Oxford International Primary

2

Maths

Teacher's Guide

Second edition

OXFORD

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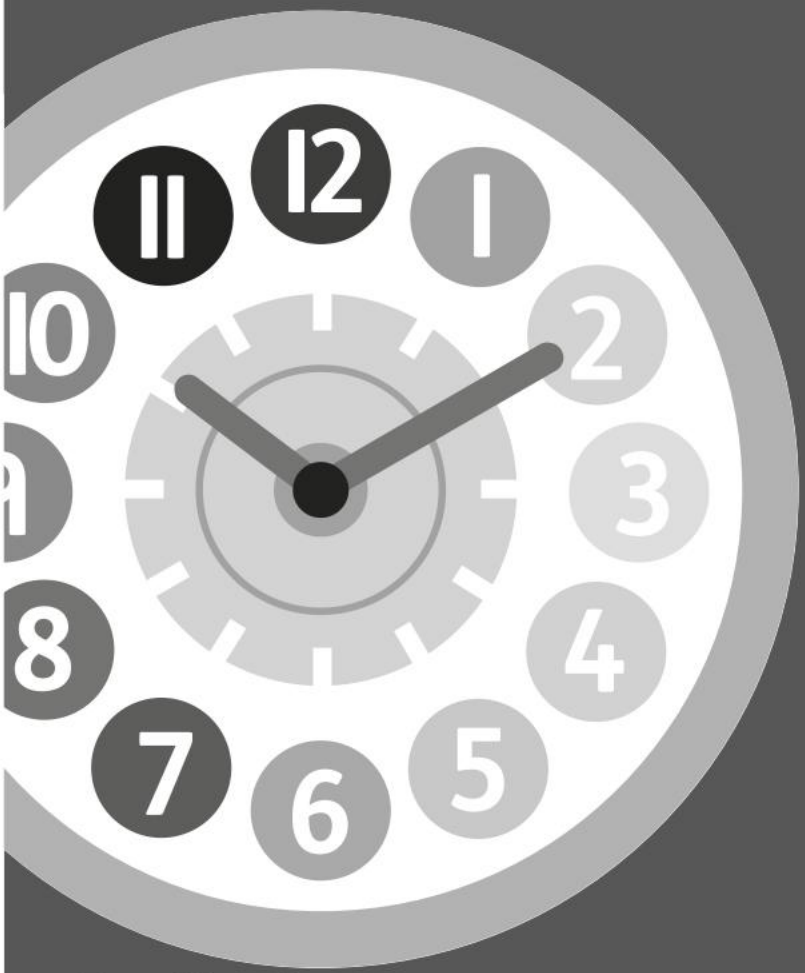

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Introduction

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.

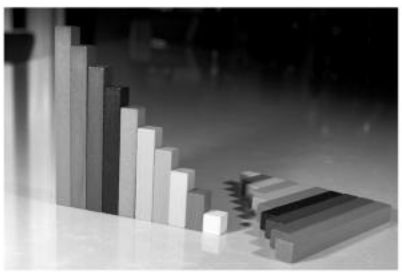
Oxford International Primary Maths and the use of manipulatives

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

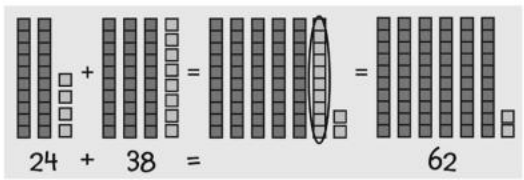
- base-ten equipment (ones-cubes, tens-rods, hundreds-flats and thousands-cubes)

- 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' wellbeing 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 members ideas or draw a collective graphic. You will write on the board during the presentation.
- Presenter: You will present the group's 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 *Oxford 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 students' 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.

Wellbeing 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?

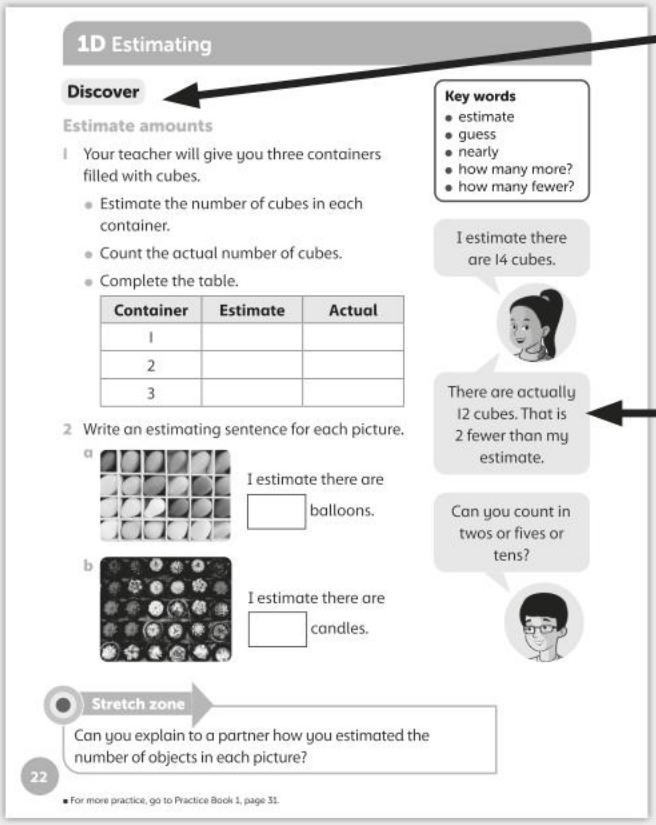
What is the biggest number you have ever seen?

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.

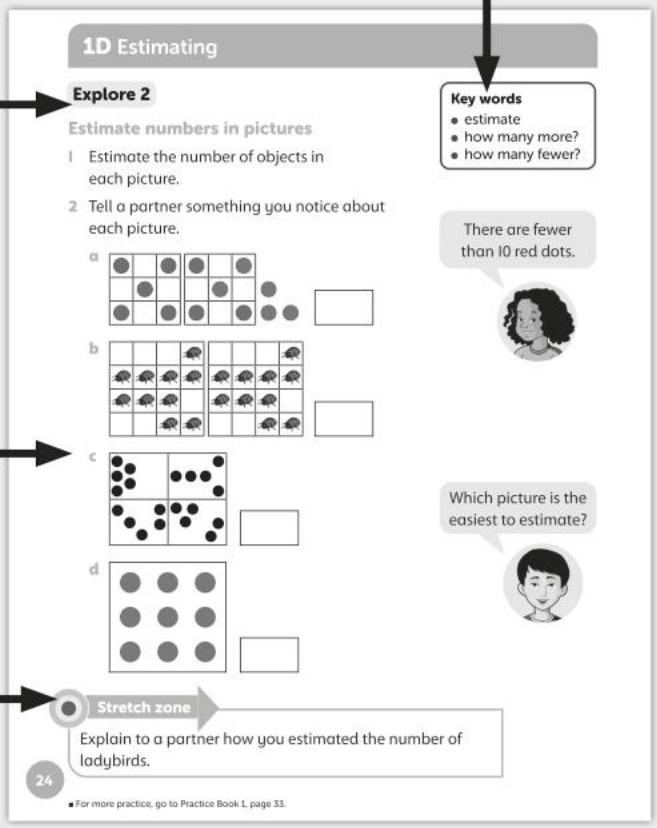
The speech bubbles provide useful hints, probing questions, or examples of how to complete a question. These help students who need a little extra support with the language or the mathematics.

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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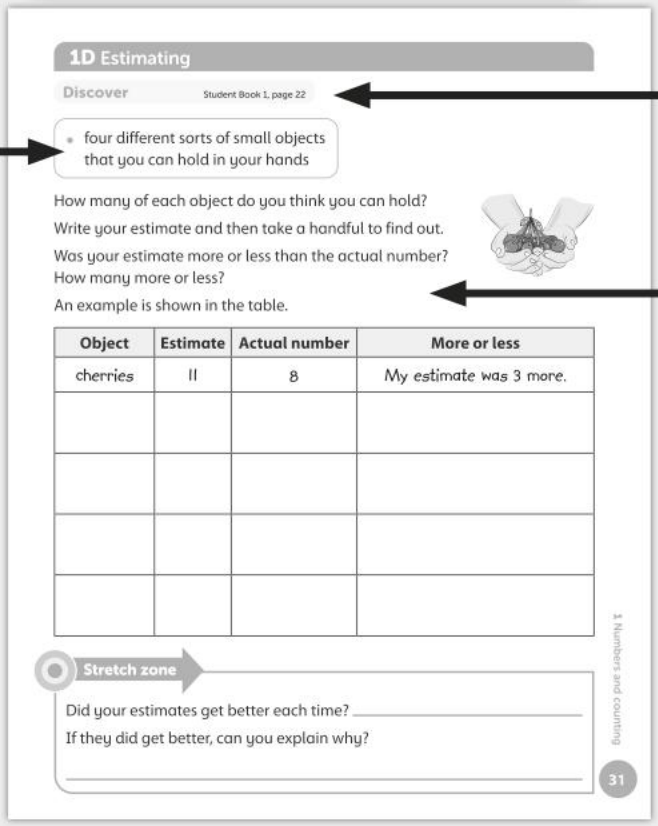
A word problem is always included on the Review page.

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.



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

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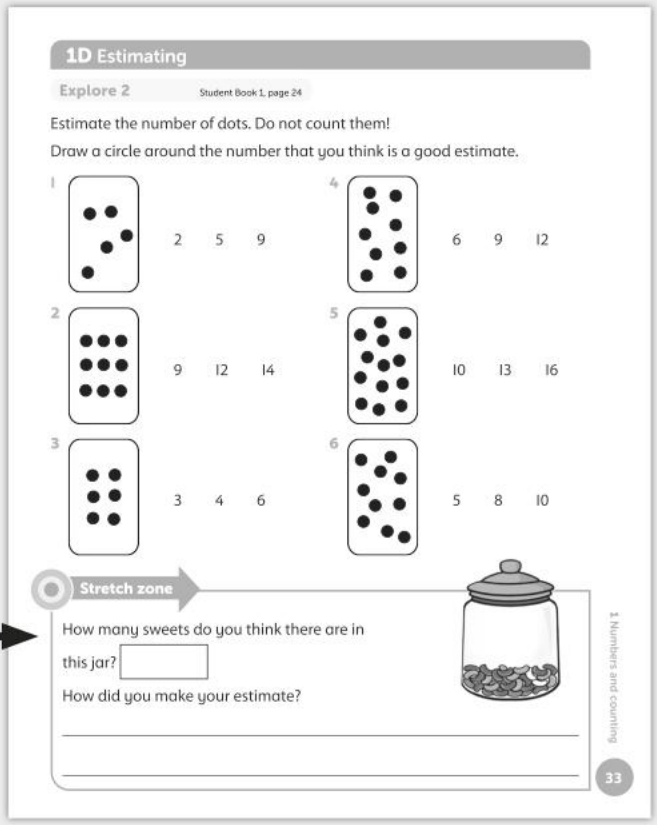
Step-by-step instructions guide students through the activities they will undertake.

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.



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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Extension activities provide challenge for the most confident students.

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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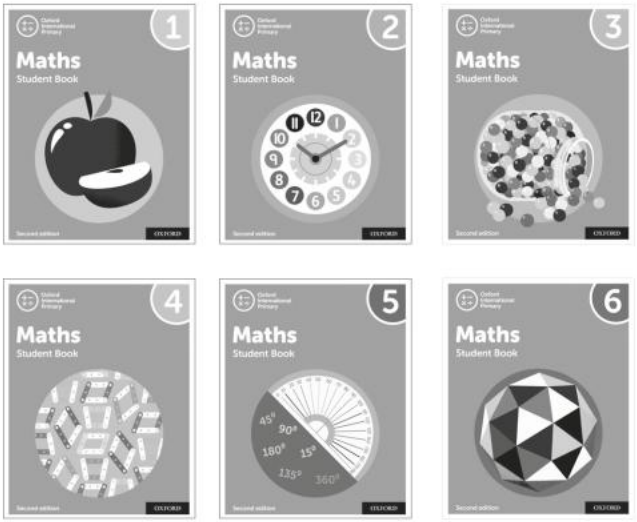
Component overview

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.

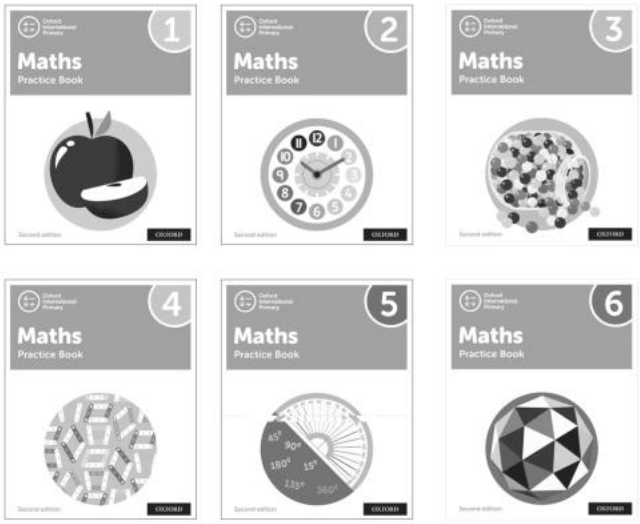
Student Book	Typical student age range
Student Book 1	Age 5–6
Student Book 2	Age 6–7
Student Book 3	Age 7–8
Student Book 4	Age 8–9
Student Book 5	Age 9–10
Student Book 6	Age 10–11



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



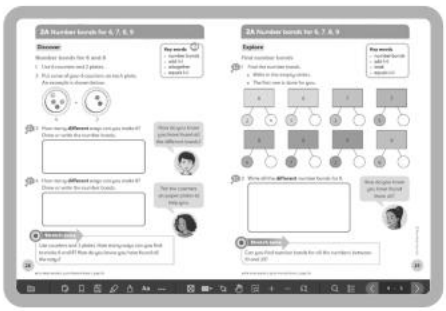
The Teacher's Guides

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:

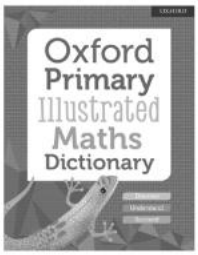
- end-of-unit summative assessment
- end-of-year summative assessment.

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

Two of the Big Ideas for this unit are place value and recognising and using the patterns within the decimal number system. The third Big Idea is that we count to find out how many, or how much.

In the decimal number system, the position of a digit gives its value – ones, tens, hundreds, thousands and so on. The digits 0 to 9 are repeated again and again. This pattern helps students to develop a clear image of the number system, supported by the 100-square and number line.

There are many patterns in the way we count, and students need to explore and describe the number patterns to enhance their understanding of number: for example, the way that every number when we count in tens has a 0 in the ones place, or how every number is either even or odd.

Awareness of the place-value system is crucial to being able to count and to calculate, and mastering the features of the system with small numbers equips students to be able to calculate with much larger numbers later.

Look out for

- **Students who confuse the teen numbers and decade numbers.** The names we give to numbers, particularly teen numbers and decade numbers, are very similar. For example, students may say 'fifty' for 'fifteen'. This confusion is very common and may extend beyond the words to the written numerals, with 15 written as 51. The main way to distinguish between the words is by stressing the parts: fifTEEN and FIFty.
- **Students who, when finding a number between two others, include the end numbers.** By crossing out the end numbers, we can ensure that students identify the correct 'between numbers'. For example, to find a number between 20 and 30 on a number line, they should cross out 20 and 30 and choose a number from the ones remaining.
- **Students who confuse the greater than (>) and less than (<) signs.** Looking at the sign as an arrow on the number line may help to avoid this confusion. Alternatively, viewing the sign as a greedy mouth, always open towards the biggest meal, that is, the highest number, is another useful image to help clarify understanding. You could display copies of the signs turned into animals or monsters with large mouths to reinforce understanding.

Possible misconceptions

- **Students may, when counting on from a number, include the starting number.** For example, counting on 3 from 5 they may say 5, 6, 7 and get 7 as their answer. Model how to count correctly along a number line and count together.
- **Students may not, when estimating numbers of objects, take into account the relative sizes of the objects.** For example, 15 large items may appear to be 'more' than 20 smaller items.

Key vocabulary

- count, digit, number, zero, one, two, three, twenty, thirty, forty, fifty, ninety, hundred
- row, column, forward, backward, place value, multiple, tens, ones, twos, fives, threes, fours, value, diagonal lines
- count on, count back, even, odd
- number pattern, sequence, number line, steps
- multiple of 10, multiple of 5, multiple of 2
- estimate, more than, less than, next to, between, smaller, larger
- round up, round down, nearest multiple of 10
- greater than >, less than <, smallest, largest
- ordinal numbers, first, second, third, …

Coverage in lessons

Learning focus	**Learning outcomes** (the ENC objectives)
Counting in tens and ones	Count in tens from any number, forward and backward. Recognise the place value of each digit in a 2-digit number (tens, ones).
Counting in tens	Count in tens from any given number, forward and backward. Read and write numbers to at least 100 in numerals and in words.
Counting in twos	Count in steps of 2 from any number, forward and backward. Read and write numbers to at least 100 in numerals and in words.
Counting in fives	Count in steps of 5 from any number, forward and backward. Read and write numbers to at least 100 in numerals and in words.
Counting in threes and fours	Count in steps of 3 [and 4] from any number, forward and backward.
Estimating and counting	Identify, represent and estimate numbers using different representations, including the number line.
Numbers in between	Identify numbers that lie between given numbers, or missing numbers when counting in steps of 2, 3, 4, 5 or 10. [Optional non-ENC objective]
Rounding to the nearest 10	Round any number up to 100 to the nearest 10, recognising that halfway numbers round upwards. [Optional non-ENC objective]
Less than and greater than	Compare and order numbers from 0 up to 100; use <, > and = signs.
Ordinal numbers	Compare and order numbers from 0 up to 100; use <, > and = signs. Use ordinal number names, for example, first, second, third and so on. [Optional non-ENC objective]

1 Numbers and counting

Engage Student Book page 6

Big question

- How can I estimate numbers? How can I order numbers?

Global skills

- **Creative skills**: problem solving/exploring
- **Interpersonal skills:** communication/teamwork

Key vocabulary

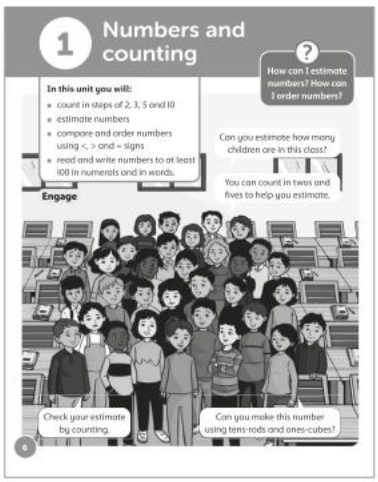
- estimate, tens, ones, twos, fives

Resources

- base-ten apparatus (tens-rods and ones-cubes)
- cubes or counters

Language support

Listen to the range of estimates students are giving. These will help you to check whether students have an idea of the quantity value of the numbers they use. Model counting in tens as often as you can – ask students to fill in the gaps when you count in tens and miss some numbers out.



Introductory activity

Ask students to look around the room and guess, without counting, how many students are in the class. Give some guidance by asking, for example, *Are there more than 5 students? Are there more than 10 students? Are there fewer than 50 students? Are there 100 students?* These questions should help students estimate a realistic total, perhaps 25, 30 or 40.

Can they estimate how many students there might be in the whole school? 20? 50? 100? More than 100?

Main activity

Ask students whether they can recall what the word 'estimate' means (to make a sensible guess). Ask them to look at the picture on page 6 of the Student Book. Display it on the IWB if possible. Ask: *Can you estimate how many students are in this class?*

Ask whether 1 would be a good estimate – allow students to explain why not. Ask whether 1 million would be a good estimate – allow students to explain why this would not be a good estimate.

Arrange students in small groups and ask each group to talk to each other and agree an estimate for the number of students in the picture. Share the estimates, drawing up a list on the board under the heading 'First estimate'.

Discuss how students reached their estimates and talk about how they might be able to find a more accurate estimate. This will lead to students discussing counting in twos or fives instead of ones or tens, for example. Students can then use base-10 equipment or other concrete resources, such as cubes and counters, to count and represent how many. Agree how many (33), and deal with any differences in counting by having groups model their counting on the board.

Differentiation

Supporting: Ask students to work in mixed-ability groups so that less-confident students can hear the numbers modelled by their peers.

Consolidating: Ask students why they think that their estimate is sensible.

Extending: Ask students how confident they are that their estimate is accurate. How close do they think their estimate will be?

Reflection time

Look at the spread of results. Are they close together? Decide whether the estimates were good ones and discuss what makes a good estimate, for example being within 5 of the right answer (or being within 20 if it's a very large number).

Which estimates were close to this total?

1A Counting in tens and ones

Discover

Student Book page 7 • Practice Book page 16

Specific learning foci

- Count, read and write numbers to 100 and back again.
- Count on in ones and tens from single- and 2-digit numbers and back again.

Global skills

- **Interpersonal skills:** communication/teamwork

Key vocabulary

- count on, count back, tens, ones, rows, columns, sequence, number pattern

Resources

- large 100-square for the front of the class
- timer

Language support

Listen carefully to how each individual says the numbers out loud. Listen out for confusion between '-teen' and '-ty' and correct, explaining that '-teen' means one ten, which is why the numbers 13, 14, 15, 16, 17, 18 and 19 are known as teen numbers. Model how to say the words: fifTEEN, FIFty.

Introductory activity

Display a large 100-square. **Count on** together from 1 to 10 and **count back** again, pointing to the numbers on the top row of the 100-square. Ask students what we call the line of numbers from 1 to 10 on a 100-square (a **row**) and ask, *How many rows of numbers in this 100-square*? (10)

Choose a row. Count along that row together, forward and backward. Ask students what happens as they count forward and backward along any row. (The **ones** digit changes but the **tens** digit stays the same until the final number.) Practise counting along other rows.

Now point to the numbers 10, 20, 30, 40, … , 100. Ask what we call a line of numbers like this on the 100-square (a **column**). Ask how many columns of numbers there are in a 100-square. (10)

Choose a column. Count down that column together, then count up the column together. *What happens when you count down and up any column?* (The tens digit changes but the ones digit stays the same, apart from the final number.) Practise counting down/up other columns.

Main activity

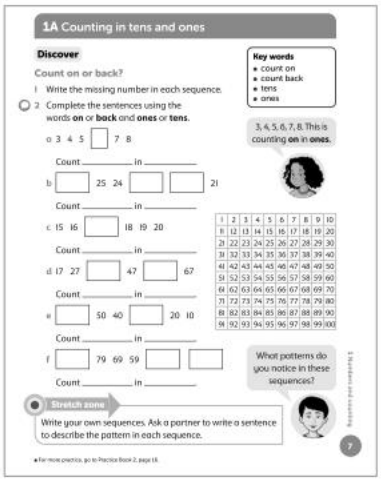
Choose a number on the 100-square, say 4, and count on along a few places: *4, 5, 6, 7, 8*. Explain that this is called a **sequence** of numbers. *How much does this sequence change from each number to the next?* (1) Say that sequences have a **number pattern** that we can find and describe. This helps us find more numbers in the sequence.

Point to the right-hand column of the 100-square. Count together in tens (10, 20, 30, …), then ask students to say how many tens for each number and then count together this way (1 ten, 2 tens, 3 tens, …). Remind students that these numbers have names that tell you how many tens they contain.

Repeat the count from 10 to 100, forward and backward, using the correct number names. Count up and down a different column and then ask students *What do you notice about the numbers? Can you see a pattern?* Can they see for themselves that the tens change but that ones stay the same? Choose another column. Count down/up that column together.

Organise students into small groups of up to six to play a counting game. Explain that the first person chooses a number and counts on (forward) or counts back (backward) from that number in ones or tens. After saying about 10 numbers, the next student in the group repeats the last number said, then chooses whether to count in ones or tens, on or back. Counting continues until everyone has had a turn. The aim is to continue counting without any pauses.

Ask students to complete the missing numbers in the counts on page 7 of the Student Book individually. They also complete the sentences to describe each count. Once they have completed the questions, ask them to take it in turns with a partner to describe each sequence. Do they notice any patterns? Can they describe them?


1A Counting in tens and ones

Discover

Count on or back?

1 Write the missing number in each sequence.

2 Complete the sentences using the words **on** or **back** and **ones** or **tens**.

Key words: count on, count back, tens, ones

3, 4, 5, 6, 7, 8. This is counting **on** in **ones**.

What patterns do you notice in these sequences?

Stretch zone

Write your own sequences. Ask a partner to write a sentence to describe the pattern in each sequence.

For more practice, go to Practice Book 2, page 18.

Differentiation

Supporting: Model counting out loud to students. Leave gaps in your counts for them to fill. Emphasise fifTEEN, FIFty so that students can hear the language patterns.

Consolidating: Encourage students to develop their own counting patterns in ones and in tens.

Extending: Ask students whether they can continue their patterns beyond 100.

Stretch zone: *Write your own sequences. Ask a partner to write a sentence to describe the pattern in each sequence.*

Check that students have correctly described the pattern using language such as counting on and back in tens and ones.

Reflection time

Count with the whole class acting as one large group. Once the count is started, anyone, including any adults in the room, can be named to continue the count. Again, the aim is to continue counting without any long pauses. Set a timer for 5 minutes. Can the class continue the count for that long? Try extending the time for longer than this.

Practice Book: Students can complete page 16 of the Practice Book. They can do this directly after the main activity, as homework, or as the focus of a separate mathematics session to help consolidate their learning and build fluency. Encourage students to say their sequences aloud so they have additional practice in saying the numbers.

Differentiated outcomes	
All students	should count to 100 in ones with support from peers and the teacher.
Most students	will understand the difference between counting in ones and counting in tens.
Some students	may continue their counts beyond 100.

Answers

Student Book page 7

a 3, 4, 5, 6, 7, 8 Count on in ones

b 26, 25, 24, 23, 22, 21 Count back in ones

c 15, 16, 17, 18, 19, 20 Count on in ones

d 17, 27, 37, 47, 57, 67 Count on in tens

e 60, 50, 40, 30, 20, 10 Count back in tens

f 89, 79, 69, 59, 49, 39 Count back in tens

Practice Book page 16

1 18, 28, 38, 48, 58, 68, 78

2 82, 72, 62, 52, 42, 32, 22

3 65, 55, 45, 35, 25, 15, 5

4 49, 59, 69, 79, 89, 99

5 97, 87, 77, 67, 57, 47, 37

Stretch zone: Students are likely to answer that they can see the tens all in one column and can count down and up it.

1A Counting in tens and ones

Explore

Student Book page 8 • Practice Book page 17

Specific learning foci

- Count, read and write numbers to at least 100 and back again.
- Count on in ones and tens from single- and 2-digit numbers and back again.

Global skills

- **Creative skills:** investigating
- **Interpersonal skills:** communication/teamwork

Key vocabulary

- count on, count back, tens, ones, rows, columns, digits, value, place value

Resources

- large 100-square for the front of the class, small 100-squares for each table
- set of place-value cards for each pair of students cut out from Resource Sheet 1, copied onto card

Language support

Display a large 100-square to support students' counting. Then listen carefully to how each individual says the numbers out loud. Correct any confusions between '-teen' and '-ty'.

Introductory activity

Give each pair of students a set of **place-value** cards. Explain that they are called place-value cards because they help us to see which place each **digit** is in, so we know its **value**. Ask students to sort their cards into two rows, a row with the ones in order (01, 02, 03, …, 09) and a row with the tens in order (10, 20, 30, …, 90). Ask students to take the cards showing 20 and 4. *Place them together so they show 24. How many tens and ones are there in this number?* (2 tens, 4 ones) Repeat for other 2-digit numbers, for example, 25, 57 and 82. Ask each time: *How many tens are there in this number? How many ones?*

Main activity

Display a 100-square, on the whiteboard if possible. Ask two students to each choose a number on the 100-square. Start from one of the numbers and count forward or backward to the other in steps of 1 or 10.