Math 1 – Unit 1 Review Function Families   Name _____

My child studied for the Unit 1 Test. I am aware that tests are worth 40% of my child's grade.

Parent Signature _____

MM1A1 a. Represent functions using function notation.   (YELLOW)

Looking at the table, answer questions 1 and 2.

Age of Julia	1	2	3	4	5	6	7	8	9
Height in inches	30	33	38	40	44	50	55	58	60

1) What is Julia's height at age 5? _____ Express this in function notation. _____

2) When Julia is 38 inches tall, how old is she? _____ Express this in function notation. _____

3) **Bananas cost \$.75 per pound at the local grocery store.**
Write a function in <u>function notation</u> that models the cost of x pounds of bananas. _____

Find the cost for 5.3 pounds of bananas. _____

4) **It costs \$10 to join a movie rental club. After you join, it costs \$3.00 to rent a DVD.**
Write a function in <u>function notation</u> that models the cost to join and rent x number of movies. _____

Find the total cost for joining and renting 5 movies. _____

5) Decide whether or not the function is written in function notation. Explain how you know. If it is not in function notation, rewrite it in function notation.

a) $g(x) = x^3 + 1$ _____

b) $f(y) = x - 4$ _____

c) $d(t) = t^2$ _____

d) $y = 5|x| -7$ _____

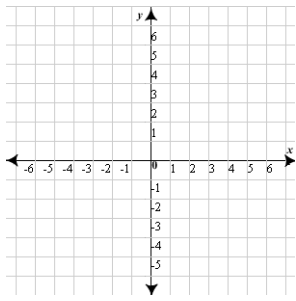6) Given the functions below, find f(-3), f(0), and f(5)

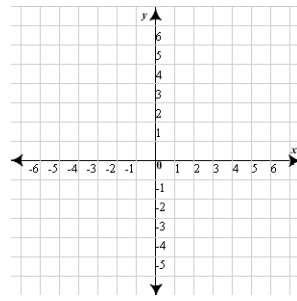a) $f(x) = 3x + 7$ b) $f(x) = 2x^2$ c) $f(x) = 8 - x$

MM1A1 b. Graph the basic functions $f(x) = x^n$, where $n = 1$ to 3, $f(x) = x$, $f(x) = |x|$, and $f(x) = 1/x$. (HOT PINK)

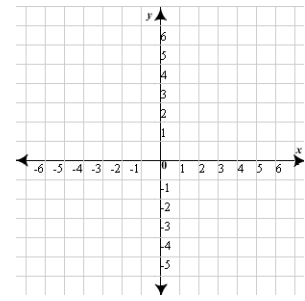**Write the equation for each parent function. Then draw the graph of the function.**
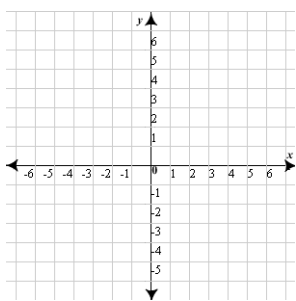
7) Linear: _____
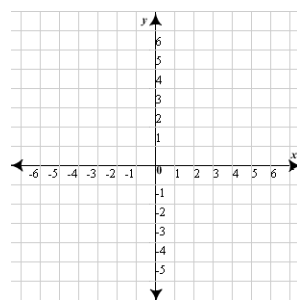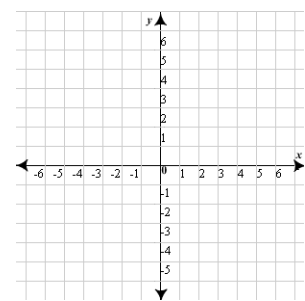
8) Absolute Value: _____

9) Quadratic: _____

10) Cubic: _____

11) Square Root: _____

12) Rational: _____

Read the following statements. Write the name of the function that is being described.

13) This function is undefined at 0. _____

14) This function is in the shape of a "V". _____

15) This function always has a constant rate of change. _____

16) This function is curvy like a snake or an "S". _____

17) This function is in the shape of a parabola. _____

18) This function has a range from 0 whenever its graph starts on the y-axis. _____

MM1A1 c. Graph transformations of basic functions including vertical shifts, stretches, and shrinks, as well as reflections across the *x*- and *y*-axes. (GREEN)

19) For the parent function $f(x) = \sqrt{x}$, how would the function be expressed in <u>function notation</u> if the graph made a vertical shift of 8? _____

20) Create the equation of a cubic function that has a shrink of ½ and has been shifted down two units. _____

21) Write the equation in <u>function notation</u> of a parabola that is reflected and stretched by 2. _____

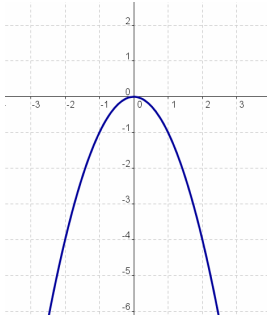22) Describe the transformations of each of these absolute value functions compared to its parent function.

a) $y = |x| - 3$ _____

b) $y = -|x| + 3$ _____

c) $y = -3|x|$ _____
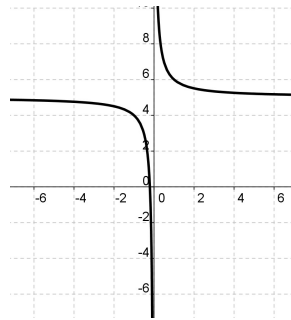
d) $y = 1/3|x|$ _____

For each transformation of the parent function shown below, identify the parent function and describe the transformation. Then come up with the equation for the new function.
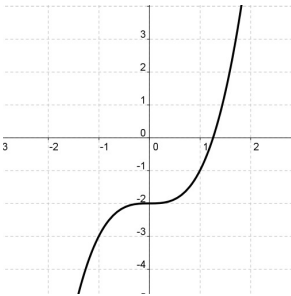
23) Parent Function:_____

Transformation: _____

New equation: _____
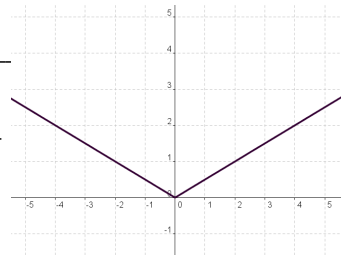
24) Parent Function: _____

Transformation: _____

New equation: _____
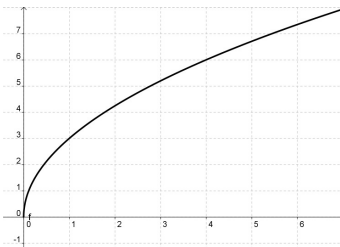
25) Parent Function:_____

Transformation: _____

New equation: _____
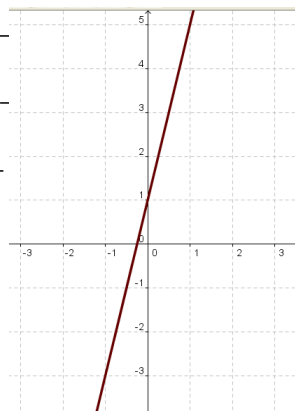
26) Parent Function: _____

Transformation:_____

New equation: _____

27) Parent Function:_____
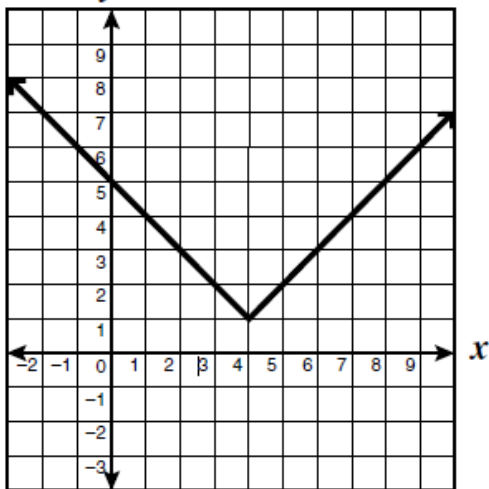
Transformation: _____

New equation: _____

28) Parent Function: _____

Transformation:_____

New equation: _____

MM1A1 d. Investigate and explain the characteristics of a function: domain, range, zeros, intercepts, intervals of increase and decrease, maximum and minimum values, and end behavior. (BLUE)

29) Describe the following characteristics of the given graph.

Domain: _____

Range: _____

X-intercepts/Zeros: _____

Y-intercepts: _____

Interval of increase: _____

Interval of decrease: _____

Maximum: _____ and/or Minimum: _____

End Behavior: _____

30) Describe the following characteristics of the given graph.
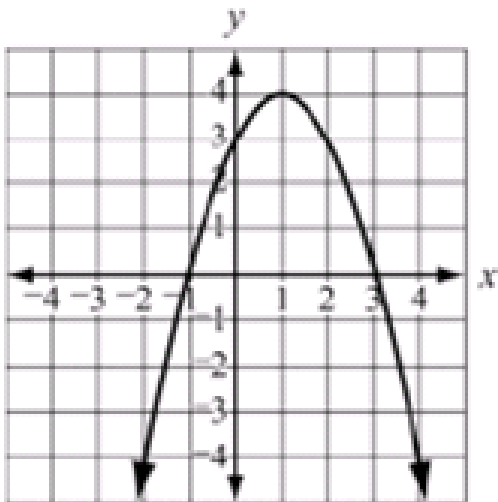
Domain: _____

Range: _____

X-intercepts/Zeros: _____

Y-intercepts: _____

Interval of increase: _____

Interval of decrease: _____

Maximum: _____ and/or Minimum: _____

End Behavior: _____

MM1A1 e. Relate to a given context the characteristics of a function, and use graphs and tables to investigate its behavior. (RED)

Tell whether or not the relation is a function. Explain. Then circle the domain and box the range.
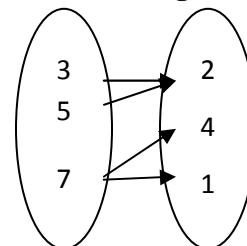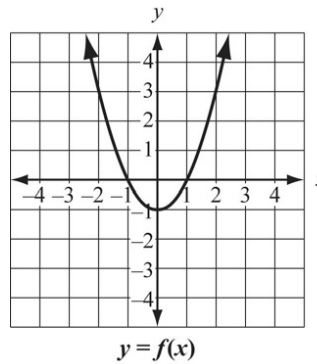
31)

Input	Output
1	3
2	3
7	2
8	2

_____

32)

Input	Output
12	13
13	14
13	15
15	16

_____

33)

_____

34) Create a table that matches the graph.

| x	-2	1	0	1	2
y					

$y = f(x)$

35) **Draw a graph to represent the situation:** A car driving 20mph speeds up to 30mphs in 5 seconds. It stays that speed for the next 5 seconds. Then it slows to a stop in the next 5 seconds.

36) Does it make sense to connect the dots above? Why or why not? Be sure to include an explanation of discrete or continuous data in your answer.

_____

37) **MULTIPLE CHOICE PRACTICE:** Which of the following describes the graphs on the right?

A) Tom rode his bike east from his home up a steep hill. After a while the slope eased off. At the top he raced down the other side.

B) Tom took his dog for a walk. He set off slowly and then increased his pace. At the park, Tom turned around and walked slowly back home.

C) Tom went for a jog. At the end of his road, he bumped into a friend and his pace slowed. When Tom left his friend, he walked quickly back home.
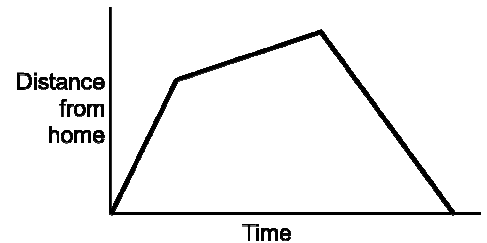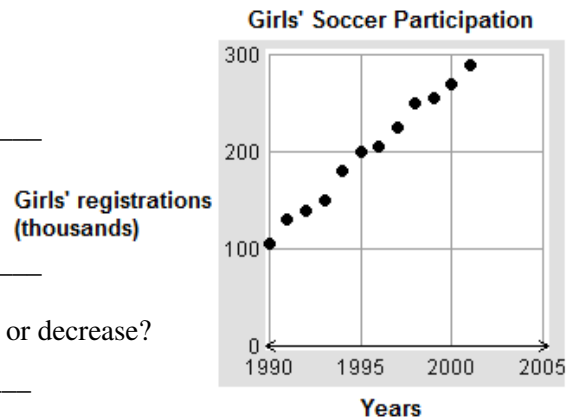

Use the graph on the right to answer questions 38-40.

38) Which part of the data is the independent variable? Explain.

_____

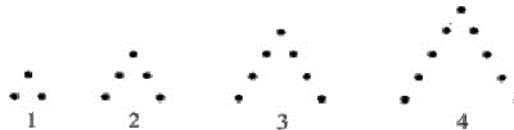39) Which part of the data is the dependent variable? Explain.

_____

40) As the years increase, do the number of girl soccer players increase or decrease?

Explain. _____

Girls' Soccer Participation

MM1A1 f. Recognize sequences as functions with domains that are whole numbers. (PURPLE)

41) **Refer to the following pattern of dot-figures:**

Write the rule for the nth term of this sequence _____

If this pattern of dot-figures is continued, how many dots will be in the 100th figure? _____

42) Write the first 6 terms of the sequence $a_n = 3n - 5$. _____ , _____ , _____ , _____ , _____ , _____
Show your work here:

Is the sequence above arithmetic or geometric? Explain. _____

List the domain: _____   List the range: _____

43) What is an explicit formula for the sequence -6, -4, -2, 0, …?
   $a_n =$ $a_{15} =$

44) Consider the sequence 3, 9, 19, 33, 51, …
Is this a finite or infinite sequence? _____

What is a_1? _____   What is a_3? _____

MULTIPLE CHOICE PRACTICE: Which expression can be used to determine the nth term in the sequence from above?

A) $6n - 3$ B) $2n^2 + 1$ C) $4n - 1$ D) $n^2 + 2$

MM1A1 g. Explore rates of change, comparing constant rates of change(slope)versus variable rates of change. Compare rates of change of linear, quadratic, square root, and other function families. (ORANGE)

45) Write the formula for rate of change:

46) Find the slope of the line with points (2, -4) and (-3, 7).

This table shows the total number of paper airplanes Gina made after school over time. Use it to answer #47 and #48.

Gina's Paper Airplanes

Time (in minutes)	0	5	10	15	20	25	30
Total Number of Paper Airplanes	0	5	10	15	23	31	39

47) What is Gina's average rate of making paper airplanes during the first 15 minutes she made them? _____

48) What is Gina's average rate of making paper airplanes during the last 15 minutes she made them? _____

The table below gives the number of lawn mowers , l , sold in a hardware store between 1985 and 1990.

Year, t	1985	1986	1987	1988	1989	1990
Lawn mowers, l	40	56	72	88	104	120

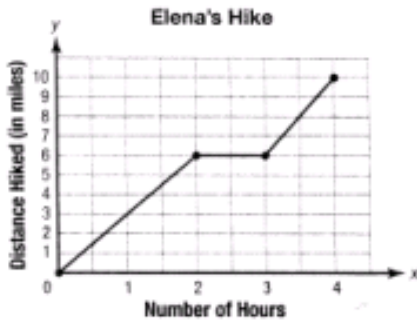49) Determine which model best fits the data. _____

50) Find the rate of change from 1987 to 1989. _____

51) What is the missing value in the table on the right? _____

    Describe its rate of change. _____

p	w
-3	14
-2	11
-1	?
0	5
1	2
2	-1

52) This graph shows how far Elena hiked over the course of four hours.

Elena's Hike

Which statement is NOT true about the rates of change shown in the graph?

A. The rate of change was 3 miles per hour between 0 and 2.

B. The rate of change was 0 miles per hour between hours 2 and 3.

C. The rate of change was 4 miles per hour between hours 3 and 4.

D. The rate of change was a constant 2.5 miles per hour between hours 0 and 4.

MM1G2 a. Use conjecture, inductive reasoning, deductive reasoning, counterexamples, and indirect proof as appropriate. (LIME GREEN)

53) **MULTIPLE CHOICE PRACTICE:** Use the graph to the right to make a conjecture that could be true. Choose the best answer below.

Girls' Soccer Participation

a) The number of girls playing soccer will exceed the number of boys playing soccer.

b) In 2003, more than 300,000 girls will play soccer.

c) In 2003, girls will no longer be playing soccer.

d) In 2003, less than 300,000 girls will play soccer
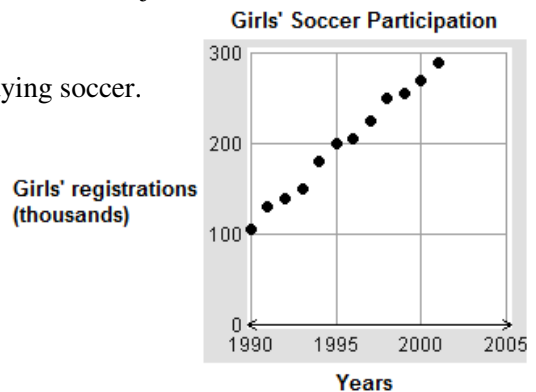
For problems 54 and 55, tell whether the statement is true or false. If false, give a counterexample.

54) If x = -6, then $x^2 = 36$. _____

55) If $x^2 = 16$, then x= 4. _____

56) **MULTIPLE CHOICE PRACTICE:** In math class, you notice that every number can be written as a prime factorization. Which factorization of 24 supports this conjecture?

A) 8 x 3   B) 12 x 2   C) 2 x 2 x 2 x 3   D) 4 x 3 x 2

Decide whether inductive or deductive reasoning is used. Then explain.

57) Your mom diets for 3 weeks and loses 3 pounds. She concludes that she can lose 20 pounds if she diets for 20 weeks.
_____

58) You use the rise of 8.1 and the run of 2.7 between two points on a line in the coordinate plane to conclude the slope of the line is 3. _____

59) On Kelly's math test, the first 3 multiple choice answers were "C." She concludes that the rest of the answers are also "C." _____

MM1G2 b. Understand and use the relationships among a statement and its converse, inverse, and contrapositive. (PINK)

Underline the hypothesis and circle the conclusion. Then tell whether it's true or false. If false, give a counterexample.

60) If you are a football player, then you are an athlete. _____

61) If a function has a constant rate of change, then it is linear. _____

Now, write the converse, inverse, and contrapositive for the statement in #60. Then decide whether the new statement is true or false.

62) Converse: _____
_____

True or False? _____

63) Inverse: _____
_____

True or False? _____

64) Contrapositive: _____
_____

True or False? _____