Algebra 2 Name_____

Review Topics from Semester 1 and 2 Worksheet

Date_____ Period____

Solve each equation by completing the square.

1) $6p^2 - 12p = -81$

2) $7x^2 - 79 = 14x$

Simplify each expression.

3) $(8m^4 + 5 - 2m) - (m - 7m^2 + 3m^4)$

4) $(2r - 2r^3 + 6r^4) + (2r - 3r^3 - 2r^2)$

Divide.

5) $(5v^3 - 32v^2 - 5v + 56) \div (5v - 7)$

6) $(-54x^3 - 30x^2 + 32x - 32) \div (6x + 8)$

Factor each completely.

7) $500u^3 - 4$

8) $432x^3 + 250$

Simplify. Your answer should contain only positive exponents.

9) $\left(\dfrac{(2u^{-4}v^{-3})^{-4}}{v^2 \cdot 2u^3v^3}\right)^{-2}$

10) $3x^4y^{-1}z^{-2} \cdot 3x^2zy^{-4}$

11) $(4x^2y^{-3})^{-3}$

12) $\dfrac{2x^{-2}y^2 \cdot -xy^{-2}}{-x^{-3}y^2}$

13) $\left(\dfrac{x^4y^{-1}}{2x^3}\right)^2$

14) $\dfrac{2x^{-1} \cdot (-x^2y^{-4})^2}{2xy^3}$

15) $\left(\dfrac{x^{-3}y^3z^0}{z^4 \cdot 2x^2y^{-2}z^3}\right)^3$

16) $\dfrac{2yx^4}{(2x^3z^4)^0 \cdot (yx^3)^{-3}}$

Simplify.

17) $8\sqrt{72a^2b^2c^2}$

18) $-2\sqrt[4]{486h^8j^3k^8}$

19) $(6 - 2i)(-4 + 5i)$

20) $(-4i)(4 - 3i) - (3i)(3 - 8i)$

Evaluate each expression.

21) $(-2) - \left(\dfrac{-9}{-9}\right) \times 6$

22) $(-2) \times 2 - ((-1) - 1)$

Find each product.

23) $(8n - 3)(7n + 5)$

24) $(6k + 8)(2k^2 - 8k + 6)$

Factor each.

25) $15x^2 - 4x - 3 = 0$

26) $6x^2 - 7x + 2 = 0$

Identify the vertex of each.

27) $y = 18x^2 + 360x + 1809$

28) $y = -3x^2 - 6x - 9$

Find the discriminant of each quadratic equation then state the number and type of solutions.

29) $-3x^2 - 10x + 2 = 2$

30) $-2k^2 + 9k - 11 = -2$

31) Dash jumps from a platform 64 feet above the pool with an initial upward velocityof 32 ft/sec. Use the formula (see the question from Exam #5) , where h is the height above the water and t is the time in seconds.

1) What is the initial height for Dash?
2) How long will it take him to reach the highest point? 2) t = _____
3) What is the highest point (maximum height) of his dive? 3) Highest point: ____ ft
4) How long will it take for Dash to hit the water (h = 0)? 4) t = _____
5) How long will it take for Dash to be at a height of 48 feet? 5) t = _____
6) Find the Domain and Range
(Hint: Sketch a graph (you only need to use #1-4 for graph and Domain/Range)).
(For the t-values of the table: Include t = 0, the t from the max height, and the t from when the diver hits the water).
Domain: [,] and Range: [,]

32) A ball is thrown straight up from the top of a 64 foot tall building with an initial speed of 48 feet per second. The height of the ball as a function of time can be modeled by the function $h(t) = -16t^2 + 48t + 64$
a) What is the (initial) height of the ball at t=0?
b) How long will it take for the ball to reach its maximum height?
c) What is the maximum height of the ball?
d) How long will it take for the ball to hit the ground?
e) How long will it take for the ball to go up and come down to a height of 16 ft?
f) Graph the function using a table with answers from parts a-d only.
g) State the domain and range of the given function (please note it should be CLOSED BRACKETS for this Domain/Range in the answers)

Write the Quadratic Equation in Vertex Form then identify the vertex, direction of opening, and min/max value of each. Then sketch the graph. State the End Behavior and Domain/Range (answer not provided for these two properties).

33) $y = -2x^2 + 8x - 12$

34) $y = -x^2 - 10x - 26$

35) $y = x^2 - 10x + 28$

36) $y = -2x^2 - 12x - 24$

Describe the end behavior of each function. Note: Rises and Falls is the SAME as Up and Down.

37) $f(x) = -x^2 - 8x - 18$

38) $f(x) = -x^4 + x^3 + 4x^2 - 5$

39) $f(x) = -x^5 + 4x^3 - 5x - 3$

40) $f(x) = x^3 - 4x^2 + 4$

Factor each and find all zeros.

41) $f(x) = 5x^4 - 8x^2 - 4$

42) $f(x) = 27x^4 + 64x$

43) $f(x) = 3x^3 + x^2 + 12x + 4$

44) $f(x) = 8x^3 + 125$

Write a polynomial in factored form then standard/general form that has the given zeros. Describe the end behavior then graph the function.

45) Degree 3, a > 0, Zeros: –3, 4, 0

46) Degree 4, a > 0, Zeros: 2, 3, 0, –1

47) Degree 4, a < 0, Zeros: 4, –4, –5, 2

48) Degree 3, a < 0, Zeros: 2, –4, –1

Find all roots.

49) $x^3 - 27 = 0$

50) $x^4 + 3x^2 + 2 = 0$

51) $x^3 - 125 = 0$

52) $x^3 + 3x^2 + x + 3 = 0$

53) $x^4 - 3x^2 - 18 = 0$

54) $x^3 + 8 = 0$

Classify each conic section and write its equation in standard form. For parabolas, identify the vertex. For circles, identify the center. For ellipses and hyperbolas identify the center and vertices.

55) $x^2 + 4y^2 - 10x + 32y + 85 = 0$

56) $x^2 + y^2 + 4x + 2 = 0$

57) $9x^2 - y^2 - 54x - 4y + 68 = 0$

58) $16x^2 + 9y^2 + 64x + 18y - 71 = 0$

59) $-x^2 + 4x + y - 8 = 0$

60) $-x^2 + y^2 - 6x - 8y + 6 = 0$

Solve each system of equations.

61) $-2y^2 + x - 3y + 4 = 0$
$x - 3y = -4$

62) $-2x^2 + 4y^2 - 3x - 5y - 90 = 0$
$x - y = 0$

63) $x^2 + 2y^2 + 12x + 6y + 36 = 0$
$x^2 + 2y^2 + 12x - 16y + 36 = 0$

64) $x^2 - y^2 + 8x + 12y - 23 = 0$
$2x^2 - y^2 + 14x + 12y - 13 = 0$

Simplify each and state the excluded values.

65) $\dfrac{5k^2 - 15k}{3k^3 + 6k^2 - 45k}$

66) $\dfrac{21n^3 - 6n^2 - 27n}{6n^3 - 30n^2 + 24n}$

Simplify each expression.

67) $\dfrac{2}{x+6} - \dfrac{4}{6x-3}$

68) $\dfrac{4x}{x+5} + \dfrac{4x}{x-3}$

69) $\dfrac{\frac{x^2}{2} + \frac{1}{x}}{\frac{x-3}{4} + \frac{x^2}{2}}$

70) $\dfrac{\frac{4}{3} + \frac{x^2}{2}}{\frac{2}{x} + \frac{1}{x}}$

Answers to Review Topics from Semester 1 and 2 Worksheet

1) $\left\{\frac{2+5i\sqrt{2}}{2}, \frac{2-5i\sqrt{2}}{2}\right\}$ 2) $\left\{\frac{7+\sqrt{602}}{7}, \frac{7-\sqrt{602}}{7}\right\}$ 3) $5m^4 + 7m^2 - 3m + 5$

4) $6r^4 - 5r^3 - 2r^2 + 4r$ 5) $v^2 - 5v - 8$ 6) $-9x^2 + 7x - 4$

7) $4(5u - 1)(25u^2 + 5u + 1)$ 8) $2(6x + 5)(36x^2 - 30x + 25)$ 9) $\frac{1024}{u^{26}v^{14}}$

10) $\frac{9x^4}{y^5z}$ 11) $\frac{y^9}{64x^6}$ 12) $\frac{2x^2}{y^2}$ 13) $\frac{x^2}{4y^2}$

14) $\frac{x^2}{y^{11}}$ 15) $\frac{y^{15}}{8x^{15}z^{21}}$ 16) $2y^4x^{13}$ 17) $48abc\sqrt{2}$

18) $-6h^2k^2\sqrt[4]{6j^3}$ 19) $-14 + 38i$ 20) $-36 - 25i$ 21) -8

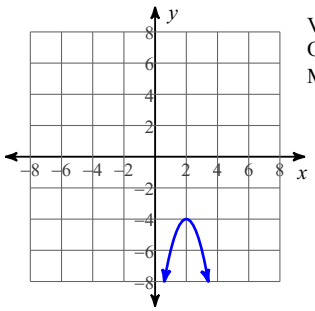
22) -2 23) $56n^2 + 19n - 15$ 24) $12k^3 - 32k^2 - 28k + 48$

25) $(3x + 1)(5x - 3) = 0$ 26) $(2x - 1)(3x - 2) = 0$ 27) $(-10, 9)$ 28) $(-1, -6)$

29) 100; two real solutions 30) 9; two real solutions 31) See Exam #5

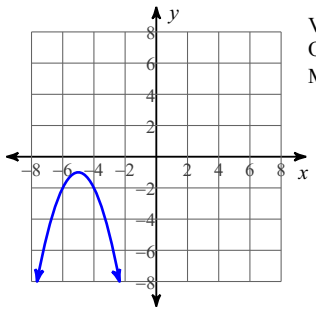
32) a) 64 feet, b) 1.5 seconds, c) 100 feet, d) 4 seconds, e) 3.8 seconds, f) See graph g) Note: Should be CLOSED BRACKETS but the software would not allow CLOSED BRACKETS Domain: $(0, 4)$ and Range: $(0, 100)$

33)



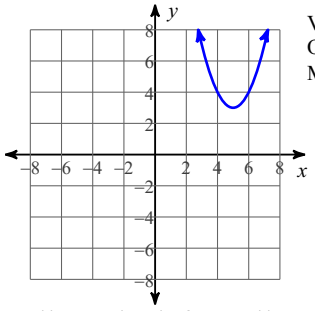
Vertex: $(2, -4)$
Opens: Down
Max value = -4

34)



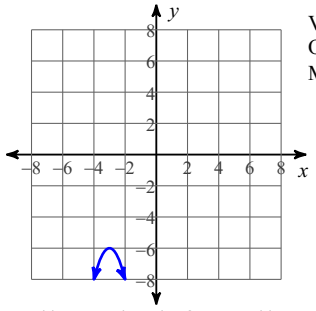
Vertex: $(-5, -1)$
Opens: Down
Max value = -1

35)



Vertex: $(5, 3)$
Opens: Up
Min value = 3

36)



Vertex: $(-3, -6)$
Opens: Down
Max value = -6

37) Falls to the left. Falls to the right

38) Falls to the left. Falls to the right

39) Rises to the left. Falls to the right

40) Falls to the left. Rises to the right

41) Factors to: $f(x) = (5x^2 + 2)(x^2 - 2)$
Zeros: $\left\{\frac{i\sqrt{10}}{5}, -\frac{i\sqrt{10}}{5}, \sqrt{2}, -\sqrt{2}\right\}$

42) Factors to: $f(x) = x(3x + 4)(9x^2 - 12x + 16)$
Zeros: $\left\{0, -\frac{4}{3}, \frac{2+2i\sqrt{3}}{3}, \frac{2-2i\sqrt{3}}{3}\right\}$

43) Factors to: $f(x) = (3x + 1)(x^2 + 4)$
Zeros: $\left\{-\frac{1}{3}, 2i, -2i\right\}$

44) $\left\{-\frac{5}{2}, \frac{5+5i\sqrt{3}}{4}, \frac{5-5i\sqrt{3}}{4}\right\}$

45) $f(x) = x^3 - x^2 - 12x$ 46) $f(x) = x^4 - 4x^3 + x^2 + 6x$

47) $f(x) = -x^4 - 3x^3 + 26x^2 + 48x - 160$ 48) $f(x) = -x^3 - 3x^2 + 6x + 8$

49) $\left\{3, \frac{-3+3i\sqrt{3}}{2}, \frac{-3-3i\sqrt{3}}{2}\right\}$ 50) $\{i\sqrt{2}, -i\sqrt{2}, i, -i\}$ 51) $\left\{5, \frac{-5+5i\sqrt{3}}{2}, \frac{-5-5i\sqrt{3}}{2}\right\}$

52) $\{-3, i, -i\}$ 53) $\{i\sqrt{3}, -i\sqrt{3}, \sqrt{6}, -\sqrt{6}\}$ 54) $\{-2, 1 + i\sqrt{3}, 1 - i\sqrt{3}\}$

55) Ellipse
$\frac{(x-5)^2}{4} + (y+4)^2 = 1$
Center: $(5, -4)$
Vertices: $(7, -4), (3, -4)$

56) Circle
$(x+2)^2 + y^2 = 2$
Center: $(-2, 0)$

57) Hyperbola
$(x-3)^2 - \frac{(y+2)^2}{9} = 1$
Center: $(3, -2)$
Vertices: $(4, -2), (2, -2)$

58) Ellipse
$\frac{(x+2)^2}{9} + \frac{(y+1)^2}{16} = 1$
Center: $(-2, -1)$
Vertices: $(-2, 3), (-2, -5)$

59) Parabola
$y = (x-2)^2 + 4$
Vertex: $(2, 4)$

60) Hyperbola
$(y-4)^2 - (x+3)^2 = 1$
Center: $(-3, 4)$
Vertices: $(-3, 5), (-3, 3)$

61) $(-4, 0)$

62) $(-5, -5), (9, 9)$

63) $(-6, 0)$

64) No solution.

65) $\frac{5}{3(k+5)}$; $\{0, 3, -5\}$

66) $\frac{(7n-9)(n+1)}{2(n-4)(n-1)}$; $\{0, 4, 1\}$

67) $\frac{8x-30}{3(2x-1)(x+6)}$

68) $\frac{8x^2+8x}{(x-3)(x+5)}$

69) $\frac{2x^3+4}{2x^3+x^2-3x}$

70) $\frac{8x+3x^3}{18}$