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NOTES TO THE TEACHER



Maths Discoveries About Chance & Data, Book 1, is part of a series of Maths Discoveries books. Each book focuses on one area of the mathematics curriculum. They are designed to help your students build mathematical concepts and understandings through hands-on activities with concrete models and tools. The activities also emphasise problem solving, communication, reasoning and making mathematical connections.

Using models and tools invites the students to explore, solve problems, construct, discuss, investigate, describe, represent and predict. The activities are designed for students working together in pairs and small groups, which encourages students to share their thinking and learning. By manipulating models and tools, using their own language to explain their thinking and sharing their thinking and learning with others, students build

deeper mathematical understandings and develop communication skills.

The concrete materials serve as a focus for communication, even among the students who do not share a primary language.

Each book presents 40 reproducible one-page explorations for students, three or four investigations for more in-depth explorations, teaching notes, and blackline masters for special recording sheets. Sample problem solutions are also included.



CSFII LEARNING OUTCOMES

Examine the outcomes from simple chance experiments and data on familiar events to order outcomes and events from least to most likely.

Interpret and evaluate information contained in tables, visual displays and databases and report on methods of data collection.

Prepare visual displays of discrete and continuous (measurement) data using a range of graphical methods.

Summarise a data set by obtaining measures of central location and spread 'by hand' and by using technology.

Compare, order and summarise data sets using simple numerical methods.

Use language of chance in everyday situations.

Collect and record data systematically.

ACTIVITIES THAT DEVELOP THESE SKILLS AND UNDERSTANDINGS

- Explorations 1-5, Investigation 3
- Explorations 6-10, Investigation 3
- Explorations 16-30, Investigation 1, 2
- Explorations 31-35, Investigation 2
- Explorations 36-40, Investigation 1, 4
- Investigation 1, 2, and 4
- Investigation 1, 2, and 4

INTRODUCTION TO MATHS DISCOVERIES ABOUT CHANCE & DATA, BOOK 1

The explorations and investigations in this book are designed to help students develop the maths skills and understandings articulated in the CSFII Learning Outcomes.

Manipulatives are wonderful tools and models for students to use. They enable students to explore concepts in ways that would be impossible on paper. When students are able to hold something in their hands, to look at it and move it around in various ways, and to take it apart, their learning is greatly enhanced. They are able to investigate and explore concepts in concrete ways; this allows them to integrate concepts into their basic maths understandings from a sound base of personal experience. The intrinsic value of manipulatives in maths education is the underlying premise of this book.

The students will be using dice to determine possible outcomes and test predictions. Transparent spinners can be placed over spinners found on exploration pages or on student-made spinners. Unifix Cubes are used to develop cube graphs that lead into bar graphs and circle graphs. Unifix Cubes will be placed in a paper bag and drawn out at random to determine outcomes. These materials are integral to developing the concepts of probability and graphing. Students need to use a variety of materials to demonstrate a transfer of the concepts of probability. In addition, the materials are used to develop various graphs at the concrete level. Students will also need crayons or markers, paper bags, and blank paper to draw on for making spinners.

USING MATHS DISCOVERIES ABOUT CHANCE & DATA, BOOK 1

Contents

This book contains 40 short problem-solving activities—explorations—divided into eight sections. There are five similar explorations in a section. Each section of explorations is preceded by teaching notes that identify the skills and understandings developed in the explorations and describe an activity for introducing the explorations. The teaching notes may also suggest questions that can be used to encourage students to think about and communicate about what they have learnt, provide ideas for extending the activities, and suggest ways to assess student learning.

This book also contains four longer, more open-ended activities—investigations. The investigations give students opportunities to extend and deepen their learning and to apply what they have learnt to solving a problem.

Suggestions for Classroom Use

These 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. Students will benefit from articulating their thinking and hearing how others may have solved the same problem in a different way. To take advantage of this, encourage the students to share their ideas with other pairs of students, with other small groups, or with the whole class.

NOTES ABOUT EXPLORATIONS 1-5



MATHS SKILLS AND UNDERSTANDINGS

- Explore concepts of chance through experiments with drawing cubes from a bag, rolling a die and spinning a spinner
- Use tally marks in a table to record results of experiments
- Develop an understanding of possible outcomes in an experiment and determine what chance each has of occurring

GETTING READY

Obtain a copy of *Cloudy with A Chance of Meatballs*

Heads				
Tails				

by Judi Barrett, MacMillan Company, 1978. Also have available eight coins of the same denomination. Draw a table on a blackboard or an overhead transparency showing the outcomes **heads** and **tails**.

For the explorations, each pair of students will need one brown paper bag; 2 or more Unifix Cubes of each colour: green, red, blue, yellow and purple; one die numbered 1–6 and one transparent spinner. If transparent spinners are not available, students can use a pencil and paper clip as a spinner.

INTRODUCING THE EXPLORATIONS

Read aloud *Cloudy With a Chance of Meatballs*. Discuss what *chance* means. Elicit ideas about the chance of something happening.

Have the students watch as you flip a coin. Ask them to identify how it lands—heads or tails. Show students how to use the tally marks to record the results. Flip the coin a few more times and record the results.

Then ask, **If the coin lands on heads, will it land on tails the next flip?** Elicit from the students that there are two possible results or outcomes: heads and tails. Develop the concept that each of these outcomes has an equal chance of happening. Say: **There is one chance out of two that the coin will land on heads. What can you say about the chance that the coin will land on tails?** (1 out of 2) Develop the concept that the previous outcomes do not affect the next outcome.

Ask, **If you flip a coin 20 times, do you think the results will be 10 heads and 10 tails?** Divide the class into groups of eight and give each group a coin and a sheet of scratch paper. Have students take turns flipping the coin for a total of 20 flips. Tell them that each flip is called a *trial*. Have them use a tally mark to record each trial. Then help the groups compare their results.

TALKING AND WRITING ABOUT THE EXPLORATIONS

To help the students reflect upon what they have discovered during the explorations, you can ask questions for discussion or journal writing: **How did you find out what could happen, or the possible outcomes? How did you find the chance of something happening? Was the chance of something happening the same as what really happened in your experiments? Why or why not?**

EXTENSION IDEAS

Students can look in the newspaper to find articles that use words such as *chance*, *prediction* and *outcomes*. Have the students share the articles in class.

Name

Use Unifix Cubes (or Constructa Cubes), a paper bag and a pencil.
Record your work.

A. Jack put 1 green cube, 1 red cube, 1 yellow cube and 1 blue cube in a paper bag.

How many cubes are green? _____

How many cubes are red? _____

How many cubes are yellow? _____

How many cubes are blue? _____



B. Jack shakes the bag. Grace draws one cube out of the bag without peeking. Her chance of getting green is 1 chance out of 4. What is her chance of getting each of the other colours?

green 1 chance out of 4

red _____ chance out of 4

yellow _____ chance out of _____

blue _____ chance out of _____

Is Grace more likely to draw one colour than another? Why or why not?

C. Try Jack's experiment. Put the same cubes in the bag as he did.

Draw one cube out of the bag. Use a tally mark to record the colour.

Put the cube back in the bag and shake it. Repeat 20 times in all.

green	
red	
blue	
yellow	

Think and Write

Compare your results with a partner's results. Are they alike?

Are they different?

EXPLORATION
2

Name

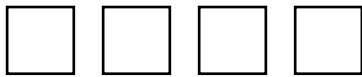
Use Unifix Cubes, a paper bag, crayons or textas, and a pencil.
Record your work.

A. Grace put 1 green cube, 1 red cube, 1 purple cube and 1 blue cube in a paper bag. If John draws a cube out of the bag, what is his chance of getting each colour?

green _____ chance out of _____ red _____ chance out of _____

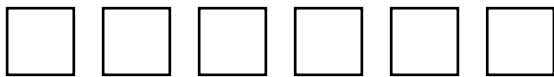
purple _____ chance out of _____ blue _____ chance out of _____

B. If Grace wants to change the chance of drawing a green cube to be 2 out of 4, what could she do? Colour the cubes to show the change.



C. John put 6 new cubes in the bag. Read the clues to figure out which cubes he chose. Colour the cubes to show what he chose.

- The chance of drawing a red cube is 2 out of 6.
- The chance of drawing a blue cube is 1 out of 6.
- The chance of drawing a purple cube is 3 out of 6.



Explore Some More

Take six cubes and hide them from a friend. Give your friend clues about the chance of drawing each colour. See if your friend can tell you which cubes you chose. Now put the cubes in the bag. Draw out one cube, record the colour, and put it back in the bag. Do this 20 times. What happens? Are you surprised?