Teacher Manual Excerpts

Chapter 1

Fractions

Fractions are often hard to draw - hence pupils are left to draw them as best they can even if portions are not the same size. This is really not ideal as fractions are based on the fact that when we divide, we have equal-sized portions.

Visually representing 1/7 or any odd numbered denominator is also not an easy task, especially if a continuous fraction is needed.

This chapter shows how we use the MATHOMAT Primary template to accomplish all the different types of representations.

We cover the basics of fractions and gradually work up to more intricate fraction properties.

A fractions game is explained - the cards are in the back of this manual under the resources section.

The aim of this chapter is to not only teach what fractions are and how they work but also how to represent them visually and how to make use of those representations when dealing with word problems.

In Chapter 1

- What is a fraction?
- Teaching fractions with MATHOMAT
- The traditional fraction-wall
- Visualizing and drawing fractions
- Different representations
- Bridging from fractions into area and perimeter
- Bridging from fractions into composite shapes
- Bridging from fractions into tessellations
- Visually explaining fraction rules
- Choosing which representation is best for different kinds of problems
- Geometry fractions with MATHOMAT
- Word Problems
- Fractions exercises

Vocabulary

- Numerator
- Denominator
- Unit shape
- Attribute shapes
- Discrete representations
- Continuous representations
- Area models
- Transitivity
- Symmetry
- Reflexivity

What you will need:

- MATHOMAT PRIMARY template

Cut outs of the following shapes:

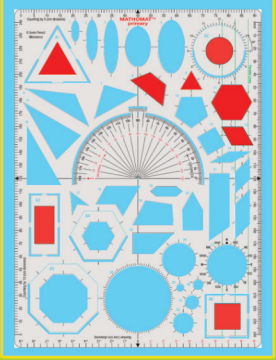
- Shape 8 Trapezium x 2
- Shape 11 Hexagon x 1
- Shape 13 Rhombus x 3
- Shape 9 Triangle x 6

The Mathomat Fractions - game

This is under the resources section at the back of the book.

On the template:

The shapes used in this chapter



AVAILABLE MATERIAL FOR MATHOMAT

Teacher's manual

- Lesson plans
- Activities
- Guidance
- Hints and Ideas
- Topic specific information

Student Workbook

- Activities
- Worksheets
- Investigations
- Theorems

Constructions Manual

- Constructions without a compass
- Three different ways for each construction
  - Base level
  - Mid level
  - Advanced level

Games and Activity Guide

Authentic games and activities to encourage student involvement.

Critical Thinking skills development

Spatial Ability development

Encouraging mathematical exploration

Teacher Manual Excerpts

Fractions

Two triangles makes one rhombus

1 triangle is ½ of a rhombus

Three triangles makes one trapezium

1 triangle is ⅓ of a trapezium

Six triangles makes one hexagon

1 triangle is ⅙ of a hexagon.

The important thing for them to notice is that all the triangles are the same size. Let them prove it by placing the template on the shapes and see if the triangle fits on all the triangles they drew.

Next they can prove it by cutting the triangles out and comparing the size.

The regular shapes are great to use when teaching halves.

Draw the following shapes:

- Shape 11 - Hexagon
- Shape 8 - Trapezium
- Shape 13 - Rhombus

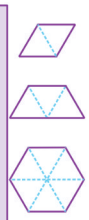
Use the triangle, shape 9, to see how many triangles can be drawn inside the other shapes.

The triangle is used as the unit shape - this means the smallest part that the other shapes consist of or can be divided into.

If your students have not yet learned about all the shape names yet, have them colour the shapes in specific colours and then ask them to use a certain amount of a specific colour to build another coloured shape.

You may use numbers as well.

Have the students draw the shapes again, this time let them fold along the blue lines. The smallest shape that all of them can fold into is the triangle.



By drawing fraction walls, students discover that these wall work with a unit shape.

Use the following:

- Shape A 3 - Rectangle
- Shape A 1 - Triangle
- Shape A 6 - Square

The way in which we will manipulate the template when drawing fractions walls is almost the same as when we tessellate.

This representation comes in handy when a student must indicate odd denominator fractions.

It is often difficult for students to divide a rectangle, square or circle into odd numbers. This is a good way to have an odd denominator fraction represented in a continuous way.

One fifth

Two sevenths

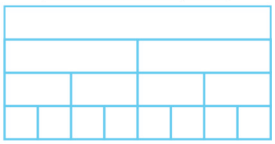
A discrete representation of two fifths.

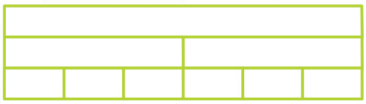
Let the students tessellate this triangle.

Let them find shapes they have used on page 3 and have them colour it in.

This fraction wall was done with squares.

Let them compare 1/2 of the square fraction wall with 1/2 of the rectangle fraction wall. They must see that the sizes differ because the unit shapes differ.





A rectangular fraction wall.

This fraction wall is best done when the paper is in landscape orientation. They can start with however many rectangles are necessary and expand as needed.

Fractions Game

The idea of this game is to get students to pay attention to the denominator of the fraction.

They should understand that the denominator and numerator conveys information about the fraction.

This game aims to help them remember that for addition and subtraction the denominator must be the same.

How to play: For an even number of players

Two players will present a card in one turn.

Take turns to throw the dice.

If the denominators on the card should change depending on the operator on the dice then player One gets the two cards.

If the denominators on the card should stay the same depending on the operator on the dice, then player Two gets the two cards.

You can adapt the game to fit the content you are teaching on fractions.

Winner is the one with the most cards.

Use the largest square on the template and draw a net for a cube.

There are 11 nets for a cube, we only provide one for this exercise.

Draw the following net:

- Shape A 6 - Square

Mark the cube with operational signs the students are familiar with.

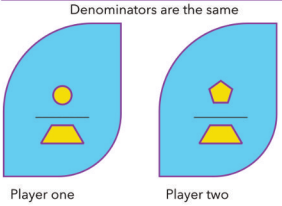
< or >	-	=
	×	
	÷	

Fractions Game Examples

You will find the full set of cards for the game at the back of this book in the resources section.

Before the game starts the players must decide who will keep the cards for a "denominators change" and who keeps it for a "denominators stay".

Denominators are the same



Player one Player two

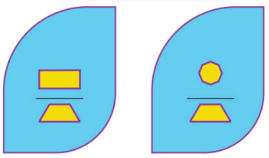
÷

Rule states that for dividing fractions, the denominators do not need to be the same.

OUTCOME: Cards show same denominator so it stays. (If cards showed different denominators they will stay as well.)

Player Two gets the cards

Denominators are the same



Player one Player two

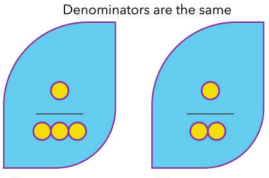
=

Rule states that for equating fractions, the denominators need to be the same.

OUTCOME: Cards show same denominator so it stays.

Player Two gets the cards.

Denominators are the same



Player one Player two

+

Rule states that for adding fractions, the denominators need to be the same.

OUTCOME: Cards show different denominators so they must change

Player One gets the cards.

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