Mrs. Colabella

Algebra 2 REVIEW ~~Part 1~~

Chapter 1 – Quadratic Functions

There are three forms of a quadratic functions:

1. standard form: $f(x) = ax^2 + bx + c$
   - The x coordinate of the vertex is $x = \frac{-b}{2a}$
2. vertex form: $f(x) = a(x-h)^2 + k$
   - The vertex is (h, k).
3. Intercept form: $f(x) = a(x-p)(x-q)$
   - The x intercepts are p and q
   - The x coordinate of the vertex is half way in between: $x = \frac{p+q}{2}$

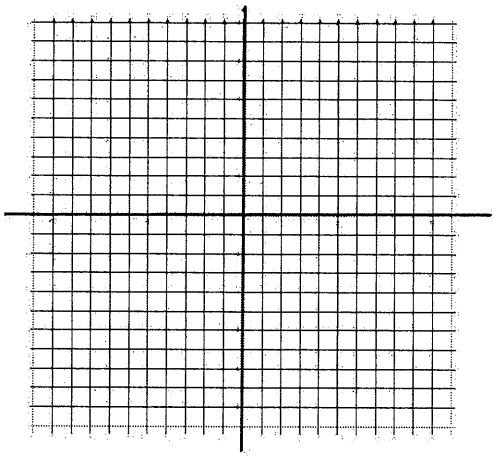
Remember that for any quadratic:

- There is an axis of symmetry through the vertex.
- If the leading coefficient ("a") is positive the parabola opens up and has a minimum value at its vertex.
- If the leading coefficient ("a") is negative the parabola opens down and has a maximum value at its vertex.
- The x-intercepts or "zeros" of the function can be found by solving the equation $ax^2 + bx + c = 0$.

Graph each function. Identify the vertex and axis of symmetry.

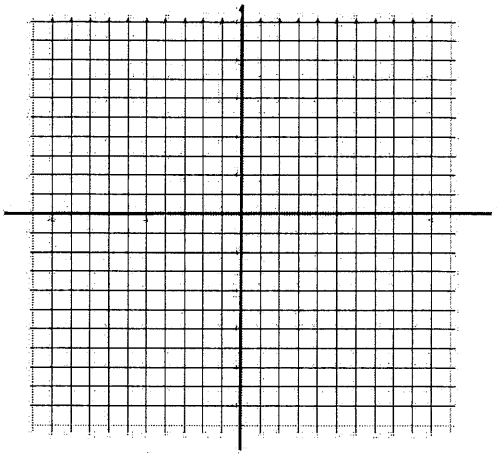
1. $f(x) = -4x^2 + 8x + 2$

Vertex (1, 6)



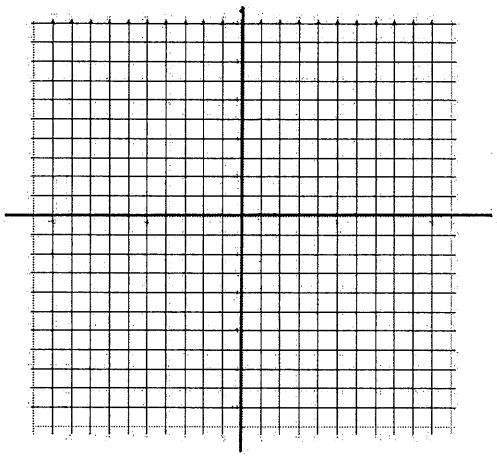
2. $f(x)=x^2-2x-3$

Vertex $(1,-4)$



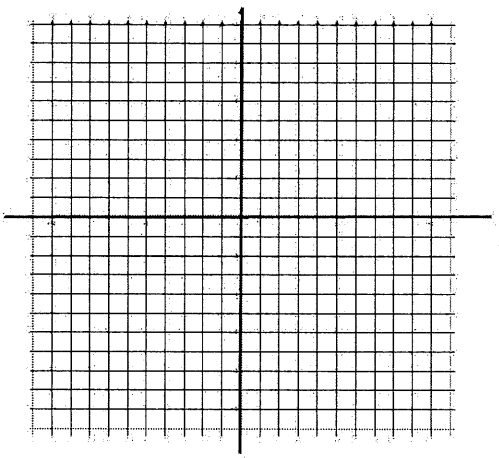
3. $y=(x+2)^2-3$

Vertex $(-2,3)$



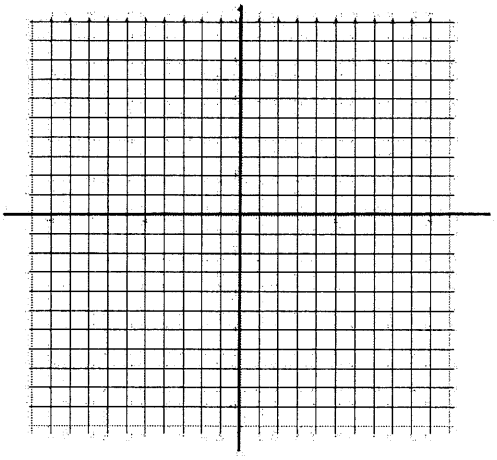
4. $y=-(x-1)^2+5$

Vertex $(1,5)$



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

There is not a problem like this on the final.



Write each equation in standard form: Page 248

6. $f(x) = -4(x-1)(x+3)$ $f(x) = -4x^2 - 8x + 12$

7. $g(x) = 6(x-4)^2 - 10$ $g(x) = 6x^2 - 48x + 86$

8. $f(x) = -3(x+5)^2 + 1$ $f(x) = -3x^2 - 30x - 74$

Simplify the expression:

9. $\sqrt{32}$ $4\sqrt{2}$

10. $\sqrt{150}$ $5\sqrt{6}$

11. $\sqrt{3} \cdot \sqrt{27}$ 9

12. $4\sqrt{5} \cdot \sqrt{5}$ 20

13. $\frac{8}{\sqrt{3}}$ not on final

14. $\sqrt{\frac{18}{11}}$

There are no problems 15 & 16

Solving Quadratic Equations

There are three ways to solve quadratic equations:

1. Factoring

   Watch out for special cases:
   - $x^2 - 9 = (x+3)(x-3)$
   - $6x^2 + 12x = 6x(x+2)$

2. Taking square roots Section 1.5, page 32

   The easy case: $x^2 = 36$. Just take the square root of each side.

3. The Quadratic Formula , Section 1.8, page 58.

   The quadratic formula is $x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Factor:

make sure you know the difference between #18 and #20

17. $x^2-13x+22$

$(x-11)(x-2)$

18. x^2-36

$(x+6)(x-6)$

19. $3x^2-6x$

$3x(x-2)$

20. x^2+81

cannot be factored

21. u^2+9u

$u(u+9)$

22. $x^2+8x+16$

$(x+4)(x+4)$ OR $(x+4)^2$

Solve by factoring:

23. $x^2-8x+12=0$

6, 2.

24. $n^2-6n=0$

0, 6.

25. $m^2=7m$

0, 7.

26. $7x^2-30x+8=0$

$\frac{2}{7}$, 4

27. $0=15x^2-5x-20$

$\frac{4}{3}$, -1

28. $0=3x^2-3x$

0, 1

Solve the Equation by Taking Square Roots (Section 1.5, page 32)

29. $s^2=169$

± 13.

30. $x^2=84$

$\pm 2\sqrt{21}$ or ± 9.17.

31. $4x^2=448$

$\pm 4\sqrt{7}$ OR ± 10.58

32. $7r^2-10=25$

$\pm\sqrt{5}$ or ± 2.24

33. $\frac{x^2}{25}-6=-2$

± 10

34. $4(x-1)^2=8$

$1\pm\sqrt{2}$ or 2.414, $-.414$

35. $7(x-4)^2-18=10$

6, 2.

36. $2(x+2)^2-5=8$

$-2\pm\sqrt{6.5}$ or -4.55, .55

37. $x^2-8=-36$

$\pm 4i\sqrt{7}$ or $\pm 5.29i$

Write the expression as a complex number in standard form $(a + bi)$: (Section 1.6, page 41)

38. $6i(3+2i)$

$-12+18i$

39. $(3+2i)+(5-i)+6i$

$8+7i$

40. $-8(+2i)(-4i)$

41. $(8-3i)(8+3i)$

73

42. $(-2+5i)(-1+4i)$

$-18-13i$

43.

Use the quadratic formula to solve the equation: (Section 1.8, page 58)

44. $x^2-4x-5=0$

5 and -1

45. $4x^2-8x+1=0$

$\frac{2\pm\sqrt{3}}{2}$

1.87, .134

Chapter 2: Polynomials and Polynomial Functions

Evaluate or simplify the expression (Section 2.1, page 88)

46. $(2^2y^3)^5$

$2^{10}y^{15}$

47. $5s^{-2}t^4$

$\frac{5t^4}{s^2}$

48. $(3a^3b^5)^{-3}$

$\frac{1}{27a^9b^{15}}$

49. $(p^3q^2)^0$

1

50. $\frac{x^{-1}y^2}{x^2y^{-1}}$

$\frac{y^3}{x^3}$

51. $\frac{y^{11}}{4x^2}\cdot\frac{8x}{y^7}$

$\frac{2y^4}{x}$

52. $\frac{y^2}{x^{-4}}$

y^2x^4

53. $\frac{4x^2y^{-1}}{6y^2}$

$\frac{2x^2}{3y^3}$

Find the product (Section 2.3, page 104)

54. $(5c^2-4)(2c^2+c-3)$

$10c^4+5c^3-23c^2-4c+12$

55. $(x+4)(x-6)(x+5)$

$x^3+3x^2-34x-120$

56. $(w-6)(4w-1)(3w+5)$

$12w^3-55w^2-107w+30$

Factor completely (Section 2.4, page 111)

57. $x^3-7x^2+4x-28$

$(x-7)(x^2+4)$

58. $x^4+4x^3-13x^2-4x+12$

$(x+6)(x+1)(x-1)(x-2)$

59. $2x^4-13x^2-45$ (try 3 or -3)

$(x+3)(x-3)(2x^2+5)$

Divide using synthetic division

60. $(7x^4-54x^3-75x^2-46x-69)\div(x-9)$

$x^4-7x^3-4x^2+8x+2+\frac{2}{(x+1)}$

switch answers

61. $(x^5+3x^4-74x^3-32x^2+82x+22)\div(x+10)$

$7x^3+9x^2+6x+8+\frac{3}{(x-9)}$

Find all real zeros (use a graphing calculator to help): (Section 2.6, page 128 and Section 2.7, page 136)

62. $f(x)=x^4-6x^3+7x^2+6x-8$

$-1, 1, 2, 4$

63. $f(x)=x^4+5x^3-7x^2-29x+30$

$-5, -3, 1, 2$

use Desmos or a graphing calculator.

Find ALL the zeros, including imaginary zeros:

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

$3, +i, -i$

65. $g(x)=x^3+2x^2+5x+10$

$-2, +\sqrt{5}i, -\sqrt{5}i$

Evaluate the expression. Give your answer as a fraction, not a decimal. Assume all variables are positive.

66. $4^{\frac{5}{2}}$ 32

67. $36^{\frac{3}{2}}$ 216

68. $27^{\frac{2}{3}}$ 81

69. $125^{\frac{-4}{3}}$ $\frac{1}{625}$

Write the expression in simplest form. Assume all variables are positive:

70. $\sqrt[3]{8x^6}$ $2x^2$

71. $\sqrt[3]{64x^3y}$ $4x\sqrt[3]{y}$

72. $\sqrt[3]{\frac{27x^3y}{125y^2}}$ $= \frac{3x}{5\sqrt[3]{y}}$

Solve the equation:

73. $3\sqrt{x+2} = 6$ 2.

74. $\sqrt[3]{x} = 5$ 125

75. $\sqrt[4]{x^2+31} = 3$ $\pm\sqrt{50}$

Find an equation for the inverse of the relation:

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

77. $y = \frac{1}{3}x$ $y = 3x$

Let $f(x) = 3x^2$ and $g(x) = 6x^{\frac{3}{2}}$.

78. Find $f(x) \cdot g(x)$ $18x^{\frac{7}{2}}$

79. Find $\frac{f(x)}{g(x)}$. (You do NOT have to state any domain restrictions.) $\frac{x^{\frac{1}{2}}}{2}$

Given $f(x) = x + 5$ and $g(x) = 2x^2 + 1$:

80. Find $g(f(2))$. 99.

81. Find $f(g(x))$. $2x^2 + 6$

82. You deposit $2000 in an account that pays 4% annual interest compounded monthly. Find the balance after 3 years.

Compound interest formula: $A = P\left(1 + \frac{r}{n}\right)^{nt}$

2,254.54.

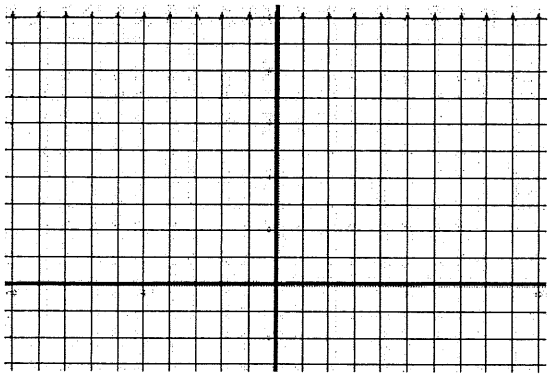
There is a problem on the final using continuous compounding $A = Pe^{rt}$ If this interest was compounded continuously, it would be $2,254.99.

83. You purchase a car for $20,000. It depreciates by 10% each year. Find the value of the car after 3 years.

$14,580

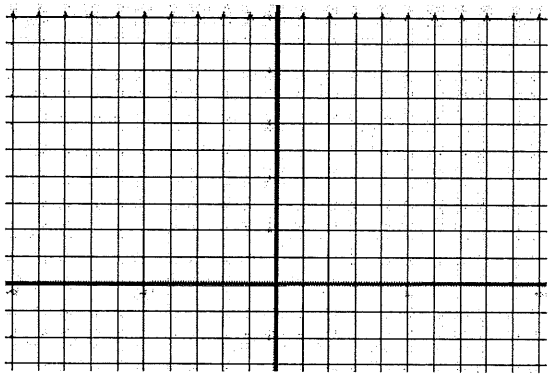
Complete the chart and graph each function:

84) $y = 2\left(\frac{1}{2}\right)^x$



x	y
-1	4
0	2
1	1

85) $y = (3)^x - 1$



X	y
-1	$-\frac{2}{3}$
0	0
1	2

86. Multiply

$$\frac{x^2 - 9x + 20}{x^2 + 9x + 14} \cdot \frac{x^2 + 6x + 8}{x^2 - x - 20}$$

$$\frac{x-4}{x+7}$$

87. Divide

$$\frac{3x^2 + 4x + 1}{x^2 - 4} \div \frac{x + 1}{x^2 + 8x + 12}$$

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