

1 What is  $24^\circ$  in radians?

a  $\frac{\pi}{15} \approx 0.209$

b  $\frac{1}{15} \approx 0.067$

c  $\frac{2}{15} \approx 0.133$

d  $\frac{2\pi}{15} \approx 0.419$

2 What is  $9\pi/10$  in degrees?

a  $0.005^\circ$

b  $162^\circ$

c  $324^\circ$

d  $0.9^\circ$

3 What is the exact value of  $\cos(3\pi/4)$ ?

a  $\frac{\sqrt{2}}{2}$

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

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

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

4 What is the exact value of  $\sec(\pi/3)$ ?

a 2

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

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

d  $\frac{1}{2}$

5 What is the exact value of  $\cot(-90^\circ)$ ?

a 1

b -1

c undefined

d 0

6 What are the amplitude  $A$  and period  $T$  of the function

$$f(x) = -\frac{1}{2} \sin(2x)?$$

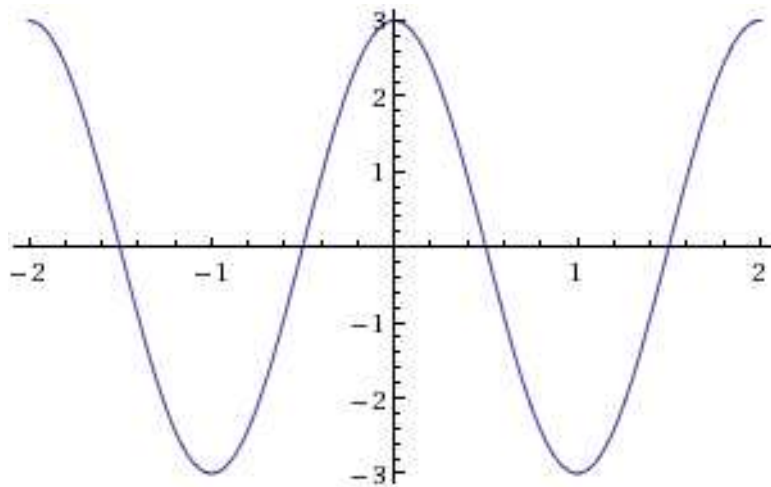
a  $A = -\frac{1}{2}, T = 2$

b  $A = 2, T = \frac{1}{2}$

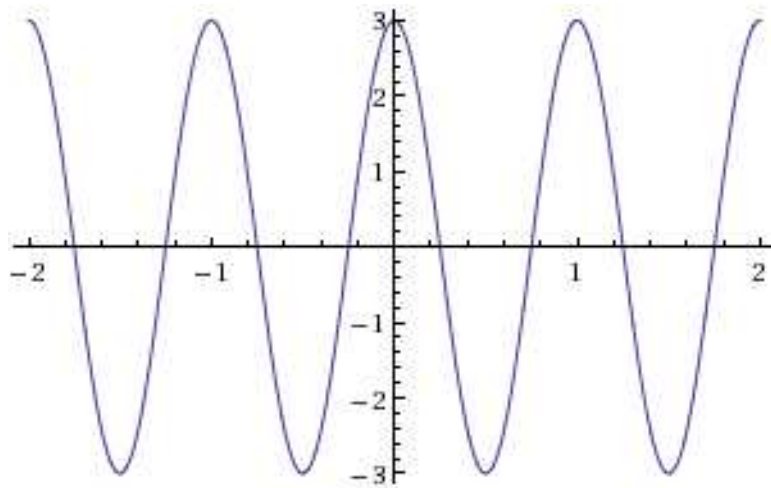
c  $A = \frac{1}{2}, T = \pi$

d  $A = 2\pi, T = 2$

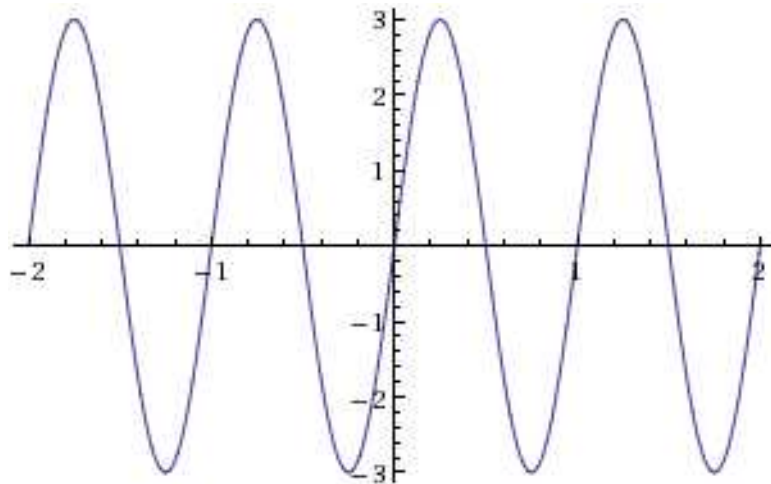
7 What is the graph of the function  $f(x) = 3 \cos(\pi x)$ ?



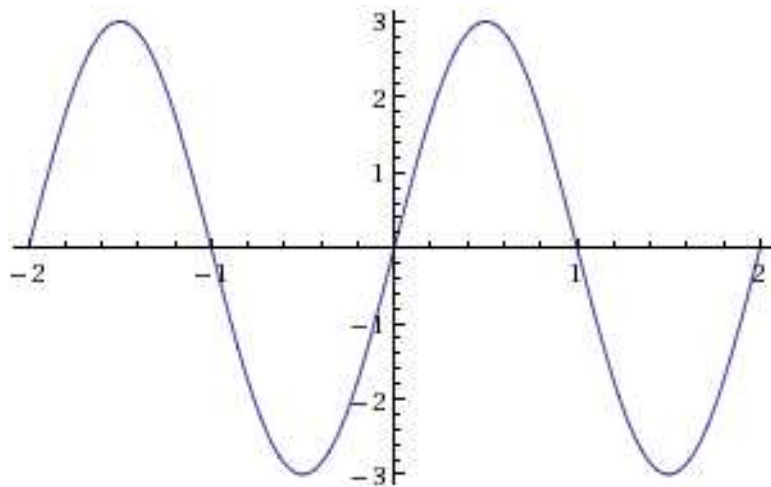
a



b



c



d

8 What is  $\operatorname{arccot}(-\sqrt{3}) = \cot^{-1}(-\sqrt{3})$ ?

a  $-\frac{\pi}{6}$

b  $\frac{5\pi}{6}$

c  $\frac{\pi}{6}$

d  $\frac{\pi}{3}$

9 Solve the equation  $2 \cos \theta + 1 = 2$  for  $0 \leq \theta < 2\pi$ .

a  $\theta = \frac{\pi}{3}, \frac{2\pi}{3}$

b  $\theta = \frac{\pi}{3}, \frac{4\pi}{3}$

c  $\theta = \frac{\pi}{3}$

d  $\theta = \frac{\pi}{3}, \frac{5\pi}{3}$

10 What is the exact value of  $\cos 105^\circ$ ?

$$a \quad -\frac{\sqrt{2} + \sqrt{6}}{4} = \frac{-\sqrt{2} - \sqrt{6}}{4} - \frac{\sqrt{2 + \sqrt{3}}}{2}$$

$$b \quad \frac{\sqrt{2} - \sqrt{6}}{4} = -\frac{\sqrt{2 - \sqrt{3}}}{2}$$

$$c \quad \frac{\sqrt{6} - \sqrt{2}}{4} = \frac{\sqrt{2 - \sqrt{3}}}{2}$$

$$d \quad \frac{\sqrt{2} + \sqrt{6}}{4} = \frac{\sqrt{2 + \sqrt{3}}}{2}$$

11 A triangle has a side of length 3 and a side of length 4. The angle between these two sides has measure  $40^\circ$ . To solve this triangle, which other quantity should you calculate first?

a the measure of the angle opposite the side of length 4

b the measure of the angle opposite the side of length 3

c either of the above (it makes no difference)

d the length of the side opposite the angle of measure  $40^\circ$

12 **Extra credit:** Solve the triangle in the previous exercise completely. (Show what equations you solve or what calculations you make along the way.)

13 A triangle has a side of length 5, and the angle opposite this side has measure  $50^\circ$ . Another side has length 2. How many triangles (up to congruence) meet this description?

a none

b one

c two

d three

14 Write  $(x, y) = (-4, 4)$  in polar coordinates, using  $r \geq 0$  and  $0 \leq \theta < 2\pi$ .

$$a \quad (r, \theta) = \left(4, \frac{5\pi}{4}\right)$$

$$b \quad (r, \theta) = \left(-4\sqrt{2}, \frac{\pi}{4}\right)$$

$$c \quad (r, \theta) = \left(4\sqrt{2}, \frac{3\pi}{4}\right)$$

$$d \quad (r, \theta) = \left(2\sqrt{2}, \frac{7\pi}{4}\right)$$

15 Write  $(r, \theta) = (2, \pi/2)$  in rectangular coordinates.

$$a \quad (x, y) = (2, 0)$$

$$b \quad (x, y) = (0, -2)$$

$$c \quad (x, y) = (-2, 0)$$

$$d \quad (x, y) = (0, 2)$$

**Answers**

1 D, 2 B, 3 C, 4 A, 5 D, 6 C, 7 A, 8 B, 9 D, 10 B, 11 D, 13 B, 14 C, 15 D

12 Given  $a = 3$ ,  $b = 4$ , and  $C = 40^\circ$ ,

$$c = \sqrt{(3)^2 - 2(3)(4) \cos(40^\circ) + (4)^2} = \sqrt{25 - 24 \cos 40^\circ} \approx 2.57.$$

Then

$$A = \arccos \frac{(4)^2 + (\sqrt{25 - 24 \cos 40^\circ})^2 - (3)^2}{2(4)(\sqrt{25 - 24 \cos 40^\circ})} = \arccos \frac{4 - 3 \cos 40^\circ}{\sqrt{25 - 24 \cos 40^\circ}} \approx 48.6^\circ,$$

and

$$B = \arccos \frac{(3)^2 + (\sqrt{25 - 24 \cos 40^\circ})^2 - (4)^2}{2(3)(\sqrt{25 - 24 \cos 40^\circ})} = \arccos \frac{3 - 4 \cos 40^\circ}{\sqrt{25 - 24 \cos 40^\circ}} \approx 91.4^\circ.$$