**Assigned: Wednesday 4/11 DUE ON Wednesday 4/18, MUST SHOW WORK FOR CREDIT**

**UNIT 3: MODELING AND ANALYZING QUADRATIC FUNCTIONS Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

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| --- | --- |
| **Question** | **Answer** |
| **Interpret the Structure of Expressions** |  |
| **1. Consider the expression** **a. What is the coefficient of *n*?****b. What terms are being added in the expression?** |  |
| **2. Factor the expression .** |  |
| **3. Factor x2 + 5x + 4.** |  |
| **4. Factor the expression .** |  |
| **5. Which expression is equivalent to ?** |  |
| **6. What is a common factor for the expression 24x2 + 16x + 144?****A. 16****B. 8x****C. 3x2 + 2x + 18****D. 8(x – 2)(3x2 + 9)** |  |
| **7. Which of these shows the complete factorization of 6*x*2*y*2 – 9*xy* – 42?** **A.** 3(2*xy*2 – 7)(*xy*2 + 2) 1. **B.** (3*xy* + 6)(2*xy* – 7)
2. **C.** 3(2*xy* – 7)(*xy* + 2)
3. **D.** (3*xy*2 + 6)(2*xy*2 – 7)
 |  |
| **Write Expressions in Equivalent Forms to Solve Problems**  |
| **8. Find the zeros of**  **x2 – 7x + 12 = 0** |  |
| **9. Write in vertex form.** |  |
| **10. The function represents the height, in feet, of a stream of water being squirted out of a fountain after *t* seconds. What is the maximum height of the water?** |  |
| **11. What are the zeros of the function represented by the quadratic expression?** |  |
| **12. What are the zeros of the function represented by the quadratic expression ?** |  |
| **13. What are the zeros of the function represented by the quadratic expression ?** |  |
| **14. What is the vertex of the graph of** **A.** (5, 66)**B.** (5, –9)**C.** (–5, –9)**D.** (–5, –34) |  |
| **15. The expression represents a company’s profit for selling *x* items. For which number(s) of items sold is the company’s profit equal to $0?****A.** 0 items**B.** 35 items**C.** 10 items and 60 items**D.** 20 items and 30 items |  |
| **Create Equations That Describe Numbers or Relationships** |
| **16. What is the value of *r* when *S* = 0 for the equation *S* = 2*πr*2 + 2*πrh* for *r*?** |  |
| **17. The product of two consecutive positive integers is 132.****a. Write an equation to model the situation.****b. What are the two consecutive integers?** |  |
| **18. The formula for the volume of a cylinder is** **a. Solve the formula for *r*.****b. If the volume of a cylinder is 200 cubic inches and the height of the cylinder is 8 inches, what is the radius of the cylinder?** |  |
| **19. Graph the function represented by the equation .** | **[image]** |
| **20. A garden measuring 8 feet by 12 feet will have a walkway around it. The walkway has a uniform width, and the area covered by the garden and the walkway is 192 square feet. What is the width of the walkway?****A.** 2 feet**B.** 3.5 feet**C.** 4 feet**D.** 6 feet |  |
| **21. The formula for the area of a circle is Which equation shows the formula in terms of *r?*** |  |
| **Solve Equations and Inequalities in One Variable** |  |
| **22. Solve the equation by factoring.** |  |
| **23. Solve the equation by using square roots.** |  |
| **24. Solve the equation 4x2 – 7x + 3 = 0 using the quadratic formula.** |  |
| **25. What are the solutions to the equation** **?****A.** *x* = –4, *x* = 3**B.** *x* = –3, *x* = 4**C.** *x* = –2, *x* = 3**D.** *x* = –6, *x* = 2 |  |
| **26. What are the solutions to the equation****?** |  |
| **27. What are the solutions to the equation ?****A.** *x* = –7, *x* = –2**B.** *x* = –14, *x* = –1**C.** *x* = –2, *x* = 7**D.** *x* = –1, *x* = 14 |  |
| **28. An object is thrown in the air with an initial velocity of 5 m/s from a height of 9 m. The equation models the height of the object in meters after *t* seconds. How many seconds does it take for the object to hit the ground?****A.** 0.94 seconds**B.** 1.77 seconds**C.** 1.96 seconds**D.** 9.0 seconds |  |
| **BUILD A FUNCTION THAT MODELS A RELATIONSHIP BETWEEN TWO QUANTITIES** |
| **29. Annie is framing a photo with a length of 6 inches and a width of 4 inches. The distance from the edge of the photo to the edge of the frame is *x* inches. The combined area of the photo and frame is 63 square inches.****a. Write a quadratic function to find the distance from the edge of the photo to the edge of the frame.****b. How wide are the photo and frame together?** |  |
| **30. A scuba diving company currently charges $100 per dive. On average, there are 30 customers per day. The company performed a study and learned that for every $20 price increase, the average number of customers per day would be reduced by 2.****a. The total revenue from the dives is the price per dive multiplied by the number of customers. What is the revenue after 4 price increases?****b. Write a quadratic equation to represent *x* price increases.****c. What price would give the greatest revenue?** |  |
| **31. Consider the sequence 2, 6, 12, 20, 30, …****a. What explicit expression can be used to find the next term in the sequence?****b. What is the tenth term of the sequence?** |  |
| **32. What explicit expression can be used to find the next term in this sequence?** **2, 8, 18, 32, 50, ...****A.** 2*n* **B.** 2*n* + 6 **C.** 2*n*2 **D.** 2*n*2 + 1  |  |
| **33. The function represents the height of an object, *s*, from the ground after time, *t*, when the object is thrown with an initial velocity of *v*, at an initial height of *h*, and where *a* is the acceleration due to gravity (32 feet per second squared)*.* A baseball player hits a baseball 4 feet above the ground with an initial velocity of 80 feet per second. About how long will it take the baseball to hit the ground?****A.** 2 seconds**B.** 3 seconds**C.** 4 seconds**D.** 5 seconds |  |
| **34. A café’s annual income depends on *x*, the number of customers. The function****describes the café’s total annual income. The function** **describes the total amount the café spends in a year. The café’s annual profit, *P*(*x*), is the difference between the annual income and the amount spent in a year. Which function describes *P*(*x*)?** | **A.** **B.** **C.** **D.**  |
| **Build New Functions from Existing Functions** |
| **35. Compare the graphs of the following functions to *f*(*x*).****a.** **b. *f*(*x*) – 5****c. *f*(*x* – 2) + 1** | **[image]** |
| **36. Is even, odd, or neither? Explain how you know.** |  |
| **37. How does the graph of f(x) compare to the graph of ?** | **[image]** |
| **38. Which statement BEST describes the graph of *f*(*x* + 6)?****A.** The graph of *f*(*x*) is shifted up 6 units.**B.** The graph of *f*(*x*) is shifted left 6 units.**C.** The graph of *f*(*x*) is shifted right 6 units.**D.** The graph of *f*(*x*) is shifted down 6 units. |  |
| **39. Which of these is an even function?** |  |
| **40. Which statement BEST describes how the graph of compares to the graph of ?****A.** The graph of *g*(*x*) is a vertical stretch of *f*(*x*) by a factor of 3.**B.** The graph of *g*(*x*) is a reflection of *f*(*x*) across the *x*-axis.**C.** The graph of *g*(*x*) is a vertical shrink of *f*(*x*) by a factor of and a reflection across the *x*-axis.**D.** The graph of *g*(*x*) is a vertical stretch of *f*(*x*) by a factor of 3 and a reflection across the *x*-axis. |  |
| **Interpret Functions That Arise in Applications in Terms of the Context**  |
| **41. A ball is thrown into the air from a height of 4 feet at time *t* = 0. The function that models this situation is** ***h*(*t*) = where *t* is measured in seconds and *h* is the height in feet.****a. What is the height of the ball after 2 seconds?****b. When will the ball reach a height of 50 feet?****c. What is the maximum height of the ball?****d. When will the ball hit the ground?****e. What domain makes sense for the function?** |  |
| **42. This table shows a company’s profit, *p*, in thousands of dollars over time, *t*, in months.**

|  |  |
| --- | --- |
| **Time, t, (months)** | **Profit, p (thousands of dollars)** |
| 3 | 18 |
| 7 | 66 |
| 10 | 123 |
| 15 | 258 |
| 24 | 627 |

**a. Describe the average rate of change in terms of the given context.****b. What is the average rate of change of the profit between 3 and 7 months?****c. What is the average rate of change of the profit between 3 and 24 months?** |  |
| **43. A flying disk is thrown into the air from a height of 25 feet at time *t* = 0. The function that models this situation is , where *t* is measured in seconds and *h* is the height in feet. What values of *t* best describe the times when the disk is flying in the air?****A.** 0 < *t* < 5**B.** 0 < *t* < 25**C.** all real numbers**D.** all positive integers |  |
| **44. Use this table to answer the question.**

|  |  |
| --- | --- |
|  |  |
| **-2** | **15** |
| **-1** | **9** |
| **0** | **5** |
| **1** | **3** |
| **2** | **3** |

 | **What is the average rate of change of *f*(*x*) over the interval –2 ≤ *f*(*x*) ≤ 0?****A.** –10**B.** –5**C.** 5**D.** 10 |
| **45. What is the end behavior of the graph of** **1?** | **A.** As *x* increases, *f*(*x*) increases.As *x* decreases, *f*(*x*) decreases.**B.** As *x* increases, *f*(*x*) decreases.As *x* decreases, *f*(*x*) decreases.**C.** As *x* increases, *f*(*x*) increases.As *x* decreases, *f*(*x*) increases.**D.** As *x* increases, *f*(*x*) decreases.As *x* decreases, *f*(*x*) increases. |
| **ANALYZE FUNCTIONS USING DIFFERENT REPRESENTATIONS** |
| **46. Graph the function .** | **[image]** |
| **47. This graph shows a function *f*(*x*). Compare the graph of *f*(*x*) to the graph of the function given by the equation****. Which function has the lesser minimum value? How do you know?**  | **48. Use the graph below to answer the question.****Which function is shown in the graph?** |
| **49. The function models the height of a ball that was hit into the air,****where *t* is measured in seconds and *h* is the height in feet. This table represents the height, *g*(*t*), of a second ball that was thrown into the air.**

|  |  |
| --- | --- |
| **Time, *t*****(in seconds)** | **Height, *g*(*t*)****(in feet)** |
| **0** | **4** |
| **1** | **36** |
| **2** | **36** |
| **3** | **4** |

 | **Which statement BEST compares the length of time each ball is in the air?****A.** The ball represented by *f*(*t*) is in the air for about 5 seconds, and the ball represented by*g*(*t*) is in the air for about 3 seconds.**B.** The ball represented by *f*(*t*) is in the air for about 3 seconds, and the ball represented by*g*(*t*) is in the air for about 5 seconds.**C.** The ball represented by *f*(*t*) is in the air for about 3 seconds, and the ball represented by*g*(*t*) is in the air for about 4 seconds.**D.** The ball represented by *f*(*t*) is in the air for about 4 seconds, and the ball represented by*g*(*t*) is in the air for about 3 seconds. |