



Manipulatives as a Tool

**FROM
CONCRETE
TO
VISUAL/REPRESENTATIONAL
TO
ABSTRACT**

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Color Tiles
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Grade 5 Math Tasks

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GRADE 5 MATHEMATICS TASKS

AUTHORS' VISION FOR IMPLEMENTATION

OVERVIEW AND DISCOVERY TIME FOR EACH MANIPULATIVE:

- Teacher distributes manipulatives to partner pairs.
- Partner pairs work together for 10 minutes to discover attributes of manipulative and make a list of the attributes
- Teacher asks partner pairs to share attributes with the whole class – teacher lists attributes on an overhead transparency
- Students work in partner pairs for 10 minutes to make discoveries with the manipulatives and make a list of the discoveries
- Teacher asks partner pairs to share discoveries with the whole class – teacher lists discoveries on an overhead transparency
- Student add to the list during any of the instructional tasks

PROCESS FOR EACH INSTRUCTIONAL TASK:

- Teacher prepares materials as listed on each task for the entire class
- Teacher places instructional task transparency on the overhead and discusses the entire task with the class before they begin working.
- Teacher places assessment transparency on the overhead before students begin working on the tasks so that students will know what questions they will answer during and after completion of the task.
- Teacher distributes 1 copy of the task and assessment to each pair/group of students.
- Students complete task.
- Teacher places assessment transparency on the overhead and debriefs the task as a class.

GEOBOARDS EXPLORATION

Square Boards with Pegs and Multi-colored Bands

One-sided with square grid

- 25 pegs evenly arranged
- Five rows with five pegs each

Two-sided with square grid and circular grid

- Square grid on one side with 25 pegs
Evenly arranged in five rows with five pegs each
- Circular grid on the other side with 17 pegs
12 placed on the circumference of the circle
1 placed in the circle's center
1 placed at each corner of the board

Geoboards are Versatile

- Useful for investigating properties of polygons
- Can be used to develop the concept of congruence
- Can be used to develop the concept of symmetry
 - Can be used to investigate angles
- Can be used to investigate area and perimeter
 - Can be used to investigate patterns
- Can be used to develop the concept of fractions
- Can be used to develop the concept of coordinate graphing
 - Can be used to investigate irrational numbers
- Can be used to develop the concept of line segments

Geoboard Task #1

Can you create Geoboard designs with certain kinds of symmetry?

Materials you will need:

- 2 Geoboards and bands
- Geodot paper
- Crayons or markers

Your assignment for this Math Mission:

- Work with a partner to create at least one design for each of these rules:
 - Rule 1:** The design has at least one line of symmetry and looks the same after every quarter turn.
 - Rule 2:** The design has no lines of symmetry and looks the same after every quarter turn.
 - Rule 3:** The design has a line of symmetry but no quarter-turn symmetry and no half-turn symmetry.
 - Rule 4:** The design has quarter-turn symmetry but no half-turn symmetry.
- Copy your designs onto geodot paper. If there is no possible design for a description, explain why.
- Be prepared to discuss the different kinds of symmetry in each of your designs.
- Answer the questions on the back of this page. Be able to explain your answer.

Geoboard Task #1 Assessment

- How did you go about creating your designs?
- How did you check for lines of symmetry?
- How did you check for quarter-turn symmetry?
- How are turn symmetry and line symmetry alike? How are they different?
- Describe a strategy for creating a design with only one line of symmetry.
- Describe a strategy for creating a design with quarter-turn symmetry.
- Describe how shapes that have symmetry are different from those that do not have symmetry.

- TEKS 5.7A Identify essential attributes including parallel, perpendicular, and congruent parts of two- and three-dimensional geometric figures
- TEKS 5.8A Sketch the results of translations, rotations, and reflections on a Quadrant I coordinate grid
- TEKS 5.8B Identify the transformation that generates one figure from another when given two congruent figures on a Quadrant I coordinate grid
- TEKS 5.14B Solve problems that incorporate understanding the problem, making a plan, carrying out the plan, and evaluating the solution for reasonableness
- TEKS 5.14C Select or develop an appropriate problem solving plan or strategy, including drawing a picture, looking for a pattern, systematic guessing and checking, acting it out, making a table, working a simpler problem, or working backwards to solve a problem
- TEKS 5.14D Use tools such as real objects, manipulatives, and technology to solve problems

Geodot Paper

