

KEY

### Essential Skills: ALG 2 Cumulative Review #1: 2011 Fall Final

1. Use the parent graph  $f(x) = x^2$  to complete each of the following for  $g(x) = -3(x+4)^2 + 11$ .  
 $a(x-h)^2+k$

- a) What are the coordinates of the vertex?  $(-4, 11)$
- b) Is  $g(x)$  a reflection of  $f(x)$  over the x-axis, the y-axis, or neither?  $x$ -axis
- c) What is the domain written in interval notation?  $(-\infty, +\infty)$
- d) What is the range written in inequality notation?  ~~$y \leq 11$~~   $y \leq 11$
- e) What is the range written in interval notation?  $(-\infty, 11]$
- f) Write  $g(x)$  in standard form.  $-3x^2 - 24x - 37$
- g) What is the degree of  $g(x)$ ?  $2$
- h) What is the leading coefficient of  $g(x)$ ?  $-3$
- i) What translation right or left does  $g(x)$  have in comparison to  $f(x)$ ?  $4$  to LEFT
- j) What translation up or down does  $g(x)$  have in comparison to  $f(x)$ ?  $11$  UP
- k) What is the y-intercept?  $-37$
- l) What is the constant in h) above?  $11$
- m) Find the y-coordinates for the point where  $x = 1$ .  $-64$
- n) What is the name of the parent function? QUADRATIC
- o) Does  $g(x)$  open up or down and how can you tell? down - looked at graph - LEADING COEFF NEG
- p) Create a new function, call it  $h(x)$ , by moving  $g(x)$  up 9 units and 5 units to the left.  $-3(x+9)^2 + 20$
- q) Does  $g(x)$  have a maximum or a minimum and what is it's value? MAX = 11
- r) Approximate the x intercepts of  $g(x)$  to the tenths place.  $-5.9$  and  $-2.1$
- s) What is the equation of the axis (line) of symmetry?  $x = -4$

2. Identify all of the roots of each equation: Use any method.

$2x^3 - 42x + 40 = 0$                        $3x^3 - 18x^2 - 9x + 132 = 0$   
 $x = -5, 1, 4$                                $x = 4, 1 \pm 2\sqrt{3}$

3. Create a polynomial function that has zeros of  $-4, 5,$  and  $3i$ .

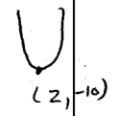
$(x+4)(x-5)(x-3i)(x+3i) = x^4 - x^3 - 11x^2 - 9x - 80$

4. Solve the equation. Simplify the answers.  $4x^2 - 5 = 3$

$x = \pm \sqrt{2}$

5. Rewrite the equation in vertex form.  $x^2 - 4x - 6 = 0$

$f(x) = (x-2)^2 + (-10)$   
 or  $(x-2)^2 - 10$



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6. Perform the indicated operation and write your answer in standard form.

a.  $(-14x+17+9x^2)+(3x-45)$

$9x^2 - 11x - 28$

b.  $(7x^3+10x+5)-(x^3-4x+5)$

$6x^3 + 14x$

c.  $4y(3x^2+6xy)$

$12x^2y + 24xy^2$

d.  $(x-3)(2x^2+4x-5)$

$2x^3 - 2x^2 - 17x + 15$

e.  $(8x^3+12x^2-6x+15) \div (2x+2)$

$4x^2 + 2x - 5 + \frac{25}{2x+2}$

7. Let  $f(x) = 3x^3 - x + 4$ . Complete each of the following. You must show all work to receive credit.

a. Use synthetic division to divide  $f(x)$  by  $x - 4$ .

$$\begin{array}{r|rrrr} 4 & 3 & 0 & -1 & 4 \\ & & 12 & 48 & 188 \\ \hline & 3 & 12 & 47 & 192 \end{array}$$

b. Using your answer from above determine if  $x - 4$  is a factor of  $f(x)$ . You must explain your answer to receive credit.

NOT A FACTOR remainder  $\neq 0$

c. Use synthetic substitution, not direct substitution, to find  $f(-1)$ .

$$\begin{array}{r|rrrr} -1 & 3 & 0 & -1 & 4 \\ & & -3 & 3 & -2 \\ \hline & 3 & -3 & 2 & 2 \end{array}$$
  
 $f(-1) = 2$

8. Factor each of the following. Write "prime" if the problem will not factor at all. You must show all work to receive credit.

a.  $3x^2 - 15$

$3(x^2 - 5)$

b.  $4x^2 - 3x - 10$

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

c.  $8x^3 - 27$

$(2x-3)(4x^2+6x+9)$

d.  $9x^2 - 100$

$(3x-10)(3x+10)$

e.  $4xy - 16x^2y + 8x^2y^5$

$4xy(1 - 4x + 2xy^4)$

f.  $x^2 - 19x + 34$

$(x-17)(x-2)$

g.  $25x^2 + 4$

prime

h.  $3x^3 - 12x - x^2 + 4$

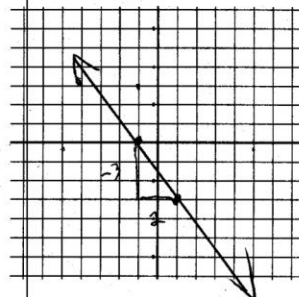
$(x-2)(x+2)(3x-1)$

9. Student Council took a survey. Of the students polled, 15% said they wanted to work the concession stand at games. 45 students were polled for the survey. How many students said they wanted to work at the games?

$0.15 \times 45 = 6.75 \Rightarrow 7$

10. Solve.  $\frac{28}{36} = \frac{g}{81}$  63

11. Graph the line that goes through the point (1,-3) and has a slope of  $-\frac{3}{2}$ .



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12. Let  $g(x)$  be the transformation of right 2 and down 4 of  $f(x) = x^2$ . Write the rule for  $g(x)$ .

A.  $g(x) = (x-2)^2 - 4$

B.  $g(x) = (x+2)^2 - 4$

C.  $g(x) = (x-4)^2 - 2$

D.  $g(x) = (x+4)^2 - 2$

E.  $g(x) = -2x^2 - 4$

13. Reflect the graph of  $f(x) = |2x-1|+3$  across the x-axis.

A.  $g(x) = |2(-x)-1|+3$

B.  $g(x) = -|2x-1|+3$

C.  $g(x) = -|2x-1|-3$

D.  $g(x) = |-2x+1|+3$

E.  $g(x) = -|2x+1|-3$

14. Describe the parent function and its transformation:  $f(x) = \sqrt{x-4} + 8$

A. square root function, shift left 4, down 8

B. square root function, shift right 4, down 8

C. square root function, shift right 4, up 8

D. rational function, shift right 4, up 8

E. rational function, shift left 4, up 8

15. Describe the parent function and its transformation:  $f(x) = 2^{x+1} - 5$

A. exponential function, shift left 1, down 5

B. square root function, shift right 1, down 5

C. quadratic function, shift right 1, up 5

D. exponential function, shift right 1, up 5

E. exponential function, shift left 1, up 5