Algebra 2 Honors Name:_____

Final Exam Review Semester 1 Period: _____

Unit 1: Equations, Inequalities, Functions

1. Solve the system of equations.

$f(x) = \begin{cases} 3x - y = 8 \\ y = 4 - x \end{cases}$ $f(x) = \begin{cases} 3x - 5y = 11 \\ x - 3y = 1 \end{cases}$ $f(x) = \begin{cases} 5x + 2y = 6 \\ 9x + 2y = 22 \end{cases}$

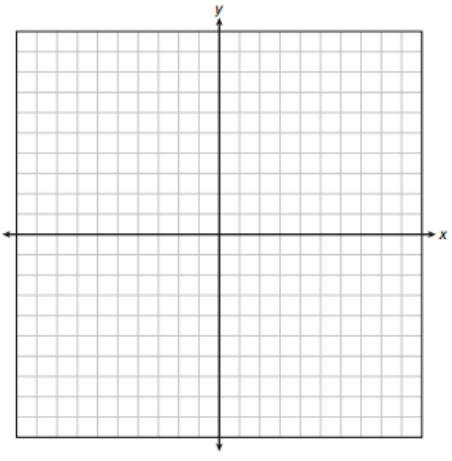
2. Aaron and Zelly want to rent a tandem bike so that they can ride together. The rental for a tandem bike is $18.50 per hour plus $3 per helmet. Write a function that gives the cost *c* as a function of the number of hours *h* that they can rent the bike.

3. Graph the following inequalities on the same grid and shade the solution region that is common to all the inequalities.

$x < 2$

$y \leq 2x$

$y \geq -3x + 2$



4. For parts a-f, use these three functions to evaluate each composite function.

$f(x) = x^2 - 2$ $g(x) = 3x$ $h(x) = 2x - 3$

a) $(f \circ g)(2)$ b) $(g \circ f)(1)$ c) $(f \circ h)(4)$

d) $(g \circ h)(3)$ e) $(h \circ f)(-1)$ f) $(h \circ g)(-2)$

5. Find the inverse of each function.

a) $f(x) = 3x + 1$ b) $g(x) = \frac{1}{2}x - 3$

c) $h(x) = \frac{3}{4}x - 3$ d) $j(x) = \frac{2x+3}{4}$

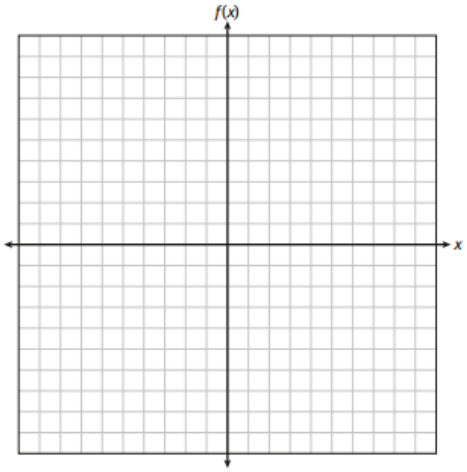
6. Find the inverse of the linear function that passes through the points (0,4) and (5,0).

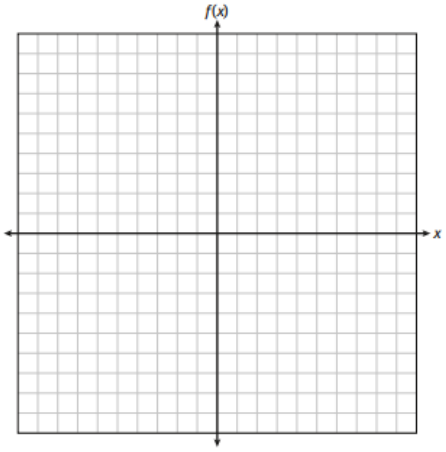
7. If $f(x) = 5x - 3$ and $g(x)$ is the inverse of $f(x)$, then what is $(f \circ g)(6) - (g \circ f)(6)$?

8. Graph the following piecewise functions.

a) $f(x) = \begin{cases} 3x + 1 & if \ \ x < 1 \\ -x + 2 & if \ \ x > 1 \end{cases}$

b) $h(x) = \begin{cases} x - 8 & if \ \ x > 3 \\ x^2 - 5 & if \ \ x \leq 3 \end{cases}$

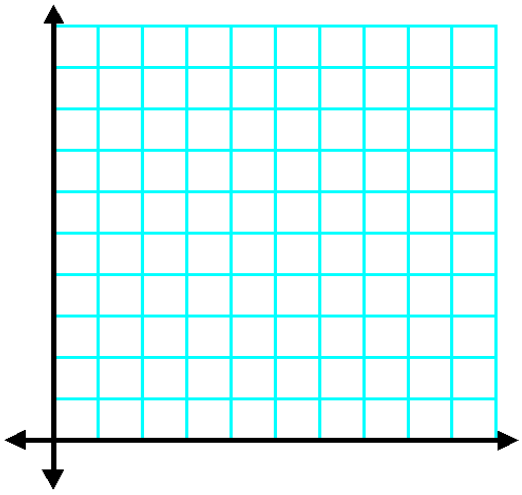




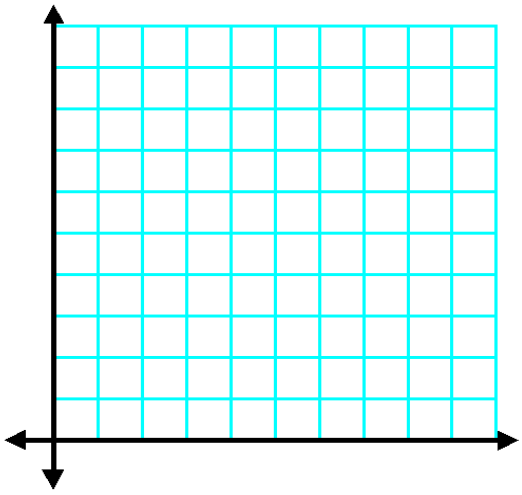
9. A medical rescue helicopter is flying at an average speed of 172 miles per hour toward its base hospital. At 2:42 pm, the helicopter is 80 miles from the hospital. The equation $172\left(\frac{m}{60}\right) = 80$, can be used to determine the number of minutes, *m,* it will take the helicopter to reach the hospital. What is the value of *m*?

10. Jimmy brings $25 to the county fair for rides. Roller coaster rides cost $4, and the spinning cup rides cost $3. But Jimmy knows that he gets queasy if he takes more than 6 roller coaster rides or more than 8 spinning cup rides. If *r* represents the number of roller coaster rides and *s* represents the number of spinning cup rides. List all of the constraints.

11. Samantha is ordering a gift for her sister online. If she spends $25 or less, her shipping fee is $10.00. If she spends over 25 and no more than 50 dollars, she is charged $7.00. If she spends over 50 dollars and no more than 100 she will pay $4 for shipping. Graph the function.



12. Matt monitors his savings account. He records an initial amount in January of $200. He is finding that the amount of money rises at a rate of $50 per month. Graph the amount of money in Matt's savings account, y, as a function of months, x, since his initial recording.



13. Dana needs to change the price of a shelf of books. She is told to apply a discount function on each price, $d(p) = 0.50p$, and then increase the resulting price, $r(p) = p + 4$. What is the function that Dana can use to calculate both price changes?

Unit 2: Quadratic Functions

14. Sarah is building rectangular fence in her backyard and wants to figure out the maximum dimensions that can be made from 160 feet of fencing. Write the function that shows the total area if the width is w.

15. The function $h(t) = -16t^2 + 20t + 6$ models the height in feet of a football t seconds after it is thrown. When, in seconds, is the football at least 10 feet about the ground?

16. Factor the following problems:

a. $x^2 - 8x - 20$ b. $4x^2 + 4x - 3$ c. $x^2 - 7x + 6$

d. $3x^2 + 9x$ e. $2x^2 + 4x + 2$ f. $4x^2 - 81$

17. What is the factored form of $10x^2 + 25x - 60$?

18. What are the solutions to the quadratic equations?

a. $x^2 - 4x - 60 = 0$ b. $-2x^2 + 7x + 15 = 0$ c. $x^2 - 7x + 11 = 5$

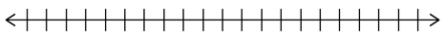
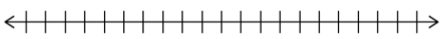
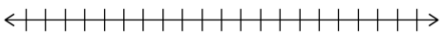
d. $x^2 - 16 = 0$ e. $5x^2 + 100 = 0$ f. $x^2 - 3x - 11 = 1 + x$

g. $3(x + 3)^2 - 4 = 6$ h. $8x^3 - 343$

19. Given the zeros are at $x = 6$ and $x = -7$. What function could you graph?

20. Find the solutions to the inequality and graph them.

a. $x^2 - x < 12$ b. $2x^2 - 9x - 5 \geq 0$ c. $x^2 + 8x + 7 > 0$

21. Simplify.

a. $\sqrt{-81}$ b. $\sqrt{-150}$ c. $-\sqrt{-12}$ d. $5 + \sqrt{-15}$

22. Find the sum or difference.

a. $(8 - 3i) - (2 + 14i)$ b. $(8 + 6i) + (10 - i)$ c. $(6 + 3i) - (2 - 5i)$

23. Find the product or quotient.

a. $(3-2i)(5+2i)$ b. $(9-13i)(1-2i)$ c. $\frac{4-7i}{-2+3i}$

24. Solve using the quadratic formula.

a. $x^2+8x=-14$ b. $2x^2+10x-3=0$

25. Find the discriminant and state the nature of the solutions.

a. $3x^2+7x=-12$ b. $3x^2+x-7=0$

26. Write the equation of the quadratic function whose graph passes through the set of points $(-3,7)$, $(0,4)$, and $(1,15)$.

27. The axis of symmetry is at $x=3$, the focus is at $(3,-1)$, and the directrix is at $y=-7$. What is the equation of the parabola?

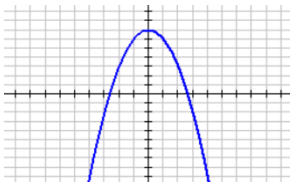
28. The parabola opens to the left, the vertex is at $(0,5)$, and the focus is at $(-5,5)$.

29. If $h(x)$ is a transformation of $f(x) = x^2$ to the left 7 units, down 3 units and vertically stretched by a factor of 4, then write $h(x)$.

30. Describe the transformation of the parent function $f(x) = x^2$. Then state the vertex and match the function to its graph.

a. $g(x) = (x-3)^2 - 6$ b. $g(x) = 3(x+4)^2$ c. $g(x) = -x^2 + 7$

a.



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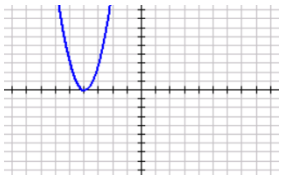
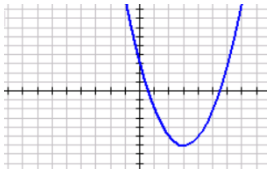


c.



31. Write each function in vertex form.

a. $g(x) = x^2 + 6x + 5$ b. $f(x) = -3x^2 + 12x - 7$

Unit 3: Polynomials

32. Find the sum:

a. $(3x^2 - 5x^3 + 2) + (8x - 6x^2 + 7x^3)$ b. $(6x - 4 + 2x^3) + (4 - 2x^2 + 9x)$

33. Find the difference:

a. $(9x^4 - 2x^2 - 8x) - (12x^2 + 3x - 4x^4)$ b. $(x^3 + 2x^2 - 6) - (4x^5 - 6x^2 + 3)$

34. Find the product

a. $5x^2(2x^2 - x + 5)$

b. $(4x^2 - 3x)(x^2 - x + 3)$

35. Find the quotient:

a. $(x^4 - 3x^3 - 2x^2 + 3x + 2) \div (x + 4)$

b. $(x^3 + 2x^2 - 5x - 6) \div (x^2 - 2)$

36. Use the Binomial Theorem to write the binomial expansion $(x + 3)^6$.

37. Use the Binomial Theorem to write the binomial expansion $(3x - 2)^4$.

38. Determine if the function is even, odd, or neither.

a. $f(x) = 8x^3 - 5$

b. $f(x) = -5+(x - 3)^2$

c. $f(x) = 13x^4 - 5x^2$

d. $f(x) = 5x^5 - 3x^3 - 4x$

e. $f(x) = 3(x^3 - 4x + 1)$

39. What is the degree of the product $3x^3(4x^2)$?

40. If a polynomial of degree 4 is multiplied by a polynomial of degree 5, what is the resulting polynomial degree?

41. Factor the following problems:

a. $2x^4 - x^3 - 18x^2 + 9x$

b. $8x^3 - 64x^2 + x - 8$

c. $x^2 - 9$

d. $x^2 - 4$

42. Sketch a graph of $V(r) = \frac{2}{3}\pi r^3$. What is the value of $V(1)$?

Unit 4: Sequences and Series

43. Consider the arithmetic sequence with $a_1 = 37$, and $d = 8$. Write the explicit formula with a_n in terms of n and a_8?

44. Consider the arithmetic sequence with $a_2 = -3$, and $d = 2$. Write the explicit formula with a_n in terms of n and a_{12}?

45. Consider the arithmetic sequence $32, 42, 52, \ldots$

    Write a recursive formula for a_n, and what is the value of a_{17}?

46. Consider the arithmetic sequence $11, 6, 1, \ldots$

    Write a recursive formula for a_n, and what is the value of a_{27}?

47. Write a formula for the nth partial sum of the arithmetic series with $a_4 = 23$ and $d = 2$.

48. Write a formula for the nth partial sum of the arithmetic series with $a_8 = 83$ and $d = -3$.

49. Consider the geometric sequence with $4, -16, 64, \ldots$

    Write the explicit formula for a_n in terms of n, and a_9.

50. Consider the geometric sequence with $8, 16, 32, \ldots$

    Write the explicit formula for a_n in terms of n, and a_{14}.

51. Consider the geometric sequence with $4, -12, 36, \ldots$

Write the recursive formula for a_n in terms of a_{n-1}, and a_{14}.

52. Consider the geometric sequence with $-1, 6, -36, \ldots$

Write the recursive formula for a_n in terms of a_{n-1}, and a_{11}.

53. Find the partial sum of the geometric series $\sum_{n=1}^{5} 2(4)^{n-1}$

54. Find the partial sum of the geometric series $\sum_{x=1}^{6} 3(2)^{n-1}$