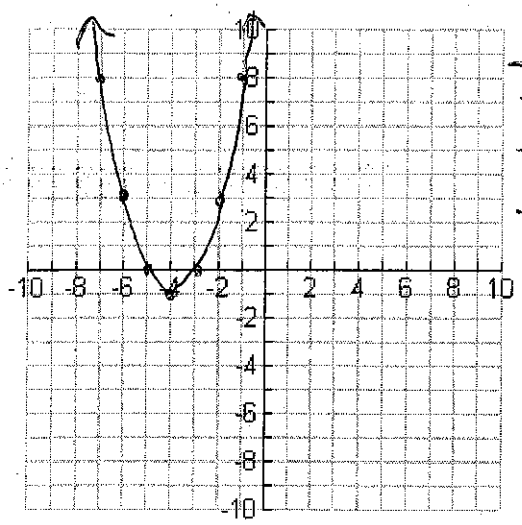
Honors GSE Algebra II
Unit 1 – Quadratics Revisited

Name AK
Review for Unit 1 Test

Part 1: Graph the following and identify the listed characteristics.

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



-6	3
-5	0
-4	-1
-3	0
-2	3

vertex $(-4, -1)$

axis of symmetry $x = -4$

domain $(-\infty, \infty)$

range $[-1, \infty)$

maximum none $x = -4$

minimum $y = -1$ at ~~$(-4, -1)$~~

interval of increase $(-4, \infty)$

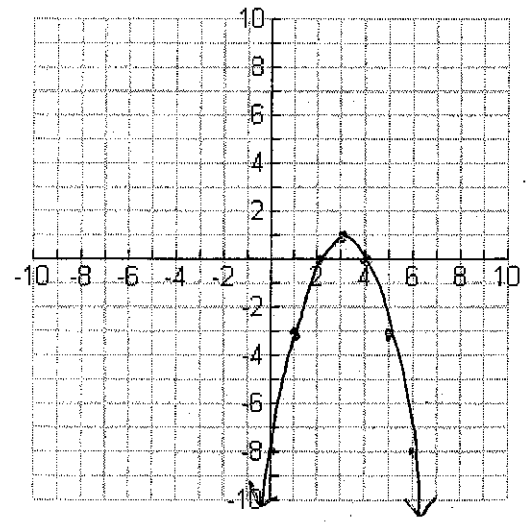
interval of decrease $(-\infty, -4)$

end behavior As $x \to -\infty$, $y \to \infty$
As $x \to \infty$, $y \to \infty$

y-intercepts $(0, 15)$

zeros $x = -5, -3$

2. $y = -x^2 + 6x - 8$



1	-3
2	0
3	1
4	0
5	-3

$\frac{-b}{2a} = \frac{-6}{2(-1)} = 3$

vertex $(3, 1)$

axis of symmetry $x = 3$

domain $(-\infty, \infty)$

range $(-\infty, 1]$ $x = 3$

maximum $y = 1$ at ~~$(3, 1)$~~

minimum none

interval of increase $(-\infty, 3)$

interval of decrease $(3, \infty)$

end behavior As $x \to -\infty$, $y \to -\infty$
As $x \to \infty$, $y \to -\infty$

y-intercepts $(0, -8)$

zeros $x = 2, 4$

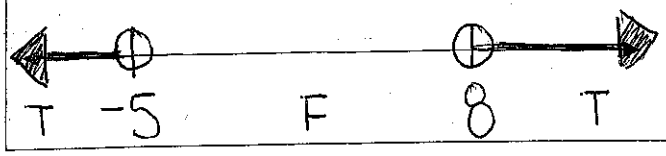
Part 2: Solve each quadratic inequality and graph the solution on a number line.

5. $x^2 - 3x - 40 > 0$

$(x-8)(x+5) = 0$

$x = 8, -5$

$(-\infty, -5) \cup (8, \infty)$



6. $2x^2 - 5x - 3 < 0$

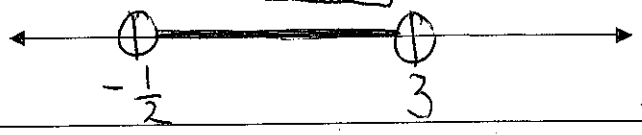
-6, -6, 1, -5

$(2x^2 - 6x) + (1x - 3) = 0$

$2x(x-3) + 1(x-3) = 0$

$(2x+1)(x-3) = 0 \quad x = -\frac{1}{2}, 3$

$(-\frac{1}{2}, 3)$



Part 3: Factor each expression completely.

7. $x^2 + 5x + 6$

6, 3, 2, 5

$(x^2 + 3x) + (2x + 6)$

$x(x+3) + 2(x+3)$

$(x+2)(x+3)$

8. $x^3 - 5x^2 - 6x$

-6, -6, 1, -5

$x(x^2 - 5x - 6)$

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

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

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

9. $x^3 - 16x^2 + 64x$

64, -8, -8, -16

$x(x^2 - 16x + 64)$

$(x^2 - 8x) - (8x + 64)$

$x(x-8) - 8(x-8)$

$x(x-8)^2$

10. $6x^2 - 5x - 6$

-36, -9, 4, -5

$(6x^2 - 9x) + (4x - 6)$

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

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

11. $27x^2 - 75$

$3(9x^2 - 25)$

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

12. $24a^3b - 32a^2b^2 - 6ab^3$

$2ab \mid 12a^2 - 16ab - 3b^2$

$(12a^2 - 18ab) + (2ab - 3b^2)$

-36, -18, 2, -16

$6a(2a-3b) + b(2a-3b)$

$2ab(6a+b)(2a-3b)$

13. $\frac{36}{49}x^2 - \frac{4}{9}$

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

14. $(x^3 + 6x^2) - (5x + 30)$

$x^2(x+6) - 5(x+6)$

$(x^2 - 5)(x+6)$

15. $x^4 - 9x^2 + 20$

20, -4, -5, -9

$(x^4 - 5x^2) + (4x^2 + 20)$

$x^2(x^2 - 5) - 4(x^2 - 5)$

$(x^2 - 4)(x^2 - 5)$

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

Part 4: Solve each of the following equations.

16. Solve by factoring: $3x^2 - 192 = 0$

$3(x^2 - 64) = 0$

$3(x-8)(x+8) = 0$

$x - 8 = 0 \quad x + 8 = 0$

$\boxed{x = 8, -8}$

17. Solve by factoring: $14x^2 - 7x = 21$

$14x^2 - 7x - 21 = 0$

$7(2x^2 - x - 3) = 0$

$(2x^2 - 3x) + (2x - 3) = 0$

$x(2x-3) + 1(2x-3) = 0$

$(x+1)(2x-3) = 0$

$x + 1 = 0 \quad 2x - 3 = 0$

-6, -3, 2, -1

$\boxed{x = -1, \frac{3}{2}}$

18. Solve by square roots: $-2(x-1)^2 + 3 = 6$

$-2(x-1)^2 = 3$

$(x-1)^2 = -\frac{3}{2}$

$x - 1 = \pm \frac{i\sqrt{3}}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}}$

$x - 1 = \pm \frac{i\sqrt{6}}{2}$

$\boxed{x = 1 \pm \frac{i\sqrt{6}}{2}}$

19. Solve by square roots: $x^2 + 25 = 0$

$x^2 = -25$

$\boxed{x = \pm 5i}$

20. Solve with quadratic formula: $-2x^2 + 3x + 2 = 0$

$(3)^2 - 4(-2)(2) = 25$

$\frac{-3 \pm \sqrt{25}}{2(-2)}$

$\frac{-3 \pm 5}{-4}$

$x = \frac{-3+5}{-4} = \frac{2}{-4} = \boxed{-\frac{1}{2}}$

$x = \frac{-3-5}{-4} = \boxed{2}$

21. Solve with quadratic formula: $x^2 + 2x + 17 = 0$

$(2)^2 - 4(1)(17) = -64$

$\frac{-2 \pm \sqrt{-64}}{2(1)}$

$\frac{-2 \pm 8i}{2}$

$\boxed{x = -1 \pm 4i}$

22. Solve by completing the square: $5x^2 + 6x = 8$

$x^2 + \frac{6}{5}x = \frac{8}{5}$

$\frac{b}{2} = \frac{6}{10} = \frac{3}{5}$

$+\frac{\cancel{36}}{\cancel{25}}\frac{9}{25} \quad +\frac{\cancel{36}}{\cancel{25}}\frac{9}{25}$

$\left(\frac{b}{2}\right)^2 = \left(\frac{3}{5}\right)^2 = \frac{\cancel{36}}{25}9$

$(x + \frac{3}{5})^2 = \frac{\cancel{36}}{25}49$

$x + \frac{3}{5} = \pm\frac{\cancel{\sqrt{49}}}{5}7$

$x = -\frac{3}{5} \pm \frac{2\sqrt{19}}{5}$ ~~or~~ $\frac{-3 \pm 2\sqrt{19}}{5}$

$\boxed{x = -2, \frac{4}{5}}$

23. Solve by completing the square: $x^2 + 4x = 3$

$x^2 + 4x + 4 = 3 + 4$

$(x+2)^2 = 7$

$x + 2 = \pm\sqrt{7}$

$\boxed{x = -2 \pm \sqrt{7}}$

Part 5: Write each expression in radical form and simplify.

24. $8^{\frac{2}{3}}$ $(2^3)^{2/3} = 2^2$ $= \boxed{4}$

25. $27^{\frac{4}{3}} = (3^3)^{4/3} = 3^4$ $= \boxed{81}$

26. $5^{\frac{2}{3}} = \sqrt[3]{5^2}$ $= \boxed{\sqrt[3]{25}}$

27. $(-32)^{\frac{3}{5}}$ $((-2)^5)^{3/5} = (-2)^3$ $= \boxed{-8}$

28. $(-32)^{\frac{3}{5}}$ $-36^{3/2} = -(6^2)^{3/2}$ $= -6^3 = -216$

29. $(-32)^{\frac{3}{5}}$ $4^{\frac{5}{2}} = (2^2)^{5/2}$ $= 2^5 = \boxed{32}$

Simplify the expressions.

30. $\frac{x^{\frac{7}{2}}}{x^{\frac{1}{2}}} = x^{\frac{7}{2}-\frac{1}{2}} = x^{\frac{6}{2}}$ $\boxed{x^3}$

31. $x^{\frac{1}{2}} \cdot x^{\frac{11}{2}} = x^{\frac{1}{2}+\frac{11}{2}} = x^{\frac{12}{2}}$ $\boxed{x^6}$

32. $(9a^2)^{\frac{1}{2}} = (3^2a^2)^{1/2} =$ $\boxed{3a}$

33. $3x^{\frac{1}{2}} \cdot 5x^{\frac{9}{2}} = 15x^{\frac{1}{2}+\frac{9}{2}} = 15x^{\frac{10}{2}}$ $\boxed{15x^5}$

34. $(16x^8y^4)^{\frac{3}{4}} = (2^4x^8y^4)^{\frac{3}{4}}$ $= 2^3x^6y^3 = \boxed{8x^6y^3}$

35. $(8x^3y^6)^{\frac{2}{3}} = (2^3x^3y^6)^{\frac{2}{3}}$ $= 2^2x^2y^4 = \boxed{4x^2y^4}$

Simplify the following.

36. $i^{39} = i \cdot i^{38} = i \cdot (i^2)^{19} = \boxed{-i}$

$4\overline{)39}$ 9 r 3

37. $i^{372} = (i^2)^{186} = \boxed{1}$

$4\overline{)372}$ 93 r 0

38. $i^{50} + i^{32} - i^{18} = i^2 + i^4 - i^2$

$4\overline{)50}$ 12 r 2 $\quad 4\overline{)18}$ 4 r 2 $\quad 4\overline{)32}$ 8 r 0

$= -1 + 1 - (-1)$

$= \boxed{1}$

Perform the following operations.

39. $(2+3i)(5-8i)$

$10 - 16i + 15i - 24i^2$

$\boxed{34 - i}$

40. $(4-2i)(-3-7i)$

$-12 - 28i + 6i + 14i^2$

$\boxed{-26 - 22i}$

41. $6i(-11-3i)$

$-66i - 18i^2$

$\boxed{18 - 66i}$

42. $\frac{(2-5i)}{i} \cdot \frac{i}{i}$

$\frac{2i - 5i^2}{i^2} = \frac{5 + 2i}{-1}$

$\boxed{-5 - 2i}$

43. $\frac{(3+2i)}{(6-4i)} \cdot \frac{6+4i}{6+4i}$

$\frac{18 + 12i + 12i + 8i^2}{36 - 16i^2} = \frac{10 + 24i}{52}$

$= \boxed{\frac{5}{26} + \frac{6}{13}i}$

44. $\frac{(9-3i)}{(i-4)} \cdot \frac{i+4}{i+4}$

$\frac{9i + 36 - 3i^2 - 12i}{i^2 - 16} = \frac{39 - 3i}{-17}$

$= \boxed{\frac{-39}{17} + \frac{3}{17}i}$