Looking at the table, answer questions 1 and 2.

<table>
<thead>
<tr>
<th>Age of Julia</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Height in</td>
<td>30</td>
<td>33</td>
<td>38</td>
<td>40</td>
<td>44</td>
<td>50</td>
<td>55</td>
<td>58</td>
<td>60</td>
</tr>
<tr>
<td>inches</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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 function notation 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 function notation 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
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 function notation if the graph made a vertical shift of 8? ________________________________

20) Create the equation of a cubic function that has a shrink of \( \frac{1}{2} \) and has been shifted down two units. ________________________________

21) Write the equation in function notation 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) \( y = \frac{1}{3}|x| \) 

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: 
29) Describe the following characteristics of the given graph.

![Graph Image]

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.

![Graph Image]

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.

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

<table>
<thead>
<tr>
<th>Input</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>7</td>
<td>2</td>
</tr>
<tr>
<td>8</td>
<td>2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Input</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>13</td>
</tr>
<tr>
<td>13</td>
<td>14</td>
</tr>
<tr>
<td>13</td>
<td>15</td>
</tr>
<tr>
<td>15</td>
<td>16</td>
</tr>
</tbody>
</table>

31) 32) 33)
34) Create a table that matches the graph.

<table>
<thead>
<tr>
<th>x</th>
<th>-2</th>
<th>1</th>
<th>0</th>
<th>1</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>y</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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.

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

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

![Pattern of Dot-Figures]

Write the rule for the \( n \)th 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 \( n \)th term in the sequence from above?

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

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.

<table>
<thead>
<tr>
<th>Gina’s Paper Airplanes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time (in minutes)</td>
</tr>
<tr>
<td>Total Number of Paper Airplanes</td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Lawn mowers, ( l )</td>
<td>40</td>
<td>56</td>
<td>72</td>
<td>88</td>
<td>104</td>
<td>120</td>
</tr>
</tbody>
</table>

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. _______________________________

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

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.

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

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) \( 8 \times 3 \)  
B) \( 12 \times 2 \)  
C) \( 2 \times 2 \times 2 \times 3 \)  
D) \( 4 \times 3 \times 2 \)
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.”

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? _________