



CAMBRIDGE  
UNIVERSITY PRESS

CAMBRIDGE

# Primary Mathematics

Teacher's Resource 1

Cherri Moseley & Janet Rees

# > Contents

Introduction

About the authors

How to use this series

How to use this Teacher's Resource

About the curriculum framework

About the assessment

Introduction to Thinking and Working Mathematically

Approaches to learning and teaching

Setting up for success

Developing mental strategies

Teaching notes

**1** Numbers to 10

**2** Geometry

**3** Fractions

**4** Measures

Project Guidance: Project 1 Snakes

**5** Working with numbers to 10

Project Guidance: Project 2 Compare the rows

**6** Position

**7** Statistics

**8** Time

**9** Numbers to 20

Project Guidance: Project 3 Counting fish

**10** Geometry (2)

Project Guidance: Project 4 Which one doesn't belong?

**11** Fractions (2)

Project Guidance: Project 5 Fair fruit

**12** Measures (2)

**13** Working with numbers to 20

**14** Statistics (2)

**15** Time (2)

**16** Position, direction and patterns

Project Guidance: Project 6 Finding baskets

Acknowledgements

## Digital resources



The following items are available on Cambridge GO. For more information on how to access and use your digital resource, please see inside front cover.

Active learning

Assessment for learning

Developing learners' language skills

Differentiation

Improving learning through questioning

Language awareness

Metacognition

Skills for Life

Letter for parents – Introducing the Cambridge Primary and Lower Secondary resources

Lesson plan template and examples of completed lesson plans

Curriculum framework correlation

Scheme of work

Diagnostic check and answers

Answers to Learner's Book questions

Answers to Workbook questions

Glossary

You can download the following resources for each unit:

Additional teaching ideas

Differentiated worksheets and answers

Language worksheets and answers

Resource sheets

# > Introduction

## **Welcome to the new edition of our Cambridge Primary Mathematics series.**

Since its launch, the series has been used by teachers and learners in over 100 countries for teaching the Cambridge Primary Mathematics curriculum framework.

This exciting new edition has been designed by talking to Primary Mathematics teachers all over the world. We have worked hard to understand your needs and challenges, and then carefully designed and tested the best ways of meeting them.

As a result of this research, we've made some important changes to the series. This Teacher's Resource has been carefully redesigned to make it easier for you to plan and teach the course.

The series has extensive digital and online support, including Digital Classroom which lets you share books with your class and play videos and audio. This Teacher's Resource also offers additional materials available to download from Cambridge GO. (For more information on how to access and use your digital resource, please see inside front cover.)

The series uses the most successful teaching approaches like active learning and metacognition and this Teacher's Resource gives you full guidance on how to integrate them into your classroom.

Formative assessment opportunities help you to get to know your learners better, with clear learning objectives and success criteria as well as an array of assessment techniques, including advice on self and peer assessment.

Clear, consistent differentiation ensures that all learners are able to progress in the course with tiered activities, worksheets and advice about supporting learners' different needs.

All our resources are written for teachers and learners who use English as a second or additional language. They help learners build core English skills with vocabulary and grammar support, as well as additional language worksheets.

We hope you enjoy using this course.

**Eddie Rippeth**

*Head of Primary and Lower Secondary Publishing, Cambridge University Press*



# > About the authors

Cherri Moseley



After teaching in a range of primary schools, Cherri became a mathematics consultant, working for a range of providers and independently. She has also worked with a wide range of publishers to write a variety of mathematics resources for teachers. For several years, Cherri led mathematical videoconferences with numerous schools around the world for Motivate, part of the Cambridge Millennium Mathematics Project, and has twice travelled to Africa to work with disadvantaged teachers to develop their mathematics subject knowledge and teaching. She has also visited schools in Hungary and Portugal to explore teaching methods and approaches. Cherri is an active member of the Mathematical Association. She is a member of the Primary Group and Senior Editor of *Primary Mathematics*, the Mathematical Association's journal specifically for those interested in primary mathematics education.

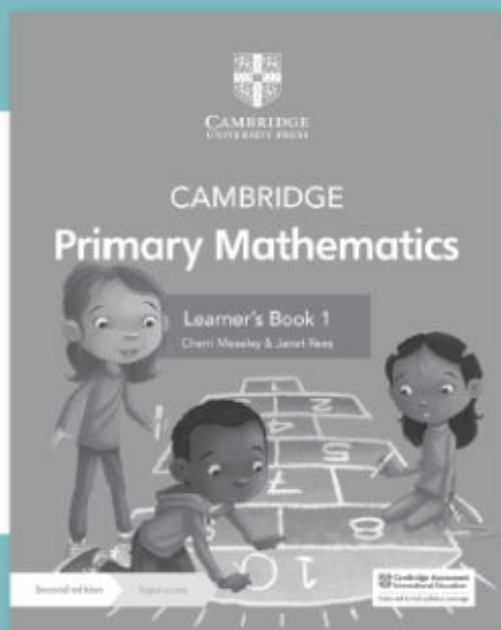
Janet Rees



Janet was a teacher and then head teacher of both mainstream and special units, working with children with varying needs, before becoming an advisory teacher for Primary Mathematics and then a trainer for the National Numeracy Strategy across the east of England. She has since worked as an independent trainer for all aspects of learning and teaching, specialising in Primary Mathematics for children aged 4 to 11 in both mainstream and special schools. This has included training and writing, working with parents and other educators and with a range of publishers both in the United Kingdom and abroad. Janet has extensive experience writing and developing teacher resources and training materials and has delivered training around the world.

# > How to use this series

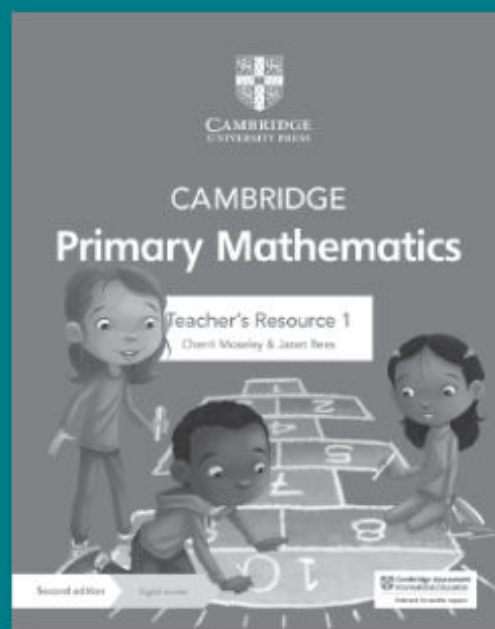
All of the components in the series are designed to work together.

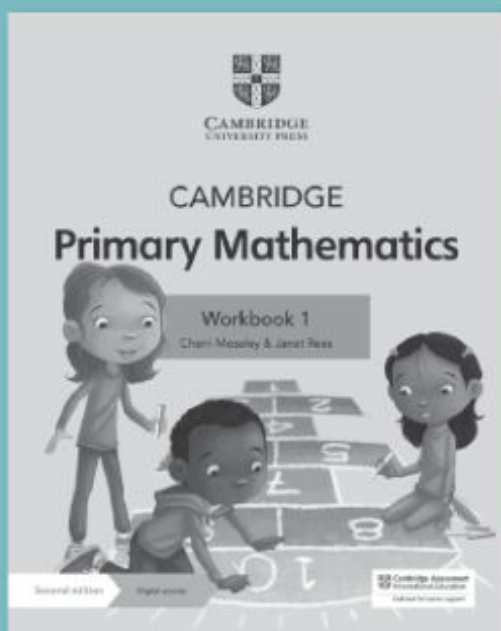


The Learner's Book is designed for learners to use in class with guidance from the teacher. It offers complete coverage of the curriculum framework. A variety of investigations, activities, questions and images motivate learners and help them to develop the necessary mathematical skills. Each unit contains opportunities for formative assessment, differentiation and reflection so you can support your learners' needs and help them progress.

The Teacher's Resource is the foundation of this series and you'll find everything you need to deliver the course in here, including suggestions for differentiation, formative assessment and language support, teaching ideas, answers, tests and extra worksheets. Each Teacher's Resource includes:

- a print book with detailed teaching notes for each topic
- Digital Access with all the material from the book in digital form plus editable planning documents, extra teaching guidance, downloadable worksheets and more.

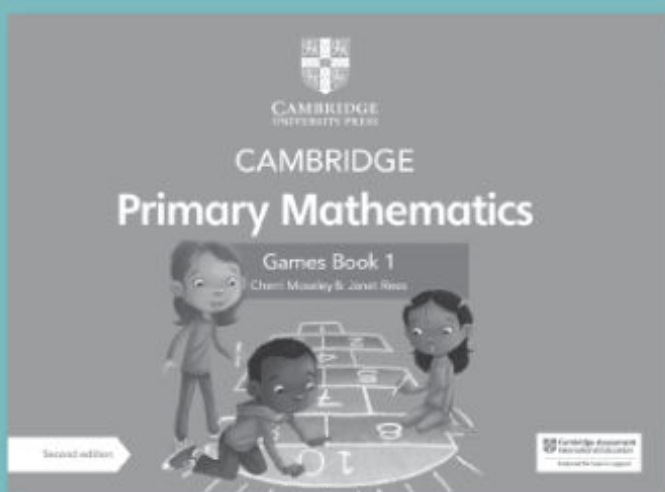
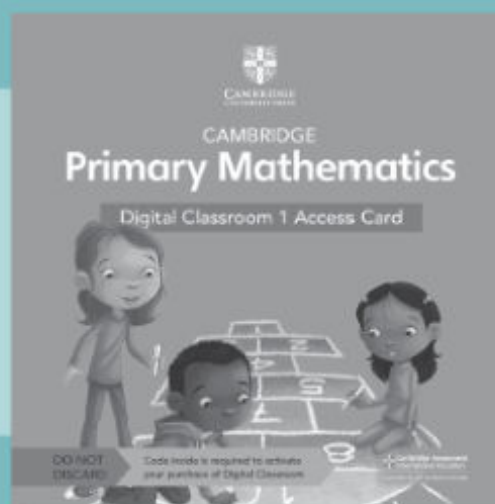





The skills-focused write-in Workbook provides further practice of all the topics in the Learner's Book and is ideal for use in class or as homework. A three-tier, scaffolded approach to skills development promotes visible progress and enables independent learning, ensuring that every learner is supported.

Teachers can assign learners questions from one or more tiers for each exercise, or learners can progress through each of the tiers in the exercise.

Digital Classroom includes digital versions of the Learner's Book and Workbook, complete with pop-up answers, designed for teachers to use at the front of class. Easily share the books with the whole class on your whiteboard, zoom in, highlight and annotate text, and get your learners talking with videos, images and interactive activities.



The Games Book is a supplementary resource designed to encourage learners to apply their mathematical knowledge through games. It consolidates and reinforces learning appropriate to the stage.

 A letter to parents, explaining the course, is available to download from Cambridge GO (as part of this Teacher's Resource).



# > How to use this Teacher's Resource

This Teacher's Resource contains both general guidance and teaching notes that help you to deliver the content in our Cambridge Primary Mathematics resources. Some of the material is provided as downloadable files, available on **Cambridge GO**. (For more information about how to access and use your digital resource, please see inside front cover.) See the Contents page for details of all the material available to you, both in this book and through Cambridge GO.

## Teaching notes

This book provides **teaching notes** for each unit of the Learner's Book and Workbook. Each set of teaching notes contains the following features to help you deliver the unit.

The **Unit plan** summarises the topics covered in the unit, including the number of learning hours recommended for the topic, an outline of the learning content and the Cambridge resources that can be used to deliver the topic.

Topic	Approximate number of learning hours	Outline of learning content	Resources
1.1 Counting sets of objects	4	Linking the value of numbers to quantities through counting. Introducing 0.	Learner's Book Section 1.1 Workbook Section 1.1 Resource sheet 1A Resource sheet 1B
<b>Cross-unit resources</b>			
<b>Digital Classroom:</b> Unit 1 multimedia enhancement			
<b>Digital Classroom:</b> Unit 1 activity			
Learner's Book Check your progress			
Language worksheet 1A			

The **Background knowledge** feature explains prior knowledge required to access the unit and gives suggestions for addressing any gaps in your learners' prior knowledge.

Learners' prior knowledge can be informally assessed through the **Getting started** feature in the Learner's Book. (See the Assessment for Learning downloadable file section for more information.)

### BACKGROUND KNOWLEDGE

This unit teaches learners how to count objects and actions up to 10. Learners will develop their understanding of the first three counting principles:

- The one-one principle. Learners must say only one number name for each object they are counting.

The **Teaching skills focus** feature covers a teaching skill and suggests how to implement it in the unit.

### TEACHING SKILLS FOCUS

#### Manipulatives

Learners learn so much more and develop a deeper understanding if they explore and discover for themselves. Using manipulatives allows learners to see the mathematics for themselves.

Reflecting the Learner's Book, each unit consists of multiple sections. A section covers a learning topic.

At the start of each section, the **Learning plan** table includes the framework codes, learning objectives and success criteria that are covered in the section.

It is helpful to share learning objectives and success criteria with your learners at the start of a lesson so that they can begin to take responsibility for their own learning. This also helps develop metacognitive skills.



LEARNING PLAN		
Framework codes	Learning objectives	Success criteria
1Nc.01	<ul style="list-style-type: none"> <li>Count objects from zero to 10, recognising conservation of number and one-to-one correspondence.</li> </ul>	<ul style="list-style-type: none"> <li>Learners can successfully count any collection of up to 10 objects.</li> </ul>

The **Language support** feature contains suggestions for how to support learners with English as an additional language. The vocabulary terms and definitions from the Learner's Book are also collected here.

LANGUAGE SUPPORT
<p><b>Estimate:</b> a sensible guess, using what you know</p> <p><b>How many?:</b> a question asking you to find out the number of objects</p>

There are often **Common misconceptions** associated with particular learning topics. These are listed, along with suggestions for identifying evidence of the misconceptions in your class and suggestions for how to overcome them.


Misconception	How to identify	How to overcome
Learners miscount because they do not arrange objects in a row or pattern and therefore include the same object twice or miss it altogether.	Give learners small collections to count.	Encourage learners to touch and move each object as they count it. This could be counting from one container to another. Slowing down and exaggerating the movement should help. Then encourage learners to arrange objects in a row, on a ten frame or in another pattern to support counting.

For each topic, there is a selection of **Starter ideas**, **Main teaching ideas** and **Plenary ideas**. You can pick out individual ideas and mix and match them depending on the needs of your class. The activities include suggestions for how they can be differentiated or used for assessment. **Homework ideas** are also provided.

<p><b>Starter idea</b></p> <p>What is inside? (10 minutes + 10 minutes Getting started exercise)</p> <p><b>Resources:</b> Box or gift bag with some objects inside. No more than 5 of any set, for example 1 key, 2 pencils, 3 large buttons, 4 small toys and 5 bricks. Alternatively, link the objects to your current topic.</p> <p><b>Main teaching idea</b></p> <p>How many are there? (40 minutes)</p> <p><b>Learning intention:</b> Learners can count a collection of up to ten objects correctly by arranging objects in a row and touching or pointing to each object in turn as they count. Learners say one counting number for each object and in the correct order.</p>
---

The **Cross-curricular links** feature provides suggestions for linking to other areas of the Primary curriculum.

CROSS-CURRICULAR LINKS
There are objects to count everywhere. Count objects linked to a particular topic, for example, seeds for a growing topic.

**Thinking and Working Mathematically skills** are woven throughout the questions in the Learner's Book and Workbook. These questions, indicated by , incorporate specific characteristics that encourage mathematical thinking.

The teaching notes for each unit identify all of these questions and their characteristics. The **Guidance on selected Thinking and Working Mathematically questions** section then looks at one of the questions in detail and provides more guidance about developing the skill that it supports.

Additional teaching notes are provided for the six **NRICH projects** in the Learner's Book, to help you make the most of them.



## Guidance on selected Thinking and Working Mathematically questions

### Learner's Book Exercise 1.1 question 8

Estimating uses all of a learner's current number skills. Through counting objects and looking at patterns, learners are beginning to understand what is meant by each number. They are **generalising** when they apply the number to the set, regardless of what the set contains.



Projects and their accompanying teacher guidance have been written by the NRICH Team. NRICH is an innovative collaboration between the Faculties of Mathematics and Education at the University of Cambridge, which focuses on problem solving and on creating opportunities for students to learn mathematics through exploration and discussion. <https://nrich.maths.org>.

› **Digital Classroom:** If you have access to Digital Classroom, these links will suggest when to use the various multimedia enhancements and interactive activities.

### PROJECT GUIDANCE: PROJECT 1: Snakes

#### Why do this project?

This task provides opportunities for learners to develop language to describe and compare (in particular) length and thickness, and to find different ways of measuring these two attributes. Learners will be making **conjectures** as they suggest whose snake is the longest/shortest and then developing their reasoning in order to convince others.

## Digital resources to download

This Teacher's Resource includes a range of digital materials that you can download from Cambridge GO.

Helpful documents for planning include:

- **Letter for parents – Introducing the Cambridge Primary and Lower Secondary resources:** a template letter for parents, introducing the Cambridge resources.
- **Lesson plan template:** a Word document that you can use for planning your lessons. Examples of completed lesson plans are also provided.
- **Curriculum framework correlation:** a table showing how the Cambridge Primary Mathematics resources map to the Cambridge Primary Mathematics curriculum framework.
- **Scheme of work:** a suggested scheme of work that you can use to plan teaching throughout the year.
- a set of documents providing more detailed information about teaching approaches.

Each unit includes:

- **Additional teaching ideas:** additional starter, main and plenary activity ideas are provided for each section in the unit.
- **Differentiated worksheets:** these worksheets are provided in variations that cater for different abilities. Worksheets labelled 'A' are intended to support less confident learners, worksheets labelled 'B' cater for most learners, and worksheets labelled 'C' are designed to challenge more confident learners. Answer sheets are provided.
- **Language worksheets:** these worksheets provide language support and can be particularly helpful for learners with English as an additional language. Answer sheets are provided.
- **Resource sheets:** these include templates and any other materials that support activities described in the teaching notes.

Additionally, the Teacher's Resource includes:

- **Diagnostic check and mark scheme:** a test to use at the beginning of the year to discover the level that learners are working at. The results of this test can inform your planning.
- **Answers to Learner's Book questions**
- **Answers to Workbook questions**
- **Glossary**

In addition, you can find more detailed information about teaching approaches.



**Video** is available through the Digital Classroom.





# > About the curriculum framework

*The information in this section is based on the Cambridge Primary Mathematics curriculum framework (0096) from 2020. You should always refer to the appropriate curriculum framework document for the year of your learners' assessment to confirm the details and for more information. Visit [www.cambridgeinternational.org/primary](http://www.cambridgeinternational.org/primary) to find out more .*

The Cambridge Primary Mathematics curriculum framework from 2020 has been designed to encourage the development of mathematical fluency and ensure a deep understanding of key mathematical concepts. There is an emphasis on key skills and strategies for solving mathematical problems and encouraging the communication of mathematical knowledge in written form and through discussion.

At the Primary level, it is divided into three major strands:

- Number
- Geometry and Measure
- Statistics and Probability.

Algebra is introduced as a further strand in the Cambridge Lower Secondary Mathematics curriculum framework.

Underpinning all of these strands is a set of Thinking and Working Mathematically characteristics that will encourage learners to interact with concepts and questions. These characteristics are present in questions, activities and projects in this series. For more information, see the Introduction to Thinking and Working Mathematically section in this resource, or find further information on the Cambridge Assessment International Education website.



A curriculum framework correlation document (mapping the Cambridge Primary Mathematics resources to the learning objectives) and scheme of work are available to download from Cambridge GO (as part of this Teacher's Resource).

# > About the assessment


Information concerning the assessment of the Cambridge Primary Mathematics curriculum framework is available on the Cambridge Assessment International Education website: [www.cambridgeinternational.org/primary](https://www.cambridgeinternational.org/primary)

# ➤ Introduction to Thinking and Working Mathematically

Thinking and Working Mathematically is an important part of the Cambridge Primary Mathematics course. The curriculum identifies four pairs of linked characteristics: specialising and generalising, conjecturing and convincing, characterising and classifying, and critiquing and improving.

Thinking and Working Mathematically characteristic	Definition
<b>Specialising</b>	Choosing <i>an example</i> and checking to see if it satisfies or does not satisfy specific mathematical criteria
<b>Generalising</b>	Recognising an underlying pattern by identifying <i>many</i> examples that satisfy the same mathematical criteria
<b>Conjecturing</b>	Forming mathematical questions or ideas
<b>Convincing</b>	Presenting evidence to <i>justify or challenge</i> a mathematical idea or solution
<b>Characterising</b>	Identifying and describing the mathematical properties of an object
<b>Classifying</b>	Organising objects into groups according to their mathematical properties
<b>Critiquing</b>	Comparing and evaluating mathematical ideas, representations or solutions to identify advantages and disadvantages
<b>Improving</b>	Refining mathematical ideas or representations to develop a more effective approach or solution

Please note that the Learner's Book and Workbook include an introductory section explaining the eight characteristics. The definitions have been simplified for learners, so please be aware that the full definitions for the characteristics are as shown in the table.

There are many opportunities for learners to develop these skills throughout Stage 1. Throughout the exercises in the Learner's Book and the Workbook, we have added this  icon alongside questions that can be used by you with your learners to develop the Thinking and Working Mathematically characteristics. There is a list of these questions and their intended characteristics in the teaching notes for each unit.

This section provides examples of questions that require learners to demonstrate the characteristics, along with sentence starters to help learners formulate their thoughts. Within the teaching notes for each unit, we have also selected one question or activity from each exercise and provided further guidance on Thinking and Working Mathematically within the context of these questions to help guidance and familiarise you with all of the characteristics.

## Specialising and generalising

