

1. A cliff diver on a Caribbean island jumps from a height of 105 feet, with an initial upward velocity of 5 feet per second. An equation that models the height,  $h(t)$ , above the water, in feet, of the diver in time elapsed,  $t$ , in seconds, is  $h(t) = -16t^2 + 5t + 105$ . How many seconds, to the nearest hundredth, does it take the diver to fall 45 feet below his starting point?

- A. 1.45
- B. 1.84
- C. 2.10
- D. 2.72

2. The expression  $x^2(x+2) - (x+2)$  is equivalent to

- A.  $x^2$
- B.  $x^2 - 1$
- C.  $x^3 + 2x^2 - x + 2$
- D.  $(x+1)(x-1)(x+2)$

3. The roots of the equation  $2x^2 + 4 = 9x$  are

- A. real, rational, and equal
- B. real, rational, and unequal
- C. real, irrational, and unequal
- D. imaginary

4. When factored completely, the expression  $3x^3 - 5x^2 - 48x + 80$  is equivalent to

- A.  $(x^2 - 16)(3x - 5)$
- B.  $(x^2 - 16)(3x - 5)(3x + 5)$
- C.  $(x + 4)(x - 4)(3x - 5)$
- D.  $(x + 4)(x - 4)(3x - 5)(3x + 5)$

5. Factor completely:  $x^3 - 49x$

- A.  $x(x+7)(x-7)$
- B.  $(x-7)(x+7)$
- C.  $x(x+7)(x-7)$
- D.  $x(x-7)(x+7)$

6. Solve for  $x$  in simplest radical form.  $2x^2 - 2x + 4 = x^2 + 6x + 5$

- A.  $x = 2 + \sqrt{10}$
- B.  $x = 2 + \sqrt{5}$
- C.  $x = 4 + 2\sqrt{5}$
- D.  $x = \frac{4 \pm \sqrt{20}}{2}$

7. Express  $ax^2 - a^2x - 1$  as a product of two binomials.

- A.  $(a-1)(x+1)$
- B.  $(a)(x-1)$
- C.  $(a+1)(x-1)$
- D.  $(ax-a)(x-1)$

8. Solve the following system of equations algebraically:

- $5 = y - x$
- $4x^2 = -17xy + 4$

- A.  $\left(-\frac{9}{2}, \frac{1}{2}\right)$
- B.  $\left(\frac{19}{2}, \frac{1}{2}\right)$  and  $\left(-\frac{1}{2}, \frac{3}{2}\right)$
- C.  $\left(\frac{9}{2}, -\frac{1}{2}\right)$  and  $\left(\frac{1}{2}, \frac{11}{2}\right)$
- D.  $\left(-\frac{9}{2}, \frac{1}{2}\right)$  and  $\left(\frac{1}{2}, \frac{11}{2}\right)$

9. What is the range of  $f(x) = (x+4)^2 + 7$ ?

- A.  $y \geq -4$
- B.  $y \geq 4$
- C.  $y = 7$
- D.  $y \geq 7$

10. Which statement below is true about how the graphs of  $y = x^2 + 3$  and  $y = x^2 - 2$  differ?

- A. The lowest point on the graph of  $y = x^2 + 3$  is  $(0, -3)$ , and the lowest point on the graph of  $y = x^2 - 2$  is  $(0, 2)$ .
- B. The graph of  $y = x^2 + 3$  is shifted up 5 units from the graph of  $y = x^2 - 2$ .
- C. The graph of  $y = x^2 + 3$  is shifted right 5 units from the graph of  $y = x^2 - 2$ .
- D. The highest point on the graph of  $y = x^2 + 3$  is  $(0, 3)$ , and the lowest point on the graph of  $y = x^2 - 2$  is  $(0, -2)$ .

11. How does decreasing the value of  $c$  by 5 units in the function  $y = x^2 + c$  affect the graph?

- A. The graph shifts up 5 units.
- B. The graph shifts down 5 units.
- C. The graph shifts right 5 units.
- D. The graph shifts left 5 units.

12. What change occurs in a parabola if the absolute value of the leading coefficient of the quadratic function increases?

- A. The graph narrows.
- B. The graph widens.
- C. The graph shifts up.
- D. The graph shifts right.

13. Which statement below is true about the graph of  $y = ax^2$  if  $a$  changes from 3 to  $-5$ ?

- A. The graph becomes wider and opens up.
- B. The graph becomes narrower and opens up.
- C. The graph becomes wider and opens down.
- D. The graph becomes narrower and opens down.

14. Which values of  $x$  are in the solution set of the following system of equations?

$$y = 3x - 6$$

$$y = x^2 - x - 6$$

- A.  $0, -4$
- B.  $0, 4$
- C.  $6, -2$
- D.  $-6, 2$

15. The roots of the equation  $2x^2 - 7x - 3 = 0$  are

- A.  $-\frac{1}{2}$  and  $-3$
- B.  $\frac{1}{2}$  and  $3$
- C.  $\frac{-7 \pm \sqrt{73}}{4}$
- D.  $\frac{7 \pm \sqrt{73}}{4}$

16. If a quadratic equation with real coefficients has a discriminant of **225**, then what type of roots does it have?

- A. 2 real, rational roots
- B. 2 real, irrational roots
- C. 1 real, rational root
- D. 2 imaginary roots

17. If a quadratic equation with real coefficients has a discriminant of **10**, then what type of roots does it have?

- A. 2 real, rational roots
- B. 2 real, irrational roots
- C. 1 real, rational root
- D. 2 imaginary roots

18. A homeowner wants to increase the size of his deck that now measures 15 feet by 18 feet. His homeowner's association declares that no deck is to be more than 928 square feet. If the length and width of the deck are to be increased by the same amount, find, **to the nearest tenth**, the maximum number of feet by which the length of the deck may be legally increased.

- A. 14 feet
- B. 21 feet
- C. 28 feet
- D. 32 feet

19. The equation  $h(t) = -16t^2 + 864t$  models the path of a rocket shot into the air. After how many seconds does the rocket hit the ground?

- A. 27 seconds
- B. 54 seconds
- C. 108 seconds
- D. 120 seconds

20. Alisha hit at a tennis ball in the air with enough topspin to make the ball land in bounds on the end line. The equation  $h(t) = -3t^2 + 10t + 2$  models the flight of the tennis ball. Find the interval for which the ball is at or above 6 feet.

- A.  $t > 1.67$  secs
- B.  $0.46 \text{ secs} \leq t \leq 2.87$  secs
- C.  $1.67 \text{ secs} \leq t \leq 10.33$  secs
- D. The ball never reaches 6 feet.

21. The equation  $h(t) = -16t^2 + 32t + 128$  models the path of a ball thrown in the air from the top of a building. After how many seconds does the ball reach its maximum height?

- A. 1 second
- B. 2 seconds
- C. 3 seconds
- D. 4 seconds

22. For what values of  $x$  is the function  $f(x) = x^2 - 4x - 5$  increasing?

- A.  $-1 < x < 5$
- B.  $x > 2$
- C.  $x < -1$  or  $x > 5$
- D.  $x < 2$

23. Which expression is the greatest common factor (GCF) of the terms of the trinomial  $12x^7y^9 - 6x^4y^7 - 10x^3y^5$ ?

- A.  $6x^7y^9$
- B.  $2x^3y^5$
- C.  $6x^3y^5$
- D.  $2x^{14}y^{21}$

24. Solve the equation  $8x^3 - 4x^2 - 18x - 9 = 0$  algebraically for all values of  $x$ .

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

25. The graph of  $y = (x - 3)^2$  is shifted left 4 units and down 2 units. What is the axis of symmetry of the transformed graph?

- A.  $x = -2$
- B.  $x = -1$
- C.  $x = 1$
- D.  $x = 7$

26. The solution set of the equation  $x^2 - 4x - 12 = 0$  is

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

27. What is the solution set of the equation  $x^2 - 5x = 0$ ?

- A.  $\{0, -5\}$
- B.  $\{0, 5\}$
- C.  $\{0\}$
- D.  $\{5\}$

28. Simplify:  $\frac{x^2 + 6x + 5}{x^2 - 25}$

- A.  $\frac{x+1}{x-5}$
- B.  $\frac{x-1}{x+5}$
- C.  $\frac{(x+1)(x+5)}{x-5}$
- D.  $\frac{x+5}{x-5}$

29. A ball is thrown straight up at an initial velocity of 54 feet per second. The height of the ball  $t$  seconds after it is thrown is given by the formula  $h(t) = 54t - 12t^2$ . How many seconds after the ball is thrown will it return to the ground?

- A. 9.2
- B. 6
- C. 4.5
- D. 4

30. What is the equation of a parabola that goes through points (0, 1), (-1, 6), and (2, 3)?

- A.  $y = x^2 + 1$
- B.  $y = 2x^2 + 1$
- C.  $y = x^2 - 3x + 1$
- D.  $y = 2x^2 - 3x + 1$

31. What is the solution set of the equation  $3x^2 = 48$ ?

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

32. Expressed in factored form, the binomial  $4a^2 - 9b^2$  is equivalent to

- A.  $(2a - 3b)(2a - 3b)$
- B.  $(2a + 3b)(2a - 3b)$
- C.  $(4a - 3b)(a + 3b)$
- D.  $(2a - 9b)(2a + b)$

33. Solve for the positive value of  $y$ :  $\frac{16}{y} = \frac{y}{4}$

- A. 32
- B. 16
- C. 8
- D. 4

34. Find the positive root of  $\frac{1}{x-1} = \frac{x+2}{4}$ ,  $x \neq 1$

- A. 1
- B. 2
- C. 3
- D. 4

35. The expression  $(2x^2 - 6x + 5) - (6x^2 - 3x + 5)$  is equivalent to

- A.  $-4x^2 - 3x$
- B.  $4x^2 - 3x$
- C.  $-4x^2 - 3x + 10$
- D.  $4x^2 - 3x - 10$

36. When  $3a^2 - 7a + 6$  is subtracted from  $4a^2 - 3a + 4$ , the result is

- A.  $a^2 + 4a - 2$
- B.  $a^2 - 10a - 2$
- C.  $-a^2 - 4a + 2$
- D.  $7a^2 - 10a + 10$

37. For which value of  $k$  will the roots of the equation  $2x^2 - 5x + k = 0$  be real and rational numbers?

- A. 1
- B. -5
- C. 0
- D. 4

38. The equation  $2x^2 + nx + n = 0$  has imaginary roots when  $n$  is equal to

- A. 10
- B. 8
- C. 6
- D. 4

**Answer Key for Math 2 Final Exam Review Unit 1 sp2015**

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|-------|-------|-------|
| 1. B  | 14. B | 27. B |
| 2. D  | 15. C | 28. A |
| 3. B  | 16. A | 29. C |
| 4. C  | 17. B | 30. D |
| 5. C  | 18. A | 31. C |
| 6. B  | 19. B | 32. B |
| 7. C  | 20. B | 33. C |
| 8. D  | 21. A | 34. B |
| 9. D  | 22. B | 35. A |
| 10. B | 23. B | 36. A |
| 11. B | 24. C | 37. C |
| 12. A | 25. B | 38. A |
| 13. D | 26. C |       |