Name: _____

Date: _____

Algebra review worksheet: Chapter 1.
Do yourself a huge favor and **Show All Work:** step-by-step, the More the Better!

Official Cheat Sheet:

Chapter 1 Summary and Review

Important Properties and Formulas

The Distance Formula
$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

The Midpoint Formula
$$\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$$

Equation of a Circle
$$(x - h)^2 + (y - k)^2 = r^2$$

Terminology about Lines

Slope: $\quad m = \dfrac{y_2 - y_1}{x_2 - x_1}$

The Slope–Intercept Equation:
$$y = mx + b$$
The Point–Slope Equation:
$$y - y_1 = m(x - x_1)$$
Horizontal Line: $\quad y = b$
Vertical Line: $\quad x = a$
Parallel Lines: $\quad m_1 = m_2, \ b_1 \neq b_2$
Perpendicular Lines:
$$m_1 m_2 = -1, \text{ or}$$
$$x = a, y = b$$

The Algebra of Functions

The Sum of Two Functions:
$$(f + g)(x) = f(x) + g(x)$$
The Difference of Two Functions:
$$(f - g)(x) = f(x) - g(x)$$

The Product of Two Functions:
$$(fg)(x) = f(x) \cdot g(x)$$
The Quotient of Two Functions:
$$(f/g)(x) = f(x)/g(x), \ g(x) \neq 0$$
The Composition of Two Functions:
$$(f \circ g)(x) = f(g(x))$$

Tests for Symmetry

x-axis: If replacing y with $-y$ produces an equivalent equation, then the graph is symmetric with respect to the x-axis.

y-axis: If replacing x with $-x$ produces an equivalent equation, then the graph is symmetric with respect to the y-axis.

Origin: If replacing x with $-x$ and y with $-y$ produces an equivalent equation, then the graph is symmetric with respect to the origin.

Even Function: $\quad f(-x) = f(x)$
Odd Function: $\quad f(-x) = -f(x)$

Transformations

Vertical Translation: $\quad y = f(x) \pm b$
Horizontal Translation: $\quad y = f(x \mp d)$
Reflection across the x-axis: $\quad y = -f(x)$
Reflection across the y-axis: $\quad y = f(-x)$
Vertical Stretching or Shrinking:
$$y = af(x)$$
Horizontal Stretching or Shrinking:
$$y = f(cx)$$

Part One: Domain and Ranges of Functions

Problem 1:
$$f(x)=\frac{6973}{x+2}$$

domain:

range:

Problem 2:
$$f(x)=x^4+x^2+17$$

domain:

range:

Problem 3:
$$f(x)=\frac{x}{x^2+5x+6}$$

domain:

range:

Problem 4:
$$f(x)=\sqrt{(25-x^2)}$$

domain:

range:

Part Two: Finding Linear Functions from Points on a Graph

<u>Problem 5:</u>
Find the slope-intercept form (i.e. "y=mx+b") of the line passing through the points (4,-10) , (-8,12)

<u>Problem 6:</u>
Find the slope-intercept form of a line having slope=4 passing though the point (4,-10)

<u>Problem 7:</u>
Find the slope-intercept form of the line perpendicular to the line of Problem 6, passing though the point (-8,12)

Part Three: Distances, Mid-Points, and Circles

<u>Problem 8:</u>
Find the distance between the points (5,8) and (-1,5)

<u>Problem 9:</u>
Find the mid-point between the points (-2,6) and (-4,3)

<u>Problem 10:</u>
Find the equation of a circle with center (-1,2) and radius $\sqrt{7}$

<u>Problem 11:</u>
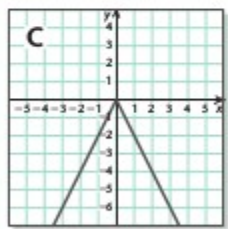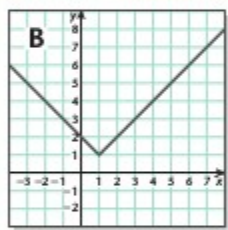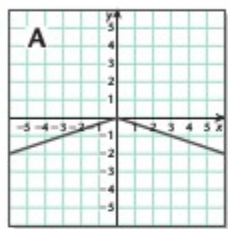Find the center and radius of a circle with the equation $(x+4)^2+(y-3)^2=36$
Graph it.
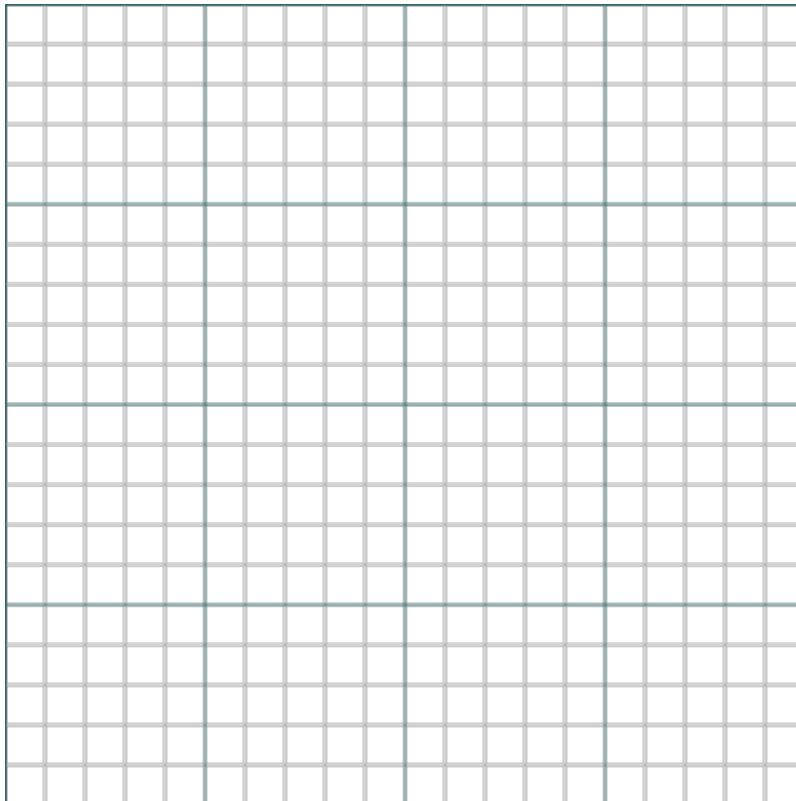
Part Four: Transforming Functions
Problem 12:
Correctly identify the graphs for just the sub-problems {2,5,6}
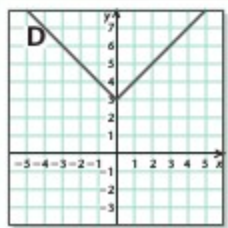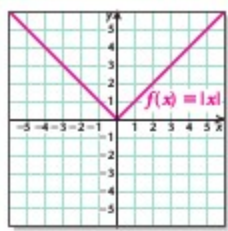
Visualizing the Graph
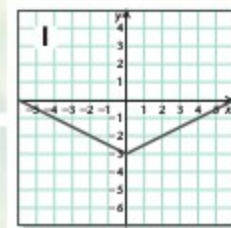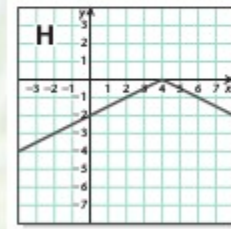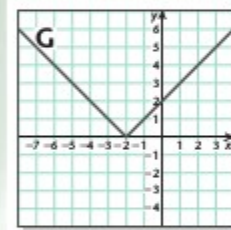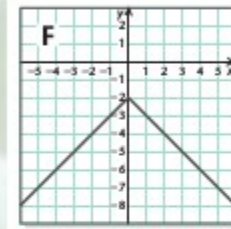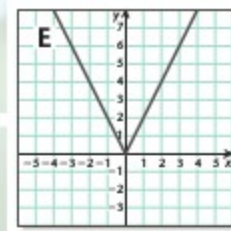
Match the function with its graph. Use transformation graphing techniques to obtain the graph of g from the basic function $f(x) = |x|$ shown at top left.

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

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

3. $g(x) = -\left|\frac{1}{3}x\right|$

4. $g(x) = |2x|$

5. $g(x) = |x + 2|$

6. $g(x) = |x| + 3$

7. $g(x) = -\frac{1}{2}|x - 4|$

8. $g(x) = \frac{1}{2}|x| - 3$

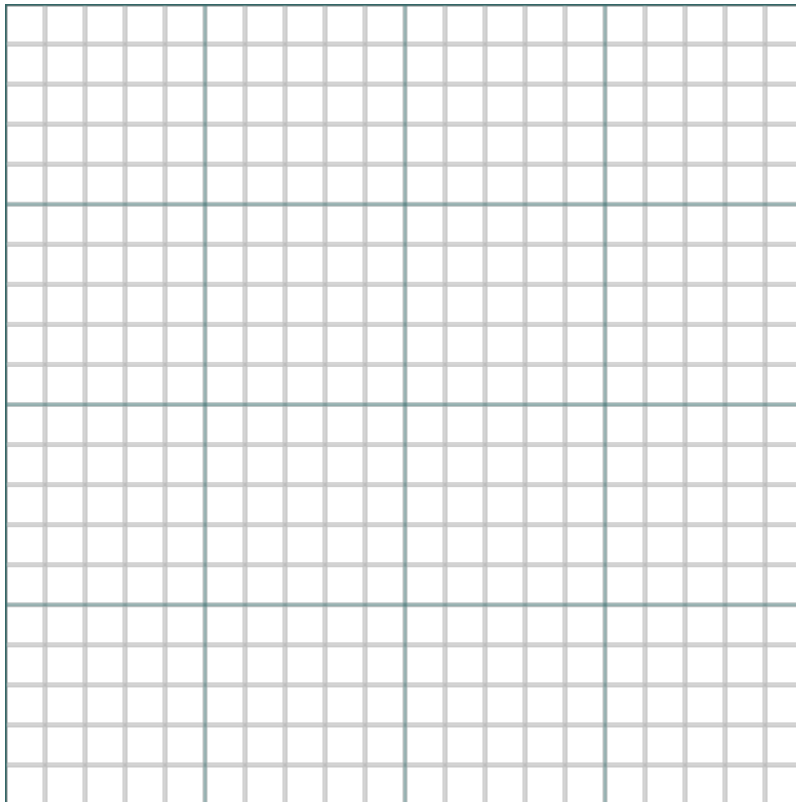9. $g(x) = -|x| - 2$

Answers on page A-10

Part Five: Graphing a function

Problem 13:
Graph the following function; exercise particular care at the boundaries between regions

$$f(x)=\begin{cases} 3 & for \ -4\leqslant x<2 \\ 6 & for \ 3<x<6 \end{cases}$$

Part Six: Composite Functions and transformations

Problem 14:

For $f(x)=\sqrt{x-3}$ and $g(x)=2x$, express the following:

a) $f(g(x))$

b) $g(f(x))$

c) $f(x)+g(x)$

d) $\dfrac{f(x)}{g(x)}$

Problem 15:

What is the domain of: $\dfrac{f(g(x))}{g(x)}$