

Algebra 2 Midterm Exam Review

Name: _____

Due Date: _____

For questions 1 – 58 use your calculator *only* when absolutely necessary!
Be sure to show all work to get credit!

Tell what property the statement illustrates.

1. $3 \cdot 4 = 4 \cdot 3$ _____ 2. $4 \cdot \frac{1}{4} = 1$ _____
3. $(2 \cdot 3) \cdot 5 = 2 \cdot (3 \cdot 5)$ _____ 4. $4 + 0 = 4$ _____

Classify each number into all appropriate number systems.

5. $\frac{1}{2}$ 6. $-2i$ 7. -2 8. $0.501021\dots$ 9. $2 + 3i$

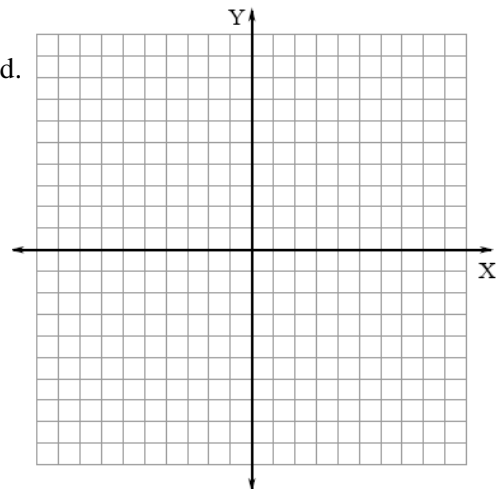
Solve the absolute value equation or inequality and graph the solution set on a number line.

10. $\left| \frac{1}{2}x - 6 \right| = 8$ _____ 11. $|x + 2| > 6$ _____ 12. $|3 - 5x| < 13$ _____

Evaluate the function for the given value of x. $f(x) = \begin{cases} 3x, & \text{if } x > 5 \\ -x + 2 & \text{if } x \leq 5 \end{cases}$

13. $f(3)$ _____ 14. $f(8)$ _____ 15. $f(-3)$ _____ 16. $f(5)$ _____ 17. $f(0)$ _____

18. Graph $f(x) = \begin{cases} 3x, & \text{if } x > 5 \\ -x + 2 & \text{if } x \leq 5 \end{cases}$ on the grid provided.



Simplify each of the following.

19. $\sqrt{-200}$

20. $\frac{12}{\sqrt{3}}$

21. $\sqrt{-10} \cdot \sqrt{-12}$

22. i^8

23. $(3-2i)^2$

24. $(4-3i)-(2+5i)$

25. $(7+3i)(2-i)$

26. $(-6+2i)+(3-5i)$

27. $\frac{3+2i}{4-i}$

28. $\frac{4+i}{2i}$

29. $\sqrt[3]{27x^3y^5}$

30. $\sqrt{500xy^4}$

31. $3\sqrt{98}-2\sqrt{50}$

32. $\left(\frac{3x^2}{y^3}\right)^{-3}$

33. $(\sqrt[3]{8})^{-3}$

34. $\frac{2x^{-3}}{3y^3} \cdot \frac{4x^3y}{-2x^2}$

35. Given the functions $f(x) = -x^2 + 3x - 4$ and $g(x) = 2x + 1$ find each of the following:

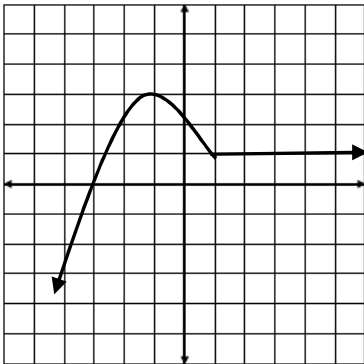
a) $f(-2)$

b) $g(4)$

c) $f(g(x))$

36. Find the inverse of the function: $f(x) = -2x + 5$

37. State the domain and range for the graph:



38. State the domain and range for the function

$$f(x) = \sqrt{x-4} + 2$$

Solve each of the following. Be sure to check for extraneous roots. Leave all answers in exact form.

39. $\sqrt[3]{2x+4} = 5$

40. $(x+3)^2 = 81$

41. $4x^2 - 9 = 0$

42. $3x^2 + 10x = -8$

43. $x^2 + 5x - 6 = 0$

44. $14x^2 = 3x + 2$

45. $2\sqrt{x+3} = -10$

46. $\frac{2}{3}(x-2)^2 = 30$

47. $(3x+1)^{\frac{2}{3}} = 16$

Factor each of the following.

48. $81x^2 - 36y^2$

49. $12x^3 + 10x^2 - 12x$

50. $4x^2 + 3x - 10$

51. $2x^3 - 7x^2 - 8x + 28$

52. $x^3 + 125$

53. $x^2 + 8x - 9$

54. Match the expression with each type of special product.

___ $2x^6 - 4x^4 + 18x^2$

___ $8x^3 - 64$

___ $x^2 - 16$

___ $x^2 + 4x + 4$

___ $x^2 - 4x + 4$

___ $x^2 - 6x - 5$

- A. Difference of two squares
- B. Perfect Square trinomial
- C. Greatest Common Factor
- D. Difference of two cubes
- E. Prime

Solve the system. Be sure to show all work!

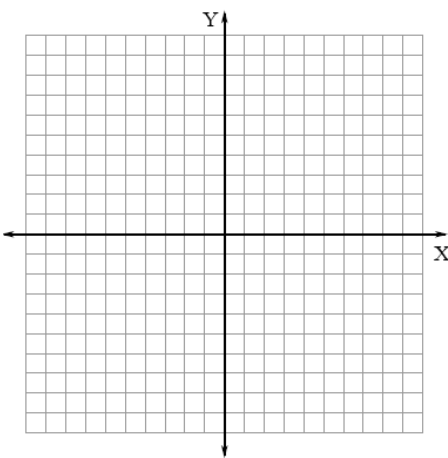
55. $x^2 + y^2 = 36$
 $2x + y = 2$

56. $y = 2x^2 - 7x - 6$
 $y = -2x - 3$

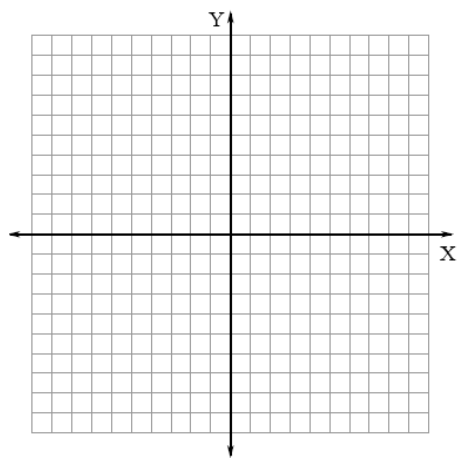
Graph each function and complete all information in the boxes.

57. $f(x) = -\frac{1}{2}x^2 + 3x + 6$

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



| |
|-------------------|
| Vertex: _____ |
| AoS: _____ |
| Zeros _____ |
| Y Intercept _____ |
| Domain: _____ |
| Range: _____ |

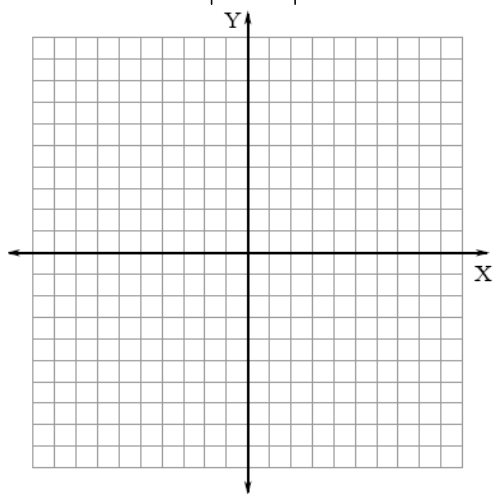


| |
|-------------------|
| Vertex: _____ |
| AoS: _____ |
| Zeros _____ |
| Y Intercept _____ |
| Domain: _____ |
| Range: _____ |

NO CALCULATORS ALLOWED FOR QUESTIONS 59 - 72!

Graph each of the following functions. Then, state the domain and the range of each one.

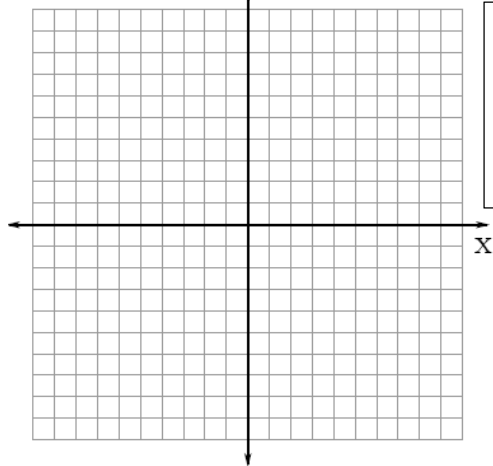
59. $y = -|2x - 4| + 1$



D: _____

R: _____

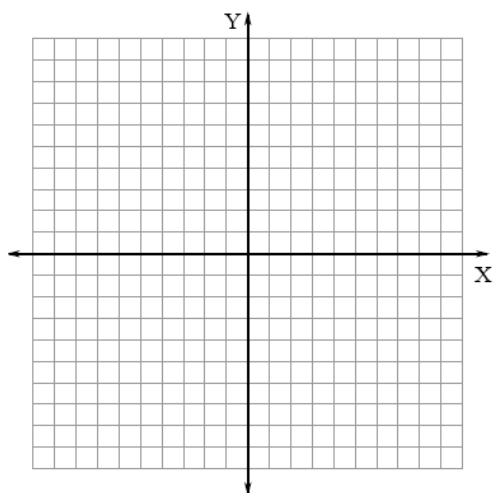
60. $f(x) = \begin{cases} x+3, & x < 2 \\ 2x-1, & x \geq 2 \end{cases}$



D: _____

R: _____

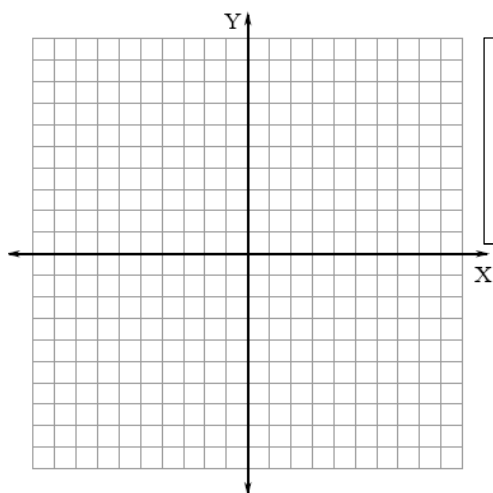
61. $y = -(x+3)^2 + 5$



D: _____

R: _____

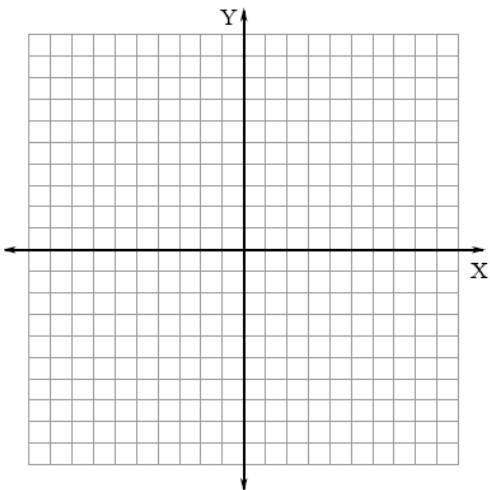
62. $g(x) = \sqrt{x-3} + 4$



D: _____

R: _____

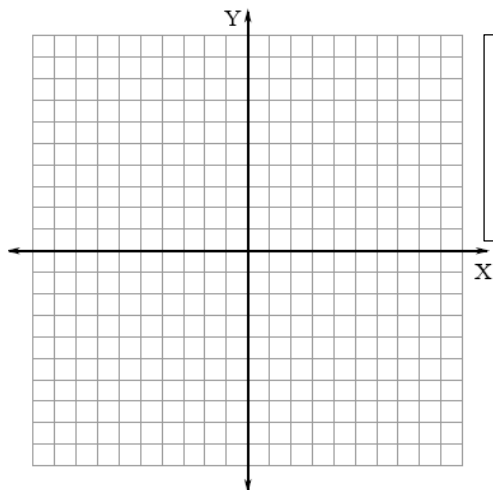
63. $h(x) = (x+2)^3 - 3$



D: _____

R: _____

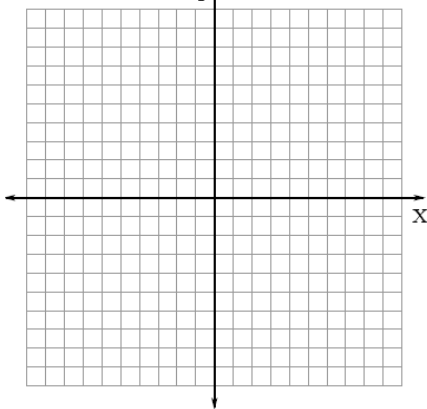
64. $f(x) = \lceil x+3 \rceil$



D: _____

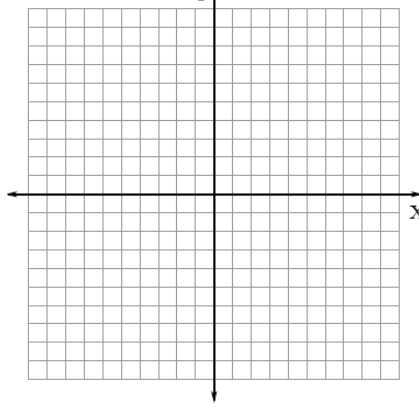
R: _____

65. $y = \sqrt[3]{x-3} - 2$



D: _____
R: _____

66. $k(x) = -\sqrt{x+2} - 1$



D: _____
R: _____

67. List all possible real roots for the function $f(x) = -4x^3 - 7x^2 + 4x - 3$

68. Find all factors of the polynomial function $f(x) = x^3 + 3x^2 - 10x - 24$.

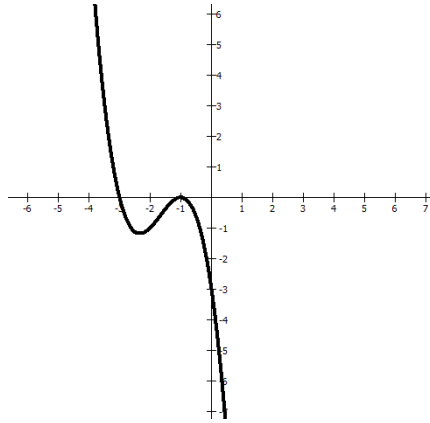
69. What is the quotient of $(2x^3 - 3x^2 + 4x - 1) \div (x - 3)$?

70. What is the quotient when $5x^4 + 10x^3 - 16x^2 + 31x - 7$ is divided by $5x^2 - 1$?

71. State the end behavior for the function $g(x) = -4x^7 + 6x^4 + 3x^2 - 2x + 10$

72. Write the equation of the function graphed. Put your answer in standard form.

$$g(x) = -2x^4 + 3x^2 - 7$$



73. Find all zeros for the function $f(x) = x^3 + 3x^2 + 7x + 5$.

74. Find the remainder for $(x^3 - 8x^2 + 7) \div (x - 3)$

75. A diver jumps off a platform 25 feet up from the water level with an initial velocity of 20 feet per second. Answer the following and round all answers to three decimal places.

a) What is the maximum height the diver reaches during her flight?

b) When will the diver enter the water? Explain how you determined your answer.