

# Making Math Meaningful

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"I like to use my hands."

"I'm a practical learner."

"I like to see how things work."

Have you heard—or even said—comments such as these? Manipulatives need to be a part of mathematics lessons. As students learn to interpret spatial and mental concepts in practical ways, they can develop strategies that help them work to a solution. When they touch, move, manipulate, or even change the shapes of materials, they can find their own learning style and better understand abstract concepts. In addition, using familiar objects from school and home helps to validate real-life applications. Manipulatives thereby help to build students' confidence as they become more enthusiastic about math.

## **Ideas and Resources**

I teach in a multigrade classroom. As I prepare lesson plans, I look around my home for ways to increase my students' learning. Like many small schools, mine has a limited budget, so buttons, dried beans, pasta shapes, nuts, bolts, and other common items become a tremendous resource. Some of my ideas come from professional catalogs and books. However, geometric shapes listed in these sources are often quite expensive. I have been able to find similar shapes in a carpenter shop's odds and ends bin at a fraction of the cost.

## **Number Stories**

This works well with lower grades, but can be adapted to the various levels if you select an appropriate operation and create a story, skit, or monologue.

***1 + 1 = ?***

I ask for three volunteers and give two of them one object each. I then tell a story that eventually directs two pupils to give their manipulatives to the third student. At the conclusion, the class is asked to retell what they

saw and heard in their own words. Then they must summarize the story in a number sentence. As a follow-up exercise, I assign number sentences about which each must write a story. Afterward, the children share their stories and comments with their peers. Sometimes a fellow student will question the perspective of the story, while others defend the author. Their discussion grows out of a genuine need to gain understanding.

### ***Shopping Spree***

Preteens and teenagers are avid shoppers for clothes, food, and music. Therefore, many mathematics activities can be designed around these interests. By using store catalogs and newspaper advertising supplements, your students can enjoy a “shopping spree” activity.

I have found it most interesting to see my students’ choices when I give them a budget of \$200 to shop for the best values on the items they would like to purchase. First, I tell them they are to make a “wish list” of items within the stated budget. We discuss their choices in class, and the projects are graded by peers based on the quality of product, price, and suitability.

As a follow-up activity, students can express their purchases mathematically as two-step equations.

### **Banking and Shopping**

Manipulatives:

- Play money (enough to give each child \$100, with some left over)
- Designated bank and shop areas
- Calculators

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- Cash box
- Supplies: Pencils, erasers, glue sticks, rulers, pens, colored pencils, writing paper, drawing paper
- Replicas of bank passbooks, deposit slips, and withdrawal forms

Lower grades love to play shop, so I set up a learning center to teach them how to manage money. As the children shop and do their banking, they practice addition, subtraction, multiplication, and division. They also learn to budget, calculate simple interest, and build up their savings.

First, choose a bank teller and shopkeeper. Then give each child \$100. They must visit the bank to deposit their

savings. The bank teller records the amount received from the clients, who in turn must record the transaction in their passbooks. I keep the interest at 10 percent, which I compare to calculating tithe.

Students can find many opportunities to earn “money.” If a child makes a special request (other than help with assignments or delegated chores), he or she must negotiate a fair wage. Students withdraw money from the bank to buy supplies. Special times during the day are scheduled for shopping and banking. Although it takes time to set up this project, I have found it to be an invaluable tool to help students practice a variety of mathematical skills.

### **Sequencing**

After placing a box of assorted items at each child’s desk, I ask the students to select several items and

arrange them in a pattern. Next, they are to write on a strip of paper one sentence describing their pattern. I collect the sentences, shuffle them, and pass them out. At my signal, the children read their sentence, then move around the room to find the matching pattern. When one finds a match, he or she is to sit at that desk. We then discuss which pattern was hardest to match. Which descriptions could be used for a variety of patterns? Which could not be solved without using other words to describe them?

This activity continues when the students return to their own seats and make up a new pattern. I then ask each

child to move over two places, study the pattern on that desk, and write a math equation or sentence describing the pattern. Sometimes children need help formulating an abstract sentence. I guide them by asking questions that lead them step by step to describe what they see.

Upper-grade students will eventually be able to write a general formula for various patterns. They should be able to also write rules for a variety of sequences.

### Geoboards

Students like using geoboards, which allow them to manipulate rubber bands to form many geometric shapes. The concepts of congruence, symmetry, area, the Pythagorean Theorem, perpendicularity, and bisecting hold endless possibilities for them to explore.

### Geometry

Students are often more motivated if they use familiar objects when working on volume, area, surface area, and cylindrical figures. Physical-education equipment, packing boxes, and food containers provide manipulative material that they can use. They will thus associate the skill with the object they used.

### Measurement

Having students plan a bulletin board is a good way to teach measurement. They have to estimate and measure to find the appropriate sizes for background material, titles, headings, and pictures. They must also decide how to arrange the material to make it attractive. Sometimes they will need to flip, slide, rotate, reduce, and/or increase some of the parts to create a balance.

Older students like to create new looks for their bedrooms. I assign them to measure the dimensions of their room, including walls, windows, and floor space. On graph paper the stu-

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dents are to draw suggested arrangements and calculate their dimensions to show how they would make changes. They can give their room a new look by changing the curtains, replacing the pictures or posters, and rearranging the furniture.

Many of the above activities can be done in groups or performed individually.

### Create Math Labs

Occasionally I make up math lab activities or games that review chapters, such as geoboard activities or measuring shapes. I place items in Ziploc bags or shoe boxes. The following are examples of a math lab:

#### Subject - Centimeters

In a box or bag, put the following items: Tape measure, manipulatives (geometric figures, keys, nails), activity sheet.

Directions: *Measure the length of each object in this package.*

#### Subject - Money

Put in box or bag: catalogs, plain paper, scissors, glue, pencils/markers, stapler.

Directions: *You are about to begin your own catalog company. Design a catalog with items important to the survival and enjoyment of people your age. (1) Find*

*pictures from the catalogs in this box and cut them up. (2) Price the items and glue them to the paper. Make sure that your items are categorized and that the catalog is paginated and has an attractive cover. (3) Write five word problems and answers based on items in your new catalog. (4) Ask a classmate to answer your questions and grade the work.*

Students need motivation to get them excited about math. Athletes are motivated by their coaches and fans to achieve the best performances for them-

selves and their team. As teachers we, too, should be the coaches and fans of our students. One way to do this is to design math activities that are practical and help each child to develop his or her mental, spatial, and tactile skills. Be sure to praise your students as they work to achieve greater understanding.

### Integrating Math Into the Curriculum

Math is used in many areas of the curriculum. Whenever the opportunity arises, I combine math with language arts, physical education, science, social studies, music, worship, and art. Students need to see math in its many forms. Music making affords a great lesson in fractions, symmetry, and balance. I have used tone chime bars to teach fraction values. The place of math becomes especially meaningful when students learn about harmonizing chords in thirds and fifths with the melody balanced by the lower altos, tenors, and basses.

The Lord wants us to bring our lives into a balance of the mental, physical, and spiritual. I believe we can show students how to do this as we integrate manipulatives into a variety of teaching areas. ✍

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