Math 30-1: Trigonometry One
PRACTICE EXAM

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1. The angle 210° is equivalent to:

A. $\frac{5\pi}{6}$ degrees

B. $\frac{5\pi}{6}$ radians

C. $\frac{7\pi}{6}$ degrees

D. $\frac{7\pi}{6}$ radians

2. The reference angle of $\frac{12\pi}{7}$ is:

A. $-\frac{\pi}{7}$ radians

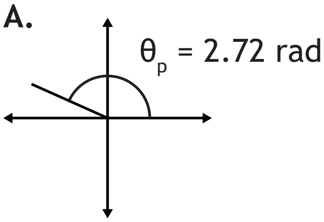
B. $\frac{\pi}{7}$ radians

C. $\frac{2\pi}{7}$ radians

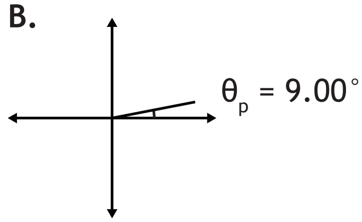
D. $\frac{6\pi}{7}$ radians

3. The principal angle of 9.00 radians is shown in:

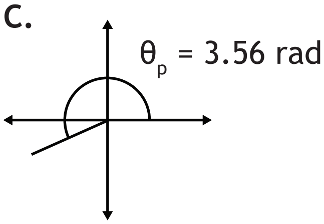
A.



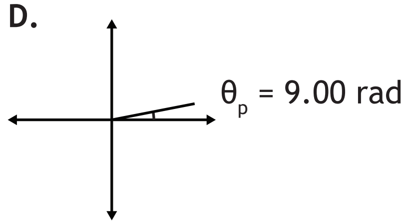
B.



C.



D.



4. The co-terminal angles of 60° within the domain $-360° \le \theta < 1080°$ are:

A. $\theta_c = -360°, 0, 360°, 720°$
B. $\theta_c = -360°, 0, 360°, 720°, 1080°$
C. $\theta_c = -300°, 420°, 780°$
D. $\theta_c = -300°, 60°, 420°, 780°$

5. The principal angle of $\frac{95\pi}{6}$ is:

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

6. If $\frac{2\pi}{5}$ is rotated 14 times clockwise, the new angle is:

A. $-\frac{138\pi}{5}$
B. $-\frac{68\pi}{5}$
C. $\frac{72\pi}{5}$
D. $\frac{142\pi}{5}$

7. If $\sec\theta > 0$ and $\tan\theta < 0$, the angle θ is in:

A. Quadrant I
B. Quadrant II
C. Quadrant III
D. Quadrant IV

8. If $\sec\theta = \frac{5}{4}$ and $\sin\theta < 0$, then cotθ is equivalent to:

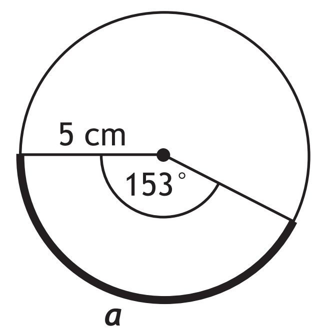
A. $\cot\theta = -\frac{4}{3}$

B. $\cot\theta = -\frac{3}{4}$

C. $\cot\theta = \frac{3}{4}$

D. $\cot\theta = \frac{4}{3}$

9. The value of *a* in the diagram is:



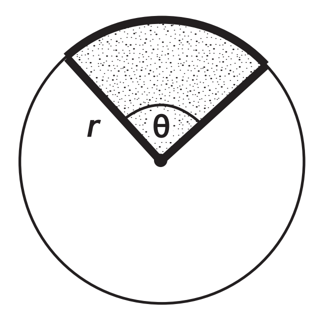
A. 0.03 cm

B. 13.35 cm

C. 30.60 cm

D. 765 cm

10. The arc length formula, a = rθ, is found by multiplying the circumference of a circle by the percentage of the circle occupied by the arc.



$$a = 2\pi r \times \frac{\theta}{2\pi} = r\theta$$

The formula for the area of a circle sector uses a similar approach, where the area of a circle ($A = \pi r^2$) is multiplied by the percentage of the circle occupied by the sector.

The area of a circle sector is:

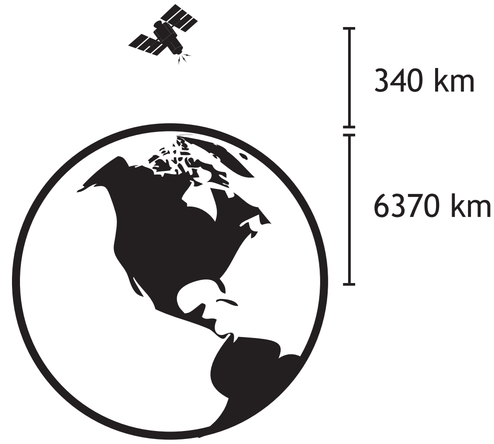
A. $A = \frac{r\theta}{2}$

B. $A = \frac{r^2\theta}{2}$

C. $A = \frac{\pi r\theta}{2}$

D. $A = \frac{\pi r^2\theta}{2}$

11. A satellite orbiting Earth 340 km above the surface makes one complete revolution every 90 minutes. The radius of Earth is approximately 6370 km. The angular speed of the satellite is:



A. $\frac{\pi}{5400}$ rad/s

B. $\frac{\pi}{2700}$ rad/s

C. $\frac{\pi}{90}$ rad/s

D. $\frac{\pi}{45}$ rad/s

12. The equation of the unit circle is $x^2 + y^2 = 1$. Which of the following points does **not** exist on the unit circle?

A. (-1, 0)

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

C. (0.5, 0.5)

D. (0.6, 0.8)

13. The exact value of $\sin \frac{13\pi}{6}$ is:

A. $-\frac{1}{2}$

B. $\frac{1}{2}$

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

D. $\frac{\sqrt{3}}{2}$

14. The exact value of $\cos^2(-840°)$ is:

A. $\frac{1}{4}$

B. $\frac{1}{2}$

C. 0

D. 1

15. The exact value of $\sec \frac{3\pi}{2}$ is:

A. -1

B. $-\frac{1}{2}$

C. 1

D. Undefined

16. The exact value of $\sin\left(-\frac{\pi}{3}\right) + \cos\left(\frac{5\pi}{4}\right)$ is:

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

B. $\frac{-\sqrt{3}+\sqrt{2}}{2}$

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

D. $\frac{\sqrt{6}}{2}$

17. The exact value of $\frac{2\tan\frac{\pi}{6}}{1-\tan^2\frac{\pi}{6}}$ is:

A. $-\sqrt{3}$

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

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

D. $\sqrt{3}$

18. The exact value of $-\tan^2\left(\frac{617\pi}{6}\right)$ is:

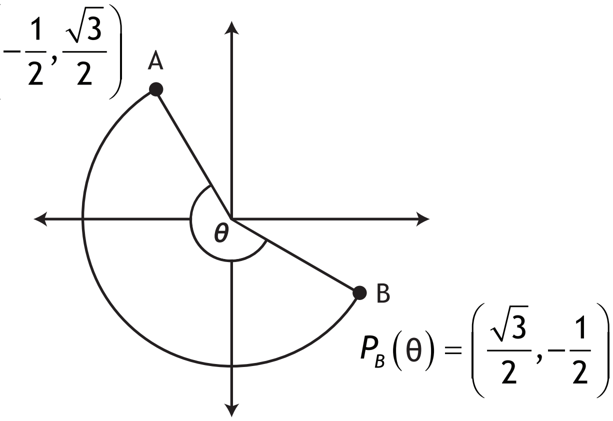
A. -1

B. $-\frac{1}{3}$

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

D. Undefined

19. What is the arc length from point A to point B on the unit circle?



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

B. $\frac{5\pi}{6}$

C. $\frac{7\pi}{6}$

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

20. If $\cos\theta = \frac{3}{5}$ exists on the unit circle, $\sin\theta$ is equivalent to:

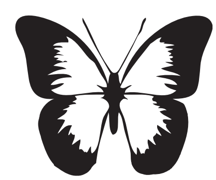
A. $-\frac{4}{5}$

B. $\frac{2}{5}$

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

D. $-\frac{4}{5}$ or $\frac{4}{5}$

21. In a video game, the graphic of a butterfly needs to be rotated. To make the butterfly graphic rotate, the programmer uses the equations:



$$x' = x\cos\theta - y\sin\theta$$
$$y' = x\sin\theta + y\cos\theta$$

to transform each pixel of the graphic from its original coordinates, (x, y), to its new coordinates, (x', y'). Pixels may have positive or negative coordinates.

If a particular pixel with coordinates of (250, 100) is rotated by $\frac{\pi}{6}$, the new coordinates are:

A. (-38, 267)

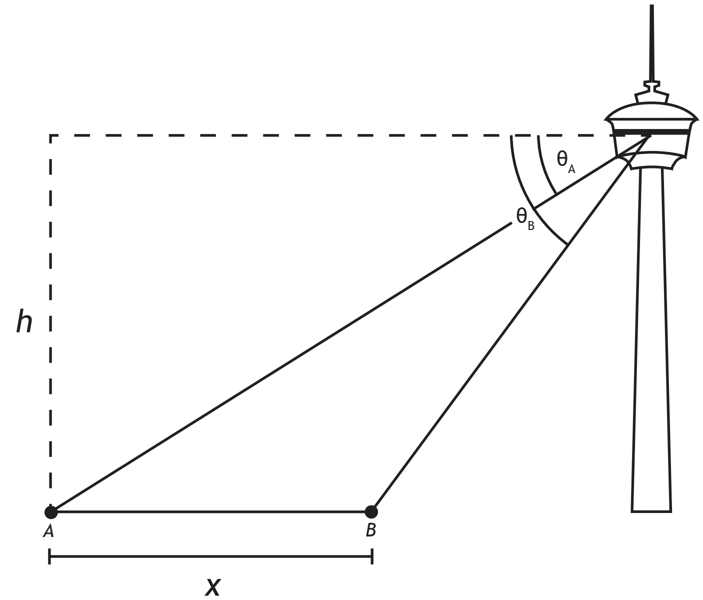
B. (38, 267)

C. (167, 212)

D. (167, 303)

22. From the observation deck of the Calgary Tower, an observer has to tilt their head θ_A down to see point A, and θ_B down to see point B. Using basic trigonometry, one can derive the equation:

$$\frac{h}{\tan\theta_A} = \frac{h + x\tan\theta_B}{\tan\theta_B}$$



The height of the observation deck is:

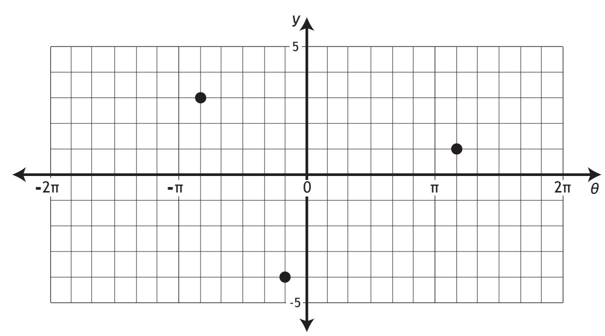
A. $h = x\left(\cot\theta_A - \cot\theta_B\right)$

B. $h = \dfrac{x}{\cot\theta_A - \cot\theta_B}$

C. $h = x\left(\tan\theta_A - \tan\theta_B\right)$

D. $h = \dfrac{x}{\tan\theta_A - \tan\theta_B}$

23. The points in the grid are located at:



A. $(-5,3), (-1,-4), (7,1)$

B. $\left(-\frac{5\pi}{6},3\right), \left(-\frac{\pi}{6},-4\right), \left(\frac{7\pi}{6},1\right)$

C. $\left(-\frac{2\pi}{3},3\right), \left(-\frac{\pi}{6},-4\right), \left(\frac{4\pi}{3},1\right)$

D. $\left(-\frac{3\pi}{4},3\right), \left(-\frac{\pi}{4},-4\right), \left(\frac{5\pi}{4},1\right)$

24. The graph of $y = \cos\theta$ has:

A. θ-intercepts at $\theta = \frac{\pi}{2} + n\pi,\ n \in I$.

B. A y-intercept at (0, 1).

C. A range of $-1 \le y \le 1$.

D. All of the above.

25. The graph of $y = \tan\theta$ has:

A. An amplitude of 1.

B. A period of 2π.

C. Vertical asymptotes at $\theta = n\pi, n \in I$.

D. Vertical asymptotes at $\theta = \frac{\pi}{2} + n\pi,\ n \in I$.

26. The range of $y = \frac{1}{2}\cos\theta - \frac{1}{2}$ is:

A. $\left\{y \mid -\frac{1}{2} \le y \le \frac{1}{2}, y \in R\right\}$

B. $\left\{y \mid -\frac{1}{2} \le y \le 0, y \in R\right\}$

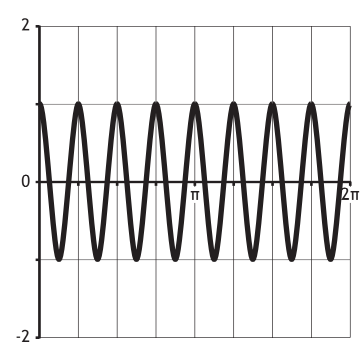
C. $\{y \mid -1 \le y \le 0, y \in R\}$

D. $\{y \mid -1 \le y \le 1, y \in R\}$

27. The number of θ-intercepts in $y = \sin 3\theta$, over the domain $0 \le \theta \le 2\pi$ is:

A. 1
B. 3
C. 6
D. 7

28. The trigonometric function corresponding to the graph is:



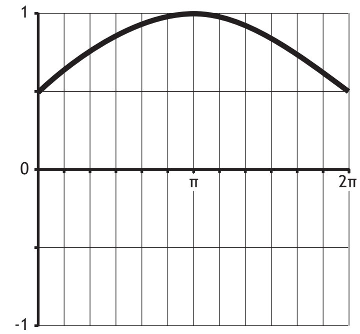
A. $y = \cos(4\theta)$

B. $y = \cos(8\theta)$

C. $y = \cos\left(\frac{1}{4}\theta\right)$

D. $y = \cos\left(\frac{1}{8}\theta\right)$

29. The trigonometric function corresponding to the graph is:



A. $y = \frac{1}{2}\sin\left(\frac{1}{2}\theta\right) + \frac{1}{2}$

B. $y = \sin\left(\frac{1}{2}\theta\right) + \frac{3}{4}$

C. $y = -\cos\theta + \frac{1}{2}$

D. $y = -\frac{1}{2}\cos\theta + 1$

30. The graph of $y = -\frac{1}{2}\sin(2\theta - 3\pi) + 1$ is:

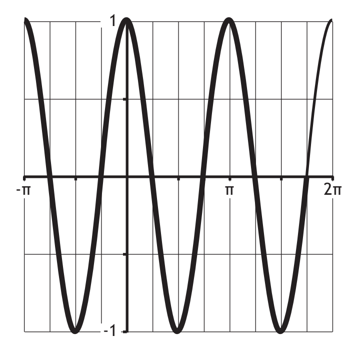
A. Shifted horizontally $\frac{3\pi}{2}$ units to the right.

B. Shifted horizontally $\frac{2\pi}{3}$ units to the right.

C. Shifted horizontally 3π units to the right.

D. Shifted horizontally 6π units to the right.

31. The trigonometric function corresponding to the graph is:



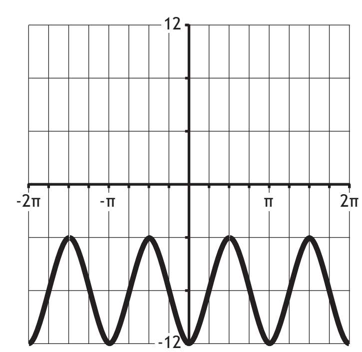
A. $y = \cos\theta$

B. $y = \cos\left(\frac{1}{2}\theta\right)$

C. $y = \cos\left[2\left(\theta + \frac{\pi}{4}\right)\right]$

D. $y = \sin\left[2\left(\theta + \frac{\pi}{4}\right)\right]$

32. The trigonometric function corresponding to the graph is:



A. $y = -\cos\theta - 12$

B. $y = -2\cos\theta - 2$

C. $y = -4\cos 2\theta - 8$

D. $y = 4\sin\left(\theta - \frac{\pi}{4}\right) - 8$

33. The trigonometric function $h(t) = \cos\left[\frac{\pi}{30}(t - 15)\right]$ represents the height of an object (in metres) as a function of time (in seconds).

The period (P) and phase shift (c) are:

A. $P = \frac{1}{15}$ s, c = 15 s

B. $P = 15\pi^\circ$, $c = 15^\circ$

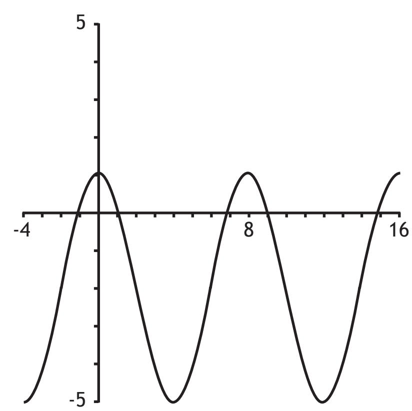
C. P = 30 s, c = -15 s

D. P = 60 s, c = 15 s

34. The optimal view window for the trigonometric function $f(x) = 13.5\cos\frac{2\pi}{96}(x - 24) + 6.5$ is:

A. x: [-40, 60, 10]; y: [-2, 14, 2]
B. x: [-24, 96, 2]; y: [-12, 8, 2]
C. x: [0, 120, 10]; y: [-8, 20, 2]
D. x: [0, 400, 100]; y: [6.5, 20, 1]

35. The trigonometric function corresponding to the graph is:



A. $y = 3\sin\left[\frac{1}{4}(x + 2)\right] - 2$

B. $y = 3\sin\left[\frac{1}{4}(x - 2)\right] - 2$

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

D. $y = 3\sin\left[\frac{\pi}{4}(x - 2)\right] - 2$

36. The range of $f(\theta) = k\sin\left(\theta - \frac{\pi}{4}\right) - 3$ is:

A. $-3 + k \le y \le 3 + k$
B. $-3 - k \le y \le -3 + k$
C. $3 - k \le y \le -3 + k$
D. $3 - k \le y \le -3 - k$

37. If the range of $y = 3\cos\theta + d$ is $[-4, k]$, the values of d and k are:

A. $d = -1; k = 2$
B. $d = -1; k = -2$
C. $d = 1; k = 2$
D. $d = 1; k = -2$

38. The graphs of $f(\theta) = \cos(2\theta)$ and $g(\theta) = \sin(2\theta)$ intersect at the points $\left(\frac{\pi}{8}, \frac{\sqrt{2}}{2}\right)$ and $\left(\frac{5\pi}{8}, \frac{-\sqrt{2}}{2}\right)$.

If the amplitude of each graph is quadrupled, the new points of intersection are:

A. $\left(\frac{\pi}{8}, 4\right), \left(\frac{5\pi}{8}, -4\right)$

B. $\left(\frac{\pi}{2}, \frac{\sqrt{2}}{2}\right), \left(\frac{5\pi}{2}, -\frac{\sqrt{2}}{2}\right)$

C. $\left(\frac{\pi}{8}, 2\sqrt{2}\right), \left(\frac{5\pi}{8}, -2\sqrt{2}\right)$

D. $\left(\frac{\pi}{8}, \frac{\sqrt{8}}{2}\right), \left(\frac{5\pi}{8}, -\frac{\sqrt{8}}{2}\right)$

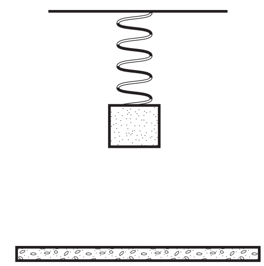
39. If the point $\left(\frac{\pi}{2}, -2\right)$ exists on the graph of $f(\theta) = a\cos\left(\theta - \frac{\pi}{4}\right) - 4$, the value of a is:

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

40. The y-intercept of $f(\theta) = -3\cos\left(k\theta + \frac{\pi}{2}\right) - b$ is:

A. $(0, -3 - b)$
B. $(0, 3 - b)$
C. $(0, -b)$
D. $(0, b)$

41. The oscillation of a mass on a spring can be modeled with the trigonometric function:



$$h(t) = -1.2\sin(2\pi t) + 4$$

In one oscillation, the mass is lower than 3.2 m for a duration of:

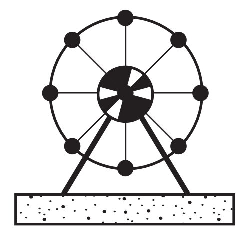
A. 0.12 s

B. 0.26 s

C. 0.38 s

D. 0.60 s

42. A Ferris wheel with a radius of 15 m rotates once every 100 seconds. Riders board the Ferris wheel using a platform 1 m above the ground. The trigonometric function that gives the height of the rider as a function of time is:



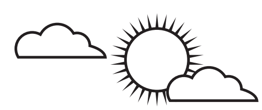
A. $h(t) = -15\cos\left(\frac{\pi}{100}t\right) + 16$

B. $h(t) = 15\cos\left(\frac{\pi}{100}t\right) + 1$

C. $h(t) = -15\cos\left(\frac{\pi}{50}t\right) + 16$

D. $h(t) = 15\cos\left(\frac{\pi}{50}t\right) + 16$

43. The following table shows the number of daylight hours in Grande Prairie over the course of one year. The data has been converted to day numbers *(January 1 is day zero)* and decimal hours so it can be graphed.



Day Number	December 21 (Day -11)	March 21 (Day 79)	June 21 (Day 171)	September 21 (Day 263)	December 21 (Day 354)
Daylight Hours	6h, 46m (6.77 h)	12h, 17m (12.28 h)	17h, 49m = (17.82 h)	12h, 17m (12.28 h)	6h, 46m (6.77 h)

The trigonometric function that gives the number of daylight hours as a function of day number is:

A. $d(n) = 12.295\cos\left[\frac{2\pi}{365}(n-11)\right] + 5.525$

B. $d(n) = -12.295\cos\left[\frac{2\pi}{365}(n-11)\right] + 5.525$

C. $d(n) = 5.525\cos\left[\frac{2\pi}{365}(n+11)\right] + 12.295$

D. $d(n) = -5.525\cos\left[\frac{2\pi}{365}(n+11)\right] + 12.295$

Trigonometry One Practice Exam - ANSWER KEY

Video solutions are in italics.

1. **D** *Degrees and Radians, Example 3b*
2. **C** *Degrees and Radians, Example 5e*
3. **A** *Degrees and Radians, Example 6c*
4. **C** *Degrees and Radians, Example 7a*
5. **D** *Degrees and Radians, Example 8d*
6. **A** *Degrees and Radians, Example 9b*
7. **D** *Degrees and Radians, Example 12b (ii)*
8. **A** *Degrees and Radians, Example 14a*
9. **B** *Degrees and Radians, Example 16b*
10. **B** *Degrees and Radians, Example 17a*
11. **B** *Degrees and Radians, Example 19a*
12. **C** *The Unit Circle, Example 1b*
13. **B** *The Unit Circle, Example 4c*
14. **A** *The Unit Circle, Example 4g*
15. **D** *The Unit Circle, Example 8b*
16. **A** *The Unit Circle, Example 9a*
17. **D** *The Unit Circle, Example 10c*
18. **B** *The Unit Circle, Example 11b*
19. **C** *The Unit Circle, Example 14d*
20. **D** *The Unit Circle, Example 15d*
21. **C** *The Unit Circle, Example 17a*
22. **B** *The Unit Circle, Example 18a*
23. **B** *Trigonometric Functions I, Example 1a*
24. **D** *Trigonometric Functions I, Example 3*
25. **D** *Trigonometric Functions I, Example 4*
26. **C** *Trigonometric Functions I, Example 7d*
27. **D** *Trigonometric Functions I, Example 9b*
28. **B** *Trigonometric Functions I, Example 11a*
29. **A** *Trigonometric Functions I, Example 11d*
30. **A** *Trigonometric Functions I, Example 13c*
31. **D** *Trigonometric Functions I, Example 14b*
32. **C** *Trigonometric Functions I, Example 16b*
33. **D** *Trigonometric Functions II, Example 2a*
34. **C** *Trigonometric Functions II, Example 4a*
35. **C** *Trigonometric Functions II, Example 5b*
36. **B** *Trigonometric Functions II, Example 6b*
37. **A** *Trigonometric Functions II, Example 6c*
38. **C** *Trigonometric Functions II, Example 6e*
39. **C** *Trigonometric Functions II, Example 7a*
40. **C** *Trigonometric Functions II, Example 7b*
41. **B** *Trigonometric Functions II, Example 11d*
42. **C** *Trigonometric Functions II, Example 12b*
43. **D** *Trigonometric Functions II, Example 13c*

Math 30-1 Practice Exam: Tips for Students

• Every question in the practice exam has already been covered in the Math 30-1 workbook. It is recommended that students refrain from looking at the practice exam until they have completed their studies for the unit.

• Do not guess on a practice exam. The practice exam is a self-diagnostic tool that can be used to identify knowledge gaps. Leave the answer blank and study the solution later.