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Notes to the Teacher

This book is designed to help your students build a foundation of basic maths skills through hands-on activities with concrete models. The activities engage students in 'doing mathematics'.

The book presents 148 reproducible one-page activities. The activities pose problems and puzzles for the students to solve, using manipulatives that are common in many classrooms. The activities encourage students to work together and talk about what they are discovering. When the students manipulate physical models, then use their own language to explain their thinking, they build deeper mathematical understanding. They also develop their ability to communicate mathematically. The physical models serve as a focus for communication, even among students who do not share a primary language.

Included in each book are sample solutions for the problems, many of which have more than one solution. Blackline masters for the manipulatives are also provided.

Suggestions for Classroom Use

The activities in *The Jumbo Book of Maths Discoveries, Years 6–9,* are organised by maths strands: Numbers and Operations; Geometry & Measurement; Patterns, Functions and Algebraic Thinking; and Data, Graphing and Probability. Within each section, the activities are sequenced according to maths concepts and skills as well as level of difficulty.

The activities can be used by students working individually, in pairs, or in small cooperative learning groups. Working together encourages students to talk about their thinking and about their discoveries. It is beneficial for students to articulate their thinking and hear how others may have solved the same problem in a different way.

You can extend the activities and create similar ones to give the children additional explorations in mathematics. Also encourage the children to create their own problems and puzzles for others to solve.

Materials Needed

The manipulatives used in the activities are listed below, along with suggested sets for pairs or small groups of students.

Fraction Builder®:	One set of Fraction Builder® pieces for each pair of students
Geoboard:	11×11 Geoboard; one Geoboard and rubber bands for each student or pair of students
Fraction Circles Deluxe:	One set for each student or pair of students
Base Ten Blocks:	Seventy ones-blocks, twenty tens-blocks, and ten hundreds-blocks for each pair or group of four students
Centimetre Cubes:	Ten each of ten colours for each pair or group of four students
Linking Cubes:	2 cm Linking Cubes; twelve each of ten colours for each pair or group of four students
Play Money:	One set of notes including ones, fives, tens, twenties, fifties and hundreds; One set of coins for each student or pair of students
Two-Colour Counters:	100 counters for each pair or group of four students
Pentominoes:	One set of twelve pieces for each student or pair of students
GeoMirror:	One for each student or pair of students
Colour Tiles:	Twenty-five each of four colours for each pair or group of four students
Tangrams:	Two sets of Tangram pieces for each student or pair of students
Pattern Blocks:	One set of at least 100 blocks for each pair or group of four students
Transparent Spinner:	One Transparent Spinner for each student or pair of students; or a spinner made from a paperclip and pencil
Dice:	One pair for each student or pair of students
Calculator:	One calculator for each student or pair of students

Introducing the Activities and the Manipulatives

If your students are not familiar with a manipulative, give them time to just explore the pieces first. This exploration will give them a chance to satisfy their curiosity about the pieces before they begin using them to solve problems. While the students are exploring, introduce the mathematical names of the pieces, and ask questions to help students discover characteristics of the pieces and the relationships between them. Here are some examples:

Geoboard – How many pins are there in the top row? How many pins are there in all? If the space bounded by four pins is one square unit of area, how many square units of area are there on the board?

Tangrams – How are the pieces alike? How are they different? How many four-sided polygons, or quadrilaterals, are there? Are the triangles all the same kind of triangle?

Base Ten Blocks – How many ones-blocks make up a tens-block? How many tens-blocks make up a hundreds-block? How many different numbers can you show with one ones-block, one tens-block, and one hundreds-block?

Play Coins – How many different ways can you show twenty-five cents with the coins? If you have six coins that total seventy-five cents, what coins could you have?

Pentominoes – How are the pieces alike? How are they different? (They are one kind of polyominoes – shapes that can be made by putting together squares of the same size. Pentominoes are each made with five squares.) What kinds of polygons do you think you can make with the pieces?

Fraction Builder® – How many different kinds of fractions are in the set? What kinds of fractions, fewer than twelfths, are not in the set? How many ways can you show $\frac{1}{2}$ with the pieces?

Pattern Blocks – What shapes are the blocks? How many sides does each block have? Are any sides the same length? How many vertices, or corners, do the shapes have?

Give students copies of the activity or place copies in a learning centre. Encourage the students to work together, as partners and in small groups, and to share their ideas with each other. Let them know that talking about what they are thinking and discovering is important.

ACTIVITY 1

Adding fractions

Use: Fraction Builder® pieces

Numbers & Operations

Name: _____

A. Choose some pieces of two different colours. Combine them to equal the whole. Do this four times.

Write an equation for each. Find or estimate the sum.

1. _____ + _____ =

2. _____ + _____ =

3. _____ + _____ =

4. _____ + _____ =

B. Combine $\frac{1}{3}$ and $\frac{4}{8}$. Describe your answer. (Hint: Look for an exact match by using pieces of a third colour.) What could you use as a common denominator to add $\frac{1}{3}$ and $\frac{4}{8}$? _____

Write the addition equation here.

C. Dave wants to make a wooden sign. His two pieces of wood are $\frac{2}{6}$ and $\frac{3}{8}$ of a metre long. If Dave combines these two pieces, will the sign be longer than $\frac{1}{2}$ metre? $\frac{3}{4}$ metre? Name a fraction piece that, if you had it, would allow you to show this combination exactly.