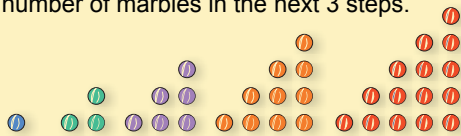


**Further investigations:****Going to the Movies!**

When taking the family to the movies, calculate the cost by creating an algebraic equation. For example: three children and two adults go to a movie. The price of a ticket for a child is \$6.25; an adult ticket is \$7.25.  $(3 \times 6.25) + (2 \times 7.25) = y$ .

**Marble Patterns**

Using marbles, create a pattern such as the one below. Make a chart to record the number of marbles in each step. Analyze the chart to find a pattern, and predict the number of marbles in the next 3 steps.

**Terminology:**

**Variable:** A symbol or letter that is used to represent a numerical value.

**Unknown:** A symbol representing an unknown quantity in algebra; frequently represented by a letter

**Algebra:** A branch of mathematics in which symbols (variables) usually letters of the alphabet are used to represent numbers, number relationships, members of a specified set, or operations. Using variables allows you to express patterns that hold for all members of a set or general relationships among two or more sets

**Pattern:** A set of numbers or objects that are generated by following a specific rule.

**Algebra****Students will:**

- Represent mathematical relationships between quantities using mathematical expressions in problem-solving situations
- Apply patterns and rules to describe relationships and solve problems
- Represent unknowns using symbols, such as  $\square$  and  $\triangle$
- Write and evaluate mathematical expressions using symbols and letters

**Fourth Grade 6 of 6****Classroom Cases:**

1. Solve the following exercises for the unknown quantities:

a.  $5 + n = 17$

**Case Closed - Evidence:** a.  $n = 12$

b.  $53 - x = 33$

b.  $x = 20$

c.  $\square + 19 = 20$

c.  $\square = 1$

d.  $4a = 32$

d.  $a = 8$

e.  $\frac{35}{b} = 7$

e.  $b = 5$

2. Find the rule used to make the table below. Fill in rows 4 - 8 using that rule, and in the last 4 rows, make up your own input and the corresponding output:

IN	OUT
4	16
2	8
6	24
	32
	4
9	
10	
	100

**Case Closed - Evidence:**

Rule: In  $x \times 4 = \text{Out}$ ; or multiply input by 4 to get output

IN	OUT
4	16
2	8
6	24
8	32
1	4
9	36
10	40
25	100
11	44
30	120
3	12
100	400

3. Solve the following word problem by writing and solving an algebraic equation. Use variables to represent the unknown numbers. Josh spent \$28 on four gifts for his friends. How much money did each gift cost if they all cost the same amount?

**Case Closed - Evidence:**

$4x = 28$

$x = 7$  Each gift cost \$7.00.

**Clues:**

Symbols are often misinterpreted by students. The letters, symbols, or pictures used to represent numbers can change from problem to problem. For example, in the two problems  $x + 4 = 10$  and  $x + 9 = 42$ , the value for the letter  $x$  is not the same. In the first problem,  $x = 6$ . In the second problem,  $x = 33$ .

Sometimes letters and/or numbers are placed side by side, as in the equation  $2a = 10$ . Here we use  $2a$  to represent  $2 \times a$ .

**Book'em:**

**Safari Park** by Stuart J. Murphy

**Two of Everything** by Lily Toy Hong

**Anno's Mysterious Multiplying Jar** and **Anno's Magic Seeds** by Mitsumasa Anno

**One Grain of Rice: a Mathematical Folktale** by Hitz Demi

**Related Files:**

[www.ceismc.gatech.edu/csi](http://www.ceismc.gatech.edu/csi)