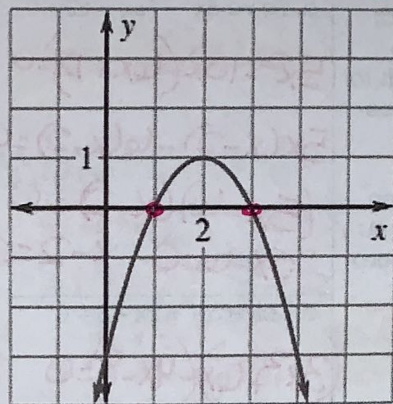
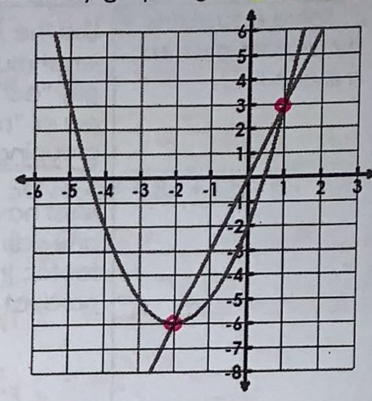
Honors Algebra 2
Unit 1 Review – Quadratics Revisited

Name:________________
Date: __________ Period: ______

What you need to know & be able to do	**Things to remember**	**Examples**	
1. Solve quadratic equations by graphing	Determine where the graph crosses the x-axis. Solution is written as x = ______. Solutions are called: x-intercepts zeros roots Solution of 2 functions is the x value of intersection points; be able to justify algebraically	a. Solve by graphing x = 1 & 3  Verify: $-x^2 + 4x - 3 = 0$ $x^2-4x+3=0$ $(x-3)(x-1)=0$ $x=3 \quad x=1$	b. Solve by graphing x = -2 & 1  Verify: $x^2 + 4x - 2 = 3x$ $x^2+x-2=0$ $(x+2)(x-1)=0$ $x=-2 \quad x=1$
2. Compute/evaluate imaginary and complex numbers.	$i = \sqrt{-1}$ $i^2 = -1$ $i^3 = -i$ $i^4 = 1$ standard form: $a \pm bi$	a. $i^{29} = 4\overline{)29}$ 7 R1 $i^1 = i$ b. $\frac{(-2i^{21})(3i^4)}{5i^2} = \frac{-6i^{25}}{-5} = \frac{6i}{5}$ c. $(3 + 4i) - (-4 - 7i)$ $7+11i$	d. $\frac{6 + 2i}{5i} \cdot \frac{i}{i} = \frac{6i+2i^2}{5i^2}$ $\frac{-2+6i}{-5}$ or $\frac{2-6i}{5}$ e. $(5 + 2i)^2$ $(5+2i)(5+2i)$ $25+20i+4i^2 = 21+20i$ f. $\frac{(3 - i)}{(2 + 4i)} \frac{(2-4i)}{(2-4i)}$ $\frac{6-14i+4i^2}{4-16i^2} = \frac{2-14i}{20} = \frac{1-7i}{10}$
3. Rational exponents.	The denominator is the "root" you take The numerator is the power you raise to	a. evaluate $64^{5/6}$ $\sqrt[6]{64}^5 = (2)^5 = 32$ b. evaluate $144^{1/2}$ $\sqrt{144} = 12$ c. $(27)^{-\frac{2}{3}} = \frac{1}{\sqrt[3]{27}^2} = \frac{1}{3^2} = \frac{1}{9}$	c. convert to radical form $a^{4/5}$ $\sqrt[5]{a^4}$ d. convert to rational exponents; simplify if possible $\sqrt[4]{81n^8a^6} = (81n^8a^6)^{1/4}$ $81^{1/4}n^{8/4}a^{6/4} = 3n^2a^{3/2}$ $\sqrt[4]{81}$
4. Solve equations by factoring when a = 1.	What multiplies to get C and adds to get b Be sure you have zero on one side and use zero product property Diff of 2 squares: $a^2-b^2 = (a+b)(a-b)$	a. Solve $x^2 - 9x + 20 = 0$ $(x-4)(x-5)=0$ $x-4=0 \quad x-5=0$ $x=4 \quad x=5$	b. Solve $x^2 - 6x - 16 = 0$ $(x-8)(x+2)=0$ $x-8=0 \quad x+2=0$ $x=8 \quad x=-2$

		c. $x^2 - 13x + 47 = 7$ $x^2 - 13x + 40 = 0$ $(x-8)(x-5) = 0$ $x-8=0 \quad x-5=0$ $x=8 \quad x=5$	d. $4x^2 - 100 = 0$ $4(x^2-25)=0$ $4(x+5)(x-5)=0$ $x+5=0 \quad x-5=0$ $x=-5 \quad x=5$
5. Solve equations by factoring when a is not 1	Use the X method; what multiplies to get "ac" but adds to equal "b"; then use grouping. Must have ZERO on one side before you factor; then use zero product property	a. Solve $5x^2 - 16x + 12 = 0$ $(5x^2 - 10x)(-6x + 12) = 0$ 60, −10, −6, −16 $5x(x-2) - 6(x-2) = 0$ $(5x-6)(x-2) = 0$ $5x-6=0 \quad x-2=0$ $x = \frac{6}{5}$ $x=2$	b. Solve $3x^2 - 18x + 15 = 0$ $3(x^2 - 6x + 5) = 0$ $3(x-5)(x-1) = 0$ $x-5=0 \quad x-1=0$ $x=5 \quad x=1$
		c. Solve $3x^2 + 2x - 8 = 0$ $(3x^2 + 6x)(-4x - 8) = 0$ −24, 6, −4, 2 $3x(x+2) - 4(x+2) = 0$ $(3x-4)(x+2) = 0$ $x = 4/3 \quad x=-2$	d. $4x^2 - 4x - 11 = -2x^2 + x - 5$ $6x^2 - 5x - 6 = 0$ −36, −9, 4, −5 $(6x^2 - 9x)(+4x - 6) = 0$ $3x(2x-3) + 2(2x-3) = 0$ $(3x+2)(2x-3) = 0$ $x = -2/3$ $x = 3/2$
6. Solve equations by factoring GCF	Use factoring by GCF when you have two terms (a & b) and both contain an x. One of the solutions will always be 0.	a. $x^2 - 4x = 0$ $x(x-4) = 0$ $x=0 \quad x-4=0$ $x=4$	b. $12x^2 = -36x$ $12x^2 + 36x = 0$ $12x(x+3) = 0$ $12x=0 \quad x+3=0$ $x=0 \quad x=-3$
7. Solve equations by finding square roots.	Use solving by square roots when your equations have parenthesis or two terms (a & c). Be aware of complex/imaginary roots	a. $\sqrt{x^2} = \pm\sqrt{-12}$ $x = \pm\sqrt{-12}$ $x = \pm 2i\sqrt{3}$	b. $8x^2 = -392$ $x^2 = -49$ $x = \pm\sqrt{-49}$ $x = \pm 7i$
		c. $7x^2 - 3 = 445$ $7x^2 = 448$ $\sqrt{x^2} = \pm\sqrt{64}$ $x = \pm 4$	d. $\sqrt{(x-4)^2} = \pm\sqrt{-9}$ $x-4 = \pm\sqrt{-9}$ $x-4 = \pm 3i$ $x = 4 \pm 3i$

		e. $-2(x+2)^2 = 72$ $\div -2 \quad \div -2$ $\sqrt{(x+2)^2} = \pm\sqrt{-36}$ $x+2 = \pm 6i$ $x = -2 \pm 6i$	f. $-3(x-3)^2 + 2 = 26$ $-3(x-3)^2 = 24$ $\sqrt{(x-3)^2} = \pm\sqrt{-8}$ $x-3 = \pm 2i\sqrt{2}$ $x = 3 \pm 2i\sqrt{2}$ g. $x^2 - 6x + 9 = 27$ $\sqrt{(x-3)^2} = \pm\sqrt{27}$ $x-3 = \pm 3\sqrt{3}$ $x = 3 \pm 3\sqrt{3}$
8. Solve equations by completing the square	Move the c term to the right side Use $\left(\frac{b}{2}\right)^2$ to complete the square and then apply square root method *Leading coefficient must be one	a. Solve $x^2 + 4x - 11 = 10$ $x^2 + 4x + 4 = 21 + 4$ $\sqrt{(x+2)^2} = \pm\sqrt{25}$ $x+2 = \pm 5$ $x = -2 \pm 5$ $x = 3$ $x = -7$ b. Solve $x^2 - 8x + 40 = 0$ $x^2 - 8x + 16 = -40 + 16$ $\sqrt{(x-4)^2} = \pm\sqrt{-24}$ $x - 4 = \pm 2i\sqrt{6}$ $x = 4 \pm 2i\sqrt{6}$	*c. Solve $4x^2 + 8x + 11 = 0$ $4x^2 + 8x \; \_ = -11 \; \_$ $4(x^2 + 2x + 1) = -11 + 4$ $4(x+1)^2 = -7$ $\sqrt{(x+1)^2} = \pm\sqrt{\frac{-7}{4}}$ $x + 1 = \pm\frac{i\sqrt{7}}{2}$ $x = -1 \pm \frac{i\sqrt{7}}{2}$
9. Solve equations by using Quadratic Formula	Use Q.F. when the equation is in standard form and number diamonds does not work. $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$	a. $x^2 + 10x + 15 = 0$ $a=1 \quad b=10 \quad c=15$ $x = \frac{-10 \pm \sqrt{(10)^2 - 4(1)(15)}}{2(1)}$ $x = \frac{-10 \pm \sqrt{40}}{2} = \frac{-10 \pm 2\sqrt{10}}{2}$ $x = -5 \pm \sqrt{10}$	b. $2x^2 + 10x = 1$ $2x^2 + 10x - 1 = 0$ $a=2 \quad b=10 \quad c=-1$ $x = \frac{-10 \pm \sqrt{(10)^2 - 4(2)(-1)}}{2(2)}$ $x = \frac{-10 \pm \sqrt{108}}{4} = \frac{-10 \pm 6\sqrt{3}}{4}$ $x = \frac{-5 \pm 3\sqrt{3}}{2}$
		c. $3x^2 + 6x + 3 = 0$ $x^2 + 2x + 1 = 0$ $a=1 \quad b=2 \quad c=1$ $x = \frac{-2 \pm \sqrt{(2)^2 - 4(1)(1)}}{2(2)}$ $x = \frac{-2 \pm \sqrt{0}}{4} = \frac{-2}{4} = \frac{-1}{2}$	d. $8x^2 - 4x + 7 = 2$ $8x^2 - 4x + 5 = 0$ $a=8 \quad b=-4 \quad c=5$ $x = \frac{4 \pm \sqrt{(-4)^2 - 4(8)(5)}}{2(8)}$ $x = \frac{4 \pm \sqrt{-144}}{16} = \frac{4 \pm 12i}{16} = \frac{1 \pm 3i}{4}$
10. Use the discriminant to determine the number of solutions	Discriminant: $b^2 - 4ac$ If the discriminant is: Positive: two real Zero: one real Negative: 2 complex/imaginary	a. Calculate the discriminant and tell number of solutions: $6x^2 + 2x + 1 = 0$ $a=6 \quad b=2 \quad c=1$ $(2)^2 - 4(6)(1)$ -20; 2 imaginary solutions	b. $3x^2 - x - 3 = 0$ $\quad a=3 \quad b=-1 \quad c=-3$ $(-1)^2 - 4(3)(-3)$ 37; 2 real sol. c. $2x^2 + 10x + 8 = 0$ $x^2 + 5x + 4 = 0 \quad a=1 \quad b=5 \quad c=4$ $(5)^2 - 4(1)(4)$ 9; 2 real solutions

11. *Determine the best method for solving quadratic equations.*	Use either: Factoring Take square roots Compl the square Quad formula	Solve the following using the best method: a. $x^2-9=-11$ $\sqrt{x^2}=\pm\sqrt{-2}$ $x=\pm i\sqrt{2}$	b. $6x^2+8x+1=0$ $a=6$ $b=8$ $c=1$ $\frac{-8\pm\sqrt{(8)^2-4(6)(1)}}{2(6)}$ $\frac{-8\pm\sqrt{40}}{12}=\frac{-8\pm2\sqrt{10}}{12}=\frac{-4\pm\sqrt{10}}{6}$
		c. $2(x+5)^2=-64$ $\sqrt{(x+5)^2}=\pm\sqrt{-32}$ $x+5=\pm4i\sqrt{2}$ $x=-5\pm4i\sqrt{2}$	d. $5x^2-7x=0$ $x(5x-7)=0$ $x=0$ $5x-7=0$ $x=\frac{7}{5}$
		e. $x^2+12x+30=-5$ $x^2+12x+35=0$ $(x+5)(x+7)=0$ $x+5=0$ $x+7=0$ $x=-5$ $x=-7$	f. $3x^2+12=-13x$ $3x^2+13x+12=0$ (36; 9, 4; 13) $(3x^2+9x)+(4x+12)=0$ $3x(x+3)+4(x+3)=0$ $(3x+4)(x+3)=0$ $x=-4/3$ $x=-3$
		g. $-5(x-2)^2=125$ $\sqrt{(x-2)^2}=\pm\sqrt{-25}$ $x-2=\pm5i$ $x=2\pm5i$	h. $5x^2+3x+1=-3$ $5x^2+3x+4=0$ $a=5$ $b=3$ $c=4$ $\frac{-3\pm\sqrt{(3)^2-4(5)(4)}}{2(5)}=\frac{3\pm\sqrt{-71}}{10}$ $\frac{3\pm i\sqrt{71}}{10}$
		i. $x^2+16=0$ $\sqrt{x^2}=\pm\sqrt{-16}$ $x=\pm4i$	j. $x^2+15x+56=0$ $(x+7)(x+8)=0$ $x+7=0$ $x+8=0$ $x=-7$ $x=-8$
12. Graphing complex numbers	Horizontal axis is the "real" axis and the vertical axis is the "imaginary" axis The absolute value of $a \pm bi$ is the distance the point is from the origin	Graph and label point P(4+2i) and point Q (-2+3i) $\lvert 2+4i\rvert=\sqrt{(2)^2+(4)^2}=\sqrt{20}$ $2\sqrt{5}$ $\lvert -2+3i\rvert=\sqrt{(-2)^2+(3)^2}=\sqrt{13}$