Magic Vase

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The Task

You're planting in the garden and uncover a vase buried in the soil. After cleaning the vase, you place it on your bedside table. You notice something shiny in the vase before you go to sleep. You pull out a handful of pennies and count them up. There are 6 pennies in the vase. When you check the vase at the end of the second day, you count 12 pennies. At the end of Day 3, you count 18 pennies. How many pennies will be in the vase after 10 days? 25 days? 100 days? Can you come up with a rule to find the number of pennies in the vase on any day?

Big Ideas

- Students extend their knowledge of patterns developed in the elementary grades and through life experiences by investigating and describing functional relationships.
- Students learn to represent relations by using ordered pairs, tables, rules, and graphs. Graphing in the coordinate plane linear equations in two variables is a focus of the study of functions.

Standards of Learning for Grades 3-4-5

4.15 The student will recognize, create, and extend numerical and geometric patterns.

5.17 The student will describe the relationship found in a number pattern and express the relationship.

5.18 The student will

a) investigate and describe the concept of variable;

b) write an open sentence to represent a given mathematical relationship, using a variable;

c) model one-step linear equations in one variable, using addition and

Standards of Learning for Grades 6-7-8

6.17 The student will identify and extend geometric and arithmetic sequences.

7.2 The student will describe and represent arithmetic and geometric sequences, using variable expressions.

7.12 The student will represent relationships with tables, graphs, rules, and words.

7.13 The student will

a) write verbal expressions as algebraic expressions and sentences as equations and vice versa; and

b) evaluate algebraic expressions for given replacement values of the variables.

7.14 The student will

a) solve one- and two-step linear equations in one variable; and

subtraction; and d) create a problem situation based on a given open sentence, using a single variable.	b) solve practical problems requiring the solution of one- and two-step linear equations. 8.16 The student will graph a linear equation in two variables. 8.17 The student will identify the domain, range, independent variable, or dependent variable in a given situation.

Process Goals

- Connections and Representations – Students will recognize and use mathematical connections to extend or generalize patterns. Students will use a variety of representations – graphical, numerical, algebraic, verbal, and physical - to record their findings and solve the problem.
- Communication – Students will justify their findings and present their results using precise mathematical language.

Related Task – Magic Bag

You're cleaning out your closet and find a velvet bag in the corner. When you pick up the bag it feels heavy, and you find 24 pennies inside it. Before you go to sleep, you pull out the pennies and count them up again. Now there are 27 pennies in the bag! When you check the bag at the end of the second day, you count 30 pennies. At the end of Day 3, you count 33 pennies. How many pennies will be in the bag after 10 days? 25 days? 100 days? Can you come up with a rule to find the number of pennies in the bag on any day?

Related Task – Magic Box

Your Grandma gives you a wooden box for your birthday. When you unwrapped the gift and opened the box, you were expecting some cash inside but found the box was empty. You felt bad for not appreciating the box, and decided you could use it to store important things. Just before you go to bed, you open the box to put a photo inside, and see 2 pennies. When you check the box at the end of the second day, you count 4 pennies. At the end of Day 3, you count 8 pennies. How many pennies will be in the box after 10 days? 15 days? 20 days? Can you come up with a rule to find the number of pennies in the box on any day?