# Algebra/Geometry Institute Summer 2003
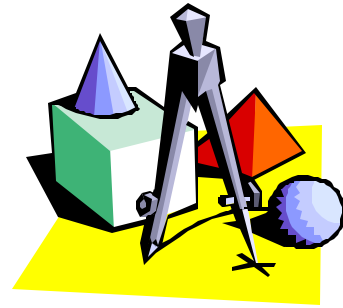
## Lesson 1

**Faculty Name: GLORIA MCCULLUM**
**School: GREENVILLE WESTON**
**City: GREENVILLE**
**Grade Level: 9 THRU 12  ALGEBRA 1**

1. Teaching objective(s) based on <u>MS Framework</u>
   - RECOGNIZE, CREATE, EXTEND, AND APPLY PATTERNS, RELATIONS, AND FUNCTIONS AND THEIR APPLICATIONS
     A. Recognize and continue a number pattern.
     B. State a rule to explain a number pattern.
     C. Complete a function based on a given rule using the input and output data given in a table.
     D. Given a real – life situation, write a real-life story formula from the data; make a table, and sketch a graph (homework).

2. Instructional Activities
   - TEACHERS INPUT, MODELING EXAMPLES, CHECKING FOR COMPREHENSION, GUIDED PRACTICE, AND INDEPENDENT ACTIVITIES.

   - STUDENTS' ACTIVITIES AND TEACHER'S STRATEGIES
     A. The students will be given a selected **<u>STUDY GUIDE</u>**, and asked to solve the problems on the **<u>GUIDE</u>**.  The teacher will discuss the pattern generalization strategy that involves development of a rule or a formula from focusing on the sequences of the pattern.  The teacher will recall how to find the differences of a sequence, by subtracting each term from the next term.  If the differences are not constant, use those differences and addition or subtraction to continue the sequence.  The teacher will model an example on the board.

       ⇒**Example**
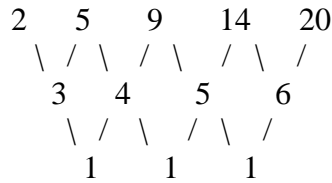       Find the next two terms in the sequence below.
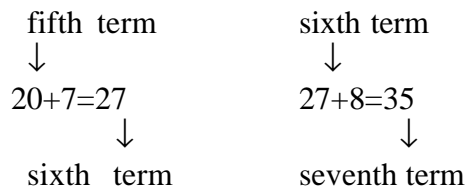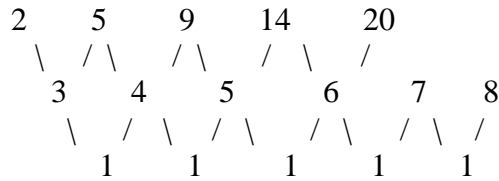       2, 5, 9, 14, 20

       ⇒**Solution**
       Find the first differences

       ```
       2     5     9     14     20
        \   / \   / \   / \   /
          3     4     5     6
       ```

Since the first differences are not constant, find the second differences.

```
2   5   9    14    20
 \ / \ / \   / \  /
  3   4   5    6
   \ / \  / \ /
    1   1    1
```

The second differences are a constant 1.  Use the constant second difference to extend the sequence of first differences.

```
2    5    9    14     20
 \  / \    / \   / \   /
  3    4    5    6    7    8
   \  / \ / \   / \  / \ /
    1    1    1    1    1
```

```
2    5    9    14    20    27    35
                      \   /  \  /
                       7      8
```

fifth  term            sixth term
  ↓                       ↓
20+7=27                27+8=35
     ↓                     ↓
sixth  term            seventh term

**B.**

| x | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|---|
| y | 15 | 17 | 19 | 21 | 23 | 25 | 27 |

 Above examples were taken from the following resource:
Algebra I Reteaching Masters.  Holt, Rineheart and Winston, 2002.  pgs. 5-6, 9-10.

The teacher and the students will work together on the activities on the **students' guide, as** guided practice, allowing the students to work on the board, or in groups, and as individuals. The teacher will explain to the students how to write a linear equation using a table. To write an equation the top numbers are independent, and the bottom numbers are dependent. Notice when x=0, y=15; that gives you the y- intercept, where the line crosses the y- axis. Write y=mx+b,  b is the y- intercept, and the differences of the independent numbers is the slope. The slope is (m).The   equation is written as : y=2x+15, because the table  is arranged so that x increases by one unit which allows you to get the slope from finding the difference of the y coordinates.

# Theme Park "Wacky World"
## Practice test: Patterns and Sequences

Study tip:  Finding a pattern
- Think about the relationship between the number of items in the sequence.

- Decide what was done to each item in the sequence to get the next item.

For problems 1 through 6, circle the correct answer.

1.  The Delta Airline is offering 2 free tickets to Wacky World to the first caller who can find the pattern in this sequence:  1, 4, 9, 16, 25…

    A.  Add an even number to the previous number
    B.  Divide the previous number by an odd number
    C.  Add an odd number to the previous number
    D.  To get the next number subtract an odd number

2.  Find out how many times the "Rusty Mountain" train broke down yesterday by finding the next number in the sequence:  -1, 1, 7, 31…

Use these diagrams to answer problems 3 and 4.
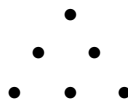
Figure 1          Figure 2              Figure 3              Figure 4

•                     •                      •                     ?
                  •   •                  •   •
                                      •   •   •

        .

Figure 5

  **?**

3.   In the "Magic Maze", you come across the figures in the diagram above.  To get out of the maze, you must find the door with the next figure on it.  How many (dots) should figure 4 have in its bottom row?

    A. 3            B.  4            C.  6            D.  8

4. You are now out of the maze! Yes! (Oh! You just stepped in melted butter!)  To get through the final door, tell us how many total dots are needed to draw figure 5.

   A. 8          B.  10          C.  12          D.  15


5. Time for a carnival game!  Find the next number in the following sequence and win a free ticket to Liberty Land:  2, 8, 20, 44, 92…

   A. 184          B.  188          C.  552          D.  140


6. The theme park has an odd way of numbering rides!  Each ride is formed by doubling the last number and adding 7.  Everyone wants to visit the Haunted House which is numbered 65, how many rides must you take from the 1$^{st}$ ride was numbered 2 to get to the Haunted House?

   _____


7. Whoops, the last four lights on the Merry Go Round just fell off.  The lights form a pattern.  Draw the next three lights in the sequence.
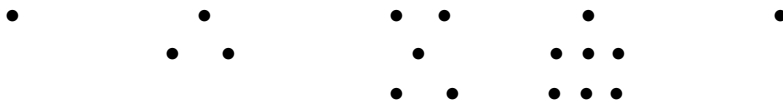
   


8. Your six friends want to ride the "Ferris Wheel" which has 48 seats.  Your friends get on. The first four seats are filled, and your six friends are in every sixth seat.  Write a sequence to show the seat numbers your six friends are in.

   _____


9. The World's Best Loser Show is shown every 3 hours.  If the first show started at 10:30

   a.  When will the third show be? _____
   b.  Will there be a show at 8:30 PM? _____


10. Are you ready for the Hall Mirror?  If you squint you will look kind of funny!
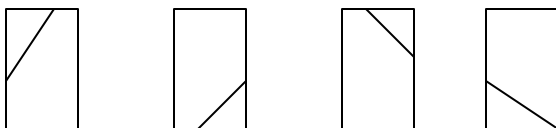
   

What will the next three mirrors look like?


## 3. Materials and Resources

pencil

paper

activities sheets

- **STUDENT STUDY GUIDE,HOLT,RINEHART, AND WINSTON,page 5,2002**


## 4    Assessment

The teacher will grade the students' activities, that are done in class, and homework

**( homework )**
**RENTAL CARS**

| HERTZ RENTALS |
|---|
| 150\WEEK |
| 1,000 FREE MILES |
| EACH  MILE 0.15,after the |
| 1000 miles |

| EZ RENTALS |
|---|
| 100\WEEK |
| EACH  MILE :0. 10 |


**5    Suppose you need to rent a car for one week.  From which of the companies should  you rent the car. (See above)**
**(a) write  an equation describing the cost of renting from each company.**
**Let x equal to the number of miles you plan to drive and y equal to total cost.**

(b )**make a table of possible values for x and the total cost (y).**
**(c) graph  the solutions to each equation use a solid line (-) for HERTZ**
    **RENTALS, and a broken line for (------) EZ RENTALS.**
**(d ) based on your graph from which company should you rent the car?**