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Primary Mathematics

Teacher's Resource 2

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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, differentiated 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 number of primary schools, Cherri became a mathematics consultant working for various providers and independently. She has worked with a wide range of publishers, writing a variety of mathematics resources for teachers. For several years, Cherri led mathematical videoconferences with different schools around the world for Motivate, part of the Cambridge Millennium Mathematics Project.

Twice she 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 also 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.

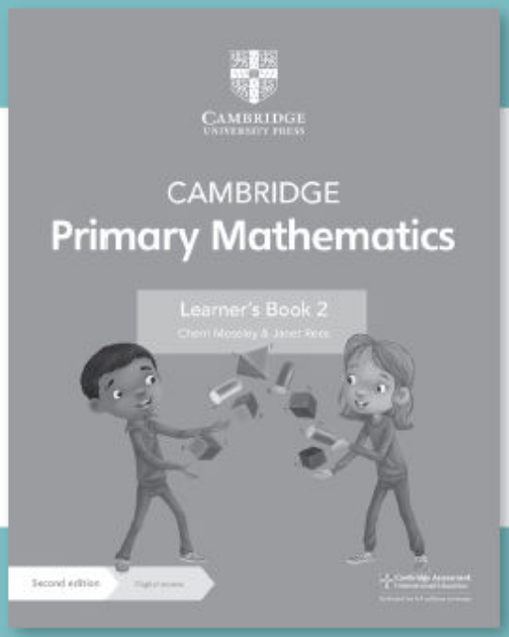
Janet Rees

As a teacher and then head teacher of both mainstream and special units, working with children with varying needs, Janet became 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 but 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 here 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

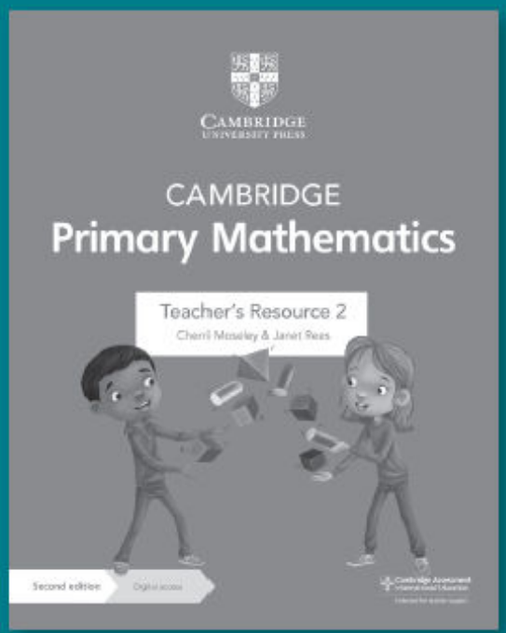
All of the components in the series are designed to work together.

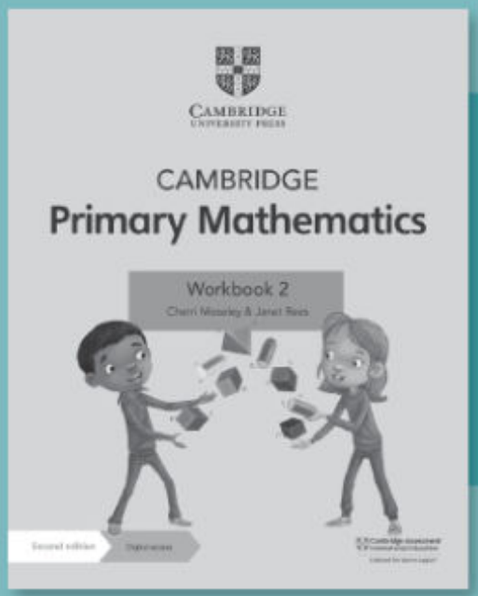


The Learner's Book is designed for learners to use in class with guidance from the teacher. It offers complete coverage of the curriculum framework. A variety of investigations, activities, questions and images motivate learners and help them to develop the necessary mathematical skills. Each unit contains 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 guidance, downloadable worksheets and more.

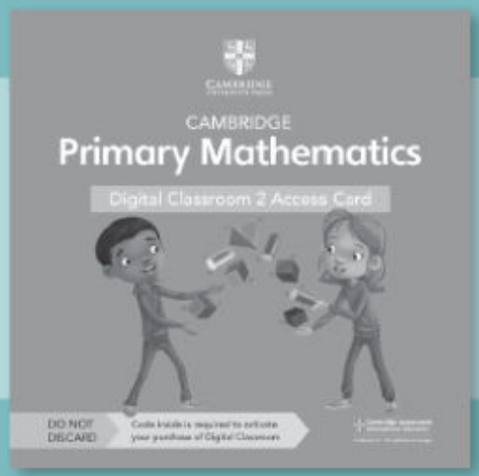


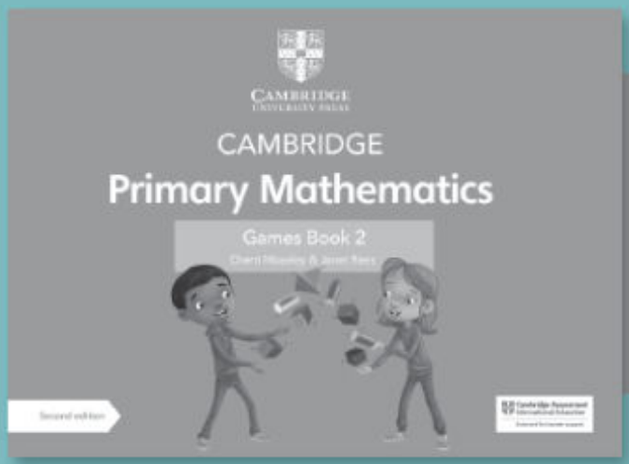


The skills-focused write-in Workbook provides further practice of all the topics in the Learner's Book and is ideal for use in class or as homework. A three-tier, scaffolded approach to skills development promotes visible progress and enables independent learning, ensuring that every learner is supported.

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 Numbers to 100	5	Recite, read and write numbers to 100, recognising the value of each digit.	Learner's Book Section 1.1 Workbook Section 1.1 Additional teaching ideas for Section 1.1 Resource sheet 1A
Cross-unit resources			
Diagnostic check and mark scheme Learner's Book Check your progress **Digital Classroom:** Unit 1 video: Numbers all around you: 20–100 **Digital Classroom:** Digital manipulative: Interactive 100 square			

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

Before starting this unit, you may want to use the diagnostic check to make sure that learners are ready to begin Stage 2. The diagnostic check can help you to identify gaps in learners' knowledge or understanding, which you can help them address before beginning this unit.

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

TEACHING SKILLS FOCUS

Manipulatives

Using manipulatives allows learners to see the mathematics for themselves. When they make physical changes to a set of objects, learners can see the effect of their actions.

Reflecting the Learner's Book, each unit consists of one or more 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 intentions 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**
2Ni.01	• Recite, read and write number names and whole numbers (from 0 to 100).	• Learners can recite, read and write numbers from 0 to 100.

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

Column: arrangement of shapes or numbers, one below another, sometimes in a grid

Digit: the numbers 0, 1, 2, 3, 4, 5, 6, 7, 8 and 9 are digits. The position of a digit gives its value. For example, in the 2-digit number 42, the 2 has a value of 2 ones, and the 4 has a value of 4 tens.

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 may confuse the order of the tens numbers.	Ask learners to count on in ones from 45 (or a similar number) into the next ten.	Count in 10s, from 10 to 100 to recall the order. Use a 100 square or number line for support when counting in ones or tens.

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.

Starter idea

What do you know about number 17? (10 minutes + 10 minutes Getting started exercise)

Resources: Mini whiteboards and pens; place value cards to 20 (Resource sheet 1A); ten frames (Resource sheet 1E) and counting objects; 0–20 number line (Resource sheet 1B).

Main teaching idea

To 100 (40 minutes)

Learning intentions: Learners recite and read numbers from 0 to 100. Learners begin to recognise the value of each **digit** in a 2-digit number, including 0 as a **place holder**. They compose and decompose 2-digit numbers using tens and ones.

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

CROSS-CURRICULAR LINKS

Numbers are used in many areas of the curriculum. Ask learners to look out for those used in measuring, particularly in science, design and technology.

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.

Guidance on selected Thinking and Working Mathematically questions

Learner's Book Section 1.1, Let's investigate after question 3

The questions prompt learners to look for similarities and differences in the rows of a 100 square. Ask learners to make an initial **conjecture** (TWM.03) and then check whether or not their conjecture is true by looking at further rows to **convince** (TWM.04) themselves.

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.

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**.

PROJECT GUIDANCE: PROJECT 1 POSSIBLY ODD

Why do this project?

This task deepens learners' understanding of odd (and even) numbers, and offers practice in comparing numbers. By challenging them to articulate a way that will always find a solution, learners will have the opportunity to refine their approaches and eventually to **generalise** (TWM.02) their strategy. This project relates to the learning objective 2Nc.05 (Recognise the characteristics of even and odd numbers (from 0 to 100)).

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

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 Primary Mathematics 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.

Each unit includes:

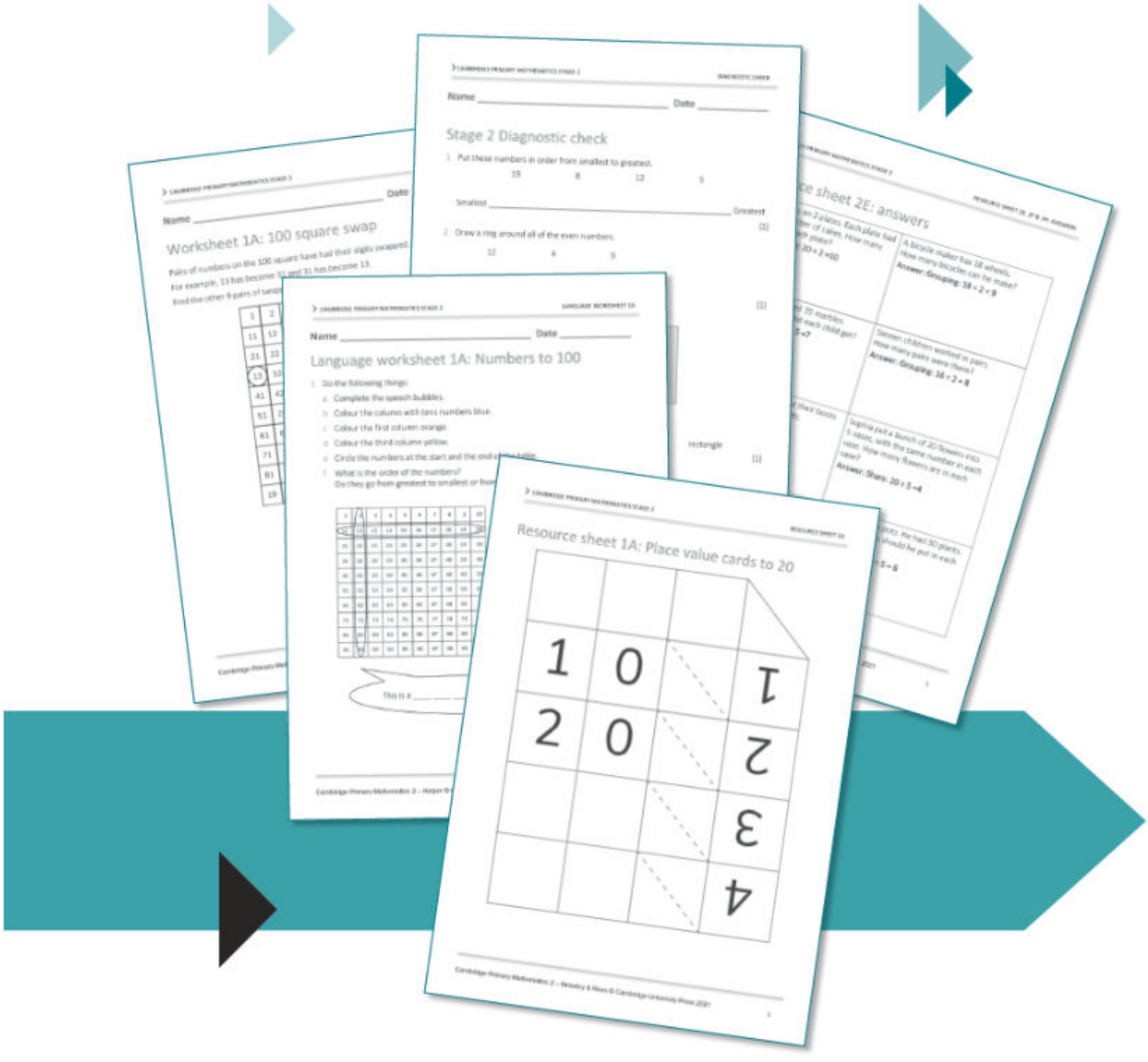
- **Additional teaching ideas:** additional starter, main and plenary activity ideas are provided for each section in the unit.
- **Differentiated worksheets:** these worksheets are provided in variations that cater for different abilities. Worksheets labelled 'A' are intended to support less confident learners, worksheets labelled 'B' cater for most learners, and worksheets labelled 'C' are designed to challenge more confident learners.
- **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**

You can also find more detailed information about teaching approaches.

Video is available through the Digital Classroom.


Name
Date
Stage 2 Diagnostic check
Smallest
Greatest
Worksheet 1A: 100 square swap
Language worksheet 1A: Numbers to 100
Resource sheet 1A: Place value cards to 20
1 0
2 0

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*** *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

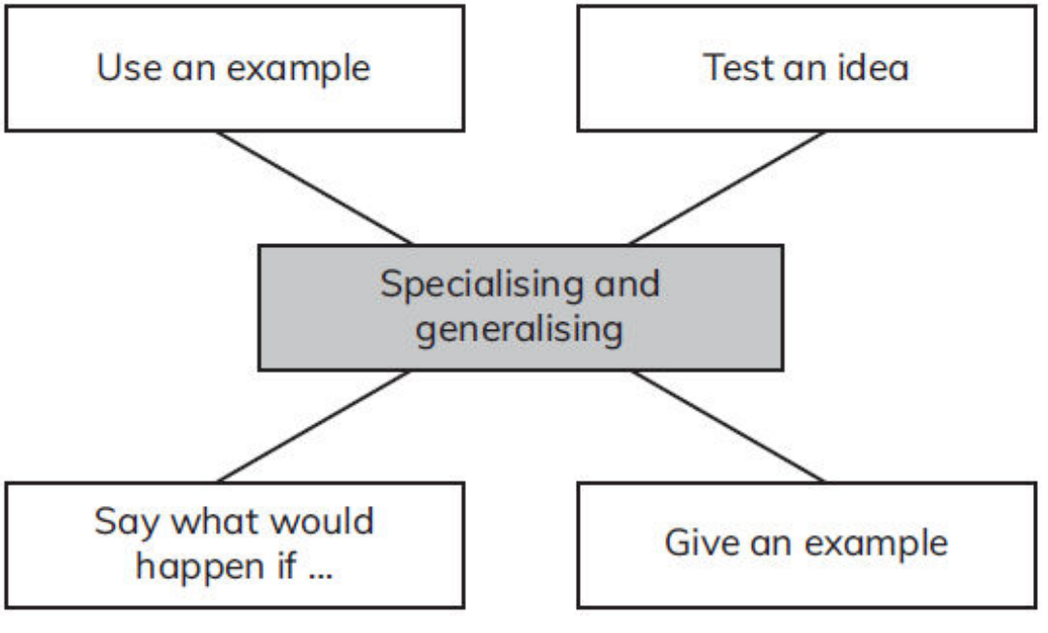
Information concerning the assessment of the Cambridge Primary Mathematics curriculum framework is available on the Cambridge Assessment International Education website: **www.cambridgeinternational.org/primary**

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
Specialising	Choosing*an example* and checking to see if it satisfies or does not satisfy specific mathematical criteria
Generalising	Recognising an underlying pattern by identifying*many* examples that satisfy the same mathematical criteria
Conjecturing	Forming mathematical questions or ideas
Convincing	Presenting evidence to*justify or challenge* a mathematical idea or solution
Characterising	Identifying and describing the mathematical properties of an object
Classifying	Organising objects into groups according to their mathematical properties
Critiquing	Comparing and evaluating mathematical ideas, representations or solutions to identify advantages and disadvantages
Improving	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 there 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 2. This section provides examples of questions that require learners to demonstrate the characteristics, along with sentence starters to help learners formulate their thoughts.

Specialising and generalising