**PreCalc 12 Chapter 6 Review 2017 v1**

**Multiple Choice**

*Identify the choice that best completes the statement or answers the question.*

**Easy**

1. What is the value of \( \csc 226^\circ \) to the nearest thousandth?
   - A. \(-0.719\)  
   - B. \(-1.390\)  
   - C. \(-1.440\)  
   - D. \(1.390\)

2. Which of these angles is NOT coterminal with an angle of \(-350^\circ\) in standard position?
   - A. \(10^\circ\)  
   - B. \(-170^\circ\)  
   - C. \(-710^\circ\)  
   - D. \(370^\circ\)

3. What is the length of the arc that subtends a central angle of \(-25^\circ\) in the unit circle?
   - A. \(\frac{5}{36}\pi\) units  
   - B. \(\frac{5}{72}\pi\) units  
   - C. \(\frac{5}{36}\pi\) units  
   - D. \(\frac{36}{5}\pi\) units

4. What is the length of the arc that subtends a central angle of \(330^\circ\) in a circle with radius 9 units?
   - A. \(\frac{11}{6}\pi\) units  
   - B. \(\frac{1}{20}\pi\) units  
   - C. \(\frac{33}{2}\pi\) units  
   - D. \(\frac{33}{4}\pi\) units

5. What is \(-570^\circ\) in radians?
   - A. \(-570\pi\) radians  
   - B. \(-\frac{102 600}{\pi}\) radians  
   - C. \(-\frac{19}{6}\pi\) radians  
   - D. \(-\frac{19}{6}\) radians

6. What is the value of \(\tan(-3.6)\) to the nearest hundredth?
   - A. \(-0.49\)  
   - B. \(3.08\)  
   - C. \(-2.03\)  
   - D. \(-0.06\)
7. What expression represents the measures of all the angles coterminal with \(-118^\circ\) in standard position?

A. \(-118^\circ + k180^\circ, k \in \mathbb{Z}\)
B. \(62^\circ + k360^\circ, k \in \mathbb{Z}\)
C. \(-118^\circ + k360^\circ, k \in \mathbb{R}\)
D. \(242^\circ + k360^\circ, k \in \mathbb{Z}\)

8. Graph \(y = \sin x\) using graphing technology.
What is the range of \(y = \sin x\)?

A. \(y \in \mathbb{R}\)
B. \(-1 \leq y \leq 1\)
C. \(y \geq 0\)
D. \(0 \leq y \leq 2\pi\)

9. What is the period of the function \(y = \sin 7x\)?

A. \(\frac{7}{2\pi}\)
B. \(\frac{2\pi}{7}\)
C. \(\frac{\pi}{7}\)
D. \(-\frac{2\pi}{7}\)

10. Which function below describes this graph?

A. \(y = \sin x + 4\)
B. \(y = \sin x\)
C. \(y = 4 \sin x\)
D. \(y = \sin(x - 4)\)

11. What is the phase shift of the function \(y = \cos\left(x - \frac{\pi}{3}\right)\)?

A. \(-\frac{7\pi}{3}\)
B. \(\frac{5\pi}{3}\)
C. \(-\frac{\pi}{3}\)
D. \(\frac{\pi}{3}\)
12. Which function below describes this graph?

![Graph](image)

A. $y = 2 \cos x$
B. $y = \cos x$
C. $y = \cos x - 2$
D. $y = \cos x - 1$

13. Describe the transformations that would be applied to the graph of $y = \sin x$ to get the graph of $y = 8 \sin \left( x - \frac{4\pi}{5} \right)$.

A. A vertical stretch by a factor of 8, and then a translation of $\frac{4\pi}{5}$ units right
B. A vertical stretch by a factor of 8, and then a translation of $\frac{4\pi}{5}$ units left
C. A vertical stretch by a factor of $\frac{4\pi}{5}$, and then a translation of 8 units right
D. A horizontal stretch by a factor of 8, and then a translation of $\frac{4\pi}{5}$ units right

14. What is the equation of the centre line of the graph of the function $y = 4 \cos \left( x + \frac{\pi}{2} \right) - 8$?

A. $y = -8$
B. $y = -32$
C. $y = \frac{\pi}{2}$
D. $y = -4$

15. Describe the transformations that would be applied to the graph of $y = \sin x$ to get the graph of $y = \sin \left( \frac{1}{3} x \right) - 6$.

A. A horizontal compression by a factor of $\frac{1}{3}$, and then a translation of 6 units down
B. A vertical stretch by a factor of 3, and then a translation of 6 units down
C. A horizontal stretch by a factor of 6, and then a translation of $\frac{1}{3}$ units right
D. A horizontal stretch by a factor of 3, and then a translation of 6 units down
Moderate (Show work for non-MC)

16. Graph \( y = \tan x \) using graphing technology.
   Which of these values is NOT an \( x \)-intercept of \( y = \tan x \)?

   A. \( 4\pi \)  
   B. \( -3\pi \)  
   C. \( \frac{8\pi}{3} \)  
   D. \( 3\pi \)

17. Which function below describes this graph?

   ![Graph Image]

   A. \( y = \sin x \)  
   B. \( y = \sin x + 5 \)  
   C. \( y = 5\sin x \)  
   D. \( y = \sin 5x \)

18. Which number is NOT in the domain of \( y = \tan 4x \)?

   A. \( -\frac{1}{2}\pi \)  
   B. \( \frac{7}{8}\pi \)  
   C. \( \frac{3}{4}\pi \)  
   D. \( -\frac{3}{4}\pi \)

19. Which function below describes this graph?

   ![Graph Image]

   A. \( y = \frac{1}{8}\cos x \)  
   B. \( y = \cos \left( \frac{x}{8} \right) \)  
   C. \( y = \cos \left( x + \frac{\pi}{8} \right) \)  
   D. \( y = \cos x \)
20. What is the range of the function \( y = 4 \cos \left( x - \frac{\pi}{2} \right) - 7 \)?

A. \( -11 \leq y \leq -3 \)  
B. \( 3 \leq y \leq 11 \)  
C. \( -3 \leq y \leq 11 \)  
D. \( -10 \leq y \leq -4 \)

21. What equation represents a sine function with amplitude 7, period \( \frac{\pi}{4} \), equation of centre line \( y = 1 \), and phase shift \( -\frac{2\pi}{5} \)?

A. \( y = 7 \sin \left( \frac{2\pi}{5} \left( x - \frac{2\pi}{5} \right) \right) + 1 \)  
B. \( y = 7 \sin \left( \frac{1}{4} x - 1 \right) - \frac{2\pi}{5} \)  
C. \( y = 7 \sin \left( \frac{1}{4} x + \frac{2\pi}{5} \right) + 1 \)  
D. \( y = 7 \sin \left( \frac{2\pi}{5} \left( x + \frac{2\pi}{5} \right) \right) + 1 \)

22. What is the period of the function \( y = 6 \sin \left( \frac{2\pi}{7} (x - 6) - 5 \right) \)?

A. \( 7 \)  
B. \( \frac{1}{7} \)  
C. \( \frac{1}{3} \)  
D. \( 1 \)

23. Suppose the function \( y = 16 \cos \left( \frac{2\pi}{5} (x - 2.5) \right) + 18 \) models the height, \( y \) metres, of a seat on a Ferris wheel at any time \( x \) minutes after the wheel begins to rotate. How long does it take the Ferris wheel to complete one full rotation?

A. \( \frac{1}{5} \) min  
B. 16 min  
C. 5 min  
D. 18 min

24. Suppose the function \( y = 12 \cos \left( \frac{2\pi}{5} (x - 2.5) \right) + 14 \) models the height, \( y \) metres, of a seat on a Ferris wheel at any time \( x \) minutes after the wheel begins to rotate. After how many minutes is the seat at the top of the wheel for the first time?

A. 12 min  
B. 2.5 min  
C. 38 min  
D. 5 min
25. Which function below best describes this graph?

A. \( y = \sin \left( \frac{5}{\pi} (x - 2) \right) - 3 \)  
B. \( y = \sin \left( \frac{\pi}{5} (x + 2) \right) - 3 \)  
C. \( y = \sin \left( \frac{\pi}{5} (x - 2) \right) - 3 \)  
D. \( y = \sin \left( \frac{5}{\pi} (x + 2) \right) - 3 \)

26. The angle 40° is shown below in standard position.  
Sketch a coterminal angle between –360° and 0° on the same axes.  
Label the angle with its measure.

27. Determine the measures of all angles between –760° and 320° that are coterminal with an angle of 492° in standard position.

28. What is the range of the function \( y = 6 \cos x \)?
29. Sketch the angle $-385^\circ$ in standard position, then identify the reference angle.

30. Identify the following characteristics of the graph of the cosine function shown below.
   - amplitude
   - period
   - equation of the centre line
   - phase shift

Moderate (Show work for non-MC)

31. Determine the exact value of \( \cot \left( -\frac{\pi}{4} \right) \).

32. Write an equation for a sine function with maximum value 9, minimum value 1, period \( \frac{2\pi}{9} \), and phase shift \( \frac{3\pi}{4} \).
33. Write an equation for a sinusoidal function that models the data graphed below.

34. A table fan has a mark on the tip of one blade. The equation \( y = 23\cos(5\pi x) + 38 \) represents the height of the mark, \( y \) centimetres, above the table \( x \) seconds after the fan is turned on. What is the height of the mark above the table when it is closest to the table?

**Difficult** (Show work for non-MC)

35. An arc is marked on the circumference of a circle. The central angle subtended by the arc measures \( \frac{6\pi}{5} \) radians. The sector of the circle formed by the arc and the radii that intersect the endpoints of the arc has area 38.3 cm\(^2\). To the nearest tenth of a centimetre, determine the radius of the circle.

**Problem**

**Moderate** (Show work for non-MC)

36. \( P(-9,40) \) is a terminal point of angle \( \theta \) in standard position. Determine the exact values of the six trigonometric ratios for \( \theta \).
37. Given \( \cot \theta = 3 \), determine all possible measures of angle \( \theta \) in the domain \(-360^\circ \leq \theta \leq 360^\circ\).
Give the answers to the nearest degree.

38. A unicycle wheel has diameter 36 in. Suppose a positive angle of rotation corresponds to the wheel moving forward. Determine the distance and the direction the wheel will roll when it turns through an angle of \(-30^\circ\).
Express the exact distance, in inches, in terms of \( \pi \).

39. \( P(2,-8) \) is a terminal point of angle \( \theta \) in standard position.
Determine all possible measures of \( \theta \) in the domain \(-3\pi \leq \theta \leq \pi\).
Give the answers to the nearest tenth of a radian.

40. Given \( \csc \theta = 7 \), determine all possible measures of angle \( \theta \) in the domain \(-2\pi \leq \theta \leq 2\pi\).
Give the answers to the nearest tenth of a radian.

41. Sketch the graph of a sine function with amplitude 3, period \( 4\pi \), equation of centre line \( y = -2 \), and phase shift \( \frac{\pi}{4} \).
Label the graph with its equation.
**Difficult** (Show work for non-MC)

42. A car tire rolls onto a nail, which punctures the tire. The function graphed below models the height in centimetres of the head of the nail above the ground at any time \( t \) seconds after the nail punctured the tire. What is the average speed of the car to the nearest kilometre per hour?

![Graph of Height of Nail Head vs Time](image)

43. In this diagram, both circles have centre O. The smaller circle has radius \( OD = 5 \) m, and the larger circle has radius \( OB = 10 \) m. Given \( \angle AOB = \frac{4\pi}{5} \), determine the exact area of the shaded region.

![Diagram of Two Circles](image)