Directions: This is a practice exam for the Math 110 Proficiency Test. If your initial mathematics placement is no placement, "MTH 108", or "MTH 108 Fulfilled", you should take not only this practice test, but also the online proficiency test in an effort to increase your placement. 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 110 is an introductory algebra course; many students find the content familiar from high school courses. Taking the practice test, studying related ideas, and taking the proficiency test is important because if you can pass out of MTH 110, 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 110 proficiency test is 60 minutes in length. For this practice exam, set a 60 minute timer for yourself.

- Like the MTH 110 proficiency test, this practice exam has 25 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 17/25 or higher places you out of MTH 110 (with an updated placement of "MTH 110 Fulfilled"); a score of 10/25 to 16/25 places you into MTH 110 (with a placement of "MTH 108 Fulfilled"). If you have an initial math placement from an ACT or SAT score, you cannot lower your placement by taking a proficiency test. A proficiency test can only raise your score.

- 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. Which of the following expressions is equivalent to the expression $5(2x-1) - 6(3-4x)$?

    (a) $-14x + 13$

    (b) $34x - 23$

    (c) $14x - 13$

    (d) $23 - 34x$

2. Which of the following expressions is equivalent to $\dfrac{x^2 y^3}{(2x^{-1}y^2)^2}$?

    (a) $\frac{1}{4}x^4 y^{-1}$

    (b) $4x^4 y$

    (c) $4y$

    (d) $\frac{1}{4}x^4 y$

3. Which of the following expressions is equivalent to $(x+3)^2 + (x-1)(x-3)$?

(a) $x^3 + 2x + 12$

(b) $2x^2 - 4x + 12$

(c) $2x^2 + 2x + 9$

(d) $2x^2 + 2x + 12$

4. In factored form, $2t^2 + 11t + 5$ is equivalent to:

(a) $(2t+1)(t+5)$

(b) $(2t+5)(t+1)$

(c) $(2t-5)(t-1)$

(d) $2(t+5)(t+1)$

5. In factored form, $9 - x^2$ is equivalent to:

(a) $(3-x)^2$

(b) $(x+3)^2$

(c) $(3-x)(3+x)$

(d) $(x-3)(x+3)$

6. The solution to the equation $11x + 3 = 5x + 4$ is:

(a) $x = 6$

(b) $x = 1$

(c) $x = \frac{1}{6}$

(d) $x = -\frac{1}{6}$

7. If we solve the equation $P = 2a + 2b$ for b, we find that:

(a) $b = \frac{P-2a}{2}$

(b) $b = \frac{P}{2} - a$

(c) $b = \frac{P+2a}{2}$

(d) $b = \frac{P}{2} + a$

8. The exact values of x that make the equation $x^2 + 3x - 3 = 0$ true are

(a) $x = 3$

(b) $x = \frac{-3\pm\sqrt{21}}{2}$

(c) $x = \pm 3$

(d) $x = \frac{3\pm\sqrt{21}}{2}$

9. If a ball tossed in the air has its height h (in feet) at time t (in seconds) given by $h(t) = -16t^2 + 32t + 48$, then the time the ball lands is

(a) $t = 2$

(b) $t = 3$

(c) $t = -1$

(d) $t = 2.5$

10. The exact solution to the equation $e^{2x-4} = 3$ is

   (a) $\frac{\ln(3)-4}{2}$

   (b) $\frac{\ln(3)+4}{2}$

   (c) $\ln(3) + 2$

   (d) $\ln(3) - 2$

11. If $A(t) = 10e^{-t}$ represents the number of grams of a decaying quantity at time t, at what time does only 1 gram remain?

   (a) $t = \ln(10e)$

   (b) $t = \ln\left(\frac{1}{10}\right)$

   (c) $t = 10e^{-1}$

   (d) $t = \ln(10)$

12. For the line given by the equation $x + y = 1$, which of the following statements is true?

   (a) The line has slope $m = -1$ and passes through the point $(-3, 4)$

   (b) The line has slope $m = 1$ and passes through the point $(-4, 3)$

   (c) The line has slope $m = -1$ and passes through the point $(-4, 3)$

   (d) The line has slope $m = 1$ and passes through the point $(-3, 4)$

13. Which of the following is an equation for the line that passes through $(1, 3)$ and $(4, 9)$?

   (a) $y = 2x + \frac{1}{2}$

   (b) $y = 2x + 1$

   (c) $y = \frac{1}{2}x + 1$

   (d) $y = \frac{1}{2}x + \frac{1}{2}$

14. Which of the following is an equation for the line that has slope $m = 1/4$ and passes through the point $(2, -3)$?

   (a) $y + 3 = 4(x - 2)$

   (b) $y = 4x - 3$

   (c) $y = \frac{1}{4}x - 3$

   (d) $y + 3 = \frac{1}{4}(x - 2)$

15. At what point do the lines $x - y = 5$ and $x + 5y = 7$ intersect?

   (a) $\left(\frac{16}{3}, \frac{1}{3}\right)$

   (b) $(5, 0)$

   (c) $\left(\frac{1}{3}, \frac{16}{3}\right)$

   (d) $\left(\frac{16}{3}, -\frac{1}{3}\right)$

16. A formula for a quadratic function $y = f(x)$ whose vertex is $(2, 4)$ and passes through the point $(3, 6)$ is given by

(a) $y = (x - 2)^2 + 4$

(b) $y = 2(x - 2)^2 + 4$

(c) $y = 2(x + 2)^2 + 4$

(d) $y = -2(x - 2)^2 + 4$

17. For the function $h(x) = 3x^2 - 5x + 9$, the value of $h(-1)$ is
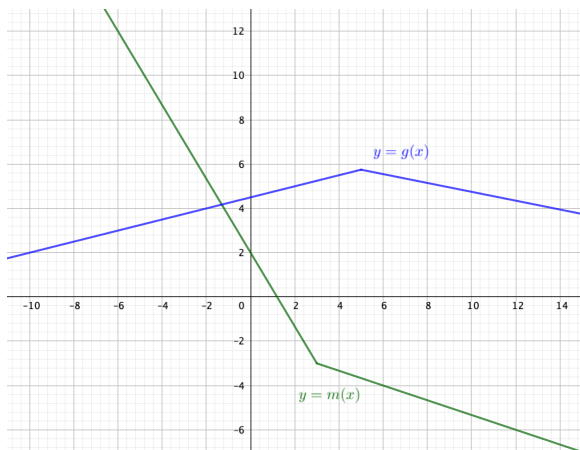
(a) 5

(b) -5

(c) 17

(d) -1

18. An equivalent way to write the function $f(x) = \frac{1}{4^x}$ is

(a) $f(x) = \left(\frac{1}{2}\right)^x$

(b) $f(x) = \frac{1}{4^{-x}}$

(c) $f(x) = \left(\frac{1}{4}\right)^x$

(d) $f(x) = 4^x$

19. If $y = f(x) = 3x + 5$, which of the following is the value of $f^{-1}(4)$?

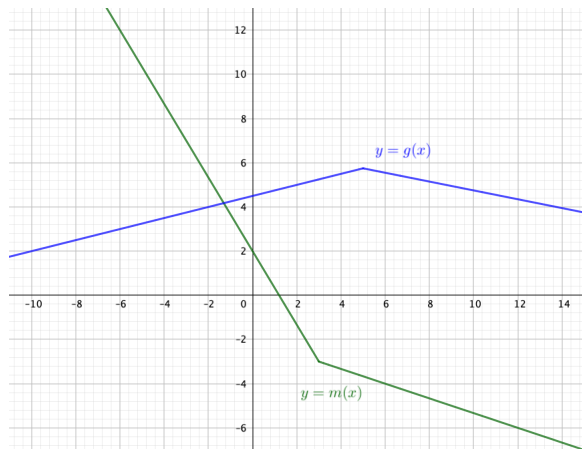(a) $-\frac{1}{3}$

(b) 17

(c) $\frac{1}{17}$

(d) $\frac{1}{3}$

20. Consider the functions $y = g(x)$ and $y = m(x)$ given by the following graph:
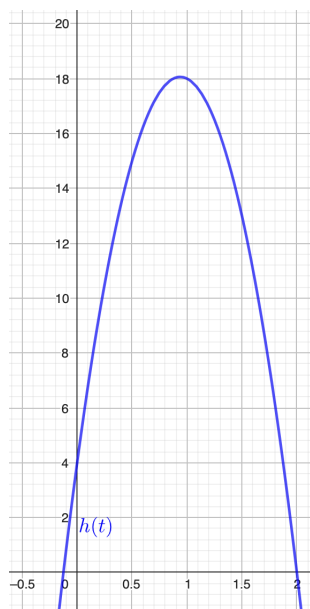

Which of the following statements is true?

(a) $g(0) = m(0)$

(b) $g(2) < g(12)$

(c) $m(2) = 0$

(d) $g(x) = 4$ when $x = -2$ or $x = 14$

21. For the function $y = g(x)$ pictured in the graph below, which is the best estimate of $g(-5)$?

(a) 2

(b) 3.25

(c) 10

(d) 5.75

22. The height (in feet) above the ground of a ball tossed in the air is given by the following graph. What is the approximate value of $h(1)$ and what is its meaning?

(a) $h(1) \approx 1.95$ and this means that about 1.95 seconds after the ball is tossed, the ball is about 1 foot off the ground.

(b) $h(1) \approx 18$ and this means that about 18 seconds after the ball is tossed, the ball is about 1 foot off the ground.

(c) $h(1) \approx 18$ and this means that 1 second after the ball is tossed, the ball is about 18 feet higher than the point from which it was tossed.

(d) $h(1) \approx 18$ and this means that 1 second after the ball is tossed, the ball is about 18 feet off the ground.

23. If Lisa walks 5 miles in 90 minutes, what is her approximate average speed?

   (a) 7.5 miles per hour

   (b) 3.33 miles per hour

   (c) 5 miles per hour

   (d) 2.5 miles per hour

24. A person walks at a constant rate of 2 feet per second toward a door that is 40 feet away. What function measures the distance from the person to the door at time t?

   (a) $d(t) = 40 + 2t$

   (b) $d(t) = -2t + 40$

   (c) $d(t) = 2t$

   (d) $d(t) = 20 - t$

25. The number of wolves, $W(t)$, on an island is measured once every 6 months, with the data recorded in the following table.

t	0	6	12	18	24	30	36
$W(t)$	38	42	44	41	36	33	32

Which of the following statements is true?

   (a) After 30 months, there are 33 wolves on the island.

   (b) After 33 months, there are 36 wolves on the island.

   (c) When there are 18 wolves on the island, 41 months have passed.

   (d) The wolf population is always growing during the 36 months shown in the table.

Answers

1. b
2. a
3. d
4. a
5. c
6. c
7. a
8. b
9. b
10. b
11. d
12. a
13. b
14. d
15. a
16. b
17. c
18. c
19. a
20. d
21. b
22. d
23. b
24. b
25. a