Oxford International Primary

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Maths

Teacher's Guide

Second edition

OXFORD

Oxford International Primary

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Teacher's Guide

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OXFORD

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Introduction

The joy of learning maths

We are living in an ever-changing world, where the way we work, live, learn, communicate and relate to one another is constantly shifting. In this climate, we need to instill in our learners the skills to equip them for every eventuality so they are able to overcome challenges, adapt to change and have the best chance of success. To do this, we need to evolve beyond traditional teaching approaches and foster an environment where students can start to build lifelong learning skills for success. Students need to learn how to learn, how to problem solve, be agile and work flexibly. Going hand-in-hand with this is the development of self-awareness and mindfulness through the promotion of wellbeing to ensure students learn the socio-emotional skills to succeed.

With *Oxford International Primary Math*s, students develop lifelong learning skills as well as mathematical skills. The course promotes the development of real-world skills including financial literacy. The activities in the Student Books and Practice Books offer numerous opportunities to think creatively and develop interpersonal skills. Fundamentally, *Oxford International Primary Math*s promotes students' self-development as critical thinking and motivation are at the heart of the problem-solving approach in the course.

This series is based on the English National Curriculum Programme of Study for Primary Maths. The books for each stage meet all the learning objectives. Each lesson includes the learning objectives from the curriculum and summary of the key teaching points. A full mapping grid identifying the unit and lesson where each objective can be found is available online at https://www.oxfordowl.co.uk/

Oxford International Primary Maths: a problem-solving approach

In this second edition of *Oxford International Primary Maths*, there is a strong focus on using a problem-solving approach. Whilst mathematical facts are important, it is unlikely that simply giving students the information they need will result in them understanding the mathematics and being able to apply their learning in new problem-solving situations. This is often described as a move from 'surface learning' to 'deep learning'.

Many people remember mathematics lessons as places where the teacher stood at the front of the class writing on the board. The students copied the information down, maybe worked through a couple of examples with the teacher and then proceeded to complete a series of exercises to practise the skill that they had been taught. This can be described as a *didactic* approach and it relies on the idea that direct instruction is the appropriate strategy to adopt. The authors of this series would argue that *heuristic* strategies encourage students to explore the mathematics for themselves supported by the teacher. 'Heuristic' derives from the Greek word meaning to discover, and in mathematics learning, heuristic strategies are ones where the student engages in exploration and discovery to solve a problem. Heuristic strategies include making a visual representation of a problem, making a calculated guess or estimate, simplifying a problem or following a known method. This results in a deeper understanding for the student.

When faced with any problem in mathematics, there are recognised stages to go through in order to solve the problem, and these have been developed and agreed by many researchers. One version that summaries the problem-solving process comes from Georg Polya:

1. Understand the problem
2. Devise a plan
3. Carry out the plan
4. Check the reasoning

In following these stages, students will engage in a number of skills which support problem solving such as trial and improvement, working systematically, pattern spotting, visualising, conjecturing and generalising.

Embedding a mastery approach

In recent years, the term 'mastery' has been used in conjunction with mathematics learning. It has been drawn from teaching approaches in countries where mathematics performance is deemed to be very high. The essence of mastery is to produce students who have deep conceptual understanding and procedural fluency through learning in a collaborative and problem-solving context. Mastery learning incorporates use of manipulatives, exposure to different methods of solving a problem, dialogue and explanation.

Following a Concrete Pictorial Abstract (CPA) approach

One of the more successful approaches to learning was provided by Jerome Bruner in his model of enactive, iconic and symbolic modes. This has been developed in recent years to form the CPA approach, which stands for concrete, pictorial and abstract, each of which aligns with Bruner's modes. The concrete phase is about making use of physical manipulatives to help understand the learning, before moving to record the learning in pictorial form as an individual student. As the learning develops, students will begin to recognise how to record their learning in a more general and abstract way. The CPA approach is not necessarily sequential, and students might move between the different modes as they work through a problem.

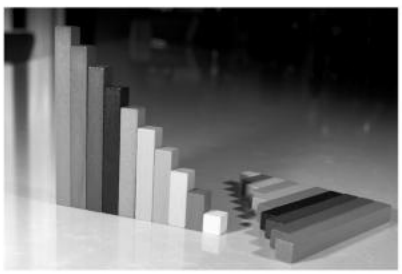
Oxford International Primary Maths and the use of manipulatives

Throughout the series, students are encouraged to use manipulatives, or concrete objects, to model addition, subtraction, multiplication and division. These manipulatives include:

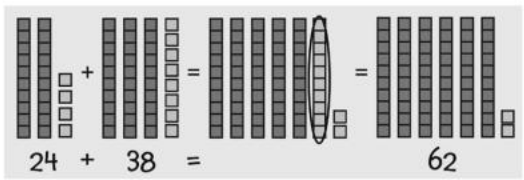
- base-ten equipment (ones-cubes, tens-rods, hundreds-flats and thousands-cubes)

- place-value counters

- number rods



Such manipulatives are used to explain to students how the written methods 'work', for example, by modelling exchanging 10 ones cubes for 1 tens rods in an addition.



Differentiation

There are several ways that you can differentiate learning in the classroom. These include:

- Differentiation by task
- Differentiation by outcome
- Differentiation by support
- Differentiation by grouping.

It has been traditional in some schools to offer up to three different levels of tasks for each lesson. This is differentiation by task. It is important that all students are exploring the same area of mathematics as they can collaborate and discuss their mathematics in a way that is not possible if students are engaged on different activities. This approach has been extensively researched and published by Jo Boaler of Stanford University, California. In her book 'The Elephant in the Classroom' (2nd Edition, 2015, Souvenir Press) she outlines projects which gave students in different schools either a differentiated approach in lessons, or lessons where everyone worked on the same task. Where all abilities worked on the same task, every student made and sustained 'better than expected' progress, and performed better on statutory tests and exams. The Education Endowment Foundation teacher's toolkit suggests that collaborative learning can result in a five-month acceleration in student learning. (See https://educationendowmentfoundation.org.uk/resources/teaching-learning-toolkit .)

The expectation in this series is that all students will be offered the same starting point. The activities are carefully designed to be accessible to all students in your class and the teacher's notes for the activity offer differentiated outcomes for students. It is also important that you offer differentiated support to different students. You will mainly do this through the sort of questioning that you engage in and support you offer. You will ask challenging questions and supporting questions to help all students access the task. For example, when engaging in a simple counting activity with some students you may model the action of counting by placing a finger on each object as you count and emphasise the last number you say to model that the last number you say gives the number of objects in the set. For other students engaged in the same activity you may ask them to compare two sets, or to find one more or one less than the set they are counting.

Grouping students to promote a growth mindset

When engaging in learning mathematics, it is expected that you will use a variety of student groupings. This may be a change for some teachers who have previously grouped students by prior attainment in their classroom. Research has shown that grouping students 'by ability' which usually means grouping students using test results, can have a negative impact on their future attainment. It is more effective to use a range of ways of grouping students. You will decide on the most appropriate way of grouping students depending on the activity. You are also given advice in the teacher's notes. It is important that the teacher is active in deciding which form of grouping is appropriate. It is also important that students learn how to operate in a range of different groups and with a range of different students so that they get used to working in a variety of ways and with different people.

There are three main ways of grouping students:

- Friendship
- Ability/Prior experience
- Mixed attainment.

Friendship groups, are most appropriate for activities in which the students have been given some element of choice. Perhaps they are carrying out some research for a data handling project or exploring data on animals to develop their understanding of measurement. This grouping is the default if teachers do not actively group students.

Ability groups, or groups based on the prior experience of students, may be helpful if the lesson requires a very specific prior knowledge. You can group students who you know have this knowledge together as they can then work with minimal teacher guidance which then allows you to focus on groups who need additional support.

Mixed-attainment groups are the grouping that is encouraged for the majority of the activities. This is also the form of grouping favoured by those following a mastery approach. Working in collaborative, all-attainment groups also supports students well-being and promotes a growth mindset. , as described in research by Carol Dweck. She found that students who were put in ability groupings tended to stay in those groupings throughout their school life, and regard themselves as having a fixed ability that could not be changed. This has dire consequences for students in middle or lower sets. By using mixed ability groupings, all students can develop a growth mindset which enables them to believe they can learn and improve, whatever their starting point. (Dweck, C., 2007, The Perils and Promise of Praise, Educational Leadership, October 2007, 65(2),, 34-39). A growth mindset is promoted when students do not feel that their future success is predicated on prior achievement. This kind of grouping is particularly helpful for students new to English. Mixed-attainment groups allow students who are less confident in English to hear their more confident peers using mathematical vocabulary. Research has shown that mixed-attainment groups benefit both high attainers, who become more secure in their mathematics knowledge through explaining their thinking to peers, and to those less secure in their mathematical knowledge as peer teaching has been shown to be effective.

Whatever form of grouping you choose, it is helpful to assign roles to individuals in the group. Some teachers use 'role cards' to remind members of the group of the role they should play. Examples of these roles are:

- Leader: You should make sure everyone has a chance to speak and focus the discussion around the task.
- Time keeper: You should encourage the group to stay on task. Announce when the time is half way through and when time is nearly up.
- Recorder: You should write down the group member's ideas or draw a collective graphic. You will write on the board during the presentation.
- Presenter: You will present the groups findings to the whole class at the end of the session.
- Resource organiser: You will make sure the group has all the resources they need during the task.

Assessment

Assessment is the process of establishing how each student is progressing and what they have achieved, or a means of measuring their learning. Assessment is usually carried out in two main ways – assessment of learning and assessment for learning.

Assessment of learning is sometimes called summative assessment, and takes place at the end of a lesson, a unit, a term or even a year. It measures what students know at that point as a summary of their learning to that point. In O*xford International Primary Maths*, summative assessment opportunities are provided in the Review lesson at the end of each unit in the Student Book, whilst half-termly summative assessment opportunities are provided through printable resources, available online.

Assessment for learning is an approach brought to prominence by Paul Black and Dylan Wiliam and is based on the notion that students have a full, clear sense of what they are learning, where they have reached in their learning and what they need to do to improve further. It is carried out during lessons and gives teachers continuous data on each student's learning, as well as allowing students to track their own learning, which provides greater motivation. (Black, P., Harrison, C., Lee, C., Marshall, B., and Wiliam, D. (2004) Inside the Black Box: Assessment for learning in the classroom. Phi Delta Kappan, Vol. 86 No. 1 pp8-21)

It is suggested that there are five key strategies for assessment for learning. These are outlined below with suggestions of how you can do this in your classroom.

1 Being clear about learning objectives and success criteria with the students.

Each activity has at least one learning objective. At the beginning of a lesson, share the activity's learning objective with the students. This should be more than simply stating the objective. You should make sure that students understand the objective and how you will measure success. For example, you might say: *I know that you can all count 10 objects* and all count to 10 as a class. Then you point to '20' on a number line and ask: *Does anyone know what this number is?* If a student knows it is 20 praise them, if no-one knows, tell them it is twenty and say: *By the end of the lesson I will be able to listen to you count to twenty.*

2 Planning student discussions that give you evidence of their learning.

Every activity plan in the Teacher's Guide offers the opportunity for small-group or whole-class discussion. There are also examples of probing questions that you can ask to assess the student's current understanding. For example, if a group has been counting two sets of objects you can ask: *Were there more or less in the second group? How do you know?*

3 Giving students feedback that helps them move forward.

This allows students to know whether or not they are meeting the success criteria and what they can do next to move their learning on. Developing the example above, if a group has been comparing two sets and understands the concept of 'more' and 'less' you could ask them to make sets that are 'one more' and 'one less' or even 'two more, and, two less'.

4 Activating students to act as instructional resources for each other.

Collaborative group work in mixed-attainment groups, as described by Jo Boaler in her research (see under Differentiation earlier), gives students the opportunity to operate both as learners and teachers, with peer learning being highly effective. Not only is understanding of the mathematics enhanced, but students can support each other in assessing their progress.

5 Activating students as owners of their own learning.

The key point here is to listen carefully to the students and adapt your questioning to support individual development and to follow individual interests.

Questioning is key

The most skilled mathematics teachers can ask open questions to elicit students' current understandings. Skilful open questioning also allows students to articulate their current understanding carefully and though this process either consolidate their understanding or come to realise where they have made a mistake. The list below offers a series of open questions that can be used whatever mathematics you are teaching:

- *How are these the same/different?*
- *About how many/how long/many more …. do you think there will be?*
- *What would happen if …?*
- *How else could you have done that?*
- *Why did you ….?*
- *How did you …?*
- *How do you know that is correct?*

If you want students to check their solutions and consolidate their learning it is helpful to ask them to explain how they reached their solution to a friend. Similarly, to support students in reflecting on their learning you might ask:

- *What mathematics did you use to solve the problem?*
- *What new mathematics did you learn?*
- *What key words did you use?*
- *What was the most challenging part of the activity?*
- *What did you do when you got stuck?*
- *What other questions could you ask?*
- *Did this remind you of any other areas of mathematics?*

In *Oxford International Primary Maths*, there is an opportunity to ask these reflective questions, and for students to reflect on their learning, at the end of each unit in the Review lesson of the Practice Book.

Word problems

Word problems are useful as an assessment of children's understanding of the correct mathematics to use in any given situation. In *Oxford International Primary Maths* word problems are included throughout the units and on every Student Book Review page as part of the end-of-unit assessment. Many teachers find teaching word problems a challenge. This area is particularly challenging for students with a limited English vocabulary as word problems are tightly bound to linguistic ability. We have to decode and understand what the problem is asking us to do before we can begin to apply our mathematical knowledge. Some teachers have found the following acronym helpful when working with students on solving word problems.

R: Read the problem carefully.

U: Understand what the problem is asking you to do.

C: Choose the mathematics or arithmetical operations that you need to use to solve the problem.

S: Solve the problem.

A: Answer the problem.

C: Check the answer is accurate and reasonable.

It is often helpful for students to underline key facts and write down the operations they are going to use before they solve the problem. For example:

> Tony rode his bicycle 7 miles to school with his friend. On his way home he took a short cut which was only 5 miles. How far did he cycle altogether?
>
> *This will be an addition calculation.*

It is a useful activity for students to annotate word problems and write down the operation(s) they will use without carrying out the calculation as this focuses on the skill of understanding the problem and choosing the operations appropriately.

Another activity which helps students becomes skilled at solving word problems is asking them to write their own word problems based on a picture or a set of objects. For example:

- How many black cubes are there? (3)
- Two friends took three cubes each. How many were left? (2)
- If I take out the black cubes, how many are left? (5)
- If I share the cubes equally between two people, how many do they each get? (4)

Wellbeing and *Oxford International Primary Maths*

It is thought that children learn more and feel more connected to their learning when they are active in their lessons. OIPM has active learning at its heart. Most lessons start with a whole-class session which usually includes

a range of physical or active activites. You will see this signified by a star jump icon in the Teacher Guide.

Many adults and children have felt anxious about their learning of mathematics at some stage. This anxiety is reduced by working collaboratively in all-attainment groups. There is also a reflective session at the end of each lesson and the formative assessment activity in the Practice Book asks students to reflect on their learning across the unit.

Well-being is also supported by effective questioning to support and stretch students and by planning group work carefully. These areas have already been discussed above.

Language Support

The challenges

Ministries of Education at both local and national level are increasingly adopting the policy of English Medium Instruction (EMI), for either one or two subjects or across the whole curriculum. The rationale for doing so varies according to the local context, but improving the levels of achievement in English is an important factor.

In international schools an additional reason is likely to be that students do not share a mother tongue with each other or perhaps the teacher. English is, therefore, chosen as the medium for instruction so that all students are in the same position and to provide the opportunity to develop proficiency in an international language.

This does not mean that the mathematics teacher is now being asked to replace the English teacher, or to have the same skills or knowledge of English (though in many primary schools one teacher may indeed teach both). What it does mean, however, is that the mathematics teacher has to view his/her role differently: he/she has to become much more language aware. It is this recognition of the need to ensure that the delivery of the content is not negatively impacted by the use of the second language that informs the planning and methodology of EMI.

This raises significant challenges, including:

- the teacher's knowledge of English
- students' level of English (which may vary considerably in international schools)
- resources which provide appropriate language support
- assessment tools which ensure that it is the content and not the language which is being tested
- differentiation which acknowledges different levels of proficiency in both language and content.

Meeting the challenges positively

Perhaps lack of confidence in their own English proficiency is one of the most common concerns among teachers. However, while it is a factor, success in EMI is not necessarily linked to the teachers' proficiency in English. Teachers who have English as their mother tongue may well lack the sensitivity to, or awareness of, the language that a non-native speaker has acquired through learning and studying the second language. Developing this awareness and demonstrating it in both materials and method is the key to effective EMI.

Classroom language/Teacher Talk

Often non-native-speaker teachers are more concerned about their ability to run and manage the whole class in English than they are about the actual teaching of the mathematics concepts, as the resources or textbook should help them with the latter. However, this use of English in the class is very important as it provides exposure to the second language, which plays a valuable role in language acquisition. It is also true that the teacher talk for purposes such as checking attendance and collecting homework does not have to be totally accurate or accessible to the students. When teaching the mathematics concepts, however, it is essential that the Teacher Talk is comprehensible. Some basic strategies to ensure this include:

- simplification of your language
- use short, simple sentences and project your voice
- paraphrase (say in a different way) as necessary
- use visuals, write or draw on the board, gestures and body language to clarify meaning
- repeat as necessary
- plan before the lesson
- prepare clear, simple instructions and check understanding.

Creating a language-rich environment

Primary teachers often excel at providing a colourful and engaging physical environment for students. In the EMI classroom, this becomes even more important. Posters, 'Word walls', lists of key structures, students' work, English signs and notices all provide a backdrop which provides the opportunity for language exposure and language acquisition.

Planning

When planning, look carefully at each stage of the unit and identify what the language demands are. This means thinking about what language students will need to understand or produce, and deciding how best to scaffold the learning to ensure that language does not become an obstacle to understanding the concept. This involves providing language support and goes beyond the familiar strategy of identifying key vocabulary.

Support for listening and reading

Listening and reading are receptive skills, requiring understanding rather than production of language. If you are asking your students to listen to or read texts in English, ask yourself the following questions when you are planning the unit:

- Do I need to teach any vocabulary before they listen/read?
- How can I prepare them for the content of the text so that they are not listening 'cold'?

- Can I provide visual support to help them understand the key content?
- How many times should I ask them to read/listen?
- What simple question can I set before they listen/read for the first time to focus their attention?
- How can I check more detailed understanding of the text? Can I use a graphic organiser (e.g. tables, charts and diagrams) or gap-fill task to reduce the language demands?
- Do I need to differentiate the task for those students who find reading/listening difficult?
- Could I make the tasks interactive (e.g. jigsaw reading, when students access different information before coming together, and information share)?
- How am I going to check their answers and give feedback?

Support for speaking and writing

Speaking and writing are productive skills because students doing these need to produce language. They are different to the receptive skills of listening and reading where students receive language from other sources. These skills may require more input from the teacher.

When you plan to use a task which requires students to *produce* English (speak or write), you need to think about how to help them do this.

This means that you have to think in detail about what language the task requires (Language Demands, LD) and what strategies you will use to help them use English to perform the task (Language Support, LS).

You need to ask yourself the following questions:

- What *vocabulary* does the task require? (LD)
- Do I need to teach this before they start? How? (LS)
- What *phrases/sentences* will they need? Think about the language for learning mathematics, e.g. predicting and comparing. What structures do they need for these language functions? (LD)
- Will they be able to produce these sentences or should I provide some *scaffolding* [e.g. sentence starters/sentence frames/gapped sentences (see below)]? (LS)

  A square has _____ sides.

  A triangle has _____ sides.

  A quadrilateral has _____ sides.

  A pentagon has _____ sides.
- While I am *monitoring* this task is there any way I can provide further support for their use of English (especially for the less-confident students)? (LS)
- What language will students need to use at the *feedback* stage (e.g. when they present their task)? Do I need to scaffold this? (LD, LS)

Teaching vocabulary and structures

Vocabulary

Learning the key mathematics vocabulary is central to EMI and 'learning' means more than simply understanding the meaning. Knowing a word also involves being able to *pronounce* it accurately and *use* it appropriately. Below is a list of strategies which could be useful:

- Avoid writing the list of vocabulary on the board at the start of the unit and 'explaining' it. The vocabulary should be introduced as and when it arises in the unit. Word boxes are provided on each page of the Student Books and Practice Books with the key words for the lesson. This helps students associate the word or phrase with the concept and context.
- Record the vocabulary clearly on the board when you first introduce it in the lesson, and check that you are confident with the pronunciation and spelling. before the lesson. If you think students may struggle to pronounce words, decide how best to model this pronunciation.
- Give students a chance to say the word once they have understood it. The most efficient way to do this is through repetition drilling.
- Use visuals whenever possible to reinforce students' understanding of the word.
- Ensure students are recording the vocabulary systematically in their glossaries, at the back of the Student Books, and, if possible, use a 'Word wall' which lists the vocabulary under unit/topic headings.
- Remember to use and revise the vocabulary.

Structures

In order for students to talk or write about their mathematics, they will need to go beyond vocabulary: they will also need to use those phrases and sentence frames which a particular task requires.

For example, they may need the following expressions in mathematics:

X is the same as Y.

The sides are the same length.

The next number in the sequence.

I predict that X will happen.

If X happens, then Y happens.

The next step is …

You need to build up these banks of common mathematics phrases and encourage students to record them. This is an important part of identifying the language demands and providing the necessary support. The teacher does not have to focus on grammar here as the language can be taught as phrases rather than specific grammatical structures.

Using this Teacher's Guide

Every unit of the Teacher's Guide begins with some useful background information. This includes:

The Big idea: The main mathematical concept covered in the unit.

Look out for: Tricky concepts that may need explaining prior to any learning taking place.

Common misconceptions: Common errors that students make or misunderstandings that students have. This section offers advice on how to deal with these misconceptions.

Key vocabulary: The key mathematical words used in the unit.

Coverage in lessons: The English National Curriculum objectives covered in the unit.

Every lesson in the Student Book and Practice Book has corresponding lesson notes in the Teacher's Guide. Each comprehensive set of lesson notes includes:

A mini reproduction: The relevant pages from the Student Book.

Global skills: These are the skills that aim to foster a classroom environment where students develop the skills for success. The skills are: *Creative skills* where students are problem solving, investigating or exploring new maths content; *Real-world skills* where students are taking part in research, or presenting and interpreting information, or if they are dealing with money and developing their financial literacy; *Interpersonal skills* where students are practising their teamwork and communication, often through working in pairs or larger groups; and *Self-development skills* where students have the opportunity to reflect on their learning and talk about what went well and what they are still uncertain about.

The key vocabulary and resources: A list of key vocabulary used in the lesson and the concrete resources required for the activity.

Language support: A range of strategies, including card sorts and card games, word walls, team games to define or explain words, use of similar words to explain meaning and exploration of the origins of words.

The key principles underpinning the language support are:

Words should be introduced and explained carefully.

The word should be explained in context.

Repetition is vital.

Words should be linked to pictures or actions.

Students should develop their own glossaries.

The learning of mathematics vocabulary should be fun.

Language should not be a barrier to effective learning of mathematics.

Detailed lesson notes: Comprehensive lesson notes, including an introduction activity and main activity.

These notes refer to the Student Book and Practice Book, where relevant. The notes include probing questions for formative assessment, which are italicised. Icons are used to suggest the groupings that should be used at each point of the activity (whole class, small group, pairs, individual). A separate 'star-jump' icon indicates that the activities give students an opportunity for physical movement (standing up, jumping, moving around) rather than doing activities sitting down.

Differentiation: The Teacher's Guide offers strategies for you to *support* those students who may have difficulty accessing the task; to *consolidate* the learning for those students who need a little more practice; and to *extend* the learning for those who need more challenge.

The Teacher's Guide also offers differentiated outcomes. These outcomes are listed in the form of:

All students

Most students

Some students

Stretch zone: Each activity in both the Student Book and the Practice Book has a stretch zone question to support deeper learning. The Teacher's Guide provides additional notes on these activities.

Reflection time: Suggestions on how to bring the class back together to reflect on the learning and share ideas.

Answers: Answers to all the Student Book and Practice Book activities are provided.

Review pages: The Teacher's Guide provides notes on the Review pages of the Student Book (summative assessment), including answers to the assessment questions, and the Practice Book (a formative, reflective review).

Digital resources: Where it is appropriate to use digital resources in a lesson, such as sharing the interactive Student eBook page on an interactive whiteboard (IWB), suggestions are embedded in the lesson plan.

Resources sheets: these photocopiable resources can be used with some of the main activities. They are referenced in the resources section of the lesson plan and are available from the *Oxford International Primary Maths* page on the Oxford Owl website (www.oxfordowl.co.uk).

Tour of a typical unit

Engage lesson

The 'Big question' provides a discussion stimulus about the key idea of the unit.

1 Numbers and counting

How do we use numbers?

In this unit you will:

- count, read and write numbers to 100
- count in twos, fives and tens
- know and make numbers using objects and pictures
- use words such as equal to, more than, less than (fewer), most, least
- read and write numbers from 1 to 20 in words.

Learning objectives are stated clearly at the beginning of every unit.

Engage

Which numbers can you see in the classroom?

Which numbers can you see on your way to school?

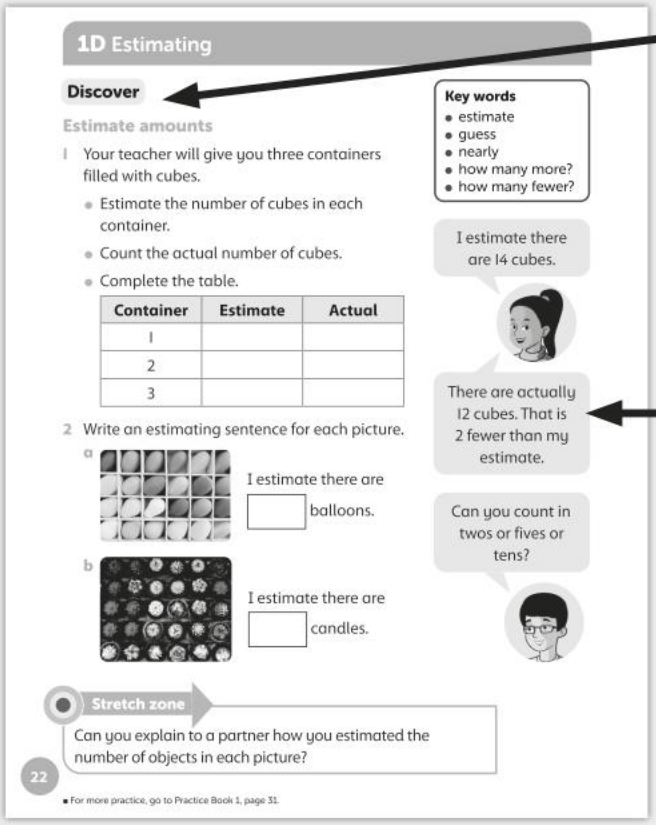
What is the biggest number you have ever seen?

Further questions allow students to develop communication skills.

6

The Engage spread is bright and colourful, with artwork or photos to spark interest in young students and provide discussion points.

Student Book Discover and Explore



Each Discover lesson introduces mathematics skills and concepts. These lessons often involve a practical activity or use of concrete resources.

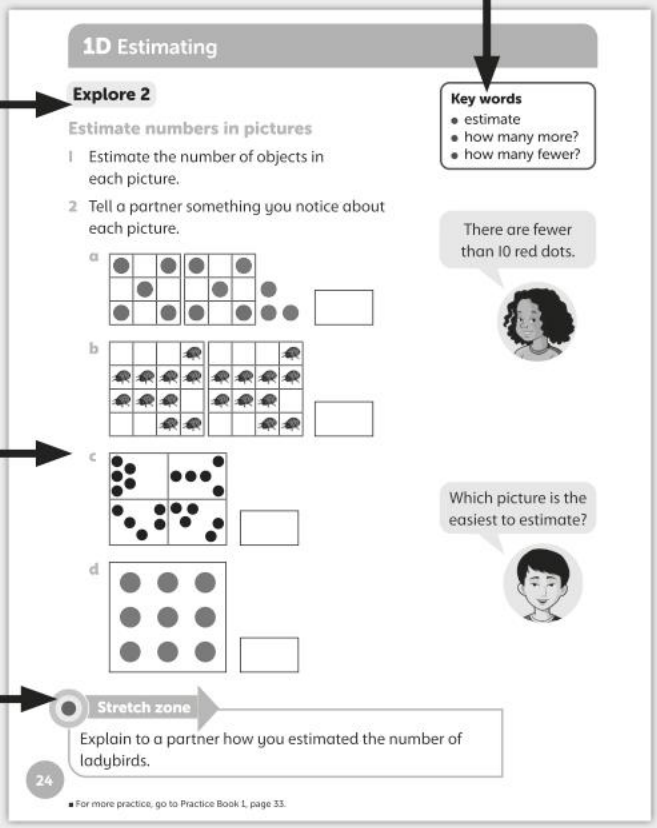
The speech bubbles provide useful hints, probing questions, or examples of how to complete a question. These help students who need a little extra support with the language or the mathematics.

The key words for the lesson are included on each page so they can be introduced in the context in which they are used.

Each Explore lesson allows students to practise the skills they learned in the Discover lesson. In these lessons, students are more likely to work independently or in pairs.

Step-by-step instructions guide students through the activities they will undertake.

Extension activities provide challenge for the most confident students.



Connect lesson

The Connect lesson makes links between the different areas of mathematics in the unit.

1 Numbers and counting

Connect

Make a number poster

Work as a group.

1 Collect some magazines. Talk about which magazines might have numbers in them. What do the numbers tell us?

Connect activities are often set in real-life contexts to make the link between mathematics and the real world.

2 Cut out pictures that have numbers.

3 Make a poster to display in class.

4 Talk in your group about the numbers you have found.

Stretch zone

Take photographs of numbers on the way home from school. What job are the numbers doing? Explain your ideas to a partner.

A further extension activity provides a challenge for the most confident students.

We use numbers to count or to say how many of something there are.

The 'Big idea' sums up what students have discovered in the unit. It answers the Big question on the Engage page.

What is the biggest number on your poster?

What is the smallest number on your poster?

Review lesson

Students' progress is assessed through the questions and tasks at the end of each unit. In Student Books 2 and 6, these questions reflect the style of the SATs (national Standard Assessment Tests).

1 Numbers and counting

Review

1 Draw the beads and write the numbers in the spaces.

Beads	Numbers	Words
	5	
		sixteen
		
		three
		
	12	
		nineteen
	1	
		four
	14	
		twenty

2 Samir has a bracelet with 19 beads. Lina's bracelet has one more bead than Samir's. How many beads are on Lina's bracelet? ☐

Celine's bracelet has 10 more beads than Lina's. How many beads are on Celine's bracelet? ☐

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A word problem is always included on the Review page.

Practice Book Discover and Explore

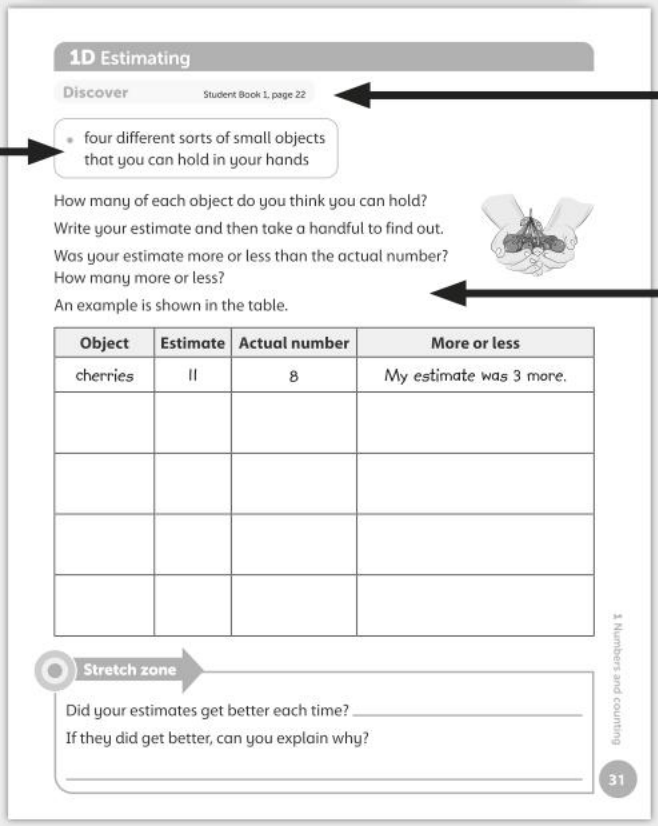
Practice Book activities can be completed in the school lesson or as homework.

Most of the Discover and Explore lessons in the Student Book have a corresponding page in the Practice Book. These activities provide opportunities for students to consolidate and deepen their learning.

Step-by-step instructions guide students through the activities they will undertake.

If students require concrete resources, these are listed in a box at the top of the page. This is particularly useful if students are completing the activities at home.

Extension activities provide challenge for the most confident students.



1D Estimating

Discover Student Book 1, page 22

- four different sorts of small objects that you can hold in your hands

How many of each object do you think you can hold?
Write your estimate and then take a handful to find out.
Was your estimate more or less than the actual number?
How many more or less?
An example is shown in the table.

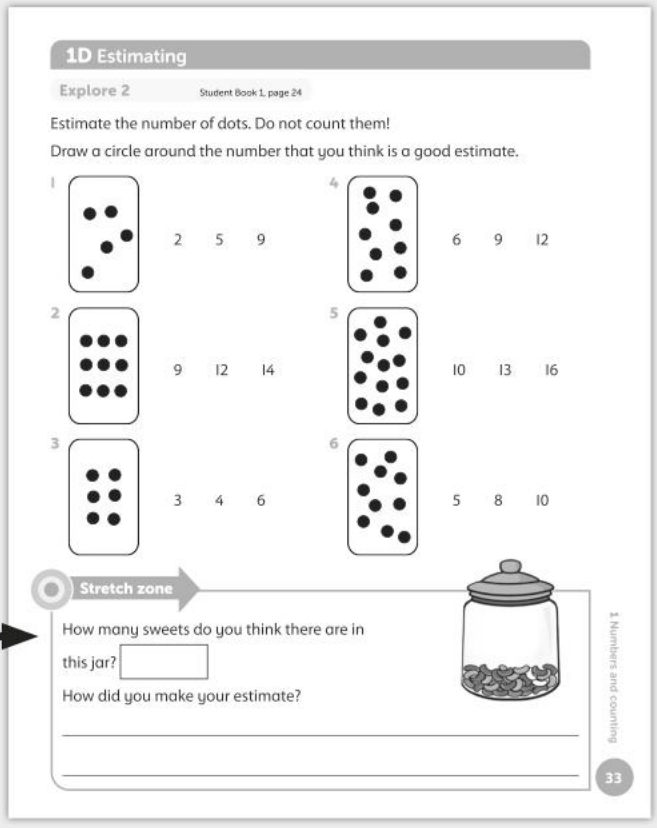
Object	Estimate	Actual number	More or less
cherries	11	8	My estimate was 3 more.

Stretch zone

Did your estimates get better each time? _____
If they did get better, can you explain why?

1 Numbers and counting

31



1D Estimating

Explore 2 Student Book 1, page 24

Estimate the number of dots. Do not count them!
Draw a circle around the number that you think is a good estimate.

1 2 5 9

2 9 12 14

3 3 4 6

4 6 9 12

5 10 13 16

6 5 8 10

Stretch zone

How many sweets do you think there are in this jar? ☐

How did you make your estimate?

_____

_____

1 Numbers and counting

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Practice Book Review

Each Review page in the Practice Book includes a reminder of all the topics learned in the unit.

1 Numbers and counting

Review

1 Draw a face next to each bubble to show how you feel about your learning.

counting objects

reading and writing numbers

counting in twos, fives and tens

estimating quantities

2 Tell a partner about one thing you did really well in this unit.

3 Draw or write about things you found easy, challenging or really hard.

Self-assessment activities help students to reflect on their learning.

What work did you feel confident doing?

What work was challenging?

Is there any work you might need some extra help with?

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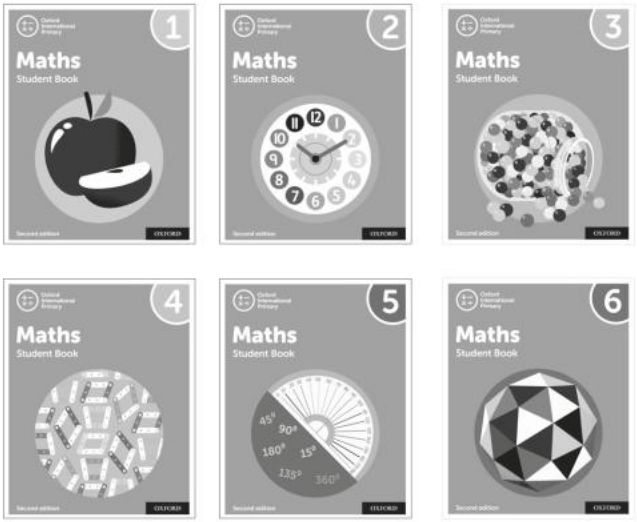
Component overview

The Student Books

The Student Books are write-in textbooks for students to read and use. There are six Student Books: one for each school year at primary school. The Student Books introduce learning through a mixture of practical, discussion and independent activities.

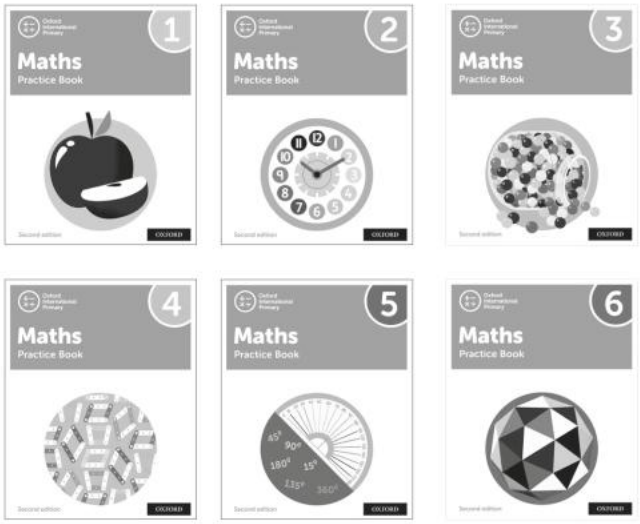
Student Book	Typical student age range
Student Book 1	Age 5–6
Student Book 2	Age 6–7
Student Book 3	Age 7–8
Student Book 4	Age 8–9
Student Book 5	Age 9–10
Student Book 6	Age 10–11



The Practice Books

The Practice Books are write-in workbooks for students to read and use. There are six Practice Books: one for each school year at primary school. The Practice Books provide deeper learning opportunities through a range of independent activities, which can be completed in school or at home.

Practice Book	Typical student age range
Practice Book 1	Age 5–6
Practice Book 2	Age 6–7
Practice Book 3	Age 7–8
Practice Book 4	Age 8–9
Practice Book 5	Age 9–10
Practice Book 6	Age 10–11



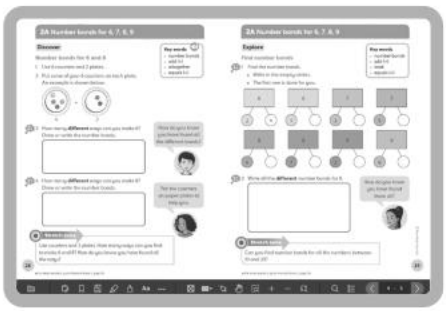
The Teacher's Guides

There are six Teacher's Guides: one for each school year at primary school. Each Teacher's Guide includes:

- An introduction with advice about delivering mathematics in primary schools using *Oxford International Primary Mathematics*.
- A unit overview, giving advice on teaching each unit, including common misconceptions and how to deal with them.
- A lesson plan for every lesson in the Student Book and corresponding pages in the Practice Book.
- Model answers to each question in the Student Book and Practice Book.

Digital resources

Interactive eBooks



For the teacher

Teachers can access the Student Books, Practice Books and Teacher's Guides online in eBook format, on the Oxford Owl website (www.oxfordowl.co.uk).

The enhanced eBooks show the course content on screen, making it easier for teachers to deliver engaging lessons.

For the students

Teachers can allocate an eBook version of the Students Books to the students for use at home. The Student eBooks include interactive activities, worksheets and audio of all the key vocabulary,

Assessment resources

The downloadable assessment materials offer you additional opportunities to assess students' progress. The materials include:

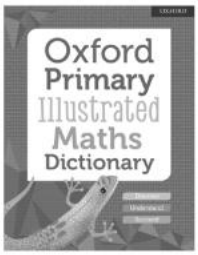
- end-of-unit summative assessment
- end-of-year summative assessment.

Every test comes with everything you need to assess and record progress including:

- Answers
- Mark schemes and guidance on assessment

Oxford Primary Illustrated Maths Dictionary

The *Oxford Primary Illustrated Maths Dictionary* gives comprehensive coverage of the key maths terminology children use in the course. Entries are in alphabetical order, and each includes a clear and straightforward definition along with a fun and informative colour illustration or diagram to help explain the meaning. The dictionary is suitable for Students with English as an Additional Language.



The curriculum

The Oxford International Curriculum offers a new approach to teaching and learning focused on wellbeing, which places joy at the heart of the curriculum and develops the global skills students need for their future academic, personal and career success.

Through six subjects – English, Maths, Science, Computing, Wellbeing and Global Skills Projects – the Oxford International Curriculum offers a coherent and holistic approach to ensure continuity and progression across every student's educational journey, equipping them with the skills to shape their own future. Through this approach, we can help your students discover the joy of learning and develop the global skills they need to thrive in a changing world.

1 Numbers and counting

Overview

Big idea

Number sense refers to a person's general understanding of number and operations. In order to develop a good sense of numbers, there are three key elements, which need to be mastered:

- Place value – an understanding of numbers expressed in a base system, usually base 10, and an ability to think of them in more than one way.
- Concepts that involve understanding the operations (+, −, × and ÷), what each of the operations are and what they do to the numbers, and an ability to write and interpret symbolic expressions, using the operation symbols, e.g. 5 + 9 or 5 − 3.
- Knowing number facts (mental strategies) using addition and subtraction to at least 20.

Use these strategies to enable students to develop a good sense of number:

- Speaking: encourage students to count aloud, explain their solutions and use correct mathematical language.
- Listening: listen for patterns when counting to and from larger numbers, for example skip counting (e.g. leaving out all even numbers when counting).
- Reading: read numbers in different contexts and estimate how many without counting.
- Writing: begin with informal, leading to more formal writing of numbers as numerals and in words.

Look out for

- **Students who are confused if the first number is called 'zero', the second 'one', the third 'two' and so on**. Show numbers on a number line that has illustrations showing the value of the number. Zero will have none, 1 has one and so on. Students then have a visual model of each quantity increasing by 1. Don't say to students that 1 is the first number.
- **Students who are confused between a number track used for ordering numbers and a number line used for calculating.** A number track has the number in a space. A number line has the number at its own unique place on the line.
- **Students who do not know that the last number in a count is the total.** Count using practical materials such as counters or cubes. When the count has finished, ask *How many altogether?*
- **Students who have difficulty with one-to-one matching,** e.g. saying '1, 2, 3, 4, 5' when there are only three objects present. As objects are counted, drop them in a bowl or bucket so that they cannot be seen. Slow the counting down to match the objects.

Possible misconceptions

- **When counting along a number line or track, students may count the number/space that they are already on**. Use a floor number line that involves students counting along the line by making jumps backwards and forwards.

Key vocabulary

- number, zero, one, two, three, ..., twenty, count
- ones, tens, cubes, tens-rods, total
- more, less, fewer, more than, less than, fewer than, most, fewest, smallest, largest, 1/2/5/10 more, 1/2/5/10 less
- count on, count back, order, steps, multiple
- estimate, guess, actual, predict, pattern

Coverage in lessons

Learning focus	**Learning outcomes** (the ENC objectives)
Counting objects	Count to and across 100, forwards and backwards, beginning with 0 or 1, or from any given number.
Reading and writing numbers	Count, read and write numbers to 100 in numerals.
Counting on and back	Given a number, identify 1 more and 1 less. Count in multiples of 2s and 10s.
Estimating	Identify and represent numbers using objects and pictorial representations including the number line, and use the language of: equal to, more than, less than (fewer), most, least.

1 Numbers and counting

Engage Student Book page 6

Big question

- How do we use numbers?

Global skills

- **Creative skills:** exploring
- **Real-world skills:** interpreting information
- **Interpersonal skills:** communication / teamwork
- **Self-development skills:** reflecting on learning

Key vocabulary

- number, zero, one, two, three, ..., twenty

Resources

- a range of pictures that contain numbers (see Student Book page 1 for ideas)
- number cards 1–20
- mini whiteboards and pens

Language support

Check that students can use the correct number names. Repeat number names to model the correct pronunciation, for example, emphasing the difference between teens and multiples of ten, e.g. four, fourteen and forty. Carry out repeated activities that involve counting out loud as a group.

Introductory activity

If you have access to an interactive whiteboard (IWB), you could display the Student Book Engage page and discuss the Big idea of the unit with students. Ask students to talk about the pictures in the Student Book and to relate them to any experiences of numbers they have had at home, at school or when out with the family.

Main activity

Ask students to share some of their ideas with the rest of the class. To encourage discussion use questions such as: *What numbers do you see when you are at home? What do you see when you go out? What is the same? What is different?*

Choose one of the pictures to discuss. *Where do you think this is? Have you seen numbers like these?*

Choose a picture. Describe it to a partner. Can they find the picture you chose?

Encourage specific mathematical language and vocabulary during discussions, e.g. rather than 'I can see a door' students should say 'I can see a door with a number 24'. Support the vocabulary with pictures, diagrams or whole-class participation in a physical activity to demonstrate the words/numbers (e.g. *hold up four fingers, point to two eyes, show me two feet*).

Ask students which numbers they can count up to. Model counting up to 100 with the whole class and counting backwards from 20.

Differentiation

Supporting: Some students may need support by counting with you – place their finger on each object as you count. Ask them to repeat the numbers after you say them. Remind students of the number names for single-digit numbers.

Consolidating: Allow students to count on their own, only counting with them if they forget numbers or miscount. If they make an error in counting, check with them by counting together. Remind students of the number names for 2-digit numbers.

Extending: Ask students to count forwards and backwards starting at 10 and 20.

Stretch zone: *Clapping maths:* Place a set of number cards 1–20 face down. Ask students to take turns to turn over and clap the number they have. Other students count in their heads and write the number on a whiteboard.

Reflection time

Give pairs a number picture that you have brought into the class. Use the think/pair/share technique. That is, each student thinks quietly for one minute, shares their ideas with a talk partner for two minutes and then some pairs share their discussion with the whole class.

1A Counting objects

Discover Student Book page 7 • Practice Book page 16

Specific learning focus

- Count up to 20 objects, understanding that the total number of objects does not change when the objects are rearranged.

Global skills

- **Creative skills:** problem solving / exploring
- **Real-world skills:** presenting information
- **Interpersonal skills:** communication / teamwork

Key vocabulary

- count, more, less, fewer

Resources

- materials for counting: cubes, coins, buttons, beads
- tray, cloth, small bucket, small open boxes, ten coins

Language support

Work with individuals during the activity to model the correct pronunciation of the numbers. Say the number first and ask the student to repeat the number.

Introductory activity

Put a number of different objects under a cloth on a tray.

Ask a student to feel under the cloth and guess how many objects there are. Remove the cloth and **count** together as a class by picking up each object as you say its number name and dropping it into a small bucket.

Put a different number of objects under the cloth and choose a different student to repeat the activity. Repeat this activity five times. After each count, ask the group: *Were there **more** or **fewer** objects that time?* For the last two repeats of the activity make the objects all the same.

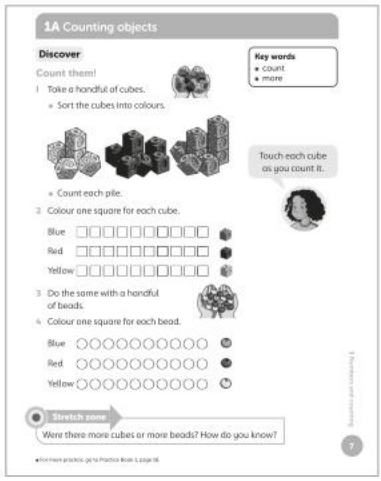
Main activity

Give each student a small box. Ask them to collect a set of their favourite counting things to put in it. Ask them to count how many they have. Then ask them to take some of the items out. *How many do you have on your table? How many do you still have in your box? If you put them all back in the box again, how many will you have?*

Ask students to replace some of the items again Repeat the questions above. Finally, replace all the items and ask them to count again. *Are there the same number now as there were at the beginning?*

Count ten coins as you drop them into a bucket. Ask how many there are to begin with, then how many there are if you take one out and put it on the table. Always refer back to the total number of coins in the bucket and on the table (always ten).

When students have completed this practical activity, they can complete the activities on page 7 in the Student Book. Put students in pairs and give them a selection of three different colours of cubes and beads (10 of each: ideally, blue, red and yellow to match the Student Book). Model how to take a handful and sort the cubes by colour, reviewing each colour name. Each student should count and sort their cubes out loud for their partner to check.


1A Counting objects

Discover

Count them!

1 Take a handful of cubes.

• Sort the cubes into colours.

Key words
• count
• more

Touch each cube as you count it.

• Count each pile.

2 Colour one square for each cube.

Blue

Red

Yellow

3 Do the same with a handful of beads.

4 Colour one square for each bead.

Blue

Red

Yellow

Stretch zone

Were there more cubes or more beads? How do you know?

7

Differentiation

Supporting: Ask students to count with you – place their finger on each object as you count.

Consolidating: Allow students to count on their own, only counting with them if they forget numbers or miscount. If they make an error in counting, check with them by counting together.

Extending: Ask students to count how many more there are in one set by comparing two sets. Line the sets up with objects next to each other so that students can see the difference.

Stretch zone: Ask students to compare the numbers of cubes and beads from the Student Book activity. How many more ...? Ask students to explain how they know if there were more cubes or more beads.

Reflection time

Put a row of buttons on the table. Ask the class to count with you as you point to each button in turn. Ask a student to cover each button with a cube. *We had* [say the number] *buttons. How many cubes do you think we have?* (same number)

Repeat several times, changing the number of cubes and buttons, always asking questions such as: *How many cubes are there now? How many buttons? Are there more buttons than cubes?*

Practice Book: Students can complete Practice Book page 16. This can be done directly after the main activity, as homework, or as the focus of a separate mathematics session to help students consolidate their learning and build fluency.

Differentiated outcomes	
All students	should be able to count to 20 accurately.
Most students	will say whether there are more or less in one group of objects compared to another.
Some students	may say how many more or less there are in one group of objects compared to another.

Answers

Student Book page 7

Students will have different numbers of coloured cubes and beads. Check that students have coloured the correct numbers of squares for each colour.

Practice Book page 16

For each number, check that students have coloured in the correct number of squares and numbered them.

1 3 squares coloured, with numbers 1–3 written correctly beneath the squares.

2 4 squares coloured, with numbers 1–4 written correctly beneath the squares.

3 1 square coloured, with number 1 written correctly beneath the square.

4 8 squares coloured, with numbers 1–8 written correctly beneath the square.

5 4 squares coloured, with numbers 1–4 written correctly beneath the squares.

Stretch zone: 3

1A Counting objects

Explore 1 Student Book page 8 • Practice Book page 17

Specific learning focus

- Count up to 20, understanding conservation of number.

Global skills

- **Creative skills:** exploring / investigating
- **Real-world skills:** presenting information
- **Interpersonal skills:** communication

Key vocabulary

- count, most, fewest, number

Resources

- 0–20 number line, marbles, counters, beads, coins, small bowls

Language support

For individuals who need to work on the vocabulary of counting, count for them and ask them to repeat the number names after you have said them. Learners developing their vocabulary should work with more confident language learners so they can hear peer modelling of the vocabulary.

Introductory activity

Count up to 10 along a number line at the front of the class. As you count, miss a number. *Which **number** was missing? How do you know?* Repeat the activity several times missing out a different number.

Main activity

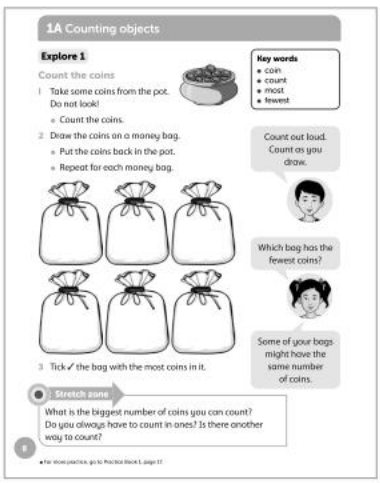
Tell this story, using marbles to act out the story: *Max likes to play marbles. Every day Max puts his marbles into his pocket*. Count out five marbles.

Sometimes he puts them in this pocket (demonstrate) *and sometimes he puts them in this pocket* (choose your other pocket). I *wonder how many different ways he can put five marbles in his pockets?*

Draw on the board the two pockets and the five marbles.

Show all the marbles in one pocket and then all in the other pocket. *What if he puts one marble in this pocket? How many will he have to put in the other pocket?* Count out the five marbles. Put one of them in one pocket and count out the rest. *One is in this pocket and so 1...2...3...4 have to go in this pocket. Does he still have five marbles?* (yes) Count them all together: *1...2...3...4...5.*

Ask students to complete page 8 in the Student Book individually. Give out bowls holding a number (between 20 and 30) of 'coins'. Explain that the bowls are their pots and, if using counters or marbles, that these are their 'coins'. Ask individual students as they work, *Which bag has the **fewest** coins so far? Which has the **most**?*



Differentiation

Supporting: Some students may need support in counting. Touch each marble or counter as you count it and say the number name. Ask them to repeat your actions.

Consolidating: Ask students to count forwards and backwards from 1 to 20 without the use of concrete objects to support them.

Extending: Encourage students to count beyond 20.

Stretch zone: Ask children what is the biggest number they know. Encourage them to count as far as they can, counting in larger steps, for example, tens or hundreds, if they know how.

Reflection time

Bring the whole class back together.

What if Max has ten marbles?

He puts two in this pocket and eight in that pocket. How many will he have altogether? (ten). Repeat with other pairs of numbers, always with a total of ten.

Practice Book: Students can complete page 17 of the Practice Book. This can be done directly after the main activity, as homework, or as the focus of a separate mathematics session to help students consolidate their learning and build fluency. Support students to read each number aloud and count out the corresponding number of counters (or another concrete resource). They can then draw this number of counters.

Differentiated outcomes	
All students	should count to 20 saying the number names with support.
Most students	will count to 20 confidently knowing that the total is given by the last number in the count.
Some students	may count beyond 20.

Answers

Student Book page 8

You should try to mark this activity as you walk around the classroom. As you look at students' books, ask students to tell you how many coins they have drawn in each bag. Some students can write the numbers next to the bag. You can write the correct numbers for those students who are not yet confident in writing numbers.

Practice Book page 17

1 Check that 7 objects have been drawn.

2 Check that 13 objects have been drawn.

3 Check that 14 objects have been drawn.

4 Check that 10 objects have been drawn.

5 Check that 16 objects have been drawn.

6 Check that 8 objects have been drawn.

Stretch zone: Students should have drawn a tick next to the set of 16.

Students should have drawn a cross next to the set of 7.

There are 9 more counters in the box with the most than in the box with the fewest. (If students include the worked example, they may tick that box, with 3 counters, as the 'fewest' and give this final answer as 13, which is also acceptable.)

1A Counting objects

Explore 2 Student Book page 9 • Practice Book page 18

Specific learning focus

- Count two sets of objects and find the total.

Global skills

- **Creative skills:** problem solving / exploring / investigating
- **Real-world skills:** presenting information
- **Interpersonal skills:** communication / teamwork

Key vocabulary

- number, zero, one, two, three, ..., twenty, more than, fewer than, altogether, total, largest, smallest

Resources

- cubes, counters, beads or similar

Language support

For students who need to work on the vocabulary of counting, count for them and ask them to repeat the number names after you have said them. Learners developing their vocabulary should work with more confident language learners so they can hear peer modelling of the vocabulary.

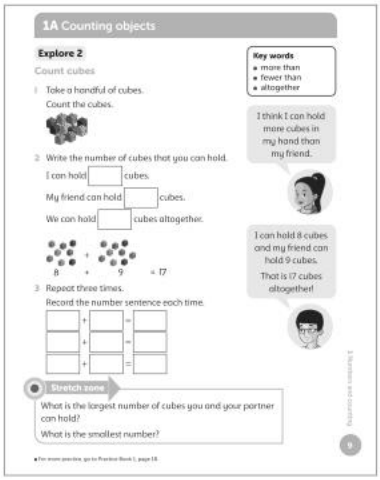
Introductory activity

Ask a student to come forward and pick up one handful of cubes and place them in a pile. Then ask another student to come forward and pick up a handful of cubes and place them beside the first pile.

Help students count the number of cubes in each pile by moving each cube away from the pile, counting as each one is moved, until they have all moved to a new pile. Ask them which pile has more cubes. Now put the piles together and count the **total**.

Main activity

Students work in pairs to complete page 9 of the Student Book. Ask them to take turns to pick up a handful of objects (cubes, counters, beads, etc.). When they have each taken a handful, ask them to count how many they each picked up. Then ask them to count to find the total number (how many **altogether**). As students are working, watch them as they count and listen to how they are saying the numbers. Help them count correctly if you hear them making counting errors. Using the example at the end of question 2, show them how to record each handful of cubes and then the total number of both handfuls of cubes in a number sentence. Addition will be introduced formally in Unit 2 so do not spend too much time making this link.


1A Counting objects

Explore 2

Count cubes

1 Take a handful of cubes.
Count the cubes.

2 Write the number of cubes that you can hold.
I can hold ☐ cubes.
My friend can hold ☐ cubes.
We can hold ☐ cubes altogether.

8 + 9 = 17

3 Repeat three times.
Record the number sentence each time.

☐ + ☐ = ☐
☐ + ☐ = ☐
☐ + ☐ = ☐

Key words
- more than
- fewer than
- altogether

I think I can hold more cubes in my hand than my friend.

I can hold 8 cubes and my friend can hold 9 cubes. That is 17 cubes altogether!

Stretch zone
What is the largest number of cubes you and your partner can hold?
What is the smallest number?

Differentiation

Supporting: Some students may need support in counting. Touch each cube as you count it and say the number name. Ask students to repeat your actions.

Consolidating: Ask students if they are sure that they have counted the total number of cubes from both piles correctly. Ask them how they know and how they can check.

Extending: Use larger numbers of cubes – three or four handfuls.

Stretch zone: *What is the **largest** number of cubes you and your partner can hold? What is the **smallest** number?*

Ask students to think about how they can count the cubes in their handfuls. Discuss why the number might change each time they pick some cubes up. Do they count ones that are dropped? What is the smallest number they can pick up? Why?

Reflection time

Ask each pair of students to describe how they counted their piles of objects. Ask a series of questions to find out who has picked up the most cubes for their pile. *Who has picked up **more than** 5 cubes? More than 6? More than 7?* Continue until you establish who picked up the most. Ask which pair had the biggest total of objects by using similar questioning. *Which pair picked up more than 10 cubes in total? More than 11?* and so on. Discuss what they did when they were counting to avoid losing their place.

Practice Book: Students can complete page 18 of the Practice Book. This can be done directly after the main activity, as homework, or as the focus of a separate mathematics session to help students consolidate their learning and build fluency. Support students to read each number aloud and count out the corresponding number of beads (or another concrete resource). They can then draw this number of beads on each 'string'.

Differentiated outcomes	
All students	should pick up a handful of objects and count them.
Most students	will count to find the total in two piles.
Some students	may count how many more in one of the piles.

Answers

Student Book page 9

Observe as students count their handfuls of cubes and help them count correctly where they are making mistakes. Try to mark this activity as you walk around the classroom. As you look at their books, ask students to tell you how many cubes they held. Check that they have written the correct numbers in the addition sentences. Use the example in question 2 to remind students how to record the total from two piles of cubes using the '+' and '=' signs. You can write the correct numbers for those students who are not yet confident in writing numbers.

Practice Book page 18

1 Check that 12 beads have been drawn.

2 Check that 7 beads have been drawn.

3 Check that 18 beads have been drawn.

4 Check that 13 beads have been drawn.

5 Check that 4 beads have been drawn.

6 Check that 15 beads have been drawn.

7 Check that 11 beads have been drawn

Students should have drawn a tick next to the string of 18 beads.

Stretch zone: Check that there are 3 more red beads than blue beads.