

## ALGE-GRID: WHAT'S THE $a$ ?

Alge-Grid puzzles were created by Carole Greenes and Tanner Wolfram. The *MathLinks* team thanks the authors for permission to use the puzzles in this program.

Alge-Grid puzzles are designed to enhance algebraic reasoning talents. They appear in the Review section of every other Grade 8 Student Packet.

Puzzles are 3-by-3 grids with each of the 9 cells containing an algebraic expression with one unknown, the  $a$ .

In each puzzle a Clue pattern is presented. The Clue pattern provides information about the numbers in three of the cells. Those three cell clues are connected along a side or corner that match their position in the grid. The Clue pattern can be moved to different locations on the grid, but cannot be rotated.

In each grid the value of  $a$  is the same. The value of  $a$  can be 1 – 9. The goal for solvers is to determine the value of the  $a$  and complete the grid to include the given numbers.

**Why:** Alge-Grid puzzles develop logical, algebraic reasoning and number sense. Working on these puzzles also provides a “need to know” for evaluating algebraic expressions.

**Prepare ahead:** Try the puzzle yourself before assigning it. This will give you insight into the strategies and the challenges students may encounter. Think about questions you might ask, as well. But, don't give the answer away!

**Launch the activity:** Use Puzzles I and II to help students understand the components of the puzzle, and establish topics for discussion.

- Print (or display) one puzzle at a time.
- Give students time to work alone first.
- Encourage students to share strategies. Record solutions.
- Generalize strategies when appropriate.

**Accountability/Follow-up:**

- Ask students to create their own Alge-Grid puzzles and exchange with peers.
- For more Alge-Grid puzzles, go to “Carole’s Puzzles and Games” in the General Resources section of the of the *MathLinks* Teacher Portal. Fifty-four puzzles with three different degrees of difficulty are available.

## ALGE-GRID: What's the a? PUZZLE I

Each clue gives the value of a corresponding cell. Use clues to find  $a$ , which has the same value in all cells. Once evaluated, the cells will contain the whole numbers 1 – 9, exactly once.

The Alge-Grid

$(\sqrt{a})^2$	$(a + 1)^2 - 6$	$a \div a$
$a^3 - 2$	$5a \div 2$	$(a \div 2)^3 + 6$
$a^2 - a + 2$	$a + 6$	$a^3 + 1$

The Clues

Number of legs on a biped

Number of vowels in the English language

Number of sides on a nonagon

Solutions to Puzzle I:

ALGE-GRID: PUZZLE I

$a = 2$

2	3	1
6	5	7
4	7	9

## ALGE-GRID: What's the $a$ ? PUZZLE II

Each clue gives the value of a corresponding cell. Use clues to find  $a$ , which has the same value in all cells. Once evaluated, the cells will contain the whole numbers 1 – 9, exactly once.

The Alge-Grid

$(a + 1) \div 4$	$a + 1$	$a - 1$
$(a + 3) \div 2$	$(a + 1) \div 2$	$(a - 1) \div 2$
$(4a)^0$	$a + 2$	$2a - 7$

The Clues

Number of planets in the solar system
Even square number
Number of wheels on a unicycle

Solutions to Puzzle II:

ALGE-GRID: PUZZLE II  
 $a = 7$

2	8	6
5	4	3
1	9	7