

Directions: This is a practice exam for the Math 123 Proficiency Test. If your initial or updated mathematics placement is “MTH 110 Fulfilled”, you should take not only this practice test, but also the online proficiency test in an effort to increase your placement (as well as the ones for MTH 122). There are two versions of the online proficiency test, and you may take each once (so if you don’t pass the first time, you can have a second attempt).

MTH 123 is a trigonometry course; many students find the content familiar from more advanced high school courses such as *Functions, Statistics, and Trigonometry*, or *Precalculus*. Taking the practice test, studying related ideas, and taking the proficiency test is important because if you can pass out of MTH 123, it saves you tuition costs and time to graduation. Use the following guidance for the practice exam to help you be as ready as possible for the actual proficiency test:

- The MTH 123 proficiency test is 30 minutes in length. For this practice exam, set a 30 minute timer for yourself.
- Like the MTH 123 proficiency test, this practice exam has 15 multiple choice questions. For each question on the practice exam and on the proficiency test itself, there are four possible answers listed, and exactly one is correct.
- You may use a graphing calculator for taking the online proficiency test, so you should also use one for the practice test. Use pencil and paper to track your own work and reasoning.
- Remember: the purpose of proficiency tests is to ensure you are placed into a course that is right for you. Doing the proficiency tests honestly and independently is the best way to assess your current mathematical preparation and help you be in the right class.
- On the online proficiency test, a score of 9/15 or higher places you out of MTH 123 (with an updated placement of “MTH 123 Fulfilled”).
- The answers to this practice exam are found on the very last page of this document; you should fully attempt the entire exam before looking at the answers.

1. Consider two line segments: one connects $(0, 0)$ and $(1, 1)$, and one that connects $(0, 0)$ and $(1, \sqrt{3})$. What is the radian measure of the angle formed by these two line segments?

- (a) $\frac{\pi}{3}$
- (b) $\frac{\pi}{4}$
- (c) $\frac{\pi}{6}$
- (d) $\frac{\pi}{12}$

2. If θ is an angle for which $\cos(\theta) = \frac{1}{3}$ and θ lies in Quadrant IV, which of the following is the value of $\sin(\theta)$?

- (a) $-\frac{2}{3}$
- (b) $\frac{2}{3}$
- (c) $\frac{\sqrt{8}}{3}$
- (d) $-\frac{\sqrt{8}}{3}$

3. For which of the following values of t is $\tan(t) = -1$?

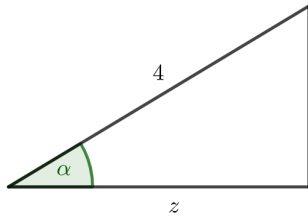
(a) $t = \frac{3\pi}{4}, -\frac{\pi}{4}$

(b) $t = \frac{\pi}{4}, -\frac{\pi}{4}$

(c) $t = \frac{3\pi}{4}, \frac{5\pi}{4}$

(d) $t = \frac{\pi}{4}, \frac{5\pi}{4}$

4. Given the pictured right triangle below, which of the following statements is true?



(a) $\sin(\alpha) = \frac{z}{4}$

(b) $\sin(\alpha) = \sqrt{4 - z^2}$

(c) $\sin(\alpha) = \frac{\sqrt{4 - z^2}}{4}$

(d) $\sin(\alpha) = \frac{\sqrt{2 - z}}{4}$

5. For the function $f(x) = 10\sin(3x) + 18$, which of the following statements is true?

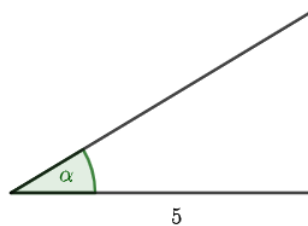
(a) The function's amplitude is 20 and its period is 6π .

(b) The function's amplitude is 10 and its period is 6π .

(c) The function's amplitude is 10 and its period is $\frac{2\pi}{3}$.

(d) The function's amplitude is 20 and its period is $\frac{2\pi}{3}$.

6. In the pictured right triangle, if $\alpha = 0.3$ radians, then the length of the other leg of the triangle is about



(a) 0.026

(b) 1.55

(c) 1.48

(d) 4.78

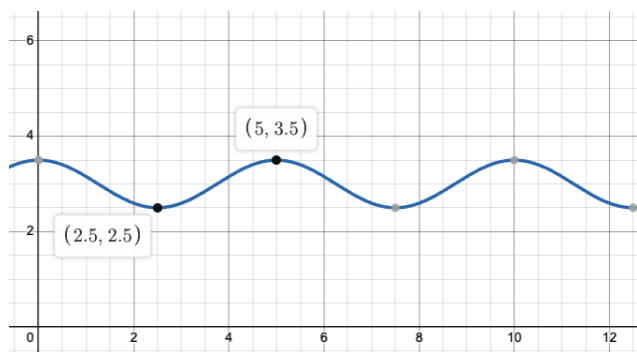
7. Suppose that in a right triangle, the hypotenuse has length 1, one of the acute angles is β , and the leg opposite β has length y . If θ is the other acute angle in the triangle, then:

- (a) $\sin(\theta) = y$
- (b) $\sin(\theta) = 1 - y$
- (c) $\sin(\theta) = \sqrt{1 - y^2}$
- (d) $\sin(\theta) = \frac{\sqrt{1 - y^2}}{y}$

8. If $g(x) = 1 - \sec^2(x)$, which of the following functions is equal to $g(x)$ for every real number x ?

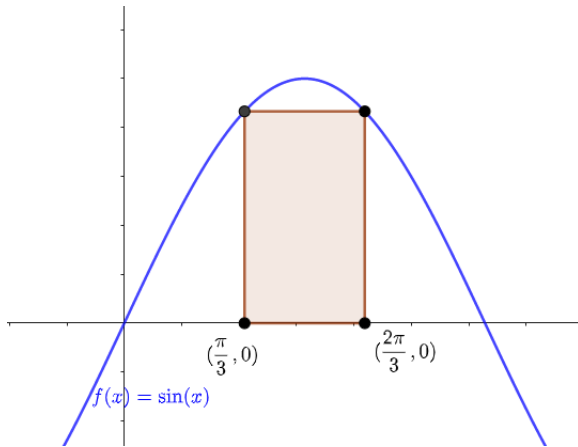
- (a) $f(x) = -\cos^2(x)$
- (b) $f(x) = \cot^2(x)$
- (c) $g(x) = -\csc^2(x)$
- (d) $g(x) = -\tan^2(x)$

9. For the pictured sinusoidal function, which of the following statements is true?



- (a) The function's amplitude is 0.5 and its period is 5
 - (b) The function's amplitude is 1 and its period is 2.5
 - (c) The function's amplitude is 1 and its period is 5
 - (d) The function's amplitude is 0.5 and its period is 2.5
10. A right triangle has legs of length 2 and 9. What is the radian measure of its smallest acute angle?
- (a) 12.53
 - (b) 1.35
 - (c) 78.47
 - (d) 0.219

11. What is the exact area of the rectangle in the figure below?



- (a) $\frac{\pi}{6}$
- (b) $\frac{\sqrt{3}}{2}$
- (c) $\frac{\pi}{3}$
- (d) $\frac{\pi\sqrt{3}}{6}$

12. The function $g(x) = \frac{\cos(x)}{\sin(2x)}$ has a vertical asymptote at which values of x ?

- (a) $n \cdot \frac{\pi}{2}$, where n is any integer
- (b) $n \cdot \frac{\pi}{4}$, where n is any integer
- (c) $\frac{\pi}{2} + n \cdot \frac{\pi}{2}$, where n is any integer
- (d) $n \cdot \pi$, where n is any integer

13. The exact solutions to the equation $10 \cos(t) - 2 = 3$ that satisfy $0 \leq t \leq 2\pi$ are

- (a) $t = -\frac{\pi}{3}, \frac{\pi}{3}$
- (b) $t = \frac{2\pi}{3}, \frac{4\pi}{3}$
- (c) $t = \frac{\pi}{3}, \frac{5\pi}{3}$
- (d) $t = \frac{4\pi}{3}, \frac{5\pi}{3}$

14. If x satisfies $-1 \leq x \leq 1$, then $\sin(\arccos(x)) =$

- (a) $\tan(x)$
- (b) x
- (c) $\sqrt{1 - x^2}$
- (d) $\frac{\pi}{2} - x$

15. The expression $\sqrt{\sin^2(2x) + \cos^2(2x)}$ is equivalent to

- (a) 1
- (b) $\sin(2x) + \cos(2x)$
- (c) $\frac{1}{2}$
- (d) $\tan(2x)$

Answers

1. d
2. d
3. a
4. c
5. c
6. b
7. c
8. d
9. a
10. d
11. d
12. a
13. c
14. c
15. a