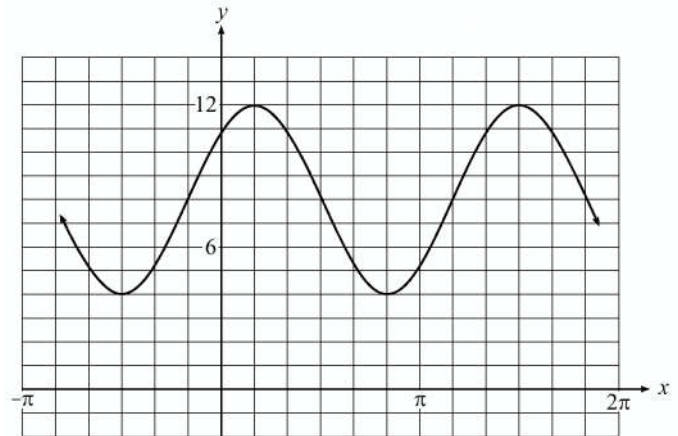


86. Which equation represents the sine function shown?

- A.  $y = 4 \sin \left[ \frac{4}{3} \left( x + \frac{\pi}{6} \right) \right] + 8$   
 B.  $y = 4 \sin \left[ \frac{4}{3} \left( x - \frac{\pi}{6} \right) \right] + 8$   
 C.  $y = 4 \sin \left[ \frac{3}{2} \left( x - \frac{\pi}{6} \right) \right] + 8$   
 D.  $y = 4 \sin \left[ \frac{3}{2} \left( x + \frac{\pi}{6} \right) \right] + 8$



87. A wheel rolling along the ground has a radius of 32 cm and rotates once every 8 seconds. At time  $t = 0$  seconds, a point  $P$  on the outside edge of the wheel is touching the ground. Determine a cosine function that gives the height,  $h$ , of point  $P$  above the ground at any time,  $t$ , where  $h$  is in cm and  $t$  is in seconds.

- A.  $h(t) = -32 \cos \left[ \frac{\pi}{4} t \right]$   
 B.  $h(t) = -32 \cos [2\pi t]$   
 C.  $h(t) = -32 \cos \left[ \frac{\pi}{4} t \right] + 32$   
 D.  $h(t) = -32 \cos [2\pi t + 32]$

JAN 2003

88. Determine the range of the function  $y = 4 \cos x - 2$ .

- A.  $-4 \leq y \leq 4$       B.  $-2 \leq y \leq 6$       C.  $-6 \leq y \leq 2$       D.  $2 \leq y \leq 6$

89. Determine the exact value of  $\cot \frac{5\pi}{3}$ .

- A.  $\sqrt{3}$       B.  $-\sqrt{3}$       C.  $\frac{1}{\sqrt{3}}$       D.  $-\frac{1}{\sqrt{3}}$

90. Determine the period of the function  $f(x) = -\frac{1}{2} \sin \frac{x}{3}$ .

- A.  $\frac{2\pi}{3}$       B.  $\pi$       C.  $4\pi$       D.  $6\pi$

91. Solve:  $2 \sin x + 1 = 0$ ,  $0 \leq x < 2\pi$

- A.  $-\frac{\pi}{6}, -\frac{5\pi}{6}$       B.  $\frac{\pi}{6}, \frac{5\pi}{6}$       C.  $\frac{7\pi}{6}, \frac{11\pi}{6}$       D.  $\frac{4\pi}{3}, \frac{5\pi}{3}$

JUN 2003

92. Convert  $120^\circ$  to radians.

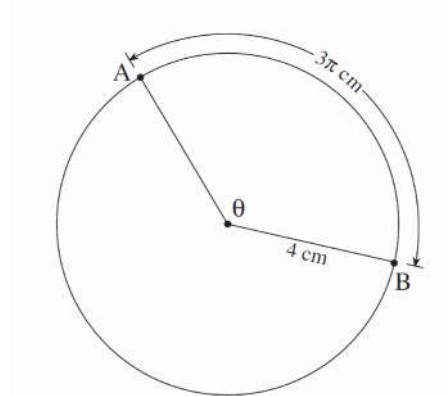
- A.  $\frac{2\pi}{3}$                       B.  $\frac{5\pi}{6}$                       C.  $\frac{3\pi}{2}$                       D.  $\frac{6\pi}{5}$

93. Determine the amplitude of  $y = -2 \sin 4\left(x - \frac{\pi}{3}\right) + 3$ .

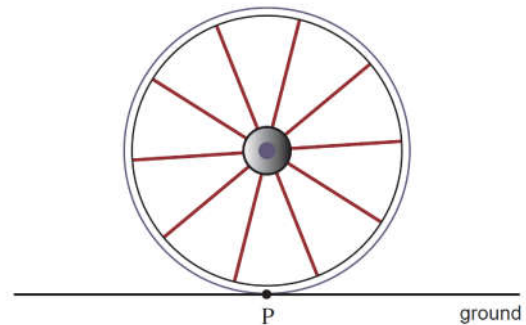
- A.  $-2$                       B.  $2$                       C.  $3$                       D.  $4$

94. A circle has a radius of 4 cm. If the length of arc AB shown on the diagram is  $3\pi$  cm, determine the measure of the central angle  $\theta$  in radians.

- A.  $\frac{3\pi}{4}$   
 B.  $\frac{4}{3\pi}$   
 C.  $\frac{3\pi}{2}$   
 D.  $3\pi$

95. A wheel with diameter 10 cm is rolling along the ground. Point P on the edge of the wheel is on the ground as shown in the diagram at the time  $t = 0$  seconds. Which equation gives the height,  $h$ , of point P above the ground at time  $t$  seconds, if the wheel rotates once every 12 seconds?

- A.  $h = -5 \cos \frac{\pi}{12}t$   
 B.  $h = -5 \cos \frac{\pi}{6}t$   
 C.  $h = -5 \cos \frac{\pi}{12}t + 5$   
 D.  $h = -5 \cos \frac{\pi}{6}t + 5$

96. The point  $(p, q)$  is the point of intersection of the terminal arm of angle  $\theta$  in standard position and the unit circle centred at  $(0, 0)$ . Which expression represents  $\sec \theta$ ?

- A.  $q$                       B.  $p$                       C.  $\frac{1}{q}$                       D.  $\frac{1}{p}$

97. Determine the equations of the asymptotes of the function  $y = \tan bx$ , where  $b > 0$ .

- A.  $x = \frac{n\pi}{b}$ ,  $n$  is an integer  
B.  $x = \frac{n\pi}{2b}$ ,  $n$  is an integer  
C.  $x = \frac{\pi}{b} + \frac{n\pi}{b}$ ,  $n$  is an integer  
D.  $x = \frac{\pi}{2b} + \frac{n\pi}{b}$ ,  $n$  is an integer

**JAN 2004**

98. Convert  $\frac{8\pi}{3}$  radians to degrees.

- A.  $60^\circ$                       B.  $120^\circ$                       C.  $240^\circ$                       D.  $480^\circ$

99. Determine the minimum value of the function  $y = -3 \sin 2x + 4$ .

- A.  $-7$                       B.  $-3$                       C.  $-1$                       D.  $1$

100. Determine the exact value of  $\sec \frac{5\pi}{4}$ .

- A.  $-\sqrt{2}$                       B.  $-\frac{1}{\sqrt{2}}$                       C.  $\frac{1}{\sqrt{2}}$                       D.  $\sqrt{2}$

101. The terminal arm of angle  $\theta$ , in standard position, passes through the point  $(-2, 9)$ . Determine the value of  $\sin \theta$ .

- A.  $\frac{-2}{\sqrt{77}}$                       B.  $\frac{9}{77}$                       C.  $\frac{-2}{\sqrt{85}}$                       D.  $\frac{9}{\sqrt{85}}$

102. In a seaport, the function  $d(t) = 2.6 \sin 0.25(t - 5) + 3.3$  can be used to approximate the depth of the water,  $d$  metres, at time  $t$  hours after midnight. Estimate the number of hours in the 24-hour interval at  $t = 0$  when the depth of the water is at least 3.5 metres.

- A. 5.31 h                      B. 11.95 h                      C. 17.26 h                      D. 23.90 h

**JUN 2004**

103. Determine the exact value of  $\cos \frac{7\pi}{4}$ .

- A.  $\frac{1}{\sqrt{2}}$                       B.  $\frac{\sqrt{3}}{2}$                       C.  $-\frac{\sqrt{3}}{2}$                       D.  $-\frac{1}{\sqrt{2}}$

104. In a circle with radius 12 cm an arc of length 20 cm subtends a central angle of  $\theta$ . Determine the measure of  $\theta$  in radians.
- A. 0.60                      B. 1.20                      C. 1.67                      D. 3.33
105. Solve:  $7 \tan x = -3$ ,  $0 \leq x < 2\pi$
- A. 2.74, 3.55              B. 2.74, 5.88              C. 0.40, 3.55              D. 0.40, 5.88
106. Give the period of  $f(x) = 3 \csc x$ .
- A.  $\frac{\pi}{3}$                       B.  $\pi$                       C.  $2\pi$                       D.  $3\pi$
107. Let  $\theta$  be an angle in standard position such that  $\tan \theta = \frac{2}{3}$  and  $\sin \theta < 0$ . Determine the exact value of  $\sec \theta$ .
- A.  $-\frac{\sqrt{13}}{2}$               B.  $-\frac{\sqrt{13}}{3}$               C.  $\frac{\sqrt{13}}{3}$                       D.  $\frac{\sqrt{13}}{2}$
108. For the function  $f(x) = 3 \sin bx + d$  where  $b$  and  $d$  are positive constants, determine an expression for the smallest positive value of  $x$  that produces the maximum value of  $f(x)$ .
- A.  $\frac{2\pi}{b}$                       B.  $\frac{\pi}{2b}$                       C.  $\frac{4\pi}{b}$                       D.  $\frac{\pi}{4b}$

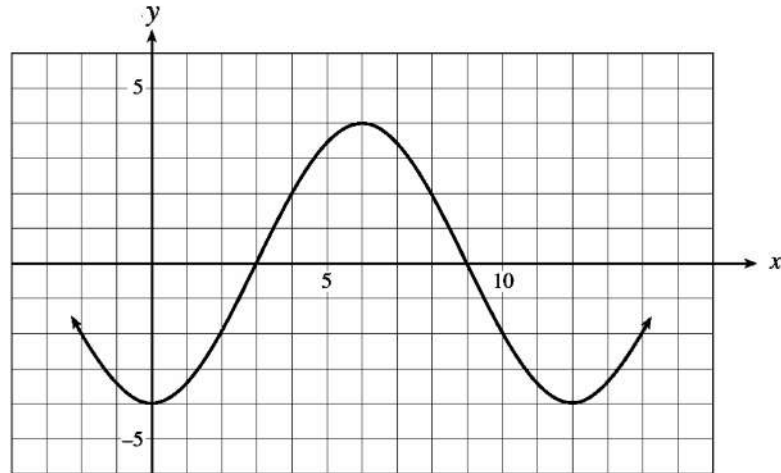
**AUG 2005**

109. Determine the amplitude of  $y = -2 \cos x - 3$ .
- A. -3                      B. -2                      C. 2                      D. 3
110. Evaluate:  $\sec \frac{4\pi}{3}$
- A. -2                      B.  $-\frac{2}{\sqrt{3}}$                       C.  $\frac{2}{\sqrt{3}}$                       D. 2

111. If  $\frac{\pi}{2} \leq \theta \leq \frac{3\pi}{2}$  and  $\tan \theta = -\frac{4}{3}$ , determine the exact value of  $\sin \theta$

- A.  $-\frac{4}{5}$                       B.  $-\frac{3}{5}$                       C.  $\frac{3}{5}$                       D.  $\frac{4}{5}$

112. Given the graph below, determine an equation of this function.



- A.  $y = -4 \cos \frac{\pi}{6}x$       B.  $y = 4 \cos \frac{\pi}{6}x$       C.  $y = -4 \cos \frac{\pi}{12}x$       D.  $y = 4 \cos \frac{\pi}{12}x$

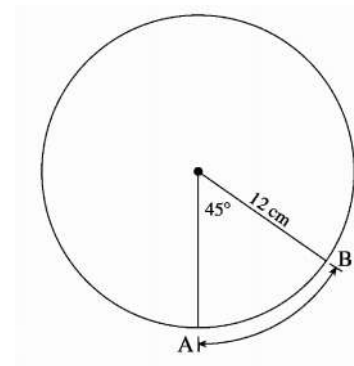
113. Determine the reference angle for  $\frac{7\pi}{5}$ .

- A.  $\frac{\pi}{5}$                       B.  $\frac{2\pi}{5}$                       C.  $\frac{3\pi}{5}$                       D.  $\frac{4\pi}{5}$

### AUG 2006

114. A circle has a radius of 12 cm. If the central angle is  $45^\circ$ , as shown in the diagram, determine the length of arc AB.

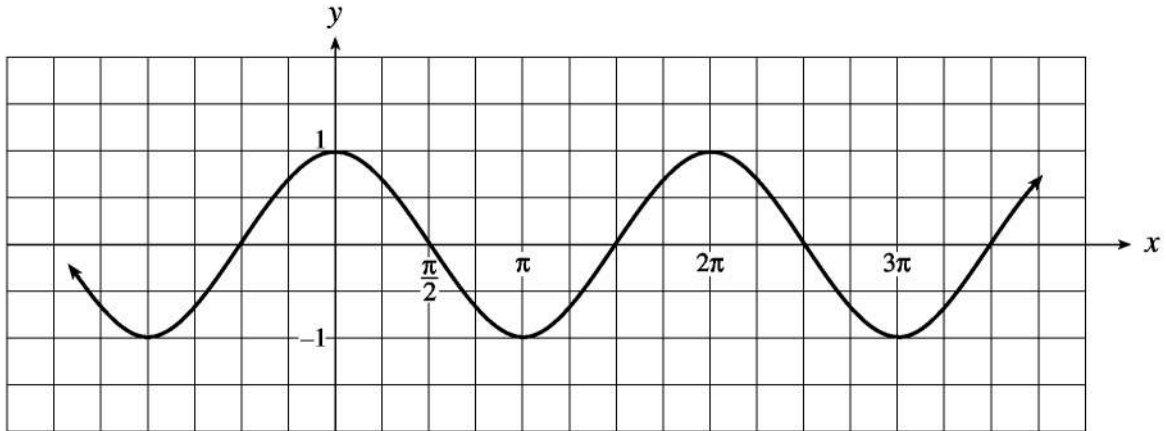
- A.  $2\pi$  cm  
B.  $3\pi$  cm  
C.  $4\pi$  cm  
D.  $6\pi$  cm



115. Determine the amplitude of the function  $y = -4 \cos(x - 2)$ .

- A.  $-4$                       B.  $-2$                       C.  $2$                       D.  $4$

116. Which equation represents the function graphed below?



A.  $y = \cos\left(x + \frac{\pi}{2}\right)$

B.  $y = \sin\left(x - \frac{\pi}{2}\right)$

C.  $y = -\cos\left(x - \frac{\pi}{2}\right)$

D.  $y = -\sin\left(x - \frac{\pi}{2}\right)$

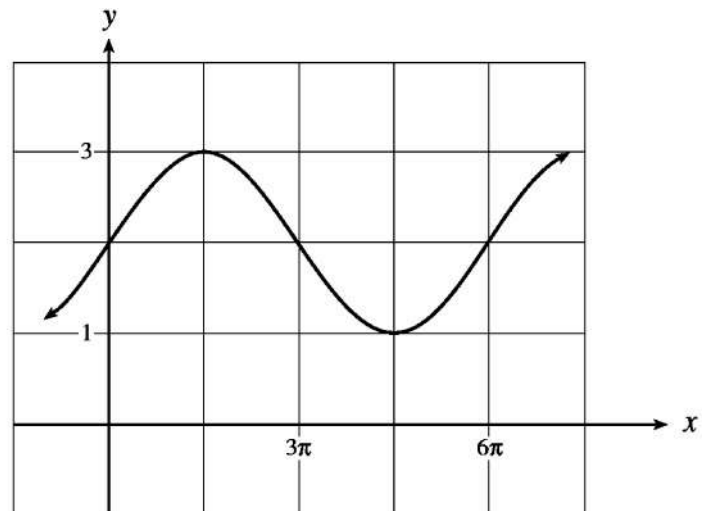
117. If the graph of the function shown below has the equation  $y = a \sin bx + d$ , determine the value of  $b$ . ( $b > 0$ )

A.  $\frac{1}{3}$

B. 3

C.  $2\pi$

D.  $6\pi$



118. Let  $\theta$  be an angle in standard position such that  $\cot \theta = -\frac{4}{3}$  and  $\sin \theta < 0$ . Determine the exact value of  $\sec \theta$ .

A.  $-\frac{5}{3}$

B.  $-\frac{5}{4}$

C.  $\frac{5}{4}$

D.  $\frac{5}{3}$

119. A wheel rolling along the ground has a diameter of 16 cm and rotates every 12 seconds. At time  $t = 0$  seconds, a point  $P$  on the outside edge of the wheel is at its highest point. Determine a cosine function that gives the height,  $h$ , of point  $P$  above the ground at any time  $t$ , where  $h$  is in cm and  $t$  is in seconds.

- A.  $h(t) = -8 \cos \frac{\pi}{6}t + 8$                       B.  $h(t) = 8 \cos \frac{\pi}{12}t + 8$   
 C.  $h(t) = 8 \cos \frac{\pi}{6}t + 8$                       D.  $h(t) = -8 \cos \frac{\pi}{12}t + 8$

## SAMPLE 2008

120. Evaluate:  $\tan \frac{5\pi}{3}$

- A.  $-\frac{1}{\sqrt{3}}$                       B.  $\frac{1}{\sqrt{3}}$                       C.  $-\sqrt{3}$                       D.  $\sqrt{3}$

121. Determine the period of the function  $y = 3 \cos \frac{\pi}{4}x$

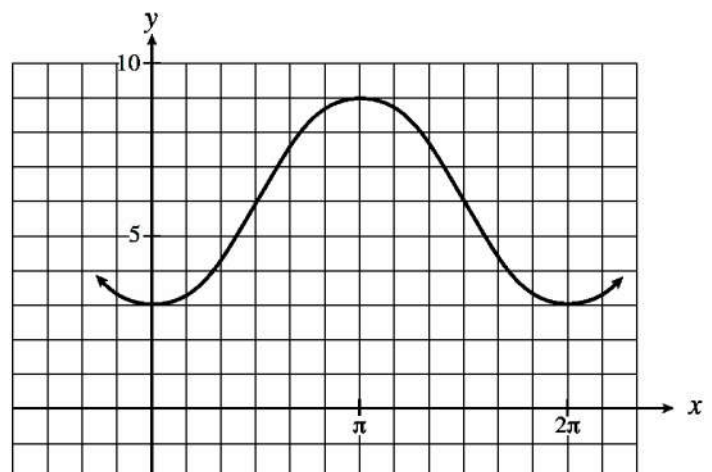
- A.  $\frac{\pi}{4}$                       B.  $\frac{\pi}{2}$                       C. 4                      D. 8

122. The terminal arm of angle  $\theta$  in standard position intersects the unit circle at  $(m, n)$ . Which expression represents  $\cot \theta$ ?

- A.  $m$                       B.  $n$                       C.  $\frac{n}{m}$                       D.  $\frac{m}{n}$

123. If the graph of the function shown below has the equation  $y = a \cos b(x - c) + d$ , determine the value of  $d$ .

- A. 3  
 B. 5  
 C. 6  
 D. 9



124. Determine an equation of an asymptote of  $y = \sec 3x$ .

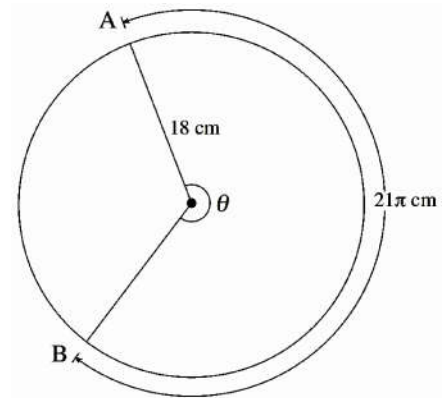
- A.  $x = \frac{\pi}{6}$                       B.  $x = \frac{\pi}{3}$                       C.  $x = \frac{2\pi}{3}$                       D.  $x = \pi$

125. The height above the ground,  $h$  metres, of a person on a Ferris Wheel at time  $t$  seconds, is given by formula  $h(t) = -20 \cos \frac{2\pi}{40}t + 23$ , where  $t \geq 0$ . Determine the earliest time, in seconds, at which the person will be 15 m above the ground.

- A. 7.38                      B. 12.62                      C. 32.62                      D. 37.14

126. A circle has a radius of 18 cm. If the length of arc AB is  $21\pi$  cm, determine the measure of the central angle  $\theta$  in degrees.

- A.  $120^\circ$   
 B.  $150^\circ$   
 C.  $210^\circ$   
 D.  $240^\circ$



127. A minimum value of a sinusoidal function is at  $\left(\frac{\pi}{4}, 3\right)$ . The nearest maximum value to the right of this point is at  $\left(\frac{7\pi}{12}, 7\right)$ . Determine an equation of this function.

128. Determine the amplitude of the function  $y = -4 \cos(x - 2)$

- A. -4                      B. -2                      C. 2                      D. 4

129. The terminal arm of angle  $\theta$  in standard position intersects the unit circle at the point  $(m, n)$ . Which expression represents  $\tan \theta$ ?

- A.  $\frac{n}{m}$                       B.  $\frac{m}{n}$                       C.  $\frac{1}{m}$                       D.  $\frac{1}{n}$



130. Determine the exact value of  $\csc \frac{7\pi}{4}$ .

A.  $-\sqrt{2}$

B.  $\sqrt{2}$

C.  $-\frac{1}{\sqrt{2}}$

D.  $\frac{1}{\sqrt{2}}$

131. In a circle, an arc of length 30 cm contains a central angle of  $120^\circ$ . Determine the radius of this circle.

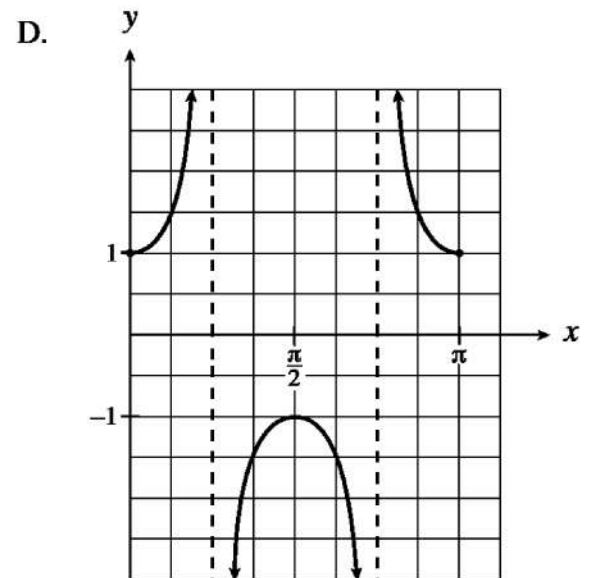
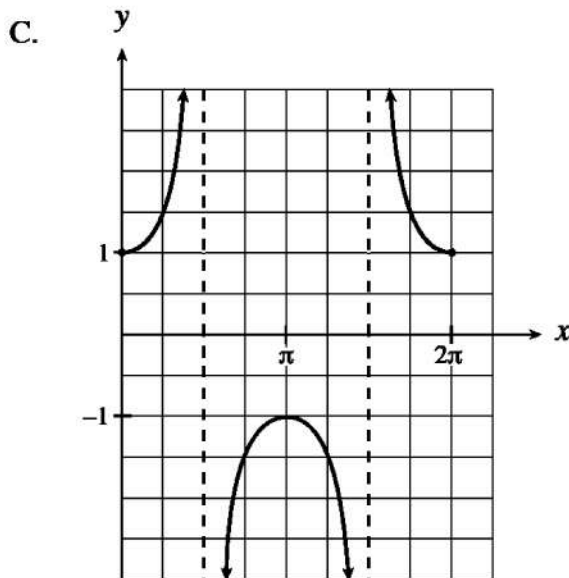
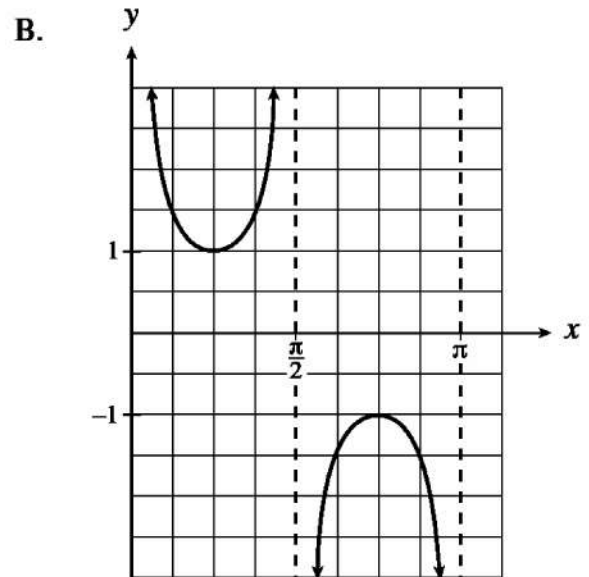
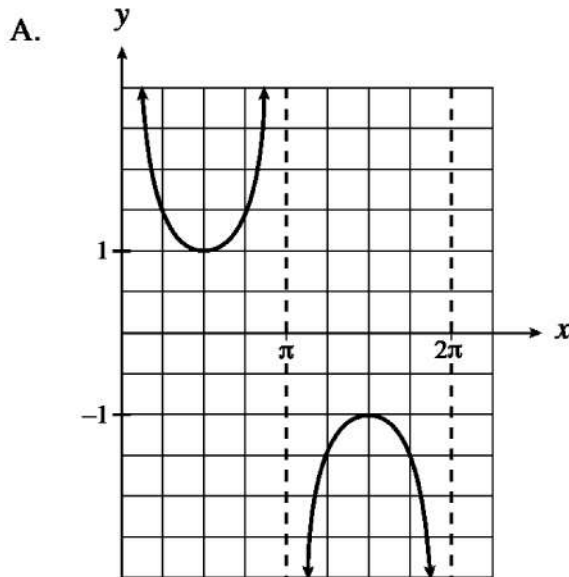
A.  $\frac{36}{\pi}$  cm

B.  $\frac{45}{\pi}$  cm

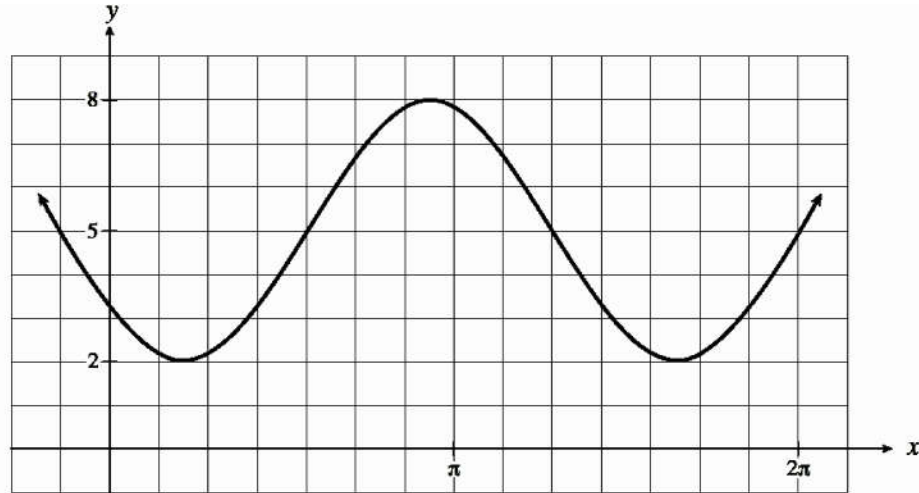
C.  $20\pi$  cm

D.  $45\pi$  cm

132. Which of the following is the graph of one period of the function  $y = \sec 2x$ ?



133. Given the graph of the function  $y = a \sin[b(x - c)] + d$  below, determine the value of  $b$ .



- A.  $\frac{10\pi}{7}$       B.  $\frac{7}{5}$       C.  $\frac{5\pi}{7}$       D.  $\frac{14}{5}$

134. The point  $(5, -6)$  is on the terminal arm of standard position angle  $\theta$ . Determine the smallest positive measure of  $\theta$  in radians.

- A. 0.69      B. 0.88      C. 5.41      D. 5.59

135. At a seaport, the water has a maximum depth of 16 m at midnight. After the maximum depth, the first minimum depth of 4 m occurs 5.8 h later. Assume that the relation between the depth in metres and the time in hours is a sinusoidal function. How many hours after midnight will the water reach a depth of 8 m for the first time?

- A. 1.76      B. 2.27      C. 3.53      D. 3.67

#### ADDITIONAL QUESTIONS

136. What is the reference angle of  $\frac{16\pi}{3}$  radians?

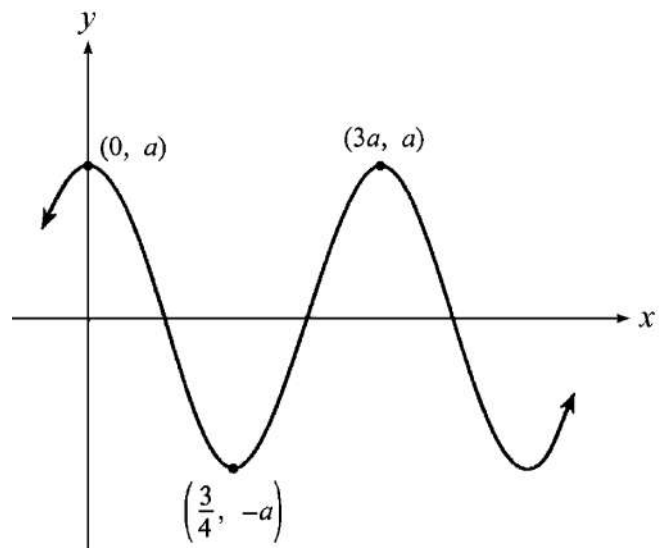
- A.  $\frac{\pi}{6}$       B.  $\frac{\pi}{3}$       C.  $\frac{2\pi}{3}$       D.  $\frac{4\pi}{3}$

137. Determine the smallest positive angle  $\theta$ , in radians, that  $\csc \theta = -\sqrt{2}$ .

- A.  $\frac{\pi}{4}$       B.  $\frac{3\pi}{4}$       C.  $\frac{5\pi}{4}$       D.  $\frac{7\pi}{4}$

138. A circle has a radius of 12 cm. Determine the area of a sector (pie-shaped region) of the circle which has a central angle of 2.1 radians. (accurate to 1 decimal place)
- A.  $25.2 \text{ cm}^2$       B.  $151.2 \text{ cm}^2$       C.  $215.4 \text{ cm}^2$       D.  $302.4 \text{ cm}^2$
139. The smallest positive zero of the function  $y = \cos k\left(x + \frac{\pi}{8}\right)$  occurs at  $x = \frac{\pi}{2}$ . Find the value of  $k$  if  $k > 0$ .
- A.  $\frac{\pi}{2}$       B.  $\frac{3\pi}{8}$       C.  $\frac{4}{5}$       D.  $\frac{5}{4}$
140. A cosine curve has a maximum point at  $(3, 20)$  and the nearest minimum point to the right of this point is  $(8, 4)$ . Which of the following is an equation for this curve?
- A.  $y = 8 \cos\left[\frac{2\pi}{5}(x+3)\right] + 12$       B.  $y = 8 \cos\left[\frac{2\pi}{5}(x-3)\right] + 12$
- C.  $y = 8 \cos\left[\frac{\pi}{5}(x+3)\right] + 12$       D.  $y = 8 \cos\left[\frac{\pi}{5}(x-3)\right] + 12$
141. If the point  $(1, 2)$  lies on the terminal arm of an angle  $\theta$  in standard position, determine the value of  $\cos(\pi + \theta)$ .
- A.  $\frac{-2}{\sqrt{5}}$       B.  $\frac{-1}{\sqrt{5}}$       C.  $\frac{1}{\sqrt{5}}$       D.  $\frac{2}{\sqrt{5}}$
142. Given the graph of  $y = a \cos kx$  as shown, determine  $a$ .

- A.  $\frac{1}{2}$   
 B. 1  
 C.  $\frac{3}{2}$   
 D. 3



143. If  $\sum_{k=1}^{\infty} (\sin x)^{k-1} = 6$ , determine  $x$  to the nearest degree.

- A.  $36^\circ$                       B.  $46^\circ$                       C.  $56^\circ$                       D.  $66^\circ$

**SAMPLE 2009**

144. Convert  $\frac{5\pi}{2}$  radians to degrees.

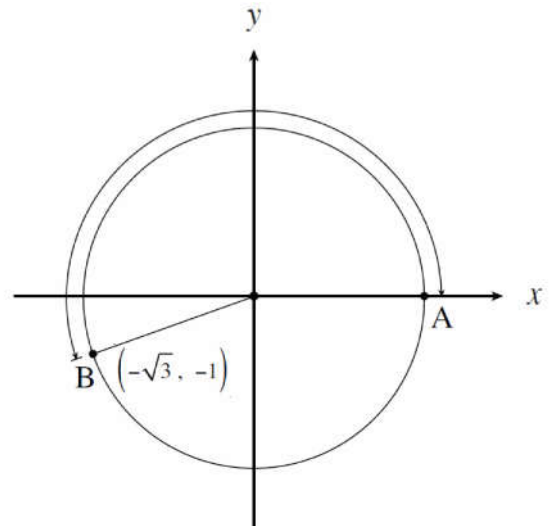
- A.  $90^\circ$                       B.  $180^\circ$                       C.  $270^\circ$                       D.  $450^\circ$

145. A circle has a radius of 20 cm. Determine the length of the arc subtended by a central angle of  $135^\circ$ .

- A.  $\frac{3\pi}{4}$  cm                      B.  $5\pi$  cm                      C.  $15\pi$  cm                      D.  $\frac{80}{3\pi}$  cm

146. The terminal arm of angle  $\theta$  in standard position passes through the point  $(-\sqrt{3}, -1)$ . Determine the length of arc AB, as shown below.

- A.  $\frac{5\pi}{6}$   
 B.  $\frac{7\pi}{6}$   
 C.  $\frac{7\pi}{3}$   
 D.  $\frac{8\pi}{3}$



147. Evaluate:  $\sec \frac{4\pi}{3}$

- A.  $-2$                       B.  $-\frac{2}{\sqrt{3}}$                       C.  $\frac{2}{\sqrt{3}}$                       D.  $2$

148. Determine the exact value of  $\tan \frac{8\pi}{3}$ .

- A.  $-\sqrt{3}$       B.  $-\frac{1}{\sqrt{3}}$       C.  $\frac{1}{\sqrt{3}}$       D.  $\sqrt{3}$

149. Determine the exact value of  $\sin\left(-\frac{3\pi}{4}\right)$ .

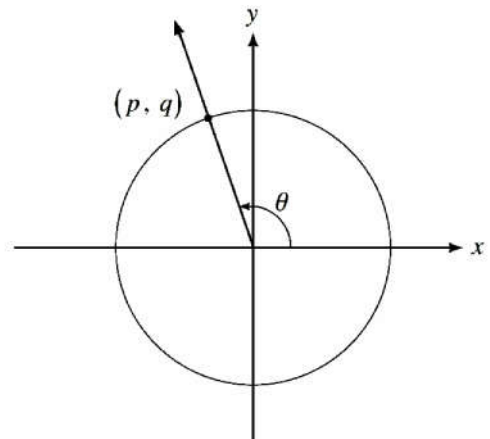
- A.  $-\sqrt{2}$       B.  $-\frac{1}{\sqrt{2}}$       C.  $\frac{1}{\sqrt{2}}$       D.  $\sqrt{2}$

150. Solve:  $\csc x = 2$ ,  $0 \leq x < 2\pi$

- A.  $x = \frac{\pi}{6}, \frac{5\pi}{6}$       B.  $x = \frac{\pi}{6}, \frac{11\pi}{6}$       C.  $x = \frac{\pi}{3}, \frac{2\pi}{3}$       D.  $x = \frac{\pi}{3}, \frac{4\pi}{3}$

151. The point  $(p, q)$  is the point of intersection of the terminal arm of angle of angle  $\theta$  in standard position and the unit circle as shown in the diagram. Which expression represents  $\tan \theta$ ?

- A.  $p$   
 B.  $q$   
 C.  $\frac{p}{q}$   
 D.  $\frac{q}{p}$



152. The terminal arm of angle  $\theta$  in standard position passes through the point  $(-2, 5)$ . Determine the value of  $\sec \theta$ .

- A.  $-\frac{\sqrt{21}}{2}$       B.  $\frac{\sqrt{21}}{5}$       C.  $-\frac{\sqrt{29}}{2}$       D.  $\frac{\sqrt{29}}{5}$

153. Point  $M(-a, b)$  is in quadrant 2 and lies on the terminal arm of angle  $\theta$  in standard position. Point  $N$  is the point of intersection of the terminal arm of angle  $\theta$  and the unit circle centred at  $(0, 0)$ . Determine the  $x$ -coordinate of point  $N$  in terms of  $a$  and  $b$ .

- A.  $\frac{-a}{\sqrt{a^2 + b^2}}$       B.  $\frac{-b}{\sqrt{a^2 + b^2}}$       C.  $\frac{a}{\sqrt{a^2 + b^2}}$       D.  $\frac{b}{\sqrt{a^2 + b^2}}$

154. Determine the amplitude of  $y = -3 \cos 4x + 2$ .

- A. -4                      B. -3                      C. 3                      D. 4

155. Determine the period of  $y = \sin \left[ \frac{2\pi}{3}(x - 6) \right]$ .

- A. 3                      B. 6                      C.  $\frac{2\pi}{3}$                       D.  $\frac{4\pi}{3}$

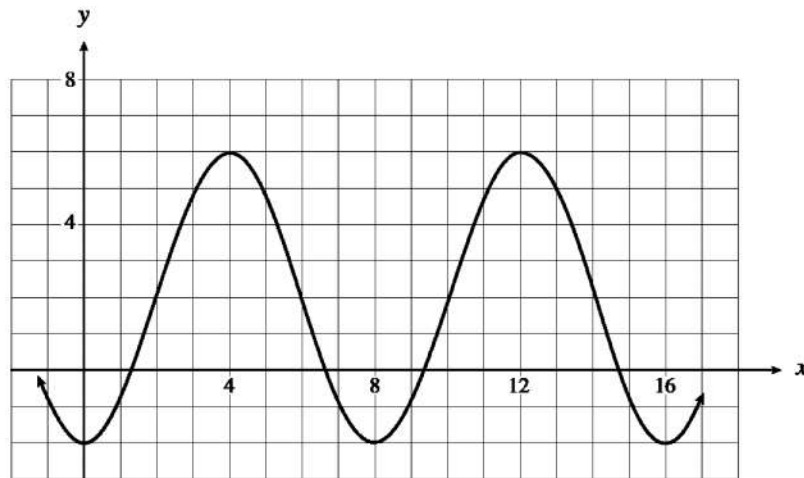
156. Determine the range of the function  $y = 6 \cos \left[ \frac{1}{2}(x - 3) \right] + 4$ .

- A.  $-6 \leq y \leq 6$                       B.  $1 \leq y \leq 7$                       C.  $-4 \leq y \leq 4$                       D.  $-2 \leq y \leq 10$

157. Which of the following lines is an asymptote for the graph of  $y = \csc 2x$ ?

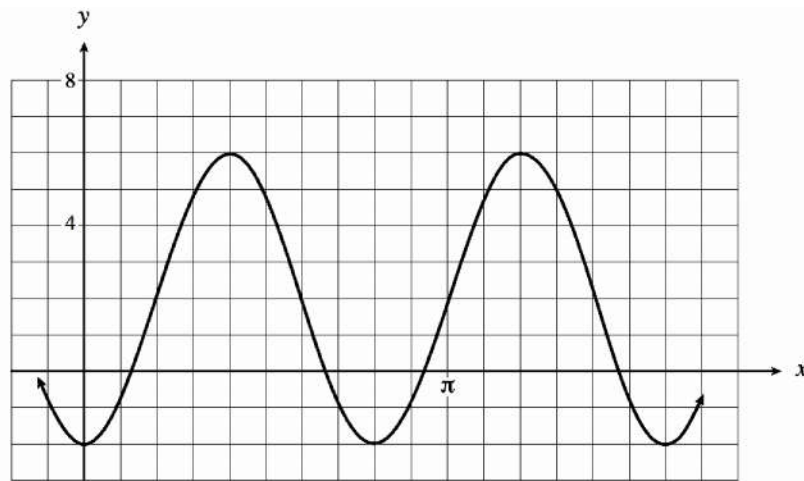
- A.  $x = 1$                       B.  $x = \frac{\pi}{4}$                       C.  $x = \frac{\pi}{2}$                       D.  $x = \frac{3\pi}{4}$

158. If the graph of the function shown below has the equation  $y = a \sin [b(x - c)] + d$ , determine the value of  $b$ . ( $b > 0$ )



- A. 4                      B. 8                      C.  $\frac{\pi}{4}$                       D.  $\frac{\pi}{8}$

159. If the graph of the function shown below has the equation  $y = a \sin b(x - c) + d$ , determine the value of  $b$ . ( $b > 0$ )



- A.  $\frac{5}{4}$                       B.  $\frac{5}{2}$                       C.  $\frac{2\pi}{5}$                       D.  $\frac{4\pi}{5}$
160. State the phase shift of the function:  $y = -\cos\left(4x - \frac{\pi}{2}\right)$
- A.  $\frac{\pi}{8}$  to the right      B.  $\frac{\pi}{8}$  to the left      C.  $\frac{\pi}{2}$  to the right      D.  $\frac{\pi}{2}$  to the left
161. Determine the domain of:  $f(x) = \tan 2x$
- A.  $x \in R$                       B.  $x \in R, x \neq \frac{\pi}{4} + \frac{n\pi}{2}, n$  is an integer
- C.  $x \in R, x \neq \frac{\pi}{2} + n\pi, n$  is an integer      D.  $x \in R, x \neq \pi + 2n\pi, n$  is an integer
162. At a seaport, the depth of the water,  $d$ , in metres, at time  $t$  hours, during a certain day is given by:  $d = 3.4 \sin\left[2\pi \frac{(t - 7.00)}{10.6}\right] + 4.8$   
On that day, determine the depth of the water at 6:30 pm.
- A. 3.43 m                      B. 3.81 m                      C. 4.80 m                      D. 6.53 m

163. A wheel with radius 20 cm has its centre 30 cm above the ground. It rotates once every 15 seconds. Determine an equation for the height,  $h$ , above the ground of a point on the wheel at time,  $t$  seconds if this point has a maximum height at  $t = 2$  seconds.

A.  $h = 20 \cos \left[ \frac{2\pi}{15}(t + 2) \right] + 30$

B.  $h = 20 \cos \left[ \frac{2\pi}{15}(t - 2) \right] + 30$

C.  $h = 30 \cos \left[ \frac{2\pi}{15}(t + 2) \right] + 20$

D.  $h = 30 \cos \left[ \frac{2\pi}{15}(t - 2) \right] + 20$

164. A Ferris wheel with a diameter of 60 m rotates once every 48 seconds. At time  $t = 0$ , a rider is at his lowest height which is 2 m above the ground.

a) Determine a sinusoidal equation that gives the height,  $h$ , of the rider above the ground as a function of the elapsed time,  $t$ , where  $h$  is in metres and  $t$  is in seconds.

b) Determine the time  $t$  when the rider will be 38 m above the ground for the first time after  $t = 0$ .

165. A mass is supported by a spring so that it rests 50 cm above a table top, as shown in the diagram below. The mass is pulled down to a height of 20 cm above the tabletop and released at time  $t = 0$ .

It takes 0.8 seconds for the mass to reach a maximum height of 80 cm above the tabletop. As the mass moves up and down, its height  $h$ , in cm above the tabletop, is approximated by a sinusoidal function of the elapsed time,  $t$ , in seconds, for a short period of time.

Determine an equation for a sinusoidal function that gives  $h$  as a function of  $t$ .

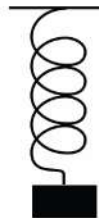


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