

Algebra Lesson Plans

DAYS 1-4

Work on identifying patterns and start writing recursive formulas.

***Special Note: keep charts on board to refer to later when working on explicit formula

DAY 1 and 2 Towers and houses

Identify patterns with numbers

- A. Building a tower with blocks (Principles and Standards for School Mathematics) Pg 160
 1. Have students build a tower and record surface area
ex: If tower is one unit high the surface area is 6, 2 units high the surface area is 10.
 2. Students should record results in table
 3. Find the pattern
- B. House patterns (Navigating through Algebra in Grades 6-8) Pg 9
 1. Have students build house and record patterns (will need squares and triangles)
 2. Two squares up and one triangle on top make House 1. Four squares, 2 wide and 2 high, and two triangles make House two. Six Squares, 3 wide and 2 high, and 3 triangles makes House 3 and so on. (students can draw or make houses with shapes)
 3. Students make a chart of results and find patterns.
 4. Optional: Make a house that is 2 squares and 4 triangles and next one 2 squares and 9 triangles and so on. You can make all different types of houses for your first one.
- C. Introduce finding the Recursive Formula
 1. Find recursive formula for both patterns.
 2. Building a tower with blocks
 - a. Recursive: $\text{Next} = \text{Now} + 4$
 - b. Explicit: $\text{SA} = 4B + 2$ (Day 5)
 3. House patterns
 - a. Recursive: $\text{Next} = \text{Now} + 3$
 - b. Explicit: $B = 3n + 0$ (Day 5)
- D. Assignment: Students design a house with different shapes and fill in chart and find pattern.

DAY 3 and 4 Working with string

- String Patterns (students should get string and scissors, the best string to use is kite string)
 - Complete tables in class and patterns if time
 - Assignment: Have students find the pattern and recursive formula for all three tables.
- A. Folding string in half
 1. Make a chart
 2. Columns are labeled number of cuts and number of pieces
 3. Fold string in $\frac{1}{2}$ and make 1 cut and you have 3 pieces. When you fold string in half and make 2 cuts you have 5 pieces

4. Table should look as shown

0		1
1		3
2		5
3		7
4		9

4. Recursive formula: $\text{Next} = \text{Now} + 2$

5. Explicit formula: $P = 2n + 1$ (Day 5)

B. Making a loop (1) (around the scissors)

1. Make table

2. Columns are labeled number of loops and number of pieces

3. Doing the activity

- With zero loops lay string on scissors and cut. You should now have 2 pieces of string
- Loop string around scissors once and cut. You should have 3 pieces of string

4. Table should look like this...

0		2
1		3
2		4
3		5
4		6
5		7

5. Recursive formula: $\text{Next} = \text{Now} + 1$

6. Explicit formula: $P = n + 2$ (Day 5)

C. Making a loop (2)

1. Make table

2. Columns are labeled number of loops and number of pieces

3. Doing the activity

- Tie a not to make a circle with the string
- Lay the circle over the scissors and cut. You should have 2 pieces of string.
- For second cut make a circle again, but this time loop the double width string around scissors once and make a cut. You should have 4 pieces of string

4. Table should look like this...

0		2
1		4
2		6
3		8
4		10

5. Recursive formula: $\text{Next} = \text{Now} + 2$

6. Explicit formula: $P = 2n + 2$ (Day 5)

- Refer to tables made in the past 4 days.
- Work on writing the explicit formula.
- Students write an explicit formula for the house pattern they made on day 2.

DAY 6 Letter patterns (NCTM Addenda Series Grades K-6 Pg 42)

- Graph paper needed
- A. Example
 1. Use Graph paper on overhead
 2. Fill in squares to make a letter and call it size 1.
 3. Extend the length and width of the letter by a unit and call it size 2.
 4. The letter has to same as the same proportion.
- B. Have students pick a letter to put on graph paper.
- C. Students enlarge letter to at least size 4
 1. Make a table with size being one column and surface area of letter being another column.
 2. Find pattern
 3. Find Recursive Formula

Day 7 Letter patterns (con)

- A. Students share tables of letter on board.
- B. Assignment: Class finds patterns, recursive formulas and explicit formulas to go with tables.

Day 8 Handshakes

- A. Students shake hands and create a table.
- 1. Example of table

People	Handshakes
1	0
2	1
3	3
4	6
5	10
6	15

- 2. Find pattern
- 3. Write formulas
 - Recursive: $\text{Next} = \text{Now} + (\text{Now} - \text{Prev.}) + 1$
 - Explicit: $H = (p - 1)p/2$

Days 9 and 10 Group Project

- A. Groups of 3 to 4
- B. Discover 2 patterns and put into table
- C. Find recursive and explicit formulas for both patterns
- D. Present 1 of the patterns to the class.
 1. opportunity for class to work on finding formulas from tables
 2. Optional: Assign 5 tables as homework to find formulas

Day 11 Final Project

- A. Student will develop a pattern.
- B. Write the recursive and explicit formula for pattern
- C. Write an explanation as to how the pattern and equations are related and why this pattern was chosen

PERFORMANCE PACKAGE TASK 1
(Algebra)

Content Standard: Patterns, Functions, and Algebra

Level: Grade 8

Specific Statement(s) from the Standard:

Generate a table of values from a formula.

Recognize when a list of number forms an arithmetic or geometric progression and be able to determine subsequent terms in the progression.

Use simple formulas with more than one variable to solve real-world and math problems.

Product(s):

Discover a pattern and write explicit and recursive formulas.

Task Description:

Students will discover a pattern to put in a chart. They will then find the recursive and explicit formula for the pattern. The students will need to write a description of their pattern and verbalize why they chose that pattern and how it works.

Special Notes:

PERFORMANCE PACKAGE TASK 1
(Algebra)

FEEDBACK CHECKLIST FOR TASK 1

The purpose of the checklist is to provide feedback to the student about his/her work relative to the content standard. Have the standard available for reference.

Y=Yes

N=Needs Improvement

<u>Student</u>		<u>Teacher</u>
_____	Place a created pattern of numbers in table	_____
_____	State pattern	_____
_____	Recursive formula	_____
_____	Explicit formula	_____
_____	Written explanation on how the pattern and equations are related and why this pattern was chosen.	_____

Overall Comments (information about student progress, quality of the work, next steps for teacher and student, needed adjustments in the teaching and learning processes, and problems to be addressed):