-90^\circ \leq x \leq 400^\circ$

a) $2 \cos^2 x - 1 = 0$

b) $2 \sin^2 x = \sin x$

c) $6 \sin^2 x + \sin x - 1 = 0$

29. Solve for x for the domain $0 \leq x < 2\pi$.

a) $\sqrt{2} \csc x - 2 = 0$

b) $\sec\left(x - \frac{\pi}{2}\right) = -1$

c) $\csc^2 x + \csc x - 2 = 0$

d) $4 \cos^2 x + \cos x - 3 = 0$

e) $6 \sec^2 x - 24 = 0$

f) $3 \sec^2 x + 11 \sec x + 10 = 0$

30. Given each of the following points lie at the intersection of a circle and the terminal arm of an angle in standard position,

i) sketch the diagram

ii) determine the values of the six trigonometric ratios

iii) determine the angle of rotation from standard position

a) $P\left(\frac{12}{13}, -\frac{5}{13}\right)$

b) $P\left(-\frac{1}{2}, -\frac{\sqrt{3}}{2}\right)$

c) $P(-5, 4)$

31. a) Given $\cos \theta = \frac{3}{5}$, $\pi \leq \theta \leq 2\pi$, determine the value of $\csc \theta$.

b) Given $\csc \theta = 4.5$, $\frac{\pi}{2} \leq \theta \leq \frac{3\pi}{2}$, determine the value of $\tan \theta$

c) Given $\sin \theta = -\frac{1}{2}$, $-90^\circ \leq \theta \leq 90^\circ$, determine the value of $\cot \theta$.

32. Find the distance between two points $P(-5, -12)$ and $P(-12, -5)$ on a circle with centre at the origin.

33. Given $g(\theta) = \cos^2 \theta - 3$ and $p(\theta) = 2 \cos \theta$, determine the values of θ such that $g(\theta) = p(\theta)$ where $\theta \in [0, 4\pi]$

34. The following solution contains two errors. Identify the errors and find the correct solution.

$$2 \cos^2 \theta - \cos \theta - 1 = 0 \quad 0 \leq \theta < 360^\circ$$

$$(2 \cos \theta + 1)(\cos \theta - 1) = 0$$

$$\cos \theta = \frac{1}{2} \quad \cos \theta = -1$$

$$\theta = 60^\circ, 180^\circ$$