**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. | |