



Pre-Calculus Summer Assignment 2021-2022 School Year

Directions: You must show all work, even for the multiple choice. Any graphing problem should be done without a graphing calculator. This assignment is due on the very first day of school. You will be held accountable for this material upon your return to school. Yes, that means a test or a quiz on this material is going to happen.

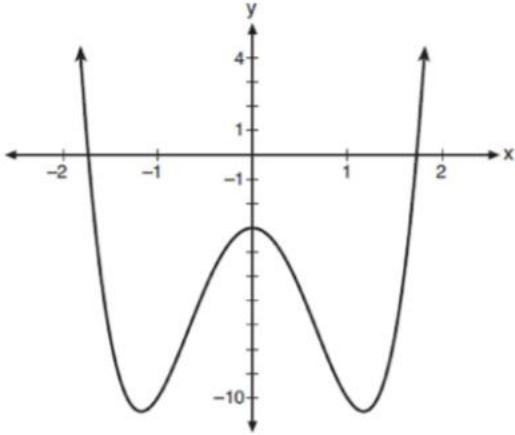
Multiple Choice

1. The solutions to $(x + 4)^2 - 2 = 7$ are
 - 1) $-4 \pm \sqrt{5}$
 - 2) $4 \pm \sqrt{5}$
 - 3) -1 and -7
 - 4) 1 and 7

2. What is the solution set of the equation $3x^2 - 34x - 24 = 0$?
 - 1) $\{-2, 6\}$
 - 2) $\{-12, \frac{2}{3}\}$
 - 3) $\{-\frac{2}{3}, 12\}$
 - 4) $\{-6, 2\}$

3. The solution to the equation $x^2 - 6x = 0$ is
 - 1) 0 , only
 - 2) 6 , only
 - 3) 0 and 6
 - 4) $\pm\sqrt{6}$

4. Consider the function $p(x) = 3x^3 + x^2 - 5x$ and the graph of $y = m(x)$ below.



Which statement is true?

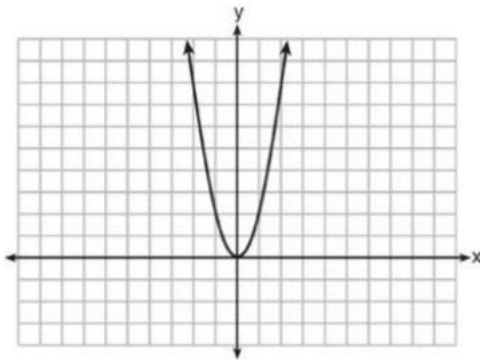
- 1) $p(x)$ has three real roots and $m(x)$ has two real roots.
 - 2) $p(x)$ has one real root and $m(x)$ has two real roots.
 - 3) $p(x)$ has two real roots and $m(x)$ has three real roots.
 - 4) $p(x)$ has three real roots and $m(x)$ has four real roots.
5. The solution of $87e^{0.3x} = 5918$, to the nearest thousandth, is
- 1) 0.583
 - 2) 1.945
 - 3) 4.220
 - 4) 14.066
6. Given $f(x) = \frac{1}{2}x + 8$, which equation represents the inverse, $g(x)$?
- 1) $g(x) = 2x - 8$
 - 2) $g(x) = 2x - 16$
 - 3) $g(x) = -\frac{1}{2}x + 8$
 - 4) $g(x) = -\frac{1}{2}x - 16$

7. Given $c(m) = m^3 - 2m^2 + 4m - 8$, the solution of $c(m) = 0$ is (Hint: Solve by factoring)
- 1) ± 2
 - 2) 2, only
 - 3) $2i, 2$
 - 4) $\pm 2i, 2$

8. The expression $\frac{x^3 + 2x^2 + x + 6}{x + 2}$ is equivalent to
- 1) $x^2 + 3$
 - 2) $x^2 + 1 + \frac{4}{x + 2}$
 - 3) $2x^2 + x + 6$
 - 4) $2x^2 + 1 + \frac{4}{x + 2}$

9. The value of the x -intercept for the graph of $4x - 5y = 40$ is
- 1) 10
 - 2) $\frac{4}{5}$
 - 3) $-\frac{4}{5}$
 - 4) -8

10. The graph of the equation $y = ax^2$ is shown below.



If a is multiplied by $-\frac{1}{2}$, the graph of the new equation is

- 1) wider and opens downward
- 2) wider and opens upward
- 3) narrower and opens downward
- 4) narrower and opens upward

11. What is the value of x in the equation

$$\frac{x-2}{3} + \frac{1}{6} = \frac{5}{6}?$$

- 1) 4
- 2) 6
- 3) 8
- 4) 11

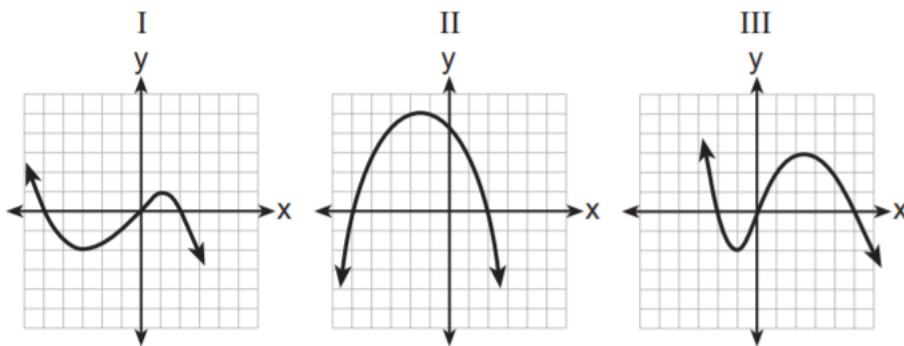
12. Which situation could be modeled by using a linear function?

- 1) a bank account balance that grows at a rate of 5% per year, compounded annually
- 2) a population of bacteria that doubles every 4.5 hours
- 3) the cost of cell phone service that charges a base amount plus 20 cents per minute
- 4) the concentration of medicine in a person's body that decays by a factor of one-third every hour

13. Krystal was given \$3000 when she turned 2 years old. Her parents invested it at a 2% interest rate compounded annually. No deposits or withdrawals were made. Which expression can be used to determine how much money Krystal had in the account when she turned 18?

- (1) $3000(1 + 0.02)^{16}$
- (2) $3000(1 - 0.02)^{16}$
- (3) $3000(1 + 0.02)^{18}$
- (4) $3000(1 - 0.02)^{18}$

14. A polynomial function contains the factors x , $x - 2$, and $x + 5$. Which graph(s) below could represent the graph of this function?



- (1) I, only
- (2) II, only
- (3) I and III
- (4) I, II, and III

15. (Hint: Graph it!)

The range of the function $f(x) = |x + 3| - 5$ is

(1) $[-5, \infty)$

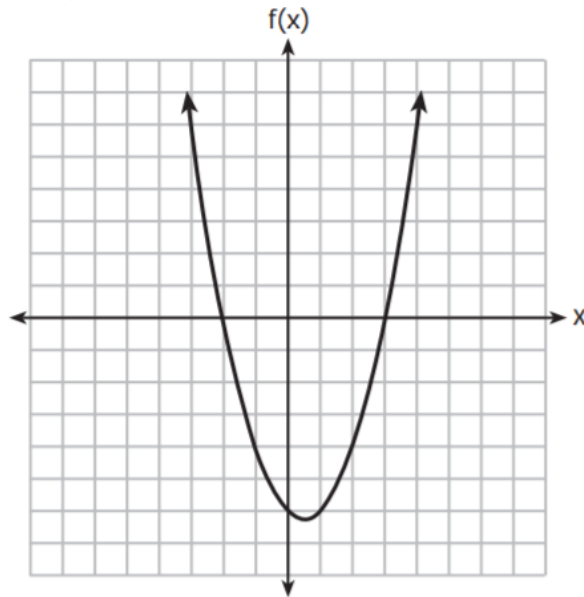
(3) $[3, \infty)$

(2) $(-5, \infty)$

(4) $(3, \infty)$

Free Response Questions. Again, show all work.

16. Below is the graph of the quadratic function, $f(x)$.



Could the factors of $f(x)$ be $(x + 2)$ and $(x - 3)$? Based on the graph, explain why or why *not*.

17. Multiply the following rational expression. State any restriction on the variable.

$$\frac{x^2 - 16}{x^2} \cdot \frac{x^2 - 4x}{x^2 - x - 12}$$

18. Solve the equation $\sqrt{2x-7} + x = 5$ algebraically, and justify the solution set.

19. Use logarithms to solve the equation below. Leave answer as an exact value.

$$1.7^x = 20$$

20. Solve the logarithmic equation below.

$$\log(x - 9) + \log x = 1$$

21. Solve the logarithmic equation below.

$$\log_2 2x = \log_2 100$$

22. Condense the expression into one logarithm.

$$\log x + 2\log y - \frac{1}{3}\log z$$

23. Expand the following logarithm.

$$\ln \frac{3x^4}{yz^5}$$

24. Using the parent function $y = |x|$, state all the transformations that took place to get the function $f(x) = -6|x + 2| + 1$.

25. Divide the following rational expression. State any restrictions on the variable.

$$\frac{15}{y^2 + 2y - 8} \div \frac{5y}{y - 2}$$

26. In a classroom of 26 students, 12 are boys and 14 are girls. A committee of 5 students is to be chosen at random. How many ways can the group of 5 consist of 3 girls and 2 boys?

27. Fill in the missing information and provide a rough sketch of the polynomial.

$$f(x) = 2(x + 3)(x - 1)^2$$

Zeros and their multiplicities:

Graph:

Y-intercept:

End behavior:

as $x \rightarrow -\infty$, $f(x) \rightarrow$ _____

as $x \rightarrow \infty$, $f(x) \rightarrow$ _____

28. Solve the absolute value equation below. Check your answers.

$$|2x - 3| + 5 = 12$$

29. Find the equations of the vertical asymptote and horizontal asymptote for the following function.

$$y = -\frac{3}{x + 5} + 2$$

30. Multiply and simplify. Write answer in standard form.

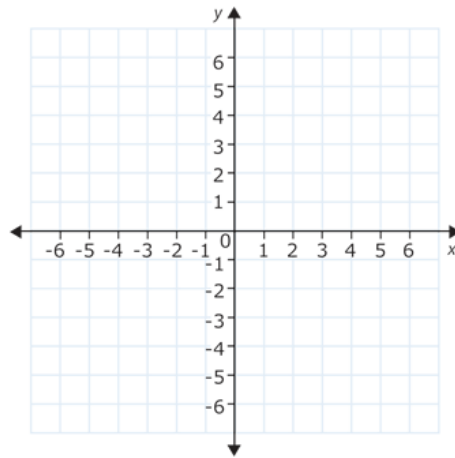
$$(2x - 3)(x + 6) - 2(x + 3)$$

31. Write the equation of a line in point-slope form that passes through the point $(-4, 5)$ that is parallel to the line $2y = 3x + 6$.

32. Write the equation of a line in slope intercept form that passes through the point $(8, -3)$ that is perpendicular to the line $y = 4x + 5$.

33. Graph the following linear equality. Shade appropriately.

$$y \leq -\frac{1}{2}x + 3.$$



34. Write a system of equations for the following word problem. Then, solve the system.

A hotel has 260 rooms. Some are singles, and some are doubles. The singles cost \$35 and the doubles cost \$60. Because of a math teachers' convention, all of the hotel rooms are occupied. The sales for this night are \$14,000. How many of each type of room does the hotel have?

35. Solve the following equation by completing the square. Leave answer in simplest radical form.

$$2x^2 - 8x = -12$$

36. Simplify: $(3 - 5i)(4 + 2i)$ where i represents the imaginary unit.

37. Graph the following parabola. Find the vertex, axis of symmetry, domain, and range.
 $4x - 1$

$$y = -2x^2 +$$