Name: ______________________ Date: ___________

Algebra II, Period ___ Math Department

Final Exam Review Packet - Algebra II

- This review packet contains questions that are similar to the type of problems that you will encounter on the exam.
- The in-class review is not meant to re-teach you everything from the second semester. It will be a quick, but thorough overview of the material.
- It is recommended that you work on this review packet leading up to your exam day so you have questions ready. Don't wait till the last minute.
- Remember that the exam counts for 20% or your course grade.
- Reviewing for the exam is **YOUR** responsibility.
- If you have questions as you prepare, make arrangements to see your teacher.

I. Quadratics Equations

Solve each of the following equations using factoring.

a. $x^2 - 36 = 0$

b. $7x^2 - 14x = 0$

c. $x^3 - 6x^2 - 7x = 0$

d. $6x^2 + 7x - 3 = 0$

e. $3x^2 + 3x - 36 = 0$

f. $32x^2 - 2 = 0$

g. $x^3 - 2x^2 - 9x + 18 = 0$

h. $x^3 - 3x^2 + 6x - 18 = 0$

Quadratics Equations (continued)

Factor each polynomial COMPLETELY.

Sum of Two Cubes: $\boxed{a^3+b^3=(a+b)(a^2-ab+b^2)}$

Difference of Two Cubes: $\boxed{a^3-b^3=(a-b)(a^2+ab+b^2)}$

a. x^3+27

b. $8x^3-125$

c. x^4+5x^2-14

d. $2x^5-18x^3+40x$

Solve each of the following equations using the Quadratic Formula.

Quadratic Formula: $\boxed{x=\dfrac{-b\pm\sqrt{b^2-4ac}}{2a}}$

a. $4x^2+6x+1=0$

b. $x^2+2x+2=0$

c. $2x^2+3x-5=0$

d. $3x^2-2x-7=0$

II. Powers, Roots, and Radicals

Rewrite the expression with positive exponents. Evaluate where possible.		
a. $(-3)^{-4}$	b. $\dfrac{4}{x^0+7}$	c. $3x^3(2x)^2$
d. $\dfrac{8a^4b^6}{2(a^5b)^2}$	e. $4(x^{-3}y^4)(-3xy^2)^2$	f. $\dfrac{20(a^{-4}b^{-2})}{8(a^{-2}b^4)^{-2}}$

Solve the radical or rational exponent equation.		
a. $x^{\frac{1}{5}}=2$	b. $2\sqrt{3x-1}+3=11$	c. $4x^2=64$
d. $2(x-2)^{\frac{1}{4}}-3=159$	e. $\sqrt{2x+4}=\sqrt{x+2}$	f. $\sqrt[3]{x}-6=-2$

III. Simplifying Rational Expressions

Simplify the Rational Expression using Multiplication or Division.

a. $\dfrac{x^2+4x-12}{x^2\left(x^2+9x+18\right)}\cdot 6x^2$

f. $\dfrac{12x^2y^3z}{6x^3y^2z^2}$

b. $\dfrac{3x^2-12}{5x-10}\cdot\dfrac{1}{2x+4}$

g. $\dfrac{x^3+3x^2}{2x}\div\dfrac{x^2+5x+6}{5x^3}$

c. $\dfrac{x^2-4}{x^2+4}\cdot\dfrac{x+2}{x-2}$

h. $\dfrac{x^2+x-20}{x+1}\div\dfrac{11x+55}{x+1}$

d. $\dfrac{5x^2-20}{25x^2}\cdot\dfrac{x}{x-2}$

i. $\dfrac{x^2+5x+6}{x+3}\div\dfrac{x^2-4}{x+1}$

e. $x^2+x-30\cdot\dfrac{x}{x^2+6x}$

j. $\dfrac{x^2+6x-7}{3x^2}\div\dfrac{x+7}{6x}$

Simplifying Rational Expressions (continued)

Simplify the Rational Expression using Addition or Subtraction. (LCD = ?)

a. $\dfrac{4}{3x^2}+\dfrac{2}{5x}$

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b. $\dfrac{3}{2x-2}+\dfrac{x+1}{4}$

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c. $\dfrac{4}{3x^3}+\dfrac{x}{6x^3+3x^2}$

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d. $\dfrac{5x-1}{x^2+2x-8}-\dfrac{6}{x+4}$

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e. $\dfrac{x+1}{x^2+6x+9}-\dfrac{1}{x^2-9}$

IV. Solving Rational Equations

Solve each rational equation.

a. $\dfrac{3}{x+4} = \dfrac{9}{x-2}$

b. $\dfrac{4x}{x-1} = \dfrac{x}{x^2-1}$

c. $\dfrac{3}{x^2-4} = \dfrac{2}{x+2} + \dfrac{x}{x-2}$

d. $\dfrac{3x-2}{x-2} = \dfrac{6}{x^2-4} + 1$

e. $\dfrac{x}{x+2} = \dfrac{3x+1}{x-1} + \dfrac{4}{x^2+x-2}$

V. Function Operations

Perform the indicated operation with the functions given.		
Let $f(x) = x^2 - 3x + 4$, $g(x) = 5x + 2$, and $h(x) = 6x$.		
a. $(f + g)(x) =$	b. $(f - h)(x) =$	c. $(g \cdot h)(x) =$
d. $(f + h)(-2) =$	e. $(h - g)(3) =$	f. $(g \cdot f)(0) =$
g. $(f \circ g)(x) =$	h. $(f \circ h)(x) =$	i. $(g \circ f)(1) =$
j. $(f \circ h)(-7) =$	k. $g(h(f(x))) =$	l. $f(g(h(-1))) =$

VI. Inverses

Find the inverse of each function.

a. $f(x) = 2x + 5$

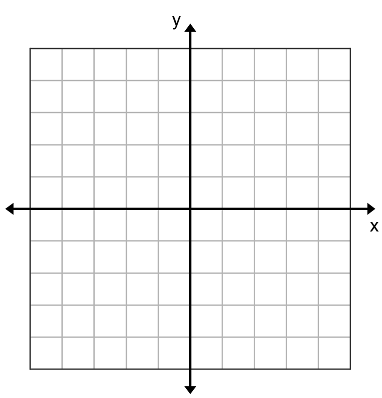
b. $f(x) = \sqrt[3]{2x+4}$

c. $f(x) = 5 - \frac{5}{2}x$

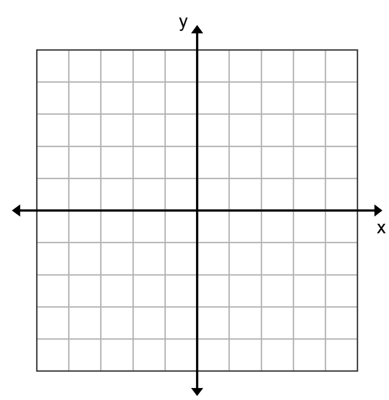
d. $f(x) = \frac{x-2}{4}$

Verify that the two functions are inverses of each other using composite functions. Then, verify (a) and (b) by graphing.

a. $f(x) = x + 7$, $g(x) = x - 7$



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



c. $f(x) = \frac{1}{3}x^2$, $g(x) = \sqrt{3x}$

d. $f(x) = \frac{x^5 + 2}{7}$, $g(x) = \sqrt[5]{7x-2}$

The graph of the inverse function is the reflection of the original function over what line?

VII. Exponential & Logarithmic Functions

Solve each equation.
$y = \log_b x$ if and only if $x = b^y$.   Think of $y = \log_b x$ as the answer to: "To what power must *b* be raised to obtain *x*?"

a. $\left(\frac{1}{3}\right)^x = 27$	b. $5^{3x} = 25^{x-1}$	c. $4^x = 0.25$
d. $10^x = 15$	e. $e^{3x} = 24$	f. $\ln 3x = -0.5003$
g. $\log_x 64 = \frac{1}{2}$	h. $\log_3 x = 5$	i. $\log_4 256 = x$
j. $\log_7(2x+5) = \log_7(x-3)$	k. $\log_2(2x^2) = 5$	l. $\log x = 2.096910013$
m. $256e^{2x} = 1400$	n. $75 = 21(1.05)^t$	o. $10^{x^2+3x-7} = 1{,}000$

Exponential & Logarithmic Functions (continued)

Write the logs in condensed form.	**Write the logs in expanded form.**
a. $2\log x - x\log y$	b. $\log x^2 y^3 z^4$
c. $\log x + 2\log y$	d. $\log\left(x^2+1\right)z$
e. $\log x + \frac{1}{2}\log y - 2\log z$	f. $\log \frac{x^2}{z^6}$
g. $\log x + \log y + \log z - 2\log w$	h. $\log x^2 y$

Exponential & Logarithmic Functions (continued)

Use the equation given and the properties of logs to solve the problems below:	
(1) $A = P\left(1+\frac{r}{n}\right)^{nt}$ (2) $A = Pe^{rt}$	where: • *P* = original amount deposited or the initial investment • *r* = the interest rate expressed as a decimal (5% → 0.05) • *n* = the number of times a year the interest is paid ("quarterly" → means n = 4) • *t* = the number of years the investment spans

a. Find the value of a $1,000 investment at 6% interest after 10 years compounded:

(a) annually

(b) quarterly

(c) monthly

(d) continuously

b. If you invest $30,000 at 4.76% interest paid quarterly, how long would it take you to double your money? Round your answer to the nearest hundredth.

c. Suppose $2,000 is invested in a 3-year certificate of deposit (CD) that earns 6% interest, compounded continuously. How much will the investment be worth after 3 years?

d. You invest $200 at 12.25% earning continuous interest. How many years does it take for your money to increase 5 times its original value? Round your answer to the nearest tenth.