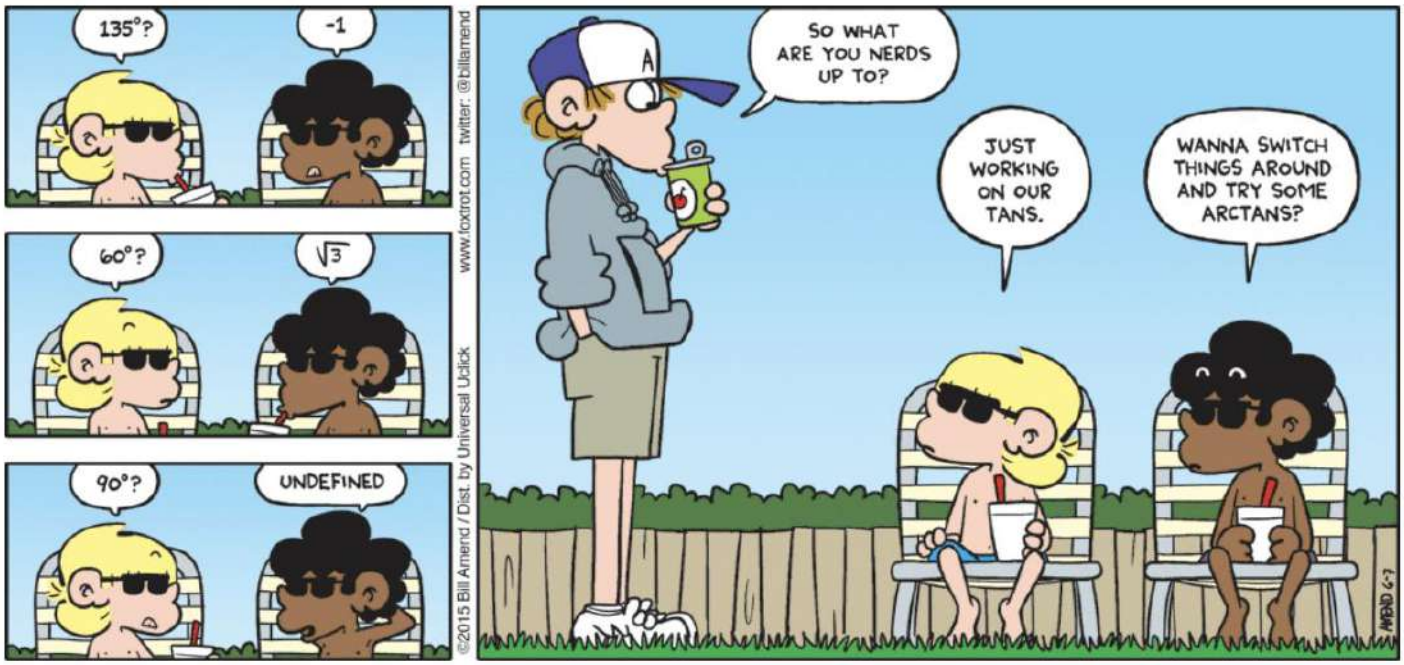
Pre-Calculus

Summer Assignment

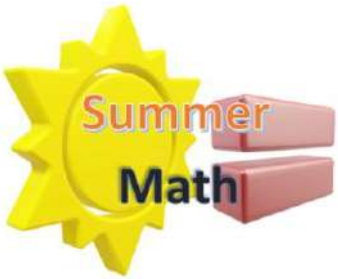
2022-2023 School Year



Pre-Calculus is a **rigorous and fast-paced course**. This standard-based course meets everyday and emphasizes the use and application of polynomial, rational, radical, logarithmic and trigonometric functions and the concept of theory of limits. There will be an extensive use of the **graphing calculator**, which will be provided for this course.

Enjoy your summer future Pre-Calculus student!!

IMPORTANT: Read this page first...



INSTRUCTIONS

1. Complete all sections and problems in this packet on your own.
2. Make sure to show ALL your work to earn credit.
3. Complete the entire packet without a calculator.
4. You may use your notes from previous math courses to help you complete your packet.

PACING

You should pace yourself to work on this assignment at least a few hours a week leading up to the start of school in September. If you complete the packet at the end of June or early in July, it will not be very helpful in preparation for the start of school. Also, it will not be helpful if you try to complete the entire packet a night or two before school starts. Pace yourself by setting a calendar reminder and scheduling blocks of time to focus on this assignment as you prepare to return to school in September.

GRADING

- On the first day of school, your math teacher will check for full completion of this Summer Assignment and the supporting work for your responses (no work = no credit). This part will be weighted at 50% (30% completion and 20% accuracy) - this is the grade that represents your effort and following of directions.
- Your teacher will then review the assignment and provide remediation as needed.
- Upon completion of your teacher's review, you will be given an assessment (a "test") based on the topics covered in this assignment. This assessment will be weighted at 50% - this is the grade that represents your mastery of the skills.
- The two weighted scores combined will count as one project grade for the 1st trimester.
- Acceptance of late assignments will be limited and subject to point deductions.

We are looking forward to meeting you in September.
Go Bulldogs!

RESOURCES & REFERENCE MATERIALS

https://www.khanacademy.org/math,
https://www.purplemath.com/
or any other websites.

Name _____ Teacher _____ Period _____

Welcome to Pre-Calculus! This summer review assignment is designed to refresh your Algebra 2 skills. It includes information that was taught in Algebra 2 and will be used throughout the Pre-Calculus course. You may need to research certain topics in this packet to figure out the correct way to solve.

Assignment Requirements: You **MUST** show **all work** in order to receive credit! All work must be done on a separate sheet of paper in a neat and organized manner. **No work, no credit!**

Part I: Matching: Match the equations with their respective description.

_____1.	$f(x)=\frac{2}{3}\lvert 4x+5\rvert-3$	A.	Linear Function
_____2.	$f(x)=\frac{2}{3}\sqrt[3]{4x+5}-3$	B.	Quadratic Function
_____3.	$f(x)=\frac{2}{3}\cdot\frac{1}{4x+5}-3$	C.	Absolute Value Function
_____4.	$f(x)=\frac{2}{3}(4x+5)^4-3(4x+5)^2-2$	D.	Cubic Function
_____5.	$f(x)=\frac{2}{3}(4x+5)^3-3$	E.	Cube Root Function
_____6.	$f(x)=\frac{2}{3}(4x+5)-3$	F.	Square Root Function
_____7.	$f(x)=\frac{2}{3}(4x+5)^2-3$	G.	Rational Function
_____8.	$f(x)=\frac{2}{3}\sqrt{4x+5}-3$	H.	Polynomial Function

Part II: Multiple Choice

9. Determine the slope of the line $7x-4y=12$

A. 7 B. 4/7 C. -3 D. 7/4

10. Find the slope-intercept form of a line passing through the points (-4, 1) and (5, 2).

A. $y = -\frac{5}{3}x + \frac{31}{3}$

C. $y = -\frac{1}{9}x + \frac{23}{9}$

B. $y = 3x - 13$

D. $y = \frac{1}{9}x + \frac{13}{9}$

11. Write the slope-intercept form of the equation of a line passing through the point (2, 1) and perpendicular to the line $4x - 2y = 3$.

A. $y = 2x - 3$

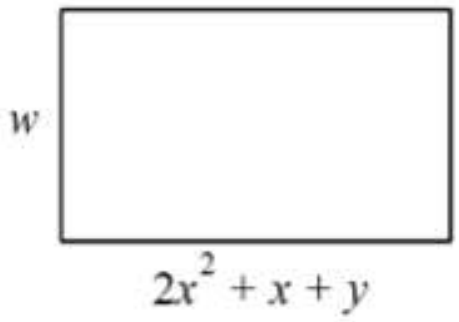
C. $y = -\frac{1}{2}x + 2$

B. $y = \frac{1}{2}x$

D. $y = 2x + 5$

12. In the figure below, the perimeter is $4x^2 + 8x - 2y$ units and the length is $2x^2 + x + y$.

What is the width?



A. $w = 2x^2 - 7x - 3y$

C. $w = 2x^2 + 8x - 2$

B. $w = 6x - 4y$

D. $w = 3x - 2y$

13. Simplify: $(5x - 3)(x^3 - 5x + 2)$

A. $5x^4 - 3x^3 + 25x^2 - 5x - 6$

C. $5x^4 - 28x^2 + 25x - 6$

B. $5x^4 - 3x^3 - 25x^2 + 25x - 6$

D. $5x^3 + 22x^2 - 5x - 6$

14. Factor completely: $2x^3 + 2x^2 - 40x$

A. $2x(x+5)(x-4)$

C. $-4x(x+2)(x+5)$

B. $5x(x+2)(x-4)$

D. $2x(x-5)(x-4)$

15. Factor completely: $3m^2 + 10m + 8$

A. $(3m+6)(m+4)$

C. $(3m-4)(m-2)$

B. $(3m+4)(m+2)$

D. $prime$

16. Factor completely: $8n^3 - 27$

A. $(2n-3)(2n^2-6n-3)$

C. $(2n-3)(4n^2+6n+9)$

B. $(2n+3)(2n^2+6n-3)$

D. $(2n+3)(4n^2+6n+9)$

17. Factor completely: $p^4 - 25p^2 + 144$

A. $(p-4)(p-3)(p^2)$

C. $(p-4)(p-4)(p+3)(p+3)$

B. $(p-4)(p+4)(p-3)(p+3)$

D. $(p+12)^2$

18. Which of the following is a factor of the polynomial $4c^2 - 13c + 10$?

A. $c+5$

C. $4c+5$

B. $4c-2$

D. $c-2$

19. Which of the following is a factor of the polynomial $10mx - 8xt - 35my + 28ty$?

A. $4m - 3t$

C. $2x + 7t$

B. $2x - 7y$

D. $4m + 3t$

20. The imaginary number i^{47} is equivalent to

A. -1

C. i

B. 1

D. $-i$

21. Which system has exactly one solution?

A. $\begin{cases} y = 4x - 5 \\ y = -\frac{1}{4}x - 5 \end{cases}$

C. $\begin{cases} y + 4x = -2 \\ y = -4x + 5 \end{cases}$

B. $\begin{cases} 6x + 3y = -1 \\ 2x + y = 4 \end{cases}$

D. $\begin{cases} 3x - y = 2 \\ y - 4 = 3(x - 2) \end{cases}$

22. Simplify: $\frac{3}{6+7i}$

A. $\frac{18}{85} + \frac{21}{85}i$

C. $\frac{18}{13} + \frac{21}{13}i$

B. $\frac{6}{85} - \frac{7}{85}i$

D. $\frac{18}{85} - \frac{21}{85}i$

23. Simplify: $(8 + 10i)(5 - 8i)$

A. $40 - 14i + 80$

C. $88 + 50i$

B. $120 - 14i$

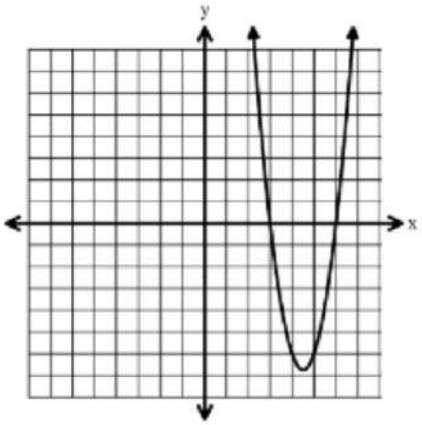
D. $40 - 14i - 80i^2$

24. Given $f(x) = 2x^2 + 16x + 18$, find the value of k if the function is written in vertex form.

A. $k = -9$ C. $k = -14$

B. $k = 4$ D. $k = 7$

25. Which function is represented by the graph?



A. $f(x) = \frac{1}{3}(x-3)(x-6)$

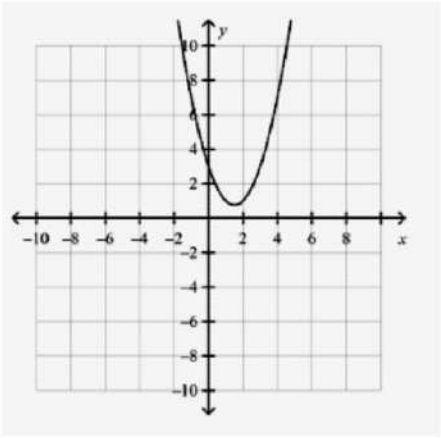
B. $f(x) = (x+3)(x+6)$

C. $f(x) = (x-3)(x-6)$

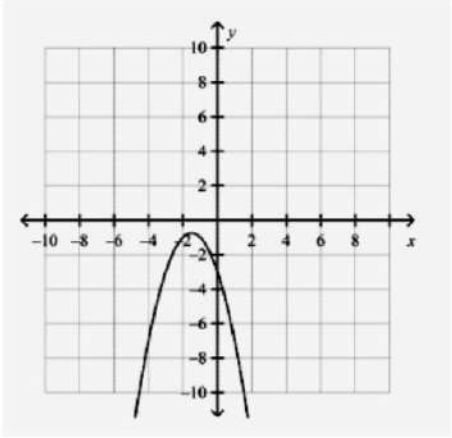
D. $f(x) = 3(x-3)(x-6)$

26. Graph $f(x)=x^2+3x+3$

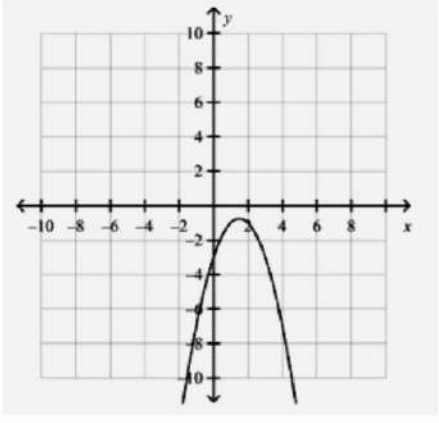
A.



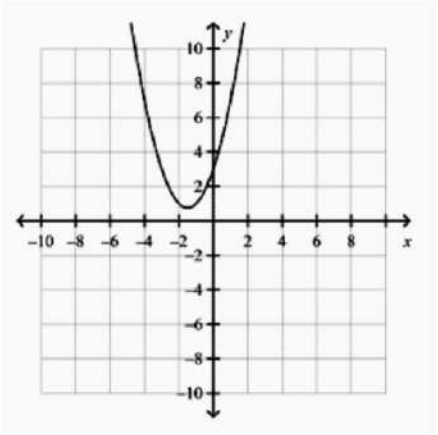
C.



B.



D.



27. Which of the following does not represent the parabola with a vertex at (1, 4) and x-intercepts (-1, 0) and (3, 0).

A. $f(x) = -x^2+x+4$

C. $f(x) = -(x-1)^2+4$

B. $f(x) = -x^2+2x+3$

D. $f(x) = -(x+1)(x-3)$

28. Solve: $2x^2 - 13x - 24 = 0$

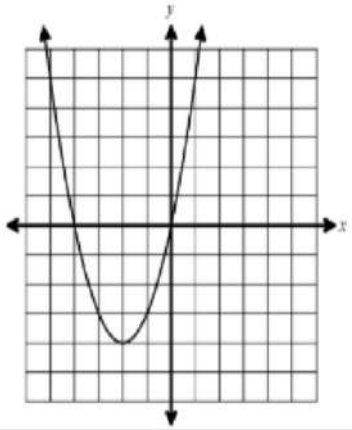
A. $x = -3 \text{ or } x = -8$

C. $x = \frac{3}{2} \text{ or } x = 8$

B. $x = \frac{3}{2} \text{ or } x = -8$

D. $x = -\frac{3}{2} \text{ or } x = 8$

29. Compare the two functions represented below. Determine which of the following statements is true.

Function $f(x)$	Function $g(x)$
	$g(x) = (x-6)^2 - 4$

A. The functions have the same vertex

.

B. The minimum value of $f(x)$ is the same as the minimum value of $g(x)$.

C. The functions have the same axis of symmetry.

D. The minimum value of $f(x)$ is less than the minimum value of $g(x)$.

30. Solve: $5(x+1)^2 = 120$

A. $x = \pm\sqrt{23}$

C. $x = \frac{-5\pm2\sqrt{30}}{5}$

B. $x = -3\sqrt{6}$ $or\ \sqrt{6}$

D. $x = -1 \pm 2\sqrt{6}$

31. What are the solutions to the quadratic equation $3x^2 + 21x = 5x - 60$?

A. $x = \frac{-8\pm4i\sqrt{29}}{3}$

C. $x = \frac{-8\pm2i\sqrt{61}}{3}$

B. $x = \frac{-8\pm2i\sqrt{29}}{3}$

D. $x = \frac{-8\pm i\sqrt{61}}{2}$

32. Simplify: $\left(\frac{32x^{18}y^{10}}{16x^9y^{20}}\right)^2$

A. $2x^9y^{20}$

C. $\frac{4x^{18}}{y^{20}}$

B. $\frac{4x^9}{y^{10}}$

D. $4x^{18}y^{-20}$

33. Simplify: $\frac{(-2mn^2)^{-3}}{4m^{-6}n^4}$

A. $\frac{m^5}{32n^{10}}$

C. $-\frac{m^3}{32n^{10}}$

B. $\frac{2m^9}{n}$

D. $\frac{8n}{m}$

34. Simplify: $\frac{x^{\frac{4}{7}} \cdot x^{\frac{3}{7}}}{x^{\frac{1}{7}}}$

A. $x^{\frac{6}{7}}$

B. $x^{\frac{7}{8}}$

C. $x^{\frac{7}{6}}$

D. $x^{\frac{8}{7}}$

35. Determine Which expression would make the following statement true: $\frac{16x^4y^7}{?} = 4x^3y^{10}$

A. $4\,xy^{-3}$

C. $4x^7y^{17}$

B. $12x^{-1}y^{-3}$

D. $64x^7y^{17}$

36. Which is equivalent to $49^{\frac{3}{2}}$?

A. 21 B. 98 C. 294 D. 343

37. Simplify: $3^{\frac{1}{3}} \cdot 9^{\frac{1}{3}}$

A. 9 B. $\sqrt[3]{3}$ C. 3 D. $\sqrt{3}$

38. Simplify: $\sqrt{72x^5y^{12}}$

A. $6x^6\sqrt{2x^5}$ C. $6x^2y^6\sqrt{x}$

B. $6\sqrt{2x^5y^{12}}$ D. $6x^2y^6\sqrt{2x}$

39. Simplify: $\sqrt[3]{48a^{13}b^{12}}$

A. $2a^4b\sqrt[3]{a}$ C. $2a^4b^4\sqrt[3]{6a}$

B. $6a^4b^4\sqrt[3]{2a}$ D. none of these

40. Simplify: $(-2-\sqrt{10})(-3+\sqrt{10})$

A. $16+6\sqrt{10}$ B. $-4+6\sqrt{10}$ C. $-4+\sqrt{10}$ D. $-15-5\sqrt{10}$

41. Simplify: $\sqrt{7x}(\sqrt{x}-7\sqrt{7})$

A. $x\sqrt{7}-49\sqrt{x}$ B. $\sqrt{7x}-49x$ C. $x\sqrt{7}-x\sqrt{49}$ D. $-\sqrt{42x}$

42. Simplify: $\frac{\sqrt{90x^{18}}}{\sqrt{2x}}$

A. $3x^8\sqrt{5x}$ B. $\sqrt{18x^{17}}$ C. $5x\sqrt{3x^8}$ D. none of these

43. Simplify: $\frac{\sqrt{7}-\sqrt{3}}{\sqrt{7}+\sqrt{3}}$

A. $\frac{4-2\sqrt{21}}{4}$

C. $\frac{-4-\sqrt{21}}{4}$

B. $\frac{5-\sqrt{21}}{2}$

D. -1

44. Solve the equation: $\sqrt{x-9}-10=-5$

A. 34

C. 16

B. 25

D. 14

45. Simplify: $\frac{\frac{3m^2-12}{4m^2+18m}}{\frac{6m-12}{8m^2+16m}}$

A. $\frac{9(m-2)}{16m^2(m+2)}$

C. $\frac{2(m+2)^2}{2m+9}$

B. $\frac{m(m^2-4)}{m-2}$

D. $3(m-2)$

46. Simplify: $\frac{x-1}{x^2-1}+\frac{2}{5x+5}$

A. $\frac{7x-6}{5(x+1)(x-1)}$

C. $\frac{3}{x+1}$

B. $\frac{7}{5(x+1)}$

D. $\frac{7}{5(x^2-1)}$

47. Simplify: $\frac{q^2-2q-35}{q^2+2q-15}-\frac{1}{q-3}$

A. $\frac{q-8}{q-3}$

C. $q-8$

B. $\frac{q-7}{q-3}$

D. $\frac{q^2-2q-36}{q^2+2q-15}$

48. Simplify: State any restrictions on the variables: $\frac{x^2-16}{x^2+5x+6} \div \frac{x^2+5x+4}{x^2-2x-8}$

A. $\frac{(x-4)^2}{(x+3)(x+1)}; x \neq -3, -1$

C. $\frac{(x-4)^2}{(x+3)(x+1)}; x \neq -4, -3, -2, -1, 4$

B. $\frac{(x+4)^2(x+1)}{(x+2)^2(x+3)}; x \neq -3, -2, 4$

D. $\frac{1}{(x+3)(x+1)}; x \neq -4, -3, -2, -1, 4$

49. Simplify the complex fraction: $\frac{\frac{3}{4y}-\frac{2}{y}}{\frac{1}{y}+\frac{3}{2y}}$

A. $\frac{20}{3}$

C. -2

B. $-\frac{1}{2}$

D. $\frac{3}{20}$

50. If each of the following expressions is defined, which is equivalent to $x - 1$?

A. $\frac{(x+1)(x-1)}{(x-1)}$

C. $\frac{x+1}{x+2} + \frac{x-1}{x+2}$

B. $\frac{(x+1)(x+2)}{x-2} \div \frac{x+2}{x-2}$

D. $\frac{(x-1)(x+2)}{x+1} \cdot \frac{x+1}{x+2}$

51. Solve the equation: $\frac{d+7}{d-4} = \frac{d-5}{d+2}$

A. $d = \frac{1}{3}$

C. $d = \frac{17}{5}$

B. $d = \frac{17}{9}$

D. $d = -\frac{17}{5}$

52. Solve the equation: $\frac{5}{3k} + \frac{1}{k} = -3$

A. $k = \frac{8}{3}$

C. $k = -\frac{8}{9}$

B. $k = -\frac{16}{9}$

D. $k = -\frac{1}{2}$

53. Solve: $\frac{x-1}{x+1}+\frac{x+7}{x-1}=\frac{4}{x^2-1}$

A. $x=\{-2,-1\}$ C. $x=\{-2\}$

B. $x=\{-1,1\}$ D. no solution

54. Find $f(t-6)$ if $f(x)=-2x^2+9x+1$.

A. $-2t^2+33t+125$ C. $-2t^2+33t-125$

B. -125 D. $-2t^2-33t-125$

55. Let $f(x)=x^2+6\ and\ g(x)=\frac{x+8}{x}, Find\ (g\circ f)(-7)$.

A. $-\frac{55}{7}$ B. $\frac{384}{7}$ C. $\frac{295}{49}$ D. $\frac{63}{55}$

56. Find the inverse of $f(x)=\frac{5x-11}{10}$

A. $f^{-1}(x)=\frac{5x-10}{11}$ C. $f^{-1}(x)=\frac{10x-11}{5}$

B. $f^{-1}(x)=\frac{5x+10}{11}$ D. $f^{-1}(x)=\frac{10x+11}{5}$

57. Divide using the synthetic division: $(x^4-18x^3+44x^2+55x-28)\div(x-4)$

A. $x^3+10x^2+68x+41$ C. $x^3-18x^2+10x+41$

B. $x^3-14x^2-12x+7$ D. $x^3-12x^2+7x-14$

58. What is the remainder in the division $(6x^3-x^2+4x-9)\div(2x-3)$?

A. 15 C. – 3

B. 3 D. -15

59. Find the zeros of the function $f(x) = x^3 - 2x^2 - 5x + 10$.

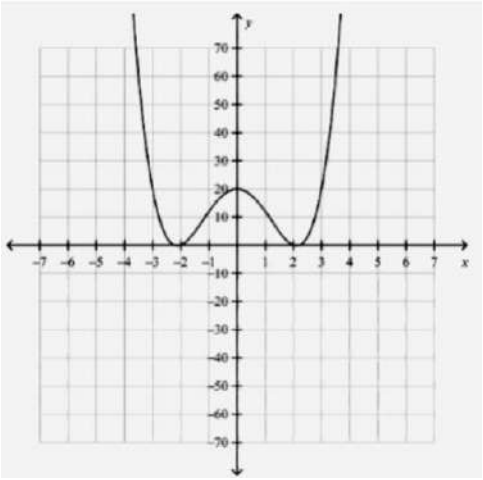
A. $-5, -2, 5$

C. $-\sqrt{5}, -2, \sqrt{5}$

B. $-5, 5, 2$

D. $-\sqrt{5},\ \sqrt{5}, 2$

60. Use the graph to identify the *y*-intercepts and zeros.



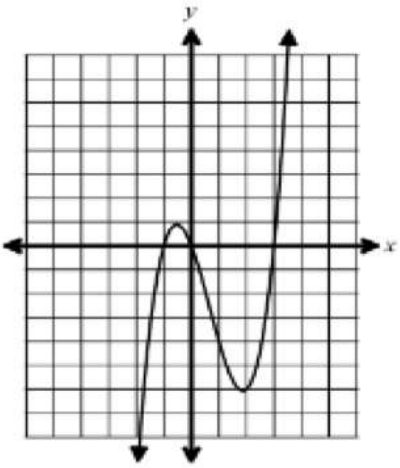
A. *y*-intercept: 20; zeros: No zeros

B. *y*-intercepts: -2.24, -2, 2, 2.24; zero: 20

C. *y*-intercept: 20; zeros: -2.24, -2, 2, 2.24

D. The *y*-intercept: -20; zeros: -2.24, -2, 2, 2.24

61. Which polynomial is graphed below?



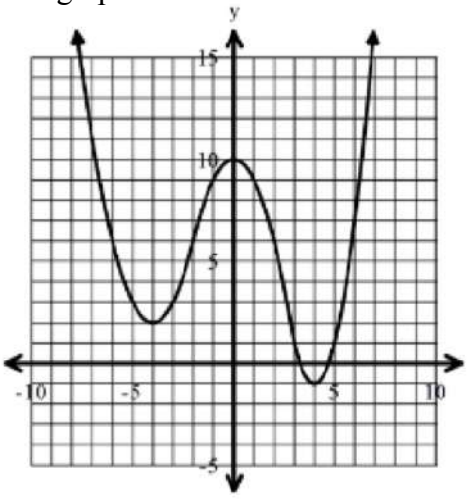
A. $f(x) = (x+1)(x-3)$

B. $f(x) = (x-1)(x+1)(x+3)$

C. $f(x) = x(x+1)(x-3)$

D. $f(x) = x(x-1)(x+3)$

62. What are the values of the relative maxima and/or minima of the function graphed below?



A. relative maxima: 10
relative minima: -1 and 2

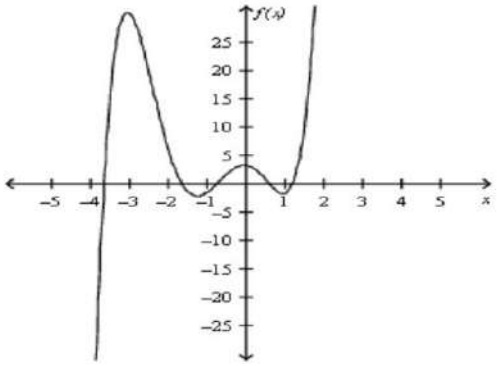
B. relative maxima: 3.3 and 4.7
relative minima: 0

C. relative maxima: 2 and 10
relative minima: -1

D. relative maxima: 0
relative minima: -4 and 4

63. For the given graph,

- describe the end behavior,
- determine whether it represents an odd-degree or even degree polynomial function,
- state the # of real zeros.



A. The end behavior of the graph is $as\ x \to -\infty, then\ f(x) \to \infty$ and $as\ x \to \infty, then\ f(x) \to \infty$.
It is an odd-degree polynomial function that has five real zeros.

B. The end behavior of the graph is $as\ x \to -\infty, then\ f(x) \to -\infty$ and $as\ x \to \infty, then\ f(x) \to \infty$.
It is an odd-degree polynomial function that has five real zeros.

C. The end behavior of the graph is $as\ x \to -\infty, then\ f(x) \to -\infty$ and $as\ x \to \infty, then\ f(x) \to \infty$
It is an odd-degree polynomial function that has four real zeros.

D. The end behavior of the graph is $as\ x \to -\infty, then\ f(x) \to -\infty$ and $as\ x \to \infty, then\ f(x) \to \infty$.
It is an even-degree polynomial function that has five real zeros.

64. Write a polynomial function in standard form with zeros at -4, 2, and -5.

A. $f(x) = x^3 + 7x^2 + 2x - 40$

B. $f(x) = x^3 + 7x^2 + 2x - 6$

C. $f(x) = x^3 - 3x^2 - 120x - 6$

D. $f(x) = x^3 - 40x^2 + 7x + 2$

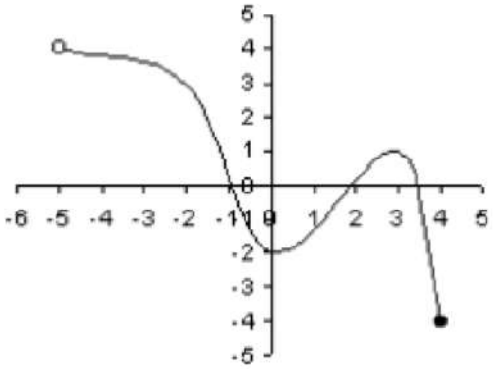
65. State the domain and range for the graph.

A. Domain: (-5, 4); Range: [-2, 4)

B. Domain: [-4, 4); Range: (-5, 4]

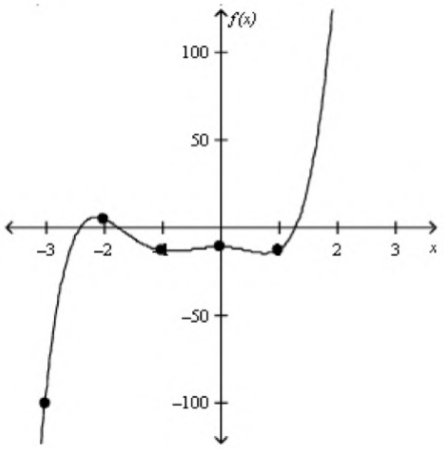
C. Domain: (-5, 4]; Range: [-4, 4)

D. Domain: [-5, 4]; Range: [-4, 4]

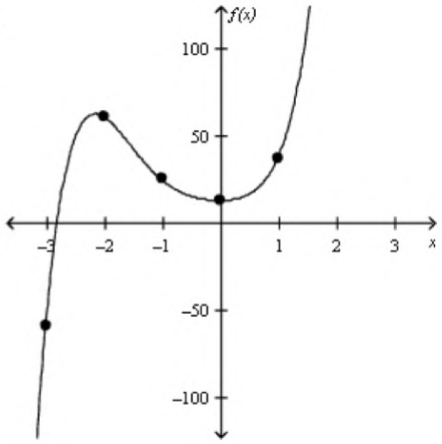


66. Graph the function. $f(x) = 3x^5 + 8x^4 - 3x^3 - 10x^2 + 12$

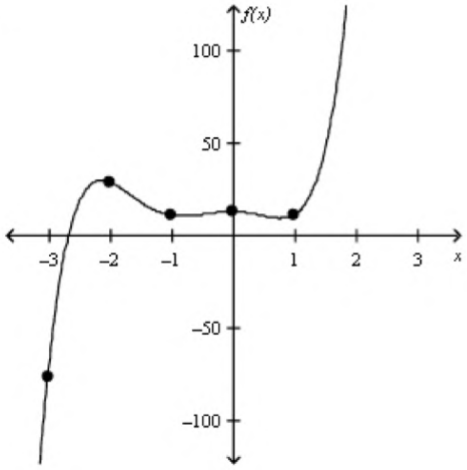
A.



C.



B.



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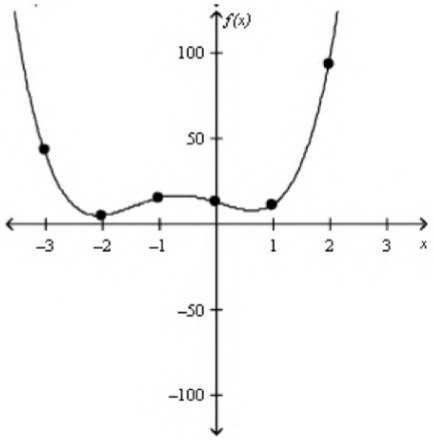


67. If $f(x)$ is given below, then what is $f(-2)$?

A. 6 C. 4

B. 2 D. 1

$$f(x) = \begin{cases} -x+4 & \text{if } x < 1 \\ x^2 & \text{if } 1 < x \le 3 \\ \sqrt{x+3} & \text{if } x > 3 \end{cases}$$

Use the quadratic equation $y = x^2 - 8x + 15$ to answer questions 68-72.

68. What is the vertex?

A. $(-1, 4)$ B. $(4, -1)$ C. $(-4, 63)$ D. $(-4, 31)$

69. What is the y-intercept?

A. $(0, -8)$ B. $(-8, 0)$ C. $(0, 15)$ D. $(15, 0)$

70. What are the x-intercepts?

A. $x = \{3, 5\}$ B. $x = \{-5, -3\}$ C. $x = \{-15, -1\}$ D. $x = \{1,\ 15\}$

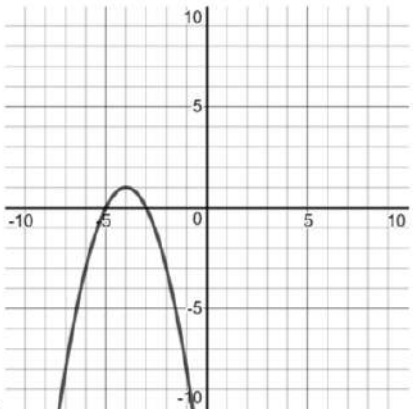
71. What is the equivalent form of the equation in vertex form?

A. $y = (x + 4)^2 - 1$ C. $y = (x - 4)^2 + 1$

B. $y = (x - 4)^2 - 1$ D. $y = (x + 4)^2 + 1$

72. Which of the following is the correct graph?

A.



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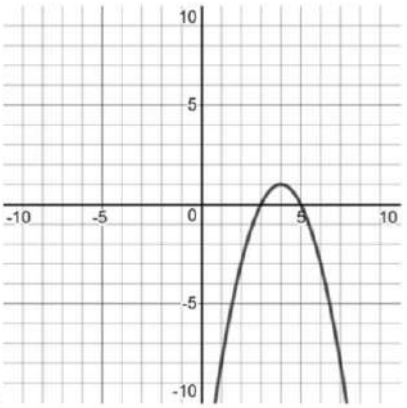
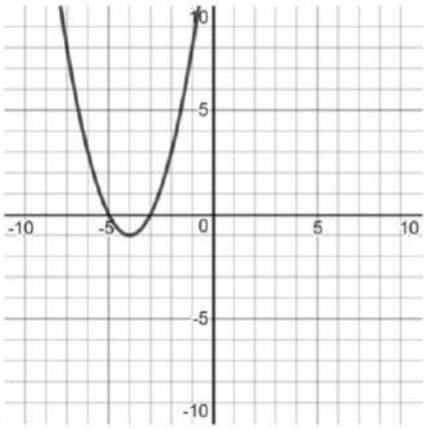
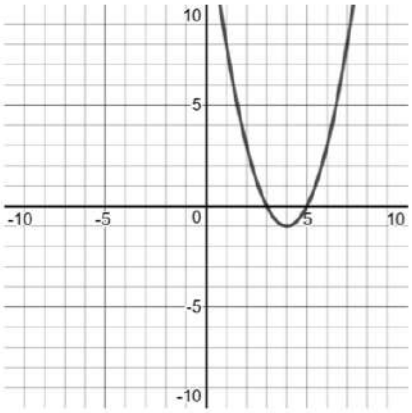


B.



D.



Use $h(x) = x^4 - 15x^2 + 38x - 60$ to answer questions 73-77.

73. How many zeros (real and imaginary) should this polynomial function have?

A. 2 B. 3 C. 4 D. 5

74. At most, how many relative extrema can a fourth degree polynomial have?

A. 2 B. 3 C. 4 D. 5

75. What is the end behavior of the graph of the function?

A. The end behavior of the graph is $as\ x \to -\infty, then\ f(x) \to \infty$ and $as\ x \to \infty, then\ f(x) \to \infty$.

B. The end behavior of the graph is $as\ x \to -\infty, then\ f(x) \to \infty$ and $as\ x \to \infty, then\ f(x) \to -\infty$.

C. The end behavior of the graph is $as\ x \to -\infty, then\ f(x) \to -\infty$ and $as\ x \to \infty, then\ f(x) \to \infty$.

D. The end behavior of the graph is $as\ x \to -\infty, then\ f(x) \to -\infty$ and $as\ x \to \infty, then\ f(x) \to -\infty$.

76. Using the Rational Zero (Root) Theorem, what are the possible rational zeros of the polynomial function?

A. $-1, -2, -3, -4, -5, -6, -10, -12, -15, -20, -30, -60$

B. $1, 2, 3, 4, 5, 6, 10, 12, 15, 20, 30, 60$

C. $\pm1, \pm2, \pm3, \pm4, \pm5, \pm6, \pm10, \pm12, \pm15, \pm20, \pm30, \pm60$

D. $\pm1, \pm3, \pm5, \pm15$

77. What are all the zeros of the polynomial function (real and imaginary)?

A. $x = \{-3, 5, 1 \pm i\sqrt{12}\}$ C. $x = \{-3, 5, 1 \pm i\sqrt{3}\}$

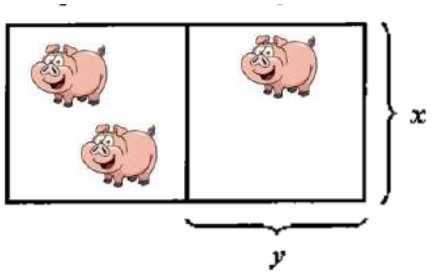
B. $x = \{-5, 3, 1 \pm i\sqrt{12}\}$ D. $x = \{-5, 3, 1 \pm i\sqrt{3}\}$

78. A farmer has 192 feet of fencing and wants to build two identical pens for his prize-winning pigs. The pens will be arranged as shown. Determine the dimensions of a pen that will maximize its area.

A. $24' \times 32'$ D. $24' \times 64'$

B. $17' \times 44'$ E. $4' \times 152'$

C. $8' \times 96'$

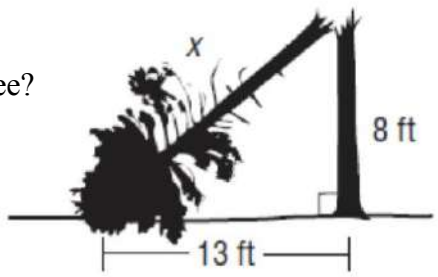


79. A large pine tree was struck by lightning and fell as shown in the diagram.

Which equation could be used to find the length of the fallen part of the tree?

A. $8^2 + 13^2 = x$ C. $13^2 - 8^2 = x$

B. $\sqrt{8^2 + 13^2} = x$ D. $\sqrt{13^2 - 8^2} = x$



80. The bottom of a ladder must be placed 4 feet from a wall. The ladder is 12 feet long.

How far above the ground does the ladder touch the wall? your number to the nearest tenth.

A. $10.6\ ft$ B. $11.9\ ft$ C. $11.3\ ft$ D. $128\ ft$