

Name: \_\_\_\_\_

Date: \_\_\_\_\_

Algebra II, Period \_\_\_\_

Math Department

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## 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% of your course grade.
  - Reviewing for the exam is **YOUR** responsibility.
  - If you have questions as you prepare, make arrangements to see your teacher.
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### 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:**  $a^3 + b^3 = (a + b)(a^2 - ab + b^2)$

**Difference of Two Cubes:**  $a^3 - b^3 = (a - b)(a^2 + ab + b^2)$

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:**  $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

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.  $\frac{4}{x^0 + 7}$

c.  $3x^3(2x)^2$

d.  $\frac{8a^4b^6}{2(a^5b)^2}$

e.  $4(x^{-3}y^4)(-3xy^2)^2$

f.  $\frac{20(a^{-4}b^{-2})}{8(a^{-2}b^4)^{-2}}$

**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.  $\frac{x^2 + 4x - 12}{x^2(x^2 + 9x + 18)} \cdot 6x^2$

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

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

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

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

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

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

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

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

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

## Simplifying Rational Expressions (continued)

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

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

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

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

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

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

#### IV. Solving Rational Equations

**Solve each rational equation.**

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

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

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

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

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

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

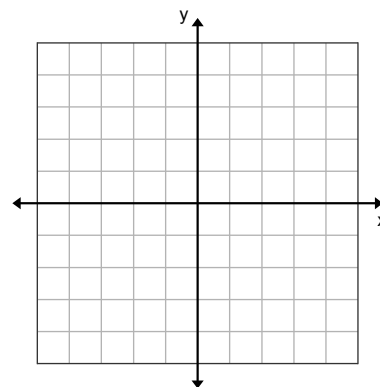
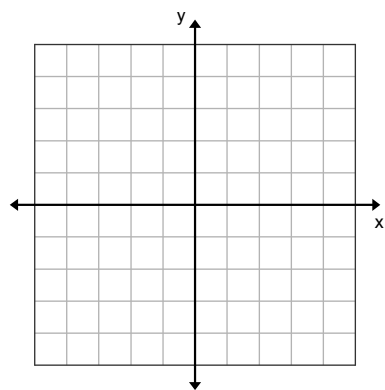
c.  $f(x) = 5 - \frac{5}{2}x$

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. $\log(x^2 + 1)z$
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%  $\rightarrow$  0.05)
- $n$  = the number of times a year the interest is paid ("quarterly"  $\rightarrow$  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.