Analytic Geometry Milestone Review Unit 5

Name: _____

1. Consider the expression $3n^2 + n + 2$.
   a. What is the coefficient of n?
   b. What terms are being added in the expression?

2. Factor the expression $16a^2 - 81$.

3. Factor the expression $12x^2 + 14x - 6$.

4. Write $f(x) = 2x^2 + 12x + 1$ in vertex form.

5. The function $h(t) = -t^2 + 8t + 2$ 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?

6. What are the zeros of the function represented by the quadratic expression $x^2 + 6x - 27$?

7. What are the zeros of the function represented by the quadratic expression $2x^2 - 5x - 3$?

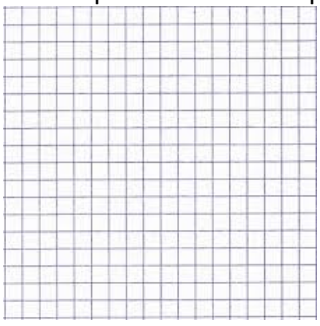
8. The product of two consecutive positive integers is 132.
   a. Write an equation to model the situation.

   b. What are the two consecutive integers?

9. The formula for the volume of a cylinder is $V = \pi r^2 h$.
   a. Solve the formula for r.

   b. If the volume of a cylinder is 200π cubic inches and the height of the cylinder is 8 inches, what is the radius of the cylinder?

10. Graph the function represented by the equation $y = 3x^2 - 6x - 9$.



Analytic Geometry Milestone Review Unit 5 Name: _____

11. Solve the equation $x^2 - 10x + 25 = 0$ by factoring.

12. Solve the equation $x^2 - 100 = 0$ by using square roots.

13. A ball is thrown into the air from a height of 4 feet at time $t = 0$. The function that models this situation is $h(t) = -16t^2 + 63t + 4$, 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?

14. This table shows a company's profit, p, in thousands of dollars over time, t, in months.

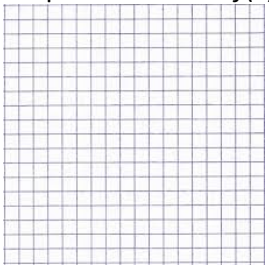
Time, t (months)	Profit, p (thousands of dollars)
3	18
7	66
10	123
15	258
24	627

    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?

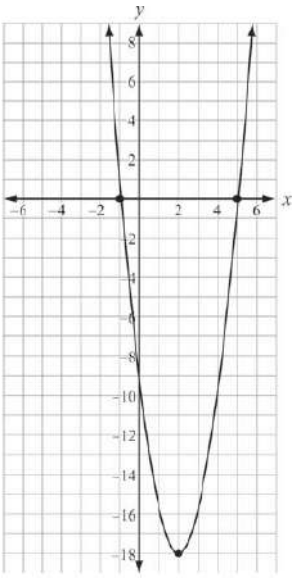
15. Graph the function $f(x) = x^2 - 5x - 24$.



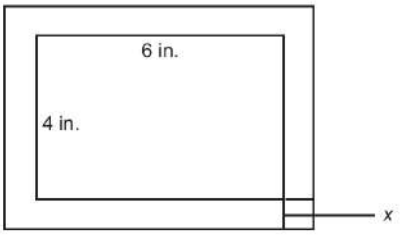
Analytic Geometry Milestone Review Unit 5

Name: _____

16. This graph shows a function $f(x)$. Compare the graph of $f(x)$ to the graph of the function given by the equation $g(x) = 4x^2 + 6x - 18$. Which function has the lesser minimum value? How do you know?



17. 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.



Note: Image is NOT drawn to scale.

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?

18. 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?

19. 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?

Analytic Geometry Milestone Review Unit 5 Name: _____

20. Compare the graphs of the following functions to $f(x)$.
    a. $\frac{1}{2}f(x)$

    b. $f(x) - 5$

    c. $f(x - 2) + 1$

21. Is $f(x) = 2x^3 + 6x$ even, odd, or neither? Explain how you know.

22. How does the graph of $f(x)$ compare to the graph of $f\left(\frac{1}{2}x\right)$?

23. This table shows that the value of $f(x) = 5x^2 + 4$ is greater than the value of $g(x) = 2^x$ over the interval [0, 8]. As x increases, will the value of $f(x)$ always be greater than the value of $g(x)$? Explain how you know.

x	$f(x)$	$g(x)$
0	$5(0)^2 + 4 = 4$	$2^0 = 1$
2	$5(2)^2 + 4 = 24$	$2^2 = 4$
4	$5(4)^2 + 4 = 84$	$2^4 = 16$
6	$5(6)^2 + 4 = 184$	$2^6 = 64$
8	$5(8)^2 + 4 = 324$	$2^8 = 256$

24. How does the growth rate of the function $f(x) = 2x + 3$ compare with $g(x) = 0.5x^2 - 3$? Use a graph to explain your answer.

25. Amery recorded the distance and height of a basketball when shooting a free throw. The height of the basketball after x seconds can be approximated by the quadratic function $f(x) = -0.118x^2 + 2.112x + 4.215$. Using this function, what is the approximate maximum height of the basketball?

Distance (feet), x	Height (feet), $f(x)$
0	4
2	8.4
6	12.1
9	14.2
12	13.2
13	10.5
15	9.8

26. This table shows the population of a city every 10 years since 1970

Years Since 1970, x	Population (thousands), y
0	489
10	801
20	1,202
30	1,998
40	2,959

    a. Make a scatter plot showing the data.

    b. Which type of function better models the relationship between 1970 and 2010, quadratic or linear?