

## Algebra 2 Final Exam Review Sheet #3: Graphing Functions

### Part 1: Graphing Functions with a, h, and k.

For the most of the following problems, you need to identify h and k. (There are also problems where you need to identify slope, etc.) Here are steps to help you!

#### Lines: $y = mx + b$

- 1) Plot y-intercept (b)
- 2) Use slope (m) to graph other points (including zero)

#### Quadratic Functions

##### Vertex Form: $f(x) = a(x - h)^2 + k$

- 1) Plot vertex (h, k)
- 2) Find and plot zero(s)
- 3) Find and plot y-intercept

##### Square Root Functions: $f(x) = a\sqrt{x - h} + k$

- 1) Plot starting point (h, k)
- 2) Find and plot zero
- 3) Find and plot y-intercept

##### Cube Root Functions: $f(x) = a\sqrt[3]{x - h} + k$

- 1) Plot inflection point (h, k)
- 2) Find and plot zero
- 3) Find and plot y-intercept

##### Absolute Value Functions: $f(x) = a|x - h| + k$

- 1) Plot vertex (h, k)
- 2) Plot other points using slope. The slope of the right side of the V is a. The slope if the left side of the V is the opposite of a.
- 3) Find and plot any zeros.
- 4) Find and plot y-intercept

##### Exponential Function: $f(x) = a \cdot b^x + k$

- 1) Draw horizontal asymptote ( $y = k$ )
- 2) Decide if graph is above of below asymptote ( $a > 0$  above,  $a < 0$  below asymptote)
- 3) Graph y-intercept
- 4) Either plot other points or figure out end behavior to determine which end approaches the asymptote and which end either approaches positive infinity or negative infinity.

## Part II: Graphing with Transformations

Sketch a rough graph of each of these functions below. Use some combination of the following to help:

- Shape of parent function.
- Transformation: stretch, flip, shift up/down or left/right.
- Domain
- $a$ ,  $h$ , and  $k$
- Plotting a few points (the  $y$ -intercept is usually a good one)

Graph paper is attached at the end of this packet. You may detach it if you like.

a.  $f(x) = -\frac{1}{2}x + 4$

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

c.  $f(x) = \frac{1}{2} \cdot 2^x + 4$

d.  $f(x) = -2|x - 4|$

e.  $f(x) = \sqrt{x + 4} + 2$

f.  $f(x) = \sqrt[3]{x - 8} - 3$

g.  $f(x) = -(x + 5)^2 + 3$

h.  $f(x) = \frac{2}{x - 3} - 1$

i.  $f(x) = -1 \cdot 3^x + 6$

j.  $f(x) = \frac{-2}{x} + 3$

k.  $f(x) = 2(x - 3)^3 + 4$

l.  $f(x) = \frac{1}{2}|x| + 2$

## Part III: Graphing Polynomial Functions

Sketch these by finding the  $x$ -intercepts and end behavior. Watch for double- and triple-roots!

a.  $f(x) = (x - 3)(x + 4)(x + 1)$

b.  $f(x) = -3(x + 1)(x - 5)^2$

c.  $f(x) = x(x + 3)^2(2x - 5)$

d.  $f(x) = -2(x + 1)^3(x - 4)$

e.  $f(x) = x^4 - 9x^2$

f.  $f(x) = -2x^3 + 8x^2 + 8x - 32$

## Part IV: Graphing Parabolas in Standard Form

**Standard Form:**  $f(x) = ax^2 + bx + c$

1) Plot vertex  $(\frac{-b}{2a}, f(\frac{-b}{2a}))$

2) Find and plot zero(s)

3) Find and plot  $y$ -intercept

a.  $y = -x^2 + 6x + 3$

b.  $f(x) = 2x^2 + 8x + 11$

c.  $h(t) = -16t^2 + 32t + 5$

d.  $f(x) = -x^2 - 4x + 12$

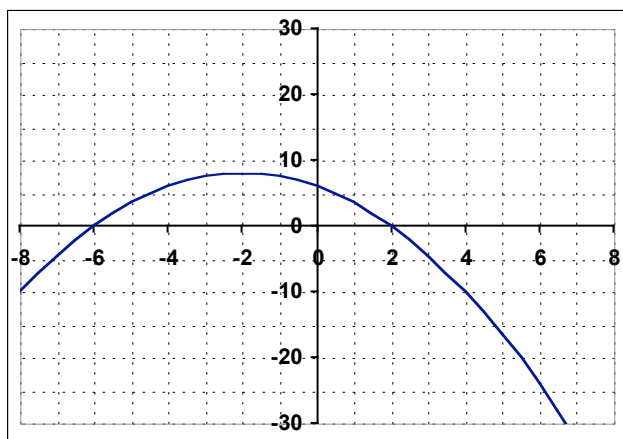
## Part V: Writing Equations of Graphs

Write the equation of the following

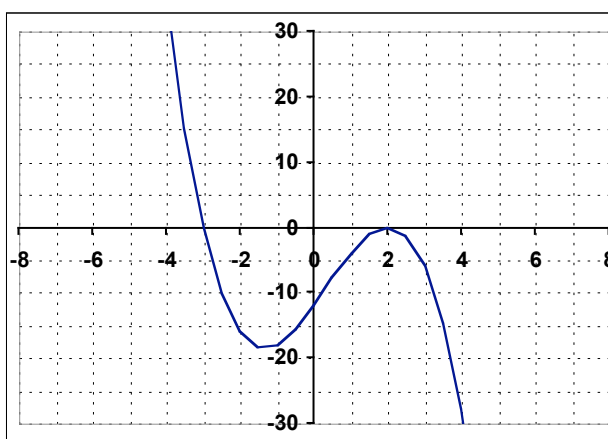
- Line going through (4,5) and (-2, 8).
- Line perpendicular to  $2x - 3y = 11$  with a  $y$ -intercept of 8.
- Line parallel to  $y = -2x + 6$  with an  $x$ -intercept of 9.
- Horizontal and vertical lines through (4,-2).
- Parabola with a vertex of (2,-4) going through the point (4,8).

Assume that all of the following graphs cross the  $x$ -axis right on the grid lines. The coordinates of one additional point are given.

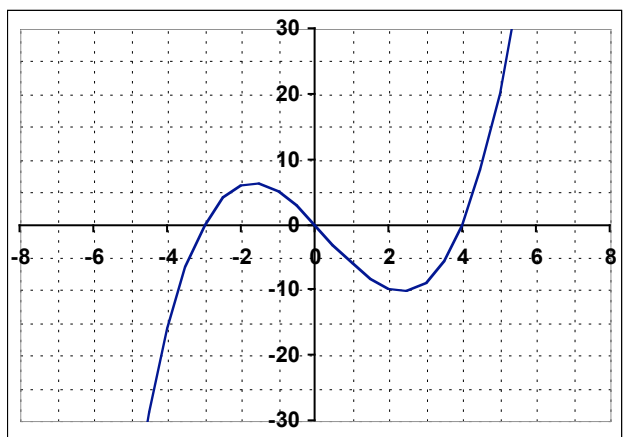
f. Goes through (4,-10)



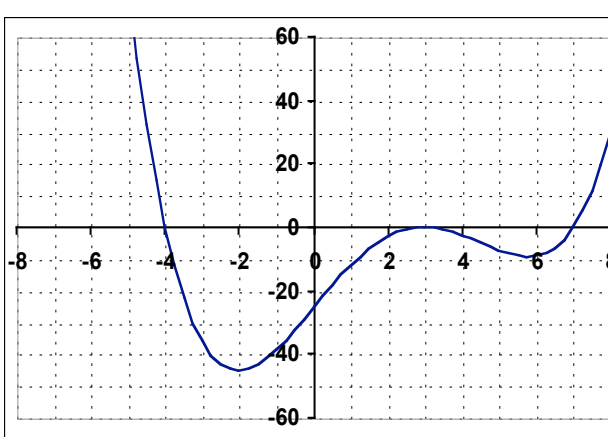
g. Goes through (1,-4)



h. Goes through (2,-10)



i. Goes through (2,-3)



Answers:

Parts I-III: check all of your answers on your calculators.

Part IV: a. vertex (3,12)

b. vertex (-2,3)

c. vertex (1,21)

d. (-2,16)

Part V: a.  $y = -0.5x + 7$

b.  $y = -1.5x + 8$

c.  $y = -2x + 18$

d. horiz:  $y = -2$ ; vert  $x = 4$

e.  $y = 3(x - 2)^2 - 4$

f.  $y = -0.5(x + 6)(x - 2)$

g.  $f(x) = -(x + 3)(x - 2)^2$

h.  $y = 0.5x(x + 3)(x - 4)$

i.  $y = 0.1(x + 4)(x - 3)^2(x - 7)$

