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This Teacher’s Guide is designed to support the component parts of Nelson International Mathematics 2. The guide covers Workbooks 2A, 2B and 2C.

Support is presented under the following headings:

• **Concept and skill development** – an overview of the topic, which outlines the objectives covered and the skills students will develop in the section.

• **Vocabulary** – highlights the keywords that you should use in your teaching. Using the correct terminology yourself and encouraging students to use the same, plays an important part in the development of sound mathematical thinking.

• **Resources needed** – a list of the items that you and the students can use for suggested activities.

• **Mental warm-ups** – It is useful to spend about ten minutes each day doing an oral and mental activity so that students get a chance to use known facts, sharpen and improve their mental strategies and practise and consolidate previously learned mental calculation strategies (such as partitioning, compensating or bridging through multiples of ten). You cannot expect the students to recall mental facts quickly unless they have practised and repeated these regularly.

  We have provided a bank of sample mental warm-ups on pages 22–40. In most cases, these activities can be done with the whole class. Students can show answers using place value cards or mini-whiteboards, or write answers in their books or on scrap paper. Alternatively, in some cases, it may be more useful to have different students come up and write answers on the board.

  Some teachers may prefer to choose activities which are linked to the concepts that will be covered in lessons that follow. For example, before teaching the section ‘ten more’ you may choose a mental activity involving counting in tens or ordering numbers with a difference of ten. However, the mental activities are designed to focus on mental calculation strategies, so they will not always link to new concepts being taught.

• **Teaching ideas** – these are listed under **Practical activities** (suggestions for activities that introduce the topics in a lively and engaging way before students tackle theoretical or written work) and **Using the Student’s materials** (notes to take you through the pages of the Workbooks with suggestions for class and group work).

• **Informal assessment questions to ask** – a list of the types of question that might help you assess the topic, including questions that can stretch higher-attaining students or to give lower-attaining ones more practice.

• **Common errors and misconceptions** – tips and advice to draw your attention to areas that students frequently find difficult or confusing, so you can prepare additional material in advance.
Key to icons

In the Workbooks, you will see icons identifying the main syllabus strand covered by a specific activity (or, in most cases, by a cluster of activities).

- Number and calculation
- Shape and space
- Measures
- Organising and using data

Note that some syllabuses identify ‘Problem solving’ as a separate strand. However, because problem solving arises in each of the four other strands, we have simply identified problem solving as one of the different kinds of activity you will find in the Workbooks.

Problem solving

Problem solving is integrated throughout the materials. The following table lists the problem solving objectives from the Cambridge Primary Mathematical Curriculum Framework and gives one or two examples to show where this objective is specifically covered in the Workbooks. However, remember, the students will use problem solving skills throughout this course and that there are many opportunities to meet each objective built into the materials.

<table>
<thead>
<tr>
<th>Objectives</th>
<th>References</th>
</tr>
</thead>
<tbody>
<tr>
<td>2Pt1</td>
<td>Choose appropriate mental strategies to carry out calculations and explain how they worked out the answer</td>
</tr>
</tbody>
</table>
| 2Pt2       | Explain methods and reasoning orally | 2A 9
2B 32, 33, 40 |
| 2Pt2       | Explore number problems and puzzles | 2A 23
2B 43, 46
2C 3, 13 |
| 2Pt4 | Make sense of simple word problems (single and easy two-step), decide what operations (addition or subtraction, simple multiplication or division) are needed to solve them and, with help, represent them, with objects or drawings or on a number line | 2A 39, 2B 48, 2C 27 |
| 2Pt5 | Make up a number story to go with a calculation, including in the context of money | See notes in Teacher’s Guide |
| 2Pt6 | Check the answer to an addition by adding the numbers in a different order or by using a different strategy, e.g. 35 + 19 by adding 20 to 35 and subtracting 1, and by adding 30 + 10 and 5 + 9 | 2B 40, 42, 2C 16 |
| 2Pt7 | Check a subtraction by adding the answer to the smaller number in the original subtraction | 2C 13, 15 |
| 2Pt8 | Describe and continue patterns which count on in twos, threes, fours or fives to 30 or more | 2A 30, 31, 32, 2B 9, 10, 11, 18, 19 |
| 2Pt9 | Identify simple relationships between numbers and shapes, e.g. this number is double ...; these shapes all have ... sides | 2A 20, 24, 2C 22 |
| 2Pt10 | Make a sensible estimate for the answer to a calculation | Throughout |
| 2Pt11 | Consider whether an answer is reasonable | 2A 6, 42, 2B 21, 2C 16 |

In this Teacher’s Guide, you will see small icons next to some of the practical activities suggested for each topic. These icons indicate a specific type of activity.

🦜 This icon indicates a practical activity, which develops mathematical understanding through the use of manipulatives. Typical manipulatives used at this level include: blocks, dice, abaci, counters, measuring sticks, items used for non-standard measures, for example, paperclips or books for length; bottles or tins for capacity, and so on. Sometimes practical activities do not involve manipulatives, for example, they might instead require students to explore their own movements or actions.

📐 This icon indicates an activity involving construction, building or craft work. For example, students might cut out 2D shapes, build 3D shapes from modelling clay, cut out symmetrical shapes, and so on.
This icon indicates an activity involving discussion, debate or any other oral work. For example, students might talk about which method they found easiest or fastest for solving a specific problem. You may also see the same icon for singing, clapping or any other activities that develop listening and speaking skills.

This icon indicates an activity involving writing or drawing. For example, students might fill in answers to number sentences or questions.

This indicates a problem solving activity.

**Fundamental principles**

This series makes the following assumptions about the teaching of mathematics:

- Students need concrete experience in order to acquire sound mathematical understanding.
- Like adults, students learn best when they investigate and make discoveries for themselves.
- Students refine their understanding and develop conceptual structures by talking about their own thinking and what they have done.
- Individual students develop at different rates, some will find certain elements of mathematics difficult, others will understand them quickly.
- Students learn in a variety of different ways; mathematics teaching should provide a rich and wide variety of experiences.
- Students will become more mathematically able if allowed to develop reliable personal methods of working; the formal recording used by mathematicians is very difficult for most students to understand.
- The conventions of mathematics should be taught only once students are confident in their own knowledge, concepts and skills.
- Students need plenty of opportunities to apply what they have learnt, and to relate their mathematics work to other areas of the curriculum and to their lives in general.
- Students learn mathematics most effectively when they enjoy and see relevance in what they are doing.

This course offers a wide range of mathematical experiences that reflect current thinking on the most effective ways of teaching and learning mathematics at the primary level. It recognises the professionalism of the teacher, and acknowledges that teachers are the best judges of experience appropriate for their own students. It does not impose an inflexible structure. Instead it provides a wide variety of practical activities, pencil and paper exercises and games linked to well-defined purposes or objectives. The teacher selects from this menu to meet the needs of classes, groups and individuals.
Frameworks for teaching

Summary of the approach

The learning framework of this course can be summarised as: do – talk – record.

Doing

Students develop their skills by manipulating apparatus, playing games, investigating patterns and rules, modelling problems and talking about their ideas with peers before they are expected to record their work.

Talking

Through discussion, students can make sense of what they have been doing. They can then begin to generalise from their experiences. The teacher’s central role is to create such situations and to judge when to intervene.

Most of the activities in this Teacher’s Guide will help you to facilitate discussion, and will encourage students to listen to each other and experiment with different ways of thinking about and solving problems.

Recording

At stage 2, students are not likely to have refined the skills and knowledge or developed the use of strategies for solving problems. They will need to use informal and very personal methods (jottings) of recording steps in a process, or keeping track of what they have done. Jottings are an important step in moving towards non-standard methods of calculation (such as diagrams and jumps on a number line) that give the students a foundation for more concise standard written methods of recording.

It is very important that you allow, and in fact encourage, students to make use of jottings as they work. Here are some possible ways of doing this in the classroom:

• Do jottings of your own as you work out solutions. For example, if you are demonstrating how to add 7 + 8 + 3 you might jot the following on the board to show how you are thinking:
  
  \[
  \begin{align*}
  7 + 3 & \rightarrow 10 \\
  10 + 8 & \rightarrow 18
  \end{align*}
  \]

• Talk through the jottings as you make them. For example, ‘It’s easier to add tens, so I’ll add 7 and 3 first’. This modelling process helps students to see that jottings are important and useful.

• Make space for jottings in the students’ exercise books. You can reinforce the importance of jottings as a means of showing your working by encouraging the students to jot as they work. If you only allow jotting on scrap paper, students may think it is not as important or valuable as their ‘real’ work in their book.

• Limit the use of prepared sheets with boxes for answers and no space for jotting down steps.
• Do activities where jotting is the point of the activity, for example, ask students to represent a fraction visually in as many ways as possible, or ask them to work out problems where they will need to jot down interim steps to keep track of the process: for example, how many ways can you find of making one dollar using any combination of 50 cent and 10 cent pieces?

• Ask students to share their jottings and compare them to show that there are different methods of working. This can help the students to see that some strategies are more efficient than others and, in turn, refine their own thinking. In the ‘make a dollar’ task above you may find that some children draw coin combinations, others list them and those who are more able and confident may make a table and work more systematically. All of these methods may provide the correct answers, but obviously some will take longer than others.

In the early stages of using apparatus in a new way, recording may take the form of drawings or words and drawings. Some students will gradually find this time-consuming and will simplify their recording independently. Others may need your suggestions and encouragement. As a teacher, you will need to work out carefully when a student is ready to use a standard mathematical symbol or format, so that recording is based on full comprehension.

It is crucial that you do not force children into formal and standard methods of recording calculations before they have fully grasped the process and are confident in the methods.

**Individual differences**

Everyone learns at their own pace, and in different ways, although experiences may be common. Adults in the real world bring a wide variety of approaches to their work, often ones they have devised for themselves despite many years in school learning standard methods. This course recognises individual differences and aims to give students the chance to explore the world of mathematics and solve problems in their own way. The course is also designed to provide equal opportunities to all students who may use it, regardless of their gender or ethnic, cultural or linguistic background.

**Developing mental strategies**

Adults perform many mathematical tasks mentally either because the tasks are simple, or because it is quicker to work things out in the head than use pencil and paper or a calculator. Too much work with paper and pencil can inhibit students from developing the flexibility and range of strategies necessary for efficient mental work.

A central aim in this course is to develop in students the ability to add or subtract numbers mentally, and to use quick recall of multiplication facts. Many of the activities encourage students to move directly from their own strategies with apparatus to working things out in their heads.
Students should be made aware of the role of mental methods as a first resort when a calculation is necessary, and not be led to believe that there is a particular method for a particular type of work, such as vertical presentation for ‘best work’, ‘answers only’ for mental arithmetic, or ‘working out’ only in rough books or on scraps of paper.

This Teacher’s Guide presents many ideas for oral work and suggests alternatives to the standard methods to help promote the development of effective mental methods. All arithmetical problems in this course are presented horizontally to encourage students to choose and use their preferred method.

One of the most significant changes to the *Cambridge Primary Mathematics Curriculum Framework* for 2012 onwards is the inclusion of a specific set of objectives under the category of Mental Strategies. These objectives aim to ensure that students are encouraged to use number facts and a range of mental strategies to add, subtract, multiply and divide. The idea is that these mental strategies are developed and used across all stages, and that students will continue to use them alongside more formal written methods as appropriate.

Mental calculation is important for both school-level mathematics and daily life, not least because it is often the most effective and simplest way to get an answer. At stage 2 in the primary school, it is usually the most effective method for solving most of the problems that students are faced with. Teaching, and encouraging the use of, mental strategies helps students to realise that numbers are quantities (rather than just seeing them as separate digits). This in turn allows them to take advantage of the particular properties of the actual numbers involved in a problem and to decide which strategy lends itself best to solving it. Mental strategies also allow students to develop a good sense of equivalence in mathematics. At a basic level, this could be simply saying $5 + 6 = 5 + 5 + 1 = 11$, but it forms the basis of algebraic manipulation and the more abstract functions that students will have to deal with at higher levels.

Here are some of the reasons that researchers around the world give to support the idea that mental computation should be included at all stages in school curricula:

- Mental calculations account for more than 80% of the calculations that adults do in daily life.
- Mental calculation is essential for estimation. This is an important skill because many of the calculations we do in daily life do not require an exact answer. For example, these pies cost $1.90 each, can I buy three with $5? ($2 \times 3 = 6$, so no.) These pies are $1.90 each, I’m buying six and the seller is asking for $15, that can’t be right!
- You often need to do some mental calculation before you can use a calculator, and you need to have some idea of how big or small the answer will be to check that you have used a calculator correctly.
• When students have a range of mental strategies, they are able to find the easiest way of doing calculations.

• Mental strategies rely on basic number relationships and they build on counting work from earlier grades, so they provide an excellent way for students to develop good number sense.

• Many of the patterns and relationships that make up the study of mathematics are numerical, but they are too vast and numerous to learn by heart, so it makes sense to develop a concept of how these work, so that you can transfer the skills to solve previously unseen problems in creative ways. To make sense of this, you just have to think about place value and counting. Once students learn the rules for making numbers, they can read and write any number. We would not, for example, teach every single number from 10 000 to 100 000 in a rote way. Instead, we expect the students to apply their knowledge to make, read and write numbers in this range.

In the sections that follow, we will explore what it means to develop mental strategies both in theory and in the classroom. Then we will present a general approach to teaching mental calculation strategies, with some examples to show how this might work. The actual strategies themselves are dealt with in more detail in the Student’s materials and teaching guidance by topic in this Teacher’s Guide.

What are mental strategies?

Essentially mental strategies are the individual methods we use to solve problems ‘in our heads’.

As an example, try to answer this question without doing any pen and paper calculation: how many 45c tickets can you buy with $10?

Once you have an answer, think about what you did to find the answer. Did you think in any of these ways?

• You can buy two 45c tickets with 1 dollar, so you can buy about 20 with $10.

• Ten 45s are 450. 450 and 450 is 900, that’s 20 tickets. You have one dollar left, so you can get two more, 22.

• 45 is almost 50, two 50s are $1, so I can buy about 20.

Very few adults will solve this problem by doing formal long division (1000 divided by 45) in their heads. This illustrates an important point about mental strategies – they do not involve simply visualising formal algorithms in your head and solving them without writing them down. Rather, mental strategies are the ways in which we use number facts that we have learnt by heart together with the relationships that exist between numbers and operations in order to solve problems. When you are teaching mental strategies for calculation, it is therefore crucial to focus on the mental processes that students use to get to the correct answer.

Recall of number facts is an important element of mental mathematics because other strategies use and depend on these. At stage 2, students should know addition and subtraction facts to 20 by heart. They should
also know multiplication facts for the $2 \times$, $5 \times$ and $10 \times$ tables. The daily mental mathematics time can be used to consolidate these facts. In general, if a student can give the answer to a known facts such as $4 \times 5$ within 2–3 seconds then you can tell that he or she has memorised and internalised it.

**Implications for classroom practice**

The Nelson International Mathematics series has the key mental strategies for each stage built into the student’s materials. There is additional support included in the Teacher’s Guide in terms of the teaching activities section for each topic as well as the sample daily mental maths activities to allow students to practise and refine their skills. In addition, we offer a series of parent cards that explain the approach and suggest how parents can support it in the home. The provision of these materials makes it easy for teachers to meet the objectives of the revised framework. However, the materials do not stand alone – your classroom methodology and the ways in which you teach, support and encourage students to use mental strategies are of utmost importance in implementing these objectives.

In a classroom where mental strategies are given their due importance, the teacher’s role would include:

- being flexible in recognising and accepting whichever strategies the students use (including allowing them to choose their own strategies as well as to work in different ways)
- using different mental strategies yourself and modelling them for the class so that they can compare them with the ones they are using
- helping students to think about their own strategies so that they can refine them and work towards more efficient strategies.

These examples demonstrate how the teacher’s behaviour and actions can support or hinder this approach.

A class is given the following subtraction: $33 - 27$ (finding a small difference between pairs of two-digit numbers).

Note that the problem is given horizontally. This is the first element of a flexible approach because it does not force the students into thinking that they have to do vertical subtraction in columns with carrying.

Here are four students’ workings.

A

$$33 - 27$$

$$+3 +3$$

$$36 - 30 = 6$$

B

$$33 - 27$$

$$37 - 27 - 4$$

$$10 - 4$$

$$6$$

C

$$33 - 27 = 6$$

$$30 + 3$$

$$27$$

$$3 + 3$$

D
All the students have the correct answer but they have found it using different strategies:

- Student A has used a strategy that involved adding the same amount to each number to get numbers that are easy to subtract.
- Student B has added 4 to the first number to get a number that is easy to subtract from and then subtracted 4 again at the end using knowledge of bonds to ten.
- Student C has decomposed the larger number into 30 + 3 and then subtracted the 27 before adding the 3 back.
- Student D has used an empty number line and done the subtraction in parts, subtracting 20 first, then subtracting 3 to bridge to 10 before subtracting the last 4.

The teacher in this classroom has several options, for example:

- He or she can ask the class to put their hands up to give the answer. This focuses on the answer and ignores the processes by which the students worked the answer out. It also makes it difficult for those students who are still trying to work things out, because the quicker students put up their hands and try to get the teacher’s attention, distracting them and making it difficult to think.
- Similarly, the teacher can ignore how these students have worked and do a column subtraction to show the class how to get to the answer.

Both of the above choices are counter-productive as they do not help the students develop confidence and in fact, moving straight to the ‘old fashioned’ algorithms has been shown to undo students’ understandings of place value.

When you value mathematical thinking and reasoning, you must make time to discuss how students got to their answers. This may involve modelling their solutions on the board and having the students verbalise and explain what they did. The students will learn from these explanations and showing them different options allows them to compare their own methods and strategies with those of others and to decide whether to move to a strategy they find more efficient. Modelling solutions and explaining thinking also makes the mathematics visible to students who may not have grasped it. When you just give students an answer, the mathematical strategies are invisible to them – they cannot see how you worked it out.

**Teaching mental calculation strategies**

The general approach to teaching strategies for mental calculation can be seen as three steps:

- **Introduce the strategy**
- **Reinforce the strategy**
- **Assess students’ mastery of the strategy**

Each of these steps is discussed in more detail below.
**Introducing the strategy**

One method of teaching a strategy is to give the class an example of a calculation for which the strategy would be useful and then to ask the students to find the answer to see whether any of them select and use the strategy. For example, you want to teach them how to add multiples of ten by counting on or back in tens.

- Start by writing $37 + 40$ on the board.
- Ask the students how they could find the answer.
- If one of the students suggests viewing it as $37 + 10 + 10 + 10 + 10$ ask them to explain the strategy to the class with your help.
- If no one suggests this, model the strategy yourself. Your modelling could include concrete materials (such as place value charts or a diagram showing that $40 = 10 \times 4$). At the demonstration phase, your modelling should include jottings to show the steps in the process.
- Discuss the thinking behind the strategy as you model it. For example, it may be difficult to add 40, but it is easy to count on four tens. I’m going to ignore the unit to start with and count on four tens: 40, 50, 60, 70. Then I’ll add back the units. My answer is 77.
- Next, do some more examples using appropriate numbers to demonstrate the logic of the strategy and discuss when it would be useful (i.e. what numbers would it work with?). If you like, you can show the students examples of when this would not be the most useful strategy. (For example, if the calculation is $3 + 90$, it will be much more efficient to count on 3 from 90 than to count 9 tens on from 3. Remind the students that the choice of strategy depends on which methods they prefer and which numbers they find easiest to work with.

**Reinforcing the strategy**

The key components for reinforcement are:

- Providing lots of similar examples to practise the strategy in isolation and develop competence in using it. You will find that the Workbooks provide examples for specific strategies as they are developed.
- Getting students to talk about and explain their thinking and methods as they use them. As they become more confident in using a strategy, they may find shorter and more efficient methods.
- Allow (and in fact encourage) jottings and pen and paper workings as you develop mental methods.

The activities you use to reinforce a strategy should be varied in type and presentation, so that students do not treat it as a rote activity, and structured in ways that encourage maximum participation. You will find suggestions to help you do this in the teaching guidelines section for each topic.

When you introduce a strategy you will need to allow sufficient time for the students to explore it and become comfortable with how it works. As they become more competent in using it, you can reduce the time spent on different activities.
Once most of the class are using the strategy confidently, your role is to help them integrate the strategy with others that they use. One method of doing this is to provide activities that include a mix of calculations, some of which are not suited to the particular strategy. It is often useful to present a mixed exercise, ask the class to look at the problems and then spend some time discussing which strategies students think will work best for different problems. Encourage them to identify the properties of the numbers that suggested each strategy to them.

**Assessing whether students can use the strategy**

Assessing mental strategies should take a variety of forms. However, the main aim of your classroom assessment is to see whether the students can work efficiently and accurately by choosing an appropriate strategy rather than to test the use of a particular strategy. So, for example, you may use ‘timed’ tests in which the students compete against themselves to recall facts and do mental calculations over a set period (such as a test a day for five days) in order to improve their own time and/or accuracy.

You can also play games to assess mental computation skills. Games that the students play in pairs offer an opportunity for you to observe the students as they work and to record any observations that you make.

One method of assessing whether the students can recall facts and use mental strategies is to gauge the time it takes them to respond to a question. As mentioned earlier, response time for known facts should be 3 seconds or less. With the other mental strategies, a good response time is 5–10 seconds (depending on how difficult the problem is). Bear in mind though, that is a goal to work towards rather than a strict guideline. When students are beginning to use a strategy, you would allow them as much time as they need to apply it and answer the problem.

Talking to students in small groups or one-to-one is also important for assessing their competence, particularly if what they jot down is unclear or incomplete. Asking questions about how they were thinking will allow you to see whether they understand the strategy and whether or not they can use it.

**Computers**

The use of a computer can support students’ learning of mathematics in a variety of ways. Obviously, your use of computers will depend on the resources available at your school. However, it is useful to know about the range of technologies available, as it is likely that your school will become increasingly well resourced as time goes on.

- **CD-Roms** are disks that contain electronic files with plenty of reference information. They may include an array of printable materials such as worksheets and practice sheets, tests, resources such as graph paper, maps, and so on.
- **Games** enable students to apply their mathematical skills through fun, interactive activities. Many educational games are designed to develop specific skills. If you have these available at your school, try to build in the use of games regularly each week. Find games that reinforce the specific areas of mathematics in which your students need regular practice.
there are specific games your class is particularly keen to spend a lot of
time playing, you may want to use game time as a reward for completing
classwork or homework.

- The Internet is a rich resource for teaching suggestions as well as a
  source of much reference material. Keep a list of maths teaching websites
  that you use regularly. If you find articles of particular interest, download
  and print them, and add them to your resource files.

The BEAM mathematics project website. (www.beam.co.uk) offers a full list
of all their teaching support resources as well as a range of free resources
(click on the ‘free resources’ tag). The free resources include downloadable
worksheets for classroom or extension use and discussion papers and articles
related to developments in primary mathematics to support professional
development of maths teachers.

You can also find a wide variety of materials to support your planning, teaching

There are interesting articles, research and activities on the Plus Magazine
website of the University of Cambridge. (http://plus.maths.org).

**Exploring and investigating**

Primary mathematics has traditionally tended almost exclusively towards
short, directed tasks which result in ‘right’ or ‘wrong’ answers. The
activities in this course provide a balance between short, fairly self-contained
activities and open-ended investigations that can be returned to and
developed over a long period of time.

Most of the activities are designed to develop students’ awareness of
the range of mathematical possibilities open to them when tackling a
mathematical task. As much as possible, allow students to take control,
make decisions and explore the many avenues that can arise from a simple
starting point.

Students should always be encouraged to ask ‘What if?’ and ‘Why?’ when
investigating. These questions may lead to uncharted territory, new
challenges, fresh understanding and the development of new skills.

Many investigations have no final solution or easily accessible generalisation
for the students. Some have a simple pattern or rule which may be
discovered and explained. However, many students will want to know
why certain patterns repeat, and offer explanations about the rules which
govern them. This is the first step towards generalisation, and teachers can
courage this by asking questions such as: ‘Why is the same number added
each time?’ or ‘Can you guess what will happen next?’

The value in investigations lies in students pursuing them to the limits of
their ability, and in the new skills that are acquired on the way. For some
students, the early, often concrete, experimentation is enough to give them
confidence, and increase their enjoyment of using already acquired skills.

There are many different ways of recording investigative work. Students
should initially be allowed to explore and note their discoveries freely.
Teachers may wish to intervene periodically to help them organise the
results so that emerging patterns are identified and interpreted.
Sources of investigation

Many everyday objects can provide rich sources of investigative work. The hundred square, addition square and multiplication square all contain many fascinating patterns. Students can also explore patterns in solid and flat shapes, such as the relationships between faces, edges and vertices of 3D shapes, and the relationships between sides, corners and angles of 2D shapes.

Use investigations to enrich the introduction of new concepts. For example, you can introduce number patterns through developing number chains and introduce geometric patterns through explorations of colour arrangements on geo-boards. Students can explore the relationship between area and perimeter, and between volume and the dimensions of cuboids.

As they develop an investigative approach, help students to become systematic in the way they work. This will help them to understand the structure and formal approaches of mathematical theory.

Mathematics in real life

Some students may struggle to understand the relevance of mathematics in their everyday lives. This course places great emphasis on making students aware of the relevance of mathematics to their own real lives.

In this Teacher’s Guide, you will find ideas for using the student’s own environment as a stimulus for mathematical activities. The Workbooks frequently require students to look at the mathematics in the classroom, the playground and their own homes. Each set of activities and problems requires new skills and fresh understanding. Many questions are open-ended or have no exact solution, and students are asked to make predictions, generalisations and estimates, and to evaluate their own answers. Encourage this skill in all areas of the curriculum.

Students use their understanding of mathematics at home and at school, in situations such as sorting toys or books, working out the times of television programmes, making patterns, helping to prepare food and playing board or card games.

In school

In school, there are many opportunities for you to teach mathematics through familiar situations, so that the students experience its usefulness and appreciate the order and sense that mathematics gives to life. For example, students can identify the date each day, as well as the time at various points throughout the lesson. Registration, dinner money, timetables, sorting and putting away equipment will provide a range of relevant experience in data work, measures and shape and space as well as number.

Play

Students of all ages should have opportunities to play both in and out of school. This offers them the freedom to explore new situations, to make discoveries for themselves and to be creative. Unfamiliar mathematics equipment should be introduced through play, with the students exploring
the functions and possibilities inherent in the materials. A good example of this is to experiment with pairs of compasses by drawing patterns and pictures before using them as mathematical instruments.

Construction kits offer students the opportunity to explore shapes and inverse operations, through building and dismantling.

**At home**

Part of the teacher’s role is to involve parents and guardians in the students’ learning. Parents need not be limited to supervising their children’s homework. There are many activities that can involve the parent actively in the child’s learning, and that can provoke mathematical discussion and language at home.

Parents can be encouraged to extend their children’s mathematical understanding through playing board and card games and by encouraging them to help with normal home activities such as cooking, gardening, cleaning and organising the home, drawing up plans and measuring when redecorating, and estimating how many or how much when shopping.

The Nelson International Mathematics scheme offers a set of parent cards (available on the website) that explain the approach taken in the series and suggest how parents can support it in the home. You can guide parents to these online resources, or you may like to print these out and send them home with the students.

Many of the students will also voluntarily help and encourage younger brothers and sisters in games and getting organised.

Family visits and holidays give students the opportunity to see environments different from their own, and to experience time and distance.

They are also likely to be budgeting pocket money, saving for special things and predicting how long it will take them to afford treats.

Students may have computer games that require them to use a variety of mathematical skills. They are likely to see and use a wide range of electronic equipment at home, which demands mathematical skills to be used properly.

Many students will also be responsible for their own timekeeping and have a degree of responsibility for others.

Some homes will not actively encourage girls to use construction kits, computers or calculators, and some parents will not be confident of their own mathematical skills or understanding. As a teacher, you can help a great deal by making explicit the mathematical content of everyday experiences and activities.

This book contains many suggestions for investigations, problems and research that students and parents can work on at home. Games made from suggestions in the scheme could become the core of a ‘lending library’ of games for students to take home for a period of time, to play with parents, or brothers and sisters. This would not only link home and school but also give parents and teachers a basis for discussion.
Organisation

The classroom

Each teacher will have preferences about how best to organise the available space. However, here are some useful guidelines for any classroom, irrespective of how it is arranged.

Storage

Always store equipment in such a way that students have easy access to it and can check it periodically. Clearly label all items and encourage students to make their own decisions about what they need.

A mathematics centre

This may or may not be where the equipment is stored, but it will be a part of the classroom that is bright and attractive with displays of students’ work and other mathematical stimuli. The centre is a place for students to go at odd moments in the day, to be challenged with mathematics-related questions and activities.

Questions and activities should be provided by both teachers and students for interactive problem solving, for example: ‘The answer is 15.2. What was the question?’; inviting students to write out their suggestions. A number pattern or sequence, on a series of cards organised by the students, may be ‘secretly’ altered by the teacher, and the students have to discover what has changed, and put it right.

The BEAM organisation offers a wide range of primary mathematics resources including manipulatives (place value cards, large dice, dominoes, fraction grids and spinners), games and online resources that are a useful and enriching addition to any classroom mathematics centre. You can see the full range of BEAM products on their website www.beam.co.uk or you can request a catalogue from your local Nelson Thornes representative.

The students

Class teaching

At times it is efficient to work with the class as a whole, perhaps when introducing a new topic. The course offers plenty of ideas for this kind of approach. The planned work needs to be suitable for all students, with individual needs and ability taken into account in subsequent group or individual follow-up activities.

Group work

You can group students in similar or mixed-ability groups, to suit the purpose of the work. This offers students the opportunity to collaborate, to discuss their work with each other and the teacher, for peer teaching to take place and for the work to be matched to their needs. It enables the teacher to work simultaneously with a number of students and this minimises the need for repeated explanations to individuals. Group teaching is an effective form of classroom organisation for both teacher and students.
**Working individually or in pairs**

At times it may be appropriate for students to work as individuals or in pairs, to provide extra help to students who need it, or to stimulate and challenge the higher-attaining students. Working individually gives students the opportunity to concentrate on their own thinking, to develop this through investigations and problem solving, to work quietly and in private, and to experiment with materials. Students working in pairs have the opportunity to develop collaborative skills, to play games together and to share ideas in an investigation.

**Assessment and record keeping**

A significant part of a primary school teacher’s day is spent on the informal evaluation of a student’s or group’s learning, and in deciding what the next learning experiences should be.

Assessment can be both formal and informal, and can serve a number of functions. Ongoing observations and discussions with students can give teachers valuable diagnostic and formative information on which to base their teaching. Students’ written and practical work can yield valuable insight into the current stage of their conceptual development and the extent to which they are developing effective skills.

Ideally, assessment should take place throughout the year and its goal should be to support students as they learn and develop their mathematical skills. For this to happen, students need to be actively involved in both their own learning and their assessment. This means that they should understand how they are going to be assessed and how their success will be measured; they need to begin to evaluate themselves, to set targets for themselves and to reflect on their own learning, so that they become more and more self-confident in mathematics.

For assessment to support the development of learning, assessment styles must be varied and relevant to the students. The programme of assessment should present opportunities for students to talk about and demonstrate what they have learned (through oral work, worksheets, exercises, tasks, projects, tests and other activities).

**Facilitating assessment**

- Give students a variety of tasks that require them to apply different skills – for example, writing tasks, using concrete apparatus or working with money. In this way students are able to show what they know in different and exciting ways.
- Think about the most appropriate way to assess a task or activity and identify the skill that you need to assess. This will help you to decide what assessment technique is most suitable at any time.
• Develop your own observation sheets to use as students work through the activities in a topic and use this to observe and assess skills and learning.

• Watch, observe and ask students questions as they work through topics, rather than only assessing the final product. This will allow you to see where they have difficulty and to address problems that may impact on understanding.

• Use a range of different contexts for assessment (individual, peer, group, oral, written) and keep clear and well-organised records of your observations and any marks you allocate. This is not only useful for your own purposes, but is also equips you to report back to parents about their child’s progress.
You should aim to do a mental maths activity that takes about ten minutes each day.

This section contains some examples that you can use as is, or adapt to suit your own classroom. We have tried to provide a range of different types of activities (factual recall, games, grids, tables, problem solving and puzzles) to show some of the ways in which you can approach the mental maths part of the lesson. However, this is not a definitive list and some activities will appeal more to some classes and teachers than others. If you need additional ideas and suggestions, there are several useful websites for teachers which give ideas and resources. Type ‘mental maths warm-ups’ into your search engine and you will be directed to a range of sites covering this topic. Many of these sites offer a range of maths activities many of which can be used with electronic whiteboards or screen projectors attached to the computer.

**Arrow cards**

Many place value and calculation activities can be demonstrated and/or answered using place value arrow cards. Arrow cards are a set of place value cards with an ‘arrow’ or point on the right-hand side. Students can organise the cards horizontally or vertically to represent numbers in expanded notation. They can overlap cards and line up the arrows to form multi-digit numbers.

These are an important teaching and learning resources and it would be useful to have a set available for each student. In stage 2, the students only need to work with numbers to 100, so you only need to prepare tens and units cards. At higher levels these can be extended to as many places as needed and also to the right to show decimal places.

Copy and enlarge the card templates. Print them onto stiff paper or card. Cut along the diagonal line from top to bottom to form the arrow. If possible, laminate the cards to make them more durable. (If you are making a set for each student, you may like to send the cards home for parents or carers to cut out.)

A basic set of tens and units arrow cards consists of:
Introducing the cards to the students

If the students have not previously worked with arrow cards, you will need to teach them how to use them.

• Begin by pointing out the arrows on the cards. Explain that these arrows always go on top of each other when you are making a number.
• Get the students to sort their cards into units and tens.
• Once students have sorted the cards, ask them to show you some numbers starting with numbers that only use one card. For example: Show me 3, 6, 7, 10, 40 or 60.
• Next, show the students how to put the cards together to build numbers. You may need to demonstrate. For example, this is how we make 45. Watch the students to see that they don’t try to put the 4 and 5 card together to do this (if they do, remind that the arrows need to go on top of each other).
Check that the students can build different numbers by calling out some numbers and having them show you.

As students build numbers they will begin to make connections and observations. For example, they may notice that building the numbers is the same as adding numbers. For example, $30 + 5 = 35$. This is an important observation that forms the basis for partitioning numbers and written methods at later stages. Encourage the students to share their observations with the class.

There are ideas for using the arrow cards in different ways in the mental maths activities section that follows as well as some suggestions for practical activities in the related chapter notes for each workbook.

As you read through the activities remember:

- Most of these activities can be repeated by simply using different values. Many of them can also be adapted to make them simpler or more difficult.
- Many of these activities can be done with no resources. However, some require you to prepare grids and/or game boards or to supply students with apparatus such as dice or cards. We suggest that you keep the materials you develop and use them to build up a mental maths resource bank of your own. For example, when you prepare grids or tables with missing values, or magic squares with a wrong number, do this on card and if possible, laminate the card so that it can be re-used. Lamination also means that students can use dry-wipe markers on the cards and these can be cleaned easily. Another option is to prepare apparatus on computer and to print these out onto overhead transparency sheets. These can be stuck onto white card to make a re-usable resource that can be wiped clean.

To make it easier for you to select activities to match what you are doing and that meet your students’ needs at different times, we have organised them into five sections:

1. Place value and number sense
2. Rounding and estimating
3. Mental problem solving
4. Calculation skills
5. Shape, space and measures (including time).

### 1. Place value and number sense

Early in the year you could use the mental maths slot to reinforce and revise number names and numerals to 100 using flashcards.

- Show a series of cards with number names on them, such as ‘eighteen’ or ‘thirty-five’. Display each card for a few seconds and have the students write the number in figures. You can either let the class take turns to say the numbers aloud or you can do this activity in silence, to test that the students can read the number names and relate them to their numeric equivalents. Check the answers as a class by displaying the correct numerals.

- If you write these on the back of the cards you can simply display them. You can then also use the cards to test number names by showing the numeral and having the students take turns to say the number you are displaying.
As the students become more familiar with counting and numbers to 100, you can vary the work with cards to include ordering and finding numbers more or less than a number as well as numbers between the given numbers. For example:

- This is the number 23. Write the number that is 1 more than this number.
- I’m going to show you a number. Write down the number that is one less than this number.
- Write the number that is 10 more/10 less than the number I am showing you.
- Here are two numbers. Which is greater?
- Here are three numbers. Which is smallest?
- Here are two numbers. Write a number that is between these two numbers.

Use arrow cards and spend some time building inverse numbers such as 39 and 93 and 19 and 91 to make sure the students understand that the position of the digit is important. Discuss the value of the digits in the numbers that the students build. Do this by building a two-digit number (for example 53) using arrow cards and ask the students to say what the 5 and the 3 represent (50 and 3).

Ask the students to make as many numbers as possible with a 1, 2 and 3 in any place. (They will need to work in groups and combine their cards to build these, or they will need to record as they make each number to keep track.) Repeat with different digits.

Play some games with the arrow card to challenge the students to listen and think carefully. For example:

- Make a number equivalent to four tens and three units, four tens and no units, no tens and 9 units.
- Build 45 and 54. Which is smaller (and similar)?
- Build 19 and 21. Which is larger (and similar, varying the order in which you give the larger and smaller numbers)?
- Build a number between 33 and 36 (and so on).
- Build an odd (or even) number between 11 and 19.
- Build three different numbers whose digits add up to ten (73, 64 and so on).
- How many numbers smaller than 100 can you build with 4 in the tens position?
- I am a number between 40 and 60 with one five. What number could I be (and similar)?
- Build a number that reads the same from back to front.
- Build a number whose name rhymes with nine (fine). (Other rhyming numbers could rhyme with bun (one); you (two); me (three); door (four); alive (five); sticks (six); heaven (seven); late (eight).)

You can also use the arrow cards to reinforce counting activities. These activities are useful because they require the students to physically build numbers and then partition them to replace digits and this helps them make sense of calculations involving two-digit numbers. Some activities are:
• Build a number that is 10 more than 37.
• Build a number that is 10 less than 83.
• Build a number that is 3 less than 44.
• Build a number that is 5 less than 80.

Display six sequences of two-digit numbers each with some numbers missing. Point to a missing number and let the students guess what it is. Repeat for each missing number.

Choose a two-digit number and display it. Ask the students to read it, identify how many tens and units it has and then count on and back in steps of ones or tens from the number. Play a game in which the students have to take turns to make up a ‘fact’ about the number. For example, using the number 55, they could say things like: it is one more than 54; it is ten more than 45, it is bigger than 50, it is between 50 and 60, it is odd, it is a multiple of five (and so on). Obviously as students learn more about numbers they will be able to give more complex facts, but at the beginning of the year aim to get three or four simple facts per number.

Display a place value table marked with tens and units columns. Like this:

<table>
<thead>
<tr>
<th>Tens (T)</th>
<th>Units (U)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Let the students copy this into their books and then play a game in pairs. They should take turns to toss a die and write the number facing up in one of the places. For example, if they get a 6, they may write it in the T or U place. Change the aim of the game so that sometimes the winner is the student who makes the biggest number and other times it is the student that makes the smallest number. You can vary this by using dice marked with numbers other than 1–6 and you can include 0 as a challenge.

You can vary the game above by starting with a target number. For example, 35. The students then place their digits aiming to get a number that is as close to 35 as possible. The winner is the student whose number is closest to 35.

Make sets of five or six different one- and two-digit numbers on small cards (you’ll need enough for each group or pair of students). You can easily make 100 cards by enlarging and then cutting up the 100 square. Shuffle them and put them into envelopes for use. Distribute the sets of numbers and let the students arrange them in order (from biggest to smallest or vice versa). You can also use these cards to sort into odd and even numbers, or number greater than 20 and numbers less than 20 and so on.

Ask the students to jot down a two-digit number. Once they have all done so, display any two-digit number of your own. The students then have to count from their number to your number. They will need to decide whether to count back or forwards and how to make it easiest for themselves. For
example, if you display 32 and the student has 65, he or she may count back in ones (three ones) to get to 62, then in tens to get to 32. Encourage number line jottings to support the counting at this stage. Bear in mind that some students will use larger jumps than others. Encourage discussion of different methods to encourage students to see the value of counting in larger groups. Make sure they understand that you get the same result, one method is simply faster (more efficient) than the other.

Play ‘Guess the number’ either as a class or in groups. Let students take turns to choose a two-digit number and make them jot it down. The group then takes turns to ask questions to try to guess the number. The student who has the number may only answer ‘yes’ or ‘no’.

Do a range of activities in which the students have to count in given steps. Vary these according to what you are doing in class and the number range that the students are working in.

- Count from 39 to 55.
- Count back in twos from 50 to 30.
- Count in tens from 15 to 55.
- Count back in tens from 65 to 25.

You can also prepare a series of charts like these to use as a mental warm-up. Students can answer orally or in writing.

<table>
<thead>
<tr>
<th>10 less</th>
<th>10 more</th>
</tr>
</thead>
<tbody>
<tr>
<td>21</td>
<td></td>
</tr>
<tr>
<td>34</td>
<td></td>
</tr>
<tr>
<td>56</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td></td>
</tr>
<tr>
<td>99</td>
<td></td>
</tr>
</tbody>
</table>

| Between |
|---------|---------|
| 10 12  |
| 23 25  |
| 38 36  |
| 100 98 |
| 54 56  |

Ask questions based on counting back and forwards using a number line marked from 0 to 100 in intervals of 10. Some possible questions are:

- What is 10 more than 45?
- What is 10 less than 90?
- What is 10 more than 60?
- What is 10 less than 12? (and so on)
Make up a set of questions based on a given two-digit number. For example, display the number 25 and ask students to write or say the number that has:

- five more tens
- three fewer ones
- two fewer tens.

Do lots of activities using place value charts. For example:

Here is a place value chart showing the number 85

<table>
<thead>
<tr>
<th></th>
<th>10</th>
<th>20</th>
<th>30</th>
<th>40</th>
<th>50</th>
<th>60</th>
<th>70</th>
<th>80</th>
<th>90</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>9</td>
<td></td>
</tr>
</tbody>
</table>

What number is shown on this chart? (52)

<table>
<thead>
<tr>
<th></th>
<th>10</th>
<th>20</th>
<th>30</th>
<th>40</th>
<th>50</th>
<th>60</th>
<th>70</th>
<th>80</th>
<th>90</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>9</td>
<td></td>
</tr>
</tbody>
</table>

Write the number in words. (Fifty-two)

If you make a large chart and laminate it, you can use wipe-dry pens to underline or circle the numbers each time. If you are using an electronic chart you can highlight the boxes you are referring to as we have above.

Let the students say each number in words, and then write it in numerals.

Ask the students to write down any two-digit number. Write a random set of two-digit numbers of your own on the board.

- Let the students make number sentences using your numbers and the number they have written down using the <, > or = signs.
- Let the students use mental strategies and jottings to find the sum of or difference between the numbers in their number sentences. Spend some time talking about the strategies they suggest.

Give the students some possible digits for each place value and ask them to work out how many numbers are possible with the given values. For example:

- The tens place can have: 2 or 5 and there are zero units. (They can make 20 or 50.)
- The tens place can have: 4, 5 or 6 and the units place can have: 0, 1, 2, 3. (They can make 40, 41, 42, 43, 50, 51, 52, 53, 60, 61, 62 and 63.)

The students should list all the numbers they can make. Making combinations is one of the problem solving objectives for this phase.

2. **Rounding and estimating**

Ask the students to jot down a two-digit number. You can specify that it should have two different digits or throw dice to generate random two-digit numbers. Once they all have a number, make a ‘human number line’ with ten students standing in a row displaying the multiples of ten (10, 20 ...
Students then take turns to display and read out their own number and then hand it to the number line student with the closest hundred. They can check each other as they go.

Write several two-digit numbers on the board. Round each to the nearest 10. Make sure some of the rounded values are incorrect. For example:

(rounding to the nearest 10)

23 → 20
26 → 20
41 → 40
38 → 30
39 → 40

Ask the students to find the incorrectly rounded numbers and to correct them. Repeat this using different numbers.

To practise and reinforce rounding off mentally, draw a grid like this one on the board. To reinforce rounding to the nearest ten, make sure the numbers all have a value other than 0 in the units place.

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>56</td>
<td>75</td>
<td>49</td>
<td>19</td>
</tr>
<tr>
<td>45</td>
<td>51</td>
<td>19</td>
<td>15</td>
</tr>
<tr>
<td>59</td>
<td>82</td>
<td>81</td>
<td>87</td>
</tr>
<tr>
<td>13</td>
<td>62</td>
<td>91</td>
<td>14</td>
</tr>
</tbody>
</table>

You can ask students to copy the grid, and have them rewrite the numbers, rounding them to the nearest ten as they do so. Alternatively, you can tell the class that you are going to round these numbers to the nearest ten. Then work through the grid, pointing at the numbers and asking different students to give the rounded number.

Write a multiple of a ten on the board and draw six arrows pointing to it. Challenge the students to write down six numbers that would round to this number. For example:

Write six numbers that would round to 30:
Ask the students to make a three-column table like this one:

<table>
<thead>
<tr>
<th>10</th>
<th>20</th>
<th>30</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Read out 8–10 numbers in the range from 5 to 39. As you say each number, the students should write it in the correct column to show the nearest ten. For example, if you say 15, the students should round it to 20 and write it in that column.

Use any book. Turn to a page, for example, page 33. Ask students to write down whether you are closer to page 30 or 40. Repeat for a few different pages.

Prepare an estimation jar. Use a glass jar or plastic container and fill it with items such as beans. Stay in the number range 0–100 at this stage. Let the students jot down how many beans they think there are in the jar (to the nearest ten). Then, show them a smaller container filled with the same items and tell them how many there are. For example, this jar has ten beans in it. How does that affect your estimate? Discuss how their estimates would change if you used larger/smaller items to fill the jar. Discuss how you could check the estimates and then count the items in groups of tens or other appropriate groups.

You can also tell the students that a jar holds an amount. For example, this jar holds 80 marbles.

Tell the class that some have been taken out and ask them to estimate how many are left, and/or how many were taken out. Discuss how they reached their estimates.

Prepare a set of cards with a number of large dots or shapes on them. For example:
Display these and get the students to estimate how many objects there are on the cards. Spend some time discussing how they reached their estimate. For example, the dots are in groups of about 5 and there are six groups, so I estimated 30. (You may need to flash the cards for a few seconds and then remove them to avoid students trying to count. Remind them that you are asking them to estimate.)

Display a blank 100 square grid (i.e. with 100 blocks and no numbers) as a reference point for 100. Then display different grids with different numbers of blocks shaded and ask the students to estimate (to the nearest ten) how many blocks are shaded and/or unshaded). Again, discuss the strategies that students used to reach their estimates. For example, estimate how many blocks are shaded on these grids:

![Grids with shaded blocks]

Display a blank number line marked with 0 and 100. Use an arrow (moveable if possible) to indicate the position of different numbers. Let the students estimate what the number could be and say how they decided. For example, I think this is about 70 because it is more than half way (50) between 0 and 100, but not quite in the middle between 50 and 100.
Once the students have dealt with simple fractions, you could show a range of shapes with parts shaded and ask them to estimate what fraction is shaded. Similarly, you could display a small set of objects with a ring around half or quarter of them and ask the students to say what fraction is encircled.

3. Mental problem solving

Test understanding of mathematical terms and vocabulary by posing worded problems to be solved mentally. For example:

- What is the sum of 5 and 5?
- I have 7, how many more do I need to have 10?
- Mike has 5 marbles, Jessie has 6 more. How many does Jessie have?
- I have 80c and 20c, how much is that altogether?
- I have four 10c coins. What amount of money do I have?
- I bought two items costing $25. What did I pay?
- Half of a class of 18 students wears glasses. How many students is this?
- There is a different of 10 between two numbers. If one number is 19, what could the other number be?
- The total of three numbers is 20. What numbers could they be?
- I divided 10 cakes equally among 3 children. How many were left over?
- What is 27 less 4?
- What is the difference between 33 and 29?
- There are ten apples in a packet. How many packets can you fill with 40 apples? How many apples will there be in 3 boxes (and similar)?

And so on.

Extend students by asking them to make up their own problems related to money. You can give them prices, allow them to work with local adverts or give them prompts such as: the answer is 42 cents, what is the question? Or make up a story sum to match this calculation: 90 cents – 3 cents = 87 cents.

Show the students pictures of groups of animals. For example, 4 birds, 5 ants, 10 antelope. Pose problems related to counting in groups (or multiplying). For example.

- How many wings altogether in this group of birds? (2 × 4 = 8)
- How many legs in this group of ants? (5 × 6 = 30)
- How many horns on these antelope? (2 × 10 = 20)
- How many legs in this group of antelope? (10 × 4 = 40)

Extend this by asking questions such as:

- If one bird flies away, how many wings will be left?
- If two more antelope join the group, how many legs will there be? And so on.

Display a few items with prices, for example an eraser for 10c, a pencil for 20c, a ruler for 40c, a notebook for 30c and a sharpener for 20c. Pose worded problems related to the prices.
For example:
- What will it cost to buy 2 pencils? (doubling)
- What can I buy for exactly $1?

You can also ask the students to pose problems for each other. Developing their own worded problems is one of the problem solving objectives for this stage. They can write these down and exchange problems to try and solve each other’s problems.

You can adapt these price activities to cover subtraction of a small number from a two-digit number by displaying prices up to 100 cents and asking students what they’d pay if they got 1, 2, 3, 5 or 10c off each price. If cents are unrealistic locally, use whole dollar amounts for the activity.

Reinforce recall of addition and subtraction facts to 20 by posing worded problems using measures and money amounts. For example:
- I had 20 metres of rope. I cut off 9 metres. How much is left?
- I paid for a $5 toy with a $20 note. How much change will I get?
- I mixed 12 kg of sand with 8 kg of cement. How much did the mixture weigh?
- A 20 litre drum contains 2 litres of oil. How much more oil can I add before it is full?
- Mandy and Sally have 20 dollar coins between them. How many dollars could they each have? (list all the bonds to 20)

And so on.

Display some target boards, stick moveable counters onto them and ask the students to work out the total score for each board (adding several small numbers). Repeat with the counters on different numbers. For example:

![Target Board Diagram]

Write a number on the board. For example 12. Ask, how could you put 12 things into equal groups? How many things would be in each group? How do you know? Record the groupings and encourage the students to find as many possibilities as they can (2 groups of 6, 6 groups of 2, 3 groups of 4, 4 groups of 3). Repeat for other suitable numbers.

Read out a number of statements. These should relate to the work you are doing, or have done recently. Ask the students to say whether the statements are true or false.
Here are some examples related to shapes:
- a rectangle has four equal sides
- a square has four right angles
- a circle has no straight sides
- a triangle has three right angles
- a pentagon has six sides.

Here are some examples related to measures:
- there are 10 cm in a metre
- 1 cm is shorter than 1 metre
- there are 100 grams in a kilogram
- \(\frac{1}{4}\) of a metre is 25 cm
- a metre rule is 100 cm long.

Here are some examples related to number:
- half of 50 is 25
- double 32 is 65
- 100c is the same as $1
- $1 is more than 99 cents
- 100 – 75 is 30
- half of 100 is 50.

4. Calculation skills

Prepare a set of ‘target’ numbers. For example 14 and 18. Ask the students to write as many calculations as they can to get to each number. You may want to limit this to focus on particular operations. For example, write as many addition sentences as you can with this answer. Or you can leave it open ended and challenge the class to find as many different operations as possible.

Give the students a ‘rule’ for generating a sequence. Write the first few numbers and let them find the next five. For example:

The rule is add 10: 15, 25, 35 …

The rule is subtract 1: 65, 64, 63, …

The rule is double the number: 1, 2, 4, …

You can adapt this by giving the students sequences and letting them identify the rules. For example:

35, 30, 25 (minus 5)
55, 65, 75 (plus 10)
45, 40, 35 (minus 5)
58, 61, 64 (plus 3)
2, 4, 8, 16 (double or times 2).
Prepare some flow diagrams and let the students complete them. For example:

Use the true or false strategy to test vocabulary and also to apply calculation skills. Give students a statement and have them say whether it is true or false. Discuss how they decided. For example:

- 1 multiplied by 7 is 8
- 2 times 3 is 6
- the difference between 6 and 15 is 9
- the sum of 3, 4 and 6 and 2 is 15
- 5 taken away from 40 is 45
- four lots of 2 are 8
- the product of 5 and 7 is 35
- half of 50 is 100
- 9 times 10 is 19
- 15 divided by 5 is 3.

Use the properties of shapes to reinforce multiplication and division facts. For example, display a triangle. Ask how many sides in 2, 5 and 10 triangles. Similarly, ask things like: I have a number of triangles. There are 27 sides. How many triangles are there? Repeat for other shapes and numbers.

Prepare some simple number puzzles, such as magic squares. Give the students a set of two-digit numbers and challenge them to use pairs of the numbers that meet certain criteria. For example, find a pair of numbers with a difference of 10, find two number where the one is 3 more than the other, and so on. Select the numbers carefully so that they work for the problems you are setting.

| 79 | 82 | 69 | 86 | 87 |

Prepare sections of multiplication tables and display them for students to complete as quickly as possible. For example:

<table>
<thead>
<tr>
<th>×</th>
<th>1</th>
<th>4</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Prepare a ‘dartboard’ like this one with a 10 or 20 in the centre.

<table>
<thead>
<tr>
<th>x</th>
<th>3</th>
<th>6</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Tell the students that each sector adds up to the number in the centre and ask the students to find the missing score on the outer ring. You can adapt this by writing a small number (1–5) in the middle and then saying that the outer ring minus the inner ring will give this result. Ask the students to find the missing numbers. Vary the task by sometimes providing the outer ring, sometimes providing the inner ring and sometimes providing some inner and some outer numbers.

Arrange the students in small groups. Give each group a pack of playing cards with the picture cards (jacks, queens and kings) removed. Tell them that the ace represents 1. Each group should shuffle the cards and place them face down on a table (or on the floor). The aim of the game is to make sums that add up to 10. Let the students take turns to turn over two cards. If they add up to 10, the player removes and keeps them. If they add up to less than 10, the player can pick a third card (if that makes 10, he or she removes the cards and keeps them). If the sum is not 10, or greater than 10, the cards are turned face down and the next student gets a turn. The game is over when no more tens can be made. The player with most ‘sums of ten’ wins. You can add zero as an option by including the jokers. You can also use the jokers and allow the students to give them any value if they are turned over (wild cards).

Test listening skills and computational fluency by reading instructions. Students can jot them down and they should record the answers and put up their hands when they have them. Adapt the tasks to the skill levels of the class and what you have covered at that stage of the year. Here are some sample activities:
• Tell the students. I’ll say a number and you double it (use easy numbers to start with). Then include an addition or subtraction, for example: I’ll say a number. You double it and then add (or subtract) 1 (or 10). Then, adapt the task, for example, I’ll say a number, add 1 to it and then double it. Or, I’ll say a number, add 10 to it and then double it.

• Make the calculation a chain calculation. For example, start with 2, double it. Add 10. Then subtract 1. Add 3 and then find the number 10 less than that.

• Give the answers and have the students make up a matching calculation. State the operation. For example, in an addition, the answer is 16. Give me two numbers. Increase the number range and the numbers, for example, the answer is 32. Give me four numbers. Change the target number regularly.

Prepare a series of short quizzes (8–10 questions) with mixed operations and mental strategies. Use these as the mental warm-up activities at intervals. Read the questions aloud and display them one by one for the class. Allow 20 to 30 seconds for the students to answer before moving on. (So, a 10-question quiz would take 5 minutes to complete.) The students can prepare a table and keep track of their results for different quizzes. Below are three sample quizzes, but bear in mind, you need to have taught the topics before you include questions on them.

---

**Sample Quiz 1**

1. 3 more than 6
2. 4 plus 8
3. 50 plus 20
4. Take 7 from 20
5. 10 less than 55
6. By how much is 90 greater than 88?
7. What is 5 times 8?
8. What is three times 2?
9. 9 tens are?
10. How many fours in 12?

**Sample Quiz 2**

1. Write in words the number that is 3 greater than 46.
2. How many tens are there in 43?
4. What is $\frac{1}{2}$ of 20?
5. How many days in a week?
6. $6 \times 10 =$
7. $14 \div 2 =$
8. $12 \div \square = 6$
9. $19 + 30 =$
10. $40 + 60 =$

**Sample Quiz 3**

1. Arrange in order from smallest to largest: 23, 19, 24, 30
2. Write the number equivalent to five tens and 3 units in figures.
3. What is the difference between 70 and 80?
4. How many jumps of 5 will you need to get from 0 to 20?
5. $65 + 5 =$
6. $97 - 4 =$
7. $34 + 9 =$
8. $27 - 8 =$
9. $40 + \square = 100$
10. How many sides does a hexagon have?
5. Shape, space and measures (including time)

Prepare a time quiz to test knowledge of units and vocabulary. Students can either say or write the answers. Here are some sample questions.

- Which is longer: a minute or a second?
- How many days in a week?
- How many months in a year?
- What is the sixth month of the year?
- Which is longer: a month or a year?
- Which month comes before September?
- Which day is before Monday?
- Which month comes after November?
- What day will it be tomorrow?
- What day is two days after Thursday?
- What is the first day of the week?
- Which is shorter: 30 seconds or 30 minutes?
- How many minutes are there in an hour?
- About how long does it take to write your name: 20 seconds or 20 minutes?

Ask students to write or show the time:

- half an hour before 2 o’clock
- half an hour after 1:00
- half an hour before 5.30
- half an hour after 4 o’clock.

Pose some questions related to mass. For example, say which item weighs the most in each pair:

- an apple or a brick
- a pencil or an apple
- a kilogram of apples or your shoe
- a litre of cola or a glass of water
- a basketball or a tennis ball
- an empty cup or a full cup.

You can adapt these questions to work with length and capacity.

Ask students to write estimates of the lengths of various familiar items in appropriate units. For example, a shoe, your book, a desk, a pin, a pencil, the door of the classroom and so one. Discuss what a reasonable estimate might be in each case.

Display a number of 2D shapes. Show each one for a few seconds and ask the students to write down the name of the shape.

Say the name of a shape and ask the students to write down how many sides it has.
Display diagrams of 3D shapes made out of construction rods or show the class models. For example, you can use drinking straws and blobs of modelling clay to build 3D shapes like this:

![3D shape diagram]

For each one, name the shape. Let the students say how many faces, corners and edges it has.

Display a number of lengths which are multiples of ten (to make 100s) and ask the students to combine them to make lengths of 1 metre.

Use the mental warm-up session as an opportunity to explore solids and shapes used in buildings. You can find pictures of homes, places of worship and/or murals and decorative patterns from a range of sources. Display these and spend some time identifying and naming the shapes used in construction, symmetrical and other properties. If the students struggle with 2D representations of 3D objects, show them real items such as dice, a soccer ball, a cereal box and let them name these, and then find pictures of them to make the connection between the real item and its representation.

Display a number of 2D shapes (or 3D objects) labelled A to F. Display the correct names of the shapes in a mixed order and ask the students to match them up.

Use plastic shapes, or prepare and laminate cards with coloured shapes on them. Distribute these to the class so each student has at least two different shapes. Play a game in which you call out commands such as ‘show me a red square’. All students with that shape should then hold it up. Repeat for different shapes, moving quickly to make the children react quickly. If they hold up a wrong shape or colour, they have to put it down. Once they’ve lost their shapes, they can’t play anymore.

Display a number of shape patterns and have the students draw the next shape. For example:

![Shape patterns]
Encourage the students to tell each other how they decided what the next shape would be.

Give students oral instructions for drawing shapes or objects in a given position. For example, draw a big square on your page to start. Draw a triangle in the top, left-hand corner. Draw a small circle around the triangle. Draw an octagon in the bottom, left-hand corner. Draw a rectangle above the octagon. And so on.

You can also display a set of shapes on a grid. For example:

```
  9 0 9
  8 0 8
```

Ask questions such as:
Which shape is in the top right corner?
What shape is above the red triangle?
Which shape is left of the green triangle?
Which shape is below the blue circle in the second row?
And similar.
Objectives

| 2Nn1 | Count, read and write numbers to at least 100 and back again |
| 2Nn2 | Count up to 100 objects, e.g. beads on a bead bar |
| 2Nn6 | Know what each digit represents in two-digit numbers; partition into tens and ones |
| 2Nn12 | Order numbers to 100; compare two numbers using the < and > signs |
| 2Nn13 | Give a sensible estimate of up to 100 objects, e.g. choosing from 10, 20, 50 or 100 |

Vocabulary

Number names to 100, digit, tens, ones (units), order, more than, less than, estimate

Resources needed

Arrow cards, large 1–50 (or 1–100) counting square, number strips, number line marked in tens from 0 to 50, spinners (see ideas below), counters, small jar filled with beans or other objects for estimating, straws, pile of counters for each pair of students.

Mental warm-up activities

There are lots of counting, number sense and estimating activities in the mental warm-ups activity bank. Select different examples to support and introduce this work.

Concepts that may be unfamiliar in this topic

Reading and writing number names beyond 30

Students should already be able to count to 100, but they may not know how to read and write numbers beyond 30. Assess what they already know before moving onto this topic. Focus on the pattern of numbers in the twenties.
and thirties and point out that the same pattern exists in the forties, fifties, sixties, seventies, eighties and nineties. Display number names in words and figures to help students learn to spell them correctly.

Note that this chapter focuses on the number range 0–50 to revise previous knowledge and extend the range of known numbers but students can still count beyond this and they will move on to the higher range (50–100) fairly quickly.

**Counting backwards in a larger range**

Students already know how to count backwards from 20 to 0. Now they will extend this to counting back from any number up to 100. Lots of practice and use of number lines, strips and counting grids will help them develop this skill. It also helps initially to give them a stack of say 55 counters or objects and have them count back in ones by ‘taking away’ the counters to say how many are left.

**Counting and estimating a greater quantity of objects**

Estimating is not a new concept, but now students will be required to visually assess a set of objects and use grouping and/or comparison to estimate how many there are.

**Comparing numbers using the < and > signs**

Students compared numbers and ordered them in stage 1, but they only used the words ‘more than’ and ‘less than’ so the symbols for greater than (>) and smaller than (<) will be new to them. Teach them that the open end of the symbol always faces the greater number.

**Teaching ideas**

**Practical activities**

- Work orally with the class to reinforce counting to 30 and to teach the numbers to 50. You can use a number chart or number line to do this. Point to the numerals, say the names and have the students repeat these. It is useful to shade the multiples of ten on your number chart to highlight these numbers and to allow students to see when they bridge from one ten to another.

- Once you have taught the numbers, point to any number and ask the students to say it. Alternatively, say the name of a number and get different students to point to it on the chart.

- Cover up some numbers on the large chart and ask the students to count, including that number in their count. You can also use this as a quiz to ask students to work out and say the numbers you have covered up.

- Use cards with the numbers 1 to 50 on them. Let the students choose cards at random and say the number. You can extend this by asking them to say the number before and/or after the number they have chosen.
Use a number spinner made from two paper plates as shown. Let the students take turns to spin the arrows and let them say and write the numbers they have made.

You can also use a limited spread of arrow cards to make numbers. Let the students use their 10, 20, 30 and 30 cards together with the unit cards. Arrange these in two piles, facing down, and let the students draw a tens card and a units card, make a number and say it, or write its name.

Refer to the arrow cards information and suggestions for using them in place value and partitioning on pages 22–24.

Reinforce the ordering of numbers orally by asking questions such as ‘What is the number after 35?’, ‘What is the number before 49?’ and so on.

Write sets of five or so consecutive numbers (for example 31, 32, 33, 34, 35) in a random order on the board. Get students to come up and to draw lines to join the numbers in order. They should say each number as they join it.

Give the students a spread of number cards (say from 20 to 30, or 35 to 45) in a mixed-up order and get them to place these in a row in the correct order. Encourage them to do this from memory, but allow them to refer to the displayed number chart or number line as they need to.

A 1–50 number grid could be drawn on an area of the playground using chalk. Students can be given instructions to stand on a certain number on the grid and to move to the numbers before or after the first one they stand on.

To begin counting and developing the concept of different amounts, the students can use straws or beads to represent numbers. A 10 can be represented by a bundle of 10 straws or placing 10 beans in a cup.
A number is represented as so many tens and so many ones.
Play a game in which up to four students display both hands (to indicate 10), while you show a number less than 10. Let the students take turns to count in tens and say the number shown.

Place a number of counters in the bottle and seal it. Pass the bottle around the group and ask students to guess how many are inside. Empty the bottle and count to see who is the closest. Repeat this activity a number of times, start with a small number and increase the beans. Do not exceed 50. Repeat the activity using larger or smaller objects, for example, marbles and rice. Observe whether the students change their estimates accordingly.

Use a blank 1–50 grid and a counter. Make sure all the students can see clearly. Place a counter in any position on the number board and ask students to guess what the number is. Count in a range of ways to see which estimates were close. Ask students who were correct to explain their strategy.

Arrange students in groups facing each other. They should have a big pile of counters between them. The students take turns to grab a handful of counters. The grabber holds out his or her hand for a short time and then closes it. Each student estimates how many, they then count and discuss which guesses were most accurate.

Continue working in a concrete fashion with the students until you are sure that they are able to count in sequence, that they recognise and can name the numbers from 1 to 50, that they have a concept of these numbers and that they are aware that two-digit numbers are composed of tens and units.

Using the Workbook

Use the number chart on page 3 to make sure that the students can read and write the numbers from 1 to 50.

Use the number sequences to informally assess whether the students can count from any two-digit number in the range.

Students to complete page 4 as a counting activity. Encourage the students to count in ones if they need to, but point out that it is faster to decompose the numbers into tens and ones and to count that way.

Students to complete page 5 once you have done some practical estimation tasks with them. Make sure they count to check and observe what strategies they use for counting.

Use page 6 to reinforce place value of numbers to 50. Make sure students remember what the signs < (less than) and > (greater than) mean before they tackle the problem solving activity on page 6.
**Assessment questions to ask**

- What number is this (point to a number on the chart)?
- Show me the number (say any number in the range).
- What number comes before/after (say any number in the range)?
- How many tens and how many units in the number 29?
- A number is composed of 3 tens and 6 units. What is the number?
- What number is missing from the sequence 32, 33, . . . , 35?
- Count on from (a given number) to (another higher number).

**Common errors and misconceptions**

Some students may not see that the pattern of counting is repeated in groups of ten. Give plenty of practice with the 1–50 chart to emphasise the pattern of tens and units. Give the students time to practise finding numbers on the chart by looking for the correct tens row and then the units. This helps to reinforce understanding of the place value pattern.

Some students may reverse the numbers, saying 32 instead of 23 and so on. This is particularly problematic in children whose first language may not be English, for whom numbers may normally be expressed differently. Watch out for this and give additional practice for students who do this.

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**2 Addition and subtraction**

<table>
<thead>
<tr>
<th>Objectives</th>
<th>2: Addition and subtraction</th>
<th>Workbook 2A pp 7–10</th>
</tr>
</thead>
<tbody>
<tr>
<td>2Nc1</td>
<td>Find and learn by heart all number pairs to 10 and pairs with a total of 20</td>
<td></td>
</tr>
<tr>
<td>2Nc2</td>
<td>Partition all numbers to 20 into pairs and record the related addition and subtraction facts</td>
<td></td>
</tr>
<tr>
<td>2Nc7</td>
<td>Use the = sign to represent equality, e.g. 16 + 4 = 17 + 3</td>
<td></td>
</tr>
<tr>
<td>2Nc11</td>
<td>Add and subtract a single digit to and from a two-digit number</td>
<td></td>
</tr>
<tr>
<td>2Nc14</td>
<td>Understand that addition can be done in any order, but subtraction cannot</td>
<td></td>
</tr>
</tbody>
</table>

**Vocabulary**

Add, subtract, sum, total, count, count on, count back, number line, number sentence, missing numbers
Resources

Arrow cards, counters as required; large class copy of number line from 0 to 20; two lids or other containers per student or group, and 10 stones; dice; number lines per student from 0 to 10.

Mental warm-up activities

Select suitable activities from the mental warm-ups activity bank.

Concepts that may be unfamiliar in this topic

There are no fundamentally new concepts in this topic. The work begins with a revision of bonds to ten and uses a number line to show addition and subtraction as counting on and counting back. Once students have revised the concepts, they extend these to include bridging 10 and counting on and counting back to develop addition facts to 20. Students may initially count on and back in single ‘ones’ but as they become more confident adding and subtracting single-digit numbers, they may do this counting on and back by counting the units in one jump. This is an essential step in the progression of addition and subtraction skills and you should note who is moving onto that step and which students are still counting ones jump-by-jump.

Note, as you work through this topic, you should focus on the fact that addition can be done in any order (students should remember this from stage 1). Demonstrate this to the students using the number lines. Point out that order matters in subtraction, and that 10 – 2 is not the same as 2 – 10. Try to avoid saying that you always subtract the smaller number from the bigger number as this is mathematically incorrect. It is perfectly possible to calculate 2 – 10 and get the answer –8 and students will begin to work with negative numbers in context whilst still in primary school. You can simply show them that counting back from 10 to 2 will give you 8, but that when you try to count back 10 from 2, you move off the number line and will therefore not get the same answer.

Teaching ideas

Practical activities

Give each group two lids and 10 stones. Two students must take turns to grab a few stones and put them into one of the lids. Explain that they are going to ‘add’ them to find out how many there are. The students must discuss how to do this and find ways of working out what the total is. Get them to check by counting the stones one by one.

Take the class outside to work with a large number line drawn in chalk on the ground. Let them take turns to throw a die to decide where to start. Throw the die again to get a number to move. Have the student say where they think they are going end up. Let them move that number of steps on the line to check. Include zero.
Give each student 10 stones. Instruct the class to make groups. For example, start with five stones. Add two more. How many do you have? Repeat this several times with different numbers. Include zero when the students are ready.

Use a number line to show that we can count on and back in groups to add or subtract numbers. Demonstrate a range of different methods. For example:

- Counting all the numbers: 3 + 5 can be seen as 3 jumps of 1 then 5 jumps of 1 like this:

```
1 0 5
```

- Counting on starting at 3 and counting 5

Repeat this for subtraction. Make sure that the students can read number lines properly and that they count the intervals and not the markers when they work with them.

Give each student a number line from 0 to 10. Play games where you tell them the starting point and how many places to move. They should shout out where they will land and then make the moves to check they are right. Repeat this several times with many different starting points including zero. You can also say ‘move zero places’ to reinforce the concept of adding zero.

Give each group a die marked from 0 to 5, a pile of stones and two lids. They must toss the die twice to get two numbers from 0 to 5. They should make the numbers they have tossed with two groups of stones and say how many they have in total.

Give the students more practical examples of combining groups and let them record their working using + and = signs in the correct way.

Make a group of 20 students. Start by dividing them into boys and girls. Ask the class to express this as a number sentence. For example, 11 girls and 9 boys is 20 altogether. Discuss other ways of splitting this group up. Make sure you get to all the addition facts for 20.

Give each student a set of 20 counters and two containers. Get them to split the counters into groups as many different ways as they can and to record this using plus and equal signs. They should record from left to right, so they record 1 + 19 and 19 + 1.
Play the grab game with sets of up to 20 counters. Get the students to work in pairs. They should each make a big grab and then count how many they have in their hands. They should work out without counting how many they have together. You can adapt this by letting one student make a grab. He or she says how many they have and the partner says how many are needed to make a given total (you set the total based on the number composition you are teaching).

Make two ten-sided spinners with the numbers from 1 to 10 on them. Get the students to spin these and then use their number lines to add the two numbers together.

Use arrow cards to make the number from 11 to 19 and then partition them (into, for example, 10 and 1) and record them as addition facts.

Using the Workbook

Let the students work in pairs to complete page 7. Encourage them to use the number line to count on or back, but allow those who need to, to model the problems using counters.

Have the students complete page 8 on their own. The problem solving activity on page 8 requires them to identify and list all number pairs to make 10. Encourage them to check each other’s answers to remove repeats. This allows you to discuss the commutative property of addition (i.e. that $8 + 2$ is the same as $2 + 8$).

Let the students work in pairs to complete page 9. You may want to check each set of additions before they move on to the next. At this point, you should encourage counting on as it is faster and easier with the larger numbers. Ask students to discuss why it is easier to start with the larger number (you have fewer numbers to count on).

Let the students complete page 10 as a timed trial. The bonds are shown in the box at the top right of the page.

Assessment questions to ask

- If I add 11 and 4, how many do I have altogether (and similar)?
- If I start at [any number] on the number line and count on 5, where will I end up?
- If I take away 3, how many are left (and similar)?
- If I start at 10 and count back 4, where will I land (and similar)?
- What number can I add to get 10? Give me three pairs.
- What do I add to 15 to get to 20 (and similar)?
- What is 20 minus 2 (and similar)?
Common errors and misconceptions

Some students may not grasp that it is easier to count on from the larger number when adding. Keep demonstrating on a number line to show them that to add 2 + 18, it is much faster to start with 18 and count on 2. This also helps to reinforce the idea that addition is commutative (you can add in any order). Once students grasp this, the number of ‘facts’ they need to learn is reduced and it is easier for them to learn the bonds to 20.

The concept of adding or subtracting 0 is sometimes confusing for young students. It may help to talk about zero as ‘nothing’. In other words you are adding or subtracting ‘nothing’ so you don’t change the number you started on. Similarly, if the answer to a calculation is 0, some students may forget to write it down and you may need to remind them that we still need an answer, even if it is 0.

3 Data handling

<table>
<thead>
<tr>
<th>Objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td>2Dh1</td>
</tr>
<tr>
<td>Answer a question by collecting and recording data in lists and tables, and representing it as block graphs and pictograms to show results</td>
</tr>
</tbody>
</table>

Vocabulary

Data, table, row, column, pictogram, key, symbol, block graph

Resources needed

Large chart showing favourite days of the week (see below for an example), shape pictogram worksheet (see practical activities for an example) for each group of students.

<table>
<thead>
<tr>
<th>Monday</th>
<th>Tuesday</th>
<th>Wednesday</th>
<th>Thursday</th>
<th>Friday</th>
<th>Saturday</th>
<th>Sunday</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>3</td>
<td>3</td>
<td>7</td>
<td>6</td>
<td>8</td>
<td>2</td>
</tr>
</tbody>
</table>

Key: ✶ = 1 student
Mental warm-up activities

Select suitable activities from the mental warm-ups activity bank. Students will not be doing any calculation work in this topic, so you may want to revise addition and subtraction facts at least once as you complete this topic.

Concepts that may be unfamiliar in this topic

Pictograms and block graphs with symbols

In stage 1 students worked with practical apparatus to build block graphs and pictograms. Now they will move towards a more abstract representation where they work from tables and lists and use the information to draw graphs and symbols (with a one-to-one correspondence). This topic should not be difficult as long as students understand there is a relationship between the data collected and organised in a table and the visual representation of that data.

Teaching ideas

Practical activities

Revise the concept of a chart using the favourite days of the week chart. Ask questions such as: ‘Which day did most children like?’; ‘Which day did the fewest children like?’; ‘How many children liked Monday?’; ‘How many more children liked Tuesdays than Wednesdays?’ and so on.

Make a horizontal display on the board. Write the letters of the alphabet in a horizontal row across the top of the board. Get the students to put up their hands to show what letters their first names begin with. Draw a stick figure below the relevant letters to represent each child. Do this systematically; for example, say ‘Everyone whose name starts with A put up your hand.’ As you draw each student, let them sit down. Use the words ‘chart’ and ‘information’ in context to reinforce their meaning. Ask the students questions about the chart.

Repeat these activities with a range of different horizontal and vertical picture charts until you are satisfied that the students can read and understand both types of chart. Revise the use of the words ‘rows’ and ‘columns’ if necessary. Discuss the characteristics of the charts as you display them – make sure the students understand that the pictures are the same size, that they are spaced equally and that the axes are labelled.

Make a permanent weather chart for the classroom. It could look something like this one:

<table>
<thead>
<tr>
<th>Monday</th>
<th>Tuesday</th>
<th>Wednesday</th>
<th>Thursday</th>
<th>Friday</th>
<th>Saturday</th>
<th>Sunday</th>
</tr>
</thead>
<tbody>
<tr>
<td>Today it is</td>
<td><img src="image" alt="Sun" /></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Let the students complete a pictogram worksheet using shapes as the data. Some students may ask whether a square is also a rectangle. Remember that in mathematics, a rectangle is a quadrilateral with four right angles and opposite sides which are equal in length. As a square conforms to this definition, it is technically also a rectangle. We call it a square because it is a ‘special’ rectangle which has all four sides equal in length. If the students do not raise this, you may want to leave the topic as is for now. Give each group a set of shapes and the following worksheet:

Name: ___________________________ Date: ___________________________

1. Draw the shapes in the correct rows on the grid to make a pictogram.

<table>
<thead>
<tr>
<th>Circle</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Square</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rectangle</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Triangle</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. Answer these questions about your pictogram:
   a) How many circles are there?
   b) Which shape is there fewest of?
   c) Which shape is there most of?
   d) How many more squares are there than rectangles?
   e) How many shapes are there altogether?

Get the students to draw a picture chart showing some data, for example the contents of the cutlery drawer at home. Let them make up questions similar to those above about their charts, and exchange them with a partner to answer each other’s questions using their grids. Use the grid below as an example:

<table>
<thead>
<tr>
<th>Knives</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Forks</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spoons</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Serving spoons</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Using the Workbook

Students can complete page 11 independently. In this activity they use tick marks in the table (one per count) as a precursor to later work on tallies. Check that they count accurately to get the correct values.

Work through page 12 with small groups of students or as a whole class. Let the students discuss the answers with each other and then share them as a class. Make sure they understand that they have to add the data for different fruits to find out how many children like the fruits altogether.

Let the students answer the questions on page 13 on their own. Check the answers as a class.

Let the students work in pairs to talk about how they would do the work on page 14 and then have each student draw his or her own graph.

Assessment questions to ask

Any of the questions from the Workbook can be adapted to the tables and charts you are using to assess how well the students understand them.

Common errors and misconceptions

Some students may forget to label the parts of the graph. Show the class examples of graphs without clear labels and let them experience how difficult it is to understand them, to highlight how important labelling is.

4 Multiplication as repeated addition

<table>
<thead>
<tr>
<th>Objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td>2Nc16</td>
</tr>
<tr>
<td>2Nc19</td>
</tr>
<tr>
<td>2Nc22</td>
</tr>
</tbody>
</table>
**Vocabulary**

Many times, repeat, groups, equal, add, multiply, multiplication sign

**Resources needed**

Counters, 1c and 5c coins, pictures showing objects in groups of one to five.

**Mental warm-up activities**

Select suitable activities from the mental warm-ups activity bank.

**Concepts that may be unfamiliar in this topic**

**Multiplication and the multiplication sign**

This is the first time the students will formally use the multiplication sign and begin to deal with times tables facts. Make sure they understand the connection between repeated addition as adding something a number of times \(3 + 3 + 3 + 3\) and the shorter notation of \(3 \times 4\).

**Teaching ideas**

**Practical activities**

1. Revise counting in twos using the number line.
2. Give each group of students a number of pictures showing two items (a pair of socks, two sweets, a pair of shoes, two fish and so on) and some counters. Ask them to work out how many of each item there would need to be to give each member of their group two. Let them find their own methods of working this out. Discuss as a class how they worked out how many items they would need.
3. Repeat this with three items, but make sure the groups of students are not bigger than six so that you do not go beyond the number range of 20.
4. Give the students a number of drawing activities. For example, draw four groups of two birds, draw five groups of three socks, draw eight groups of two sweets and so on. Let them write the total number of objects in each set of groups.
5. Practise counting 1c coins in twos.

Get the children to complete a chart using five cent coins: one five cent = ___; two five cents = ___; three five cents = ___; four five cents = ___. Do not go beyond 20.
Spend time making groups of two and three objects and getting the students to describe what they have made and done until you are satisfied they understand the concept of repeated addition. Once they have done this, move onto groups of four and five objects, reducing the number of groups to remain within the number range of 20. Use these activities to begin to formulate multiplication facts for the $3\times$ and $4\times$ tables using number lines:

- One jump of $3 = 1 \times 3 = 3$
- Two jumps of $3 = 2 \times 3 = 6$ and so on.

Remember to match the models you are using to the correct notation (calculation). Two groups of 3 is $2 \times 3$. Three groups of 2 is $3 \times 2$.

**Using the Workbook**

- You may want to complete page 15 as a class. Chanting the additions and reading the sentences out loud is a good reinforcement. Alternatively, let the students work on their own, or in pairs, to complete the problems.

  Students already know that we use signs to simplify what we write in mathematics. Introduce the multiplication sign and give the students some practice in making the sign before they complete page 16. The concepts are the same as on the previous page, but an additional number sentence is introduced for the multiplication concept.

**Assessment questions to ask**

- What is $2 + 2 + 2$ (and so on, for all the numbers dealt with)?
- What are three fives (and so on, for all the numbers dealt with)?
- Write $2 + 2 + 2$ as a multiplication sentence.

**Common errors and misconceptions**

Students may have difficulty visualising number patterns. Talking of multiplication as three groups of two may help them to ‘see’ what you are doing, as will using counters and pictures to demonstrate what is happening. At this stage, the use of visuals to reinforce what is being calculated is very powerful and it helps students to see whether they have solved problems correctly or not. Stick to language that relates to the problem at hand, for example, if you are talking about birds’ legs, keep referring to two legs. Be careful of moving to abstract terminology too quickly as this may confuse the students.

Some students may not immediately see how the multiplication sign is different from the plus sign. Spend time drawing patterns which use both, so that they can see the difference.
5 Making equal groups (division)

<table>
<thead>
<tr>
<th>Objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td>2Nc18 Understand division as grouping and use the ÷ sign</td>
</tr>
<tr>
<td>2Nc22 Work out multiplication and division facts for the 3× and 4× tables</td>
</tr>
<tr>
<td>2Nc23 Understand that division can leave some left over</td>
</tr>
</tbody>
</table>

**Vocabulary**

Equal groups, shared equally, sharing, left over (remainder)

**Resources needed**

Number lines, number tracks, beads, counters (or objects such as beans to use as counters).

**Mental warm-up activities**

Select suitable activities from the mental warm-ups activity bank.

**Concepts that may be unfamiliar in this topic**

**Dividing a quantity into a number of equal groups**

The concept of equal sharing should be familiar to the students, but in stage 1 they only worked with sharing a small group into two equal parts. Now they will extend this to make a larger number of groups.

**Remainders (some left over)**

When the students worked with numbers or counters to decide whether a number was odd or even, they would have come across the concept that an odd number of counters cannot be divided into groups of two exactly and that there will always be one left over. Remind them of this when you deal with the concept of a remainder (only referring to it as a left over at this stage).

**Teaching ideas**

**Practical activities**

Students could explore different ways of dividing a number into equal-sized sets. The numbers 12, 16, 24 and 36 will provide students with lots of different ways. Work with concrete objects if you need to, but you can also provide marked number lines for the students to investigate grouping in different ways.
Students could use beans (counters) or a number line to find the number of sets of a particular size in a number. Using beans, they can simply arrange them into sets and count the number of sets. Using a number line, they start at the number and come down in jumps equal to the size of the set until they reach zero. The number of sets is equal to the number of jumps.

Students could divide different numbers of beans into sets of two and discover which left a remainder of one and which did not. From this they could identify a pattern of even and odd numbers.

Ask students to use beans (or counters) to discover how many different ways they could share 12 sweets out equally between two, three, four and six children. Write down their answers on the board and discuss them:

- 2 children get 6 sweets
- 3 children get 4 sweets
- 4 children get 3 sweets
- 6 children get 2 sweets

Introduce the idea of dividing things into sets. Remind students of the different ways they were able to share 12 sweets equally and show them that 12 is equal to:

- 2 sets of 6
- 3 sets of 4
- 4 sets of 3
- 6 sets of 2

They should use beans and number lines to prove to themselves that this is true.

**Using the Workbook**

Let the students complete page 17 on their own. Encourage them to draw round the objects shown to make equal groups. Check that they are able to express the groups mathematically.

Let the students work through page 18 independently or in pairs. If they are confused working on paper, let them model situations with counters, using one-to-one correspondence to divide the objects into the given number of groups so that they can see how many are left over.

**Assessment questions to ask**

- Six mangoes are shared equally between three people. How many mangoes does each person get?
- How many sets of 5 can be made from 10?
- There are 12 sweets in a bag. How many boys would get 2 sweets each if they were shared equally?
Common errors and misconceptions

Some students struggle to make the connection between multiplication and division and between division and repeated subtraction (making groups). Lots of practice with concrete objects and number lines at this early stage will help them to consolidate the ideas and make it easier for them to understand the inverse nature of multiplication and division as they progress through the stages.

6 3D shapes

<table>
<thead>
<tr>
<th>6: 3D shapes</th>
<th>Workbook 2A pp 19–21</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Objectives</strong></td>
<td></td>
</tr>
<tr>
<td>2Gs2</td>
<td>Sort, name, describe and make 3D shapes (e.g. cubes, cuboids, cones, cylinder, spheres and pyramids) referring to their properties; recognise 2D drawings of 3D shapes</td>
</tr>
<tr>
<td>2Gs4</td>
<td>Find examples of 2D and 3D shapes and symmetry in the environment</td>
</tr>
<tr>
<td></td>
<td>Note: 2D shapes are covered in Chapter 8 of Workbook 2B and 2C and symmetry is covered in Workbook 2C</td>
</tr>
</tbody>
</table>

Vocabulary

Shapes, box, ball, cone, can, pipe, properties, flat, curved, face, edge, vertex, same, different. Solid, cube, cuboid, cylinder, sphere, triangular prism, sphere

Resources needed

A range of objects to demonstrate each shape – aim for different dimensions of each type; flashcards with the names of the shapes; chart paper and pictures from magazines of solid objects; a ‘feely bag’ with small objects representing each shape (a cotton reel, a marble, a die, a cuboid eraser, the tip of a crayon; cone examples of solids (cube, cuboid, cylinder, sphere, triangular prism, sphere).

Mental warm-up activities

Select suitable activities from the mental warm-ups activity bank.

Concepts that may be unfamiliar in this topic

Vocabulary used to talk about solids (face, edge, vertex)

Students should already be familiar with solids and be able to name common solids based on their appearance and properties. This year you will formalise what they already know by talking about the parts of solids and using the differences (for example, the different number of faces, and the shape of the faces) to classify solids more mathematically.
**Teaching ideas**

**Practical activities**

- Ask the students to bring a collection of solid shapes to school. Make sure each group has some of each shape under study. Get the groups to sort their shapes into groups, telling them to put the shapes that have similar properties together. Let them verbalise why they have grouped the shapes the way they have.

- Teach the names of the shapes. Put one of each shape on display in the classroom and label it with a flashcard. Make a shapes chart for display. Write the names of the shapes at the top and stick pictures of solids that conform to each shape underneath the names.

- Use the ‘feely bag’. Let students take turns to put their hand into the bag and feel a shape without looking at it. They should try to guess what it is before removing it from the bag.

- Give each group a set of solid shapes and a set of name cards. Let the students take turns to read a name and then find a solid to match it. The others must agree whether this is correct. If so, the student can use the name card to label the shape he or she has chosen.

- Take the students on a ‘shape walk’ around the school grounds. Let them identify and name solid shapes in the environment. If you have access to digital cameras and computers, you can take photographs of the shapes they identify and then display them again back in class to check they are named correctly.

- Teach the concept of flat and curved using the solids and seeing which ones roll and which ones don’t. Spend time exploring the fact that some shapes and cones roll when placed one way, but not when placed the other way.

- Give each student a box shape. Get them to trace one base and cut it out. Have them draw a face on the cut-out piece. Next, get them to stick the face back onto the solid they were working with using sticky-tac. Explain that the sides of solids are called ‘faces’. Discuss how many faces each box will have (six). Get the students to trace each face, cut it out and stick it back onto the box using sticky-tac.

- Get each student to remove the faces from their boxes and to jumble them up. Ask them to swap with a partner and to match up the faces, re-sticking them onto the solid.

- Divide the class into groups and give each group a solid shape. Get students in the group to identify the shapes of the sides of the shape. Groups should exchange shapes until they have examined them all.

- Give each student a piece of modelling clay. Get them to make a model of a cube, a cuboid, a cylinder, a pyramid and a sphere.
Include some practical sorting activities using one criteria (a cone, not a cone) and so on, modelling Venn diagrams in the classroom.

**Using the Workbook**

- Use page 19 to make sure that the children know the correct mathematical names of solids and that they can match solids to their names.
- Let the students complete page 20 in pairs. Allow them to examine models of solids to count the faces, vertices and edges if they need to. Assess that they are able to use a table to organise and record the information about shapes.
- Page 21 is a more problem solving approach to classifying shapes. The students are given certain conditions and they have to select the shape that matches each set of conditions and eliminate those that don’t.

**Assessment questions to ask**

- What shape is this?
- I have a shape that rolls and is round. What is it called?
- I have a shape that has two flat faces and it rolls. What is it called?
- I have a shape with a round face and a vertex. What is it called?
- I have a shape with straight sides and sharp vertices. It does not roll. What is it called?
- I have six square faces, what shape am I?
- I have two triangle faces, what shape am I?
- I have two faces that are circles, what shape am I?
- What shape has rectangles as faces?
- How many faces does a cuboid have?
- On which shape are all of the faces exactly the same shape and size?
- If a sphere was squashed flat what shape would it be?
- Which shape has one face that is square and some which are rectangles?
- How many faces does a sphere have?

**Common errors and misconceptions**

Students may find it difficult to make the transition from solid objects to visual representations of these objects. Help them by getting them to draw the shapes themselves so that they can begin to develop a sense of perspective.

Students may be confused about the difference between a cube and a cuboid. Explain that a cube is a special type of cuboid in which all of the edges are exactly the same length. Use rods or everyday items as visual demonstration and page 20 for reference on this point, including the problem solving question.
When you deal with solids and talk about faces, edges and vertices you need to teach that a cylinder has three faces. Two are flat circles and one face is curved. It has two curved edges and no corners.

A cone has a flat end face and one curved edge and one vertex (more correctly called an apex in mathematics) where its curved face comes to a point. It may help the students if you draw faces on the actual faces of the shape, paint the edges and stick blobs of modelling clay onto the corners so that they can see these easily.

7 More work with numbers

<table>
<thead>
<tr>
<th>Objectives</th>
<th>Workbook 2A pp 22–24</th>
</tr>
</thead>
<tbody>
<tr>
<td>2Nn1</td>
<td>Count, read and write numbers to at least 100 and back again</td>
</tr>
<tr>
<td>2Nn12</td>
<td>Order numbers to 100; compare two numbers using the &gt; and &lt; signs</td>
</tr>
<tr>
<td>2Nn14</td>
<td>Understand odd and even numbers and recognise these up to at least 20</td>
</tr>
</tbody>
</table>

Vocabulary
Largest, smallest, missing number, odd, even, digits

Resources needed
1–50 chart for reference, a number of counters per student.

Mental warm-up activities
Select suitable activities from the mental warm-ups activity bank.

Concepts that may be unfamiliar in this topic
There are no new concepts in this topic. Students will work with numbers in a familiar range to reinforce their number sense and order and compare numbers. They will also revise and formalise what they already know about odd and even numbers.

Teaching ideas
Practical activities

You can repeat any of the practical counting activities from pages 42–44 of this book before the students work on paper to complete the activities.
Use the number chart to reinforce counting in twos from different starting points (odd and even numbers). Let the students take turns to choose a number and then count on in twos from there. Use the term ‘every second number’ when you explain this.

Demonstrate how some numbers can be divided exactly into groups of two, whilst some have one left over. Say the numbers that can be divided exactly and look at the ones digits. Repeat this for the numbers with one left over. Revise the terms ‘odd’ and ‘even’.

Using the Workbook

Let the students work on their own to complete page 22. If they struggle, encourage them to place counters on the 1–50 chart to represent each number in the set. Once they have placed all five counters, they can see in which order to write the numbers.

Make sure the students realise that the number lines on page 23 show different groups (skip counting). Allow them to work in pairs to work out what the ‘division’ is on each number line before they attempt to fill in the missing numbers. You may want to explore the problem solving activity as a class, so that students can demonstrate how they are thinking about the solution. This type of problem is the basis of algebraic reasoning and you can adapt it to talk about shapes (I am thinking of a shape with three equal sides and three corners. What is it?) and money (I have three coins, the total is more than . . . , but less than . . .. The biggest coin is worth . . . cents).

Let the students work through page 24 on their own. Investigating patterns and formulating your own ideas is a powerful method of learning concepts.

Assessment questions to ask

• You can adapt any of the questions from page 45 of this book to assess progress made in these ordering activities.

Common errors and misconceptions

Some students may find it very difficult to identify the number patterns. If this is the case, allow them time to make their own patterns on a number line so they can see how it is done (it’s often easier to create a pattern than to identify one). Once they have created their own patterns, cover or remove some numbers and let them work out which ones are missing.

It may be difficult for students to see the difference between sets of objects or counters (of, for example, 11 or 12 objects) if they are in random order, but if they are arranged in pairs, it is easy for them to work out how many there are and whether the amount is odd or even.
8 2D shapes

<table>
<thead>
<tr>
<th>Objectives</th>
<th>Workbook 2A pp 25–29</th>
</tr>
</thead>
<tbody>
<tr>
<td>2Gs1</td>
<td>Sort, name, describe, visualise and draw 2D shapes (e.g. squares, rectangles, circles, regular and irregular pentagons and hexagons) referring to their properties; recognise common 2D shapes in different positions and orientations</td>
</tr>
<tr>
<td>2Gs4</td>
<td>Find examples of 2D and 3D shape and symmetry in the environment</td>
</tr>
<tr>
<td>2Dh1</td>
<td>Answer a question by collecting and recording data in lists and tables, and representing it as block graphs and pictograms to show results.</td>
</tr>
</tbody>
</table>

Vocabulary
Flat, curved, side, vertex, square, rectangle, triangle, circle, shape, same, different.

Resources needed
A range of objects to demonstrate each shape – aim for different dimensions of each type; flashcards with the names of the shapes; shapes (square, rectangle, triangle, circle); modelling clay; geo-strips; pin-boards; dotted paper; cardboard; colouring pencils; pin-board and rubber bands.

Mental warm-up activities
Select a range of number and calculation activities from the mental warm-ups activity bank.

Concepts that may be unfamiliar in this topic
Sides and corners
Although the students have worked with 2D shapes previously, they haven’t used the formal properties to identify, name and/or classify the shapes. This year you will introduce the concept of sides and corners (angles) as a precursor to work on naming shapes using their properties.

Teaching ideas
Practical activities
Give the students a set of mixed 2D shapes of different sizes. Have them sort them into groups. Give them time to verbalise the reasons
for their groupings. Be aware that some students may not sort by
shape at this stage and they may place all the big shapes together,
or all the red shapes together. Question them to lead them to other
methods of sorting the shapes by characteristics related to shape.

Use shapes to make patterns and designs. Encourage the students to
combine shapes to see if they can make new shapes. For example, they
could put two squares together to make rectangle.

Use strips, pin-boards and dotted paper to construct squares,
rectangles, triangles and other plane shapes. Students should count
the number of sides and corners on each shape they construct. They
can experiment by varying shape while keeping the number of sides
the same.

Challenge the students to examine different objects in the classroom
and identify and name plane shapes.

Do a survey in the school environment to find, name and count
shapes. Discuss which shapes are most common and let the
students suggest reasons. For example, there are lots of squares and
rectangles because the tiles, windows, doors, walls and other features
are these shapes.

**Using the Workbook**

Use page 25 to revise or teach the names of flat shapes and to make
sure that students can identify shapes when they are mixed with
other shapes and when they are oriented or sized differently. Let the
students work to count and graph the shapes and assess their skills in
this area. (You may need to revise the table and basic graph concepts
you have already taught students before doing the sorting tasks.)

Let the students work through page 26 on their own. Encourage them
to draw over the sides and to circle the vertices so it is easy to keep
check of what they have counted.

Page 27 requires the students to draw shapes on a grid. If possible,
allow them to use pinboards and rubber bands to model shapes to see
how to do this.

Page 28 is a patterning page that informally introduces translations
of congruent shapes. Make sure the students are able to find identical
shapes even when they are reflected. You can also revise basic mirror
symmetry using a mirror and the symmetrical pattern.

Do page 29 as a fun, creative activity that gives the students a chance
to draw, use and combine the shapes they have learned to make their
own pattern.
Assessment questions to ask

- What shape is this?
- What shapes have four sides?
- What shapes are round?
- What shape has three sides?
- What is the same about a rectangle and a square?
- What is different about a rectangle and a square?

Common errors and misconceptions

Some students may struggle to tell the difference between a square and a rectangle, particularly if the rectangle is not very elongated. Give them plenty of opportunity to handle both shapes and to draw around them. You can also get them to cut out and fold their tracings diagonally, the two halves of squares will match perfectly whilst the rectangles will not.

All students need lots of practical experience of sorting shapes to develop a good concept of shapes and their properties in an informal way. When you deal with shapes, the circle can be confusing. It is important to remember that it is not a polygon – it is a flat shape with one curved boundary. At this level, it may be best to talk about straight sides and curved sides to prevent any confusion.

9 Skip counting

<table>
<thead>
<tr>
<th>Objectives</th>
<th>Workbook 2A pp 30–33</th>
</tr>
</thead>
<tbody>
<tr>
<td>2Nn2</td>
<td>Count up to 100 objects, e.g. beads on a bead bar</td>
</tr>
<tr>
<td>2Nn3</td>
<td>Count on in ones and tens from single- and two-digit numbers and back again.</td>
</tr>
<tr>
<td>2Nn4</td>
<td>Count in twos, fives and tens and use grouping in twos, fives or tens to count larger groups of objects.</td>
</tr>
<tr>
<td>2Nn7</td>
<td>Find 1 or 10 more/less than any two-digit number</td>
</tr>
<tr>
<td>2Nc4</td>
<td>Learn and recognise multiples of 2, 5 and 10 and derive the related division facts</td>
</tr>
</tbody>
</table>

Note: division is covered in Workbook 2B and the division sign is introduced in Workbook 2C.

Vocabulary

Ones, twos, fives, tens, number names to 50, even, odd
Resources needed
Number lines; number tracks; beads; counters; blank 1–50 chart; number cards, place value charts

Mental warm-up activities
Select suitable complementary activities from the mental warm-ups activity bank.

Concepts that may be unfamiliar in this topic
Multiples of 2, 5 and 10
The students should already be able to recognise multiples of 2 and 10, but they may have forgotten the patterns and/or the term multiples. They have not previously worked with multiples of 5 in a formal way. As you work through the activities and discuss the patterns, use the term multiple and reinforce the idea of patterning by looking at the units digits and what it tells you about the multiples. Students should begin to realise that all multiples of 2 are even number, all multiples of 5 have a 5 or a 0 in the units place and all multiples of 10 have a 0 in the units place.

Teaching ideas
Practical activities

Students arrange beans (counters, etc.) in pairs. They add up the number of beans in one pair, two pairs, etc.

Students arrange beans (counters, etc.) in sets of five and ten. They add up the number of beans in one set, two sets, etc.

Ask students to name things that come in pairs, like shoes, socks, gloves, hands, etc. Using hands as an example, get students to stand in front of the class and hold up their hands so the rest of the class can count the number of hands. Write the total down on the board each time. Ask students if they can see a pattern. Repeat this for fingers per hand (multiples of 5) and fingers per student (multiples of 10).

Reinforce the pattern obtained by counting in twos using a number line. Show students that, starting at zero and jumping two each time, they get the same pattern of numbers as when they added pairs together.

Ask students to name things that come in fives, like a five-a-side football team, sides of a pentagon or the points on a star. Get students to make ten groups of five using counters. Ask the class how many counters are in one group of five, two groups of five, etc. Write the total down on the board each time. Ask students if they can see a pattern.
Reinforce the pattern obtained by counting in fives using a number line. Show students that, starting at zero and jumping five each time, they get the same pattern of numbers as when they added the sets of five together.

Repeat these activities for tens.

Ask the students to help make pictures of multiples of 10 by drawing 10 dots on a square of paper. Arrange the papers on a large sheet of paper or on the board. As you stick one square (of 10) in place, ask how many dots there are. Write 10 and say the number ‘ten’. Stick two squares underneath this (to make 20). Get the students to count the dots and repeat this for all the numbers from 10 to 90, effectively extending the range of tens to beyond 50.

Using the Workbook

Children can play in pairs using counters on the grid on page 30, telling each other to count two places forward or back. Once they have done this, have them work independently through the number line and odd number out activities.

Complete the first part of page 31 as a class. Once the students have coloured the multiples of five, talk about the patterns they see. Let them work independently to complete the other activities on the page.

Let the students work in pairs to complete page 32. Make sure they are confident counting on in tens beyond 50.

Encourage the students to count in tens to count the objects on page 33. They can use these pictures to help them work out the answers to the 10 less and 10 more table.

Assessment questions to ask

- Starting on . . . and making three jumps of (2, 5 or 10) on the number line, what number will you land on?
- How many groups of (2, 5 or 10) do you need to make (a given number)?
- What is ten more than (any multiple of 10)?
- What is ten less than (any multiple of 10)?

Common errors and misconceptions

Students may find it challenging to learn multiplication facts, so it is important they understand how the multiples are generated and that they can see the connection between repeated addition and multiplication.

Some students find it difficult to deal with place value in multiplication by ten (the idea that you multiply 6 by 10 and the units (6) becomes the tens in the answer). It may help to use concrete apparatus such as base ten blocks to model this and to show the actual movement of digits to the left on the place value table as a written reinforcement.
10 Measurement: weight

Objectives

<table>
<thead>
<tr>
<th>2M11</th>
<th>Estimate, measure and compare lengths, weights and capacities, choosing and using suitable uniform non-standard and standard units and appropriate measuring instruments</th>
</tr>
</thead>
<tbody>
<tr>
<td>2M12</td>
<td>Compare lengths, weights and capacities using the standard units: centimetre, metre, 100 g, kilogram and litre</td>
</tr>
</tbody>
</table>

Vocabulary

Lighter, heavier, weight, kilogram, needle, scale, balance

Resources needed

Balance or shop scales (a simple balance can be made using a coat hanger); sand; bags large enough to hold 1 kg of sand; plastic litre bottles; kitchen scale calibrated in kilograms; 2 kg bag of flour or rice; a variety of objects to be weighed as indicated by the unit; weighs more/less spinner.

Mental warm-up activities

Select suitable activities from the mental warm-ups activity bank.

Concepts that may be unfamiliar in this topic

Standard units of mass (kilogram)

Many students will have seen weight given on the information labels of domestic containers but perhaps not understood the significance. In this unit, students investigate the concept of weight as how heavy an object is. We formalise and build on students’ everyday knowledge of weight, using the kilogram to express weight. All of the content of this unit is practically oriented.

Note that the correct scientific term for the weight of an object is mass. At this level though, we use the term weight as the students are physically weighing objects and it is the more commonly used term in everyday life.

Teaching ideas

Practical activities

Spend some time revising the comparative language that students were exposed to in stage 1 (heavy, light, bigger, smaller, lighter, heavier, lightest, heaviest). You can do this by comparing objects and arranging
them, or by allowing the students to left objects and decide which is heavier/lighter and so on.

Before carrying out the practical work in this unit, students must make their own 1 kg weights, using a plastic litre bottle of water or sand.

Students can make a simple balance by attaching a bag to each end of a coat hanger using bulldog clips, and suspending the coat hanger from a hook or nail. A coat hanger balance must be suspended away from the wall so it is free-moving.

Students should estimate the weights of a group of objects and then use 1 kg weights to check the accuracy of their estimates. Objects should be ordered in terms of increasing weight.

Students to work in pairs with a weighs more/less spinner. One student chooses an object and spins; the second student has to identify an object that weighs more or weighs less. This can be verified using a balance.

Students should use a kitchen scale that is calibrated in kilograms to weigh some objects. Make sure they can read the scale, as they will need this skill for page 37.

**Using the Workbook**

- Encourage the students to draw the things they estimate are heavier or lighter on page 34 before getting them to use a balance to check.

- If possible, bring a brick to class and let the students feel how heavy it is. This will help them to work out whether the items are heavier or lighter than a brick on page 35. Check that they can organise their data in a simple table.

- Page 36 is a sequencing activity that requires the students to compare masses of different objects. Watch them as they work through this to see what strategies they employ. Have a class discussion around the problem solving question.

- The students can work independently to read the scales and record the amounts in kilograms on page 37. Allow them to use the abbreviation ‘kg’ if they want to.

- Page 38 is more challenging only in so far as the masses extend to 100 kg. Allow the students to work in pairs to solve the problems and complete the page. More abstractly, they can also be asked to draw a linear scale, i.e. an arrowed line, label the left end ‘heaviest’ and the right end ‘lightest’ and label points on the line on which to place the cats correctly.
Assessment questions to ask

- What does ‘kg’ stand for?
- Arrange the following in increasing order of weight ... (select a range of five different weights).
- How do you know which object is heavier on a balance scale?
- How many $\frac{1}{2}$ kg packets of butter have the same weight as a 1 kg packet?
- If a 1 kg block of cheese is cut into four equal pieces, what is the weight of each piece?
- Jossie weighs 10 kg more than Mika. If Mika weights 23 kg, how much does Jossie weigh (and similar)?

Common errors and misconceptions

In the UK, both kilograms and pounds are in everyday use and may be a source of confusion for some students. For an accurate conversion 2.2 lb are equal to 1 kg, however, at this level a conversion rate of 2 lb to 1 kg will be sufficient and will provide students with a ready way of converting between the two units. Teach them that weights in pounds are ‘about double’ the same weights in kilograms.

The word ‘kilogram’ is often contracted to ‘kilo’ by shopkeepers.

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11 Place value and rounding

<table>
<thead>
<tr>
<th>11: Place value and rounding</th>
<th>Workbook 2A pp 39–42</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Objectives</strong></td>
<td></td>
</tr>
<tr>
<td>2Nn6</td>
<td>Know what each digit represents in two-digit numbers; partition into tens and ones</td>
</tr>
<tr>
<td>2Nn7</td>
<td>Round two-digit numbers to the nearest multiple of 10</td>
</tr>
</tbody>
</table>

Vocabulary

Place value, digit, tens, ones, partition, round, nearest ten

Resources needed

Straws, rubber bands, beans, cups, Cuisenaire rods, place value cards, place value chart.

Mental warm-up activities

Select suitable rounding and estimating activities from the mental warm-ups activity bank to support this work.
Concepts that may be unfamiliar in this topic

Rounding a number to the nearest ten

The concept of rounding to the nearest ten is introduced here using the concept that a number is physically closer to one ten than to another on the number line or number chart. Try to avoid using the term ‘rounding off’ when you talk about rounding a number as this may cause students to think you ‘drop off’ a digit rather than round the number up or down based on its closeness to a multiple of ten. Explain also that it is a rule (convention) to round numbers with a five in the units place to the ten that follows (in other words, we round up if the units are 5 or more).

Teaching ideas

Practical activities

 Students work in pairs. Give each pair 20 straws and a rubber band. They should group 10 straws together with the elastic band to make a bundle of 10. One student should say a number between 10 and 20 and the other student should use the bundle of 10, together with other straws, to represent the number. Students should also carry out the reverse process. One student should use straws to represent a number and the other student should count the number of straws to find the number. Repeat this using arrow cards to relate what you are doing to tens and units and place value.

 Students work in pairs. Give each pair 20 beans and two cups (or two Cuisenaire rods). They should put 10 beans together in a cup to make a group of 10. One student should say a number between 10 and 20 and the other student should use the group of 10, together with other beans, to represent the number. Students should also carry out the reverse process. One student should use beans to represent a number and other student should count the number of beans to find the number. Repeat this using arrow cards to relate what you are doing to tens and units and place value. Extend the above activities using straws or beans to represent numbers between 1 and 50.

 Draw a large number line from 20 to 30 on the ground outside. Let pairs of students choose numbers and stand on them. When you ring a bell or blow a whistle, have them move to the 20 or 30 (whichever is closest to them). Have a discussion about what to do if you are standing on 25. Make sure the students grasp that they have to move to the bigger ten if they are on a multiple of 5.

Using the Workbook

 Students should be able to complete page 39 independently. Check that they don’t get mixed up and are clear which spike is for tens and which is for units. Encourage the students to tell you how they solved the word problem.
Let the students work through page 40 to reinforce tens and units. You can also use arrow cards and ask the students to build numbers that you give them. Use the problem solving activity to make sure they are able to read and make sense of numbers when expressed as tens and units and as units and tens.

Once you have played some games around the nearest 10 and students understand the concept, let them compete to see who can complete page 41 correctly in the shortest time.

Let the students work in pairs to discuss and complete page 42.

**Assessment questions to ask**

- How many units are in 10?
- How many units are in 20?
- What is the value of ‘2’ in the number 32?
- What is the value of ‘5’ in the number 57?
- Is 26 closer to 20 or to 30 (and so on for different numbers)?
- True or false? The closest ‘ten’ to 33 is 30.

**Common errors and misconceptions**

Some students have difficulty interpreting the value of the digits in a two-digit number. For example, if asked the value of the ‘4’ in the number 47 the students will say it is 4. It will help their understanding if students think of a two-digit number as the sum of so many tens and so many units, i.e. the number 47 as the sum of $40 + 7$. Using arrow cards to build and partition numbers will help in this regard.

### 12 Measurement: length

<table>
<thead>
<tr>
<th><strong>Objectives</strong></th>
<th><strong>Workbook 2A</strong> pp 43–46</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>2M11</strong></td>
<td>Estimate, measure and compare lengths, weights and capacities, choosing and using suitable uniform non-standard and standard units and appropriate measuring instruments</td>
</tr>
<tr>
<td><strong>2M12</strong></td>
<td>Compare lengths, weights and capacities using the standard units: centimetre, metre, 100 g, kilogram and litre. Note: this topic is covered again in Workbook 2B and 2C to fully meet the objectives for measuring length.</td>
</tr>
</tbody>
</table>
Vocabulary

Length, long, wide, high, ruler, centimetre, estimate, compare.

Resources needed

A set of four objects about a centimetre in length; centimetre cube blocks or tens rods from a counting set; simple rulers marked in centimetres; 10 cm strips of paper marked in blocks for each student.

Mental warm-up activities

Select suitable activities from the mental warm-ups activity bank.

Concepts that may be unfamiliar in this topic

Using a ruler to measure length in centimetres

The students have already had some experience of measuring using non-standard units. At this level, the students will work with the centimetre as a standard unit of length. The advantage of this (over the metre) is that it allows them to measure objects in the classroom and to lay out and use cubes with edges of one centimetre to compare objects to a known length. The cubes help the students relate centimetres in measurement to intervals on a ruler. They will also use a ruler to measure items to the nearest centimetre (which is accurate enough at this level).

Teaching ideas

Practical activities

Use a small set of four objects to show the students some objects that are about a centimetre in length. Allow them to find other examples and to check these are 1 cm by comparing them to a centimetre cube or to the set you have developed.

Use a single 1 cm cube to measure some small items in centimetres. Discuss the difficulty involved in moving the cube along to find the length and show that it is much easier to measure the length of an object with a strip of cubes, or paper marked in centimetres, because you can put it alongside the object and then count the number of units.

Spend time estimating the lengths of different objects to reinforce the length of a centimetre and the length of 10 cm. Show an object and have the students say whether it is less than a centimetre, about a centimetre or more than a centimetre. Do this for other lengths up to 10 cm.

Introduce the use of a ruler. Let the students measure their fingers, each other’s ears, the width of their feet and other parts of the body. The idea is to familiarise them with the use of the ruler. Make sure they realise they have to work from the 0 end of the ruler and count forwards to get a measure. They cannot measure from the other end.
Try measuring some curved objects in centimetres. Try to get the students to suggest using strips of paper or lengths of string which they can then compare with a ruler. They may also suggest using a measuring tape, which is a practical solution.

**Using the Workbook**

Point out that the ruler on page 43 shows real centimetres. Show the students that their finger is a good tool for estimating centimetres, and let them choose their most accurate finger. Similarly, centimetre cubes and the plug of a USB flash drive are about 1 cm. Let the students work in pairs to estimate, measure and record the body lengths.

Let the students work independently to estimate the length of the objects on page 44. You may want to measure the objects afterwards to help them decide if their estimates are good or not. Let them work on their own to find and record items for the problem solving task.

Page 45 focuses on the use of a ruler. Make sure each student has a ruler or a centimetre strip and let them work out the lengths themselves.

Page 46 is more of a challenge activity that you can use to assess whether the students are able to use a ruler to take a few measurements and that they realise they have to add these to get a total length. Moving the ruler from position to position requires some dexterity and students have to remember to start each measure from zero. Watch that they don’t measure by ‘counting’ on in this case. Discuss with the class what methods and strategies they used for adding the lengths. Let them work in pairs to complete the problem solving activity.

**Assessment questions to ask**

- Which is longer, your foot or your shoe?
- Is this (hold up object) longer or shorter than a centimetre?
- How long do you think this object is?
- How do you use a ruler to measure lengths?
- What are the markings on the ruler equal to?
- Measure this line. How many centimetres long is it?

**Common errors and misconceptions**

Students may not want to estimate in case they are wrong. It is important to teach them how to estimate effectively by comparing the thing they are estimating with a known length. Challenge them to become better at estimating through practice. Point out that many people do jobs where they estimate very well; builders or tilers are a good example of people who estimate length very well.
Students may need you to demonstrate how to use a ruler or other measuring tool correctly. You also need to watch as they use these tools to make sure they do use them correctly.

13 Data handling

<table>
<thead>
<tr>
<th>Objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td>2Nn15</td>
</tr>
<tr>
<td>2Dh2</td>
</tr>
</tbody>
</table>

- Sort numbers, e.g. odd/even, multiples of 2, 5 and 10
- Use Carroll and Venn diagrams to sort numbers or objects using one criterion; begin to sort numbers and objects using two criteria; explain choices using appropriate language, including ‘not’

Note: Venn diagrams are covered in Workbook 2B.

Vocabulary
Even, odd, diagram, two-way table, Carroll diagram

Resources
Items for sorting as necessary (plastic shapes, large and small objects, stones, sticks, natural and human-made objects).

Mental warm-up activities
Select suitable activities from the mental warm-ups activity bank.

Concepts that may be unfamiliar in this topic
Sorting items using two criteria
It is fairly easy for students to sort items using one criterion. Now they will use two criteria to sort objects into four groups. This is the basis of two-way tables and also the concept used to develop Carroll diagrams.

Carroll diagrams
A Carroll diagram is a type of two-way table that relies on the idea of objects being either one thing or not that same thing, to sort information. For example, shapes could be classified as square or not square as well as blue or not blue. Objects fit into boxes on the table if they meet both criteria specified for a box.
**Teaching ideas**

**Practical activities**

Spend some time physically sorting and classifying objects using the criterion of being or not being a particular thing. For example, you could sort items into plastic and not plastic. It is important the students focus on the ‘plastic’ criterion and that they realise that all objects that are ‘not plastic’ fit into the other group, no matter what they are made of.

**Using the Workbook**

Use the sorting activities on page 47 to teach the students how to combine two tables of sorted items to get one table that compares the items using both the criteria used in the single table. Make sure they realise that in order to fit into say the first box, the number has to be both even and less than 10.

Use page 48 to make sure that the students can distinguish shapes based on two attributes (colour and shape) and to assess whether they are able to use a two-way table (Carroll diagram) to organise data.

**Assessment questions to ask**

Use the tables and other tasks in this topic to test understanding. Ask questions such as:

- Where would I write this number? Why?
- What can you say about all the numbers in this box on the table?
- I have a shape that is grey and square, where would I draw it?

**Common errors and misconceptions**

Young students may struggle with the idea of triangle and not triangle (or banana and not banana). Make sure you give them plenty of oral practice with identifying items that are (one thing) and that are not (one thing). For example, you may want to hold up a range of writing materials and get the students to say whether each item is a pencil or not a pencil.
Objectives

2Nn16 Recognise that we write one half \( \frac{1}{2} \); one quarter \( \frac{1}{4} \) and three quarters \( \frac{3}{4} \)

2Nn17 Recognise that \( \frac{2}{2} \) or \( \frac{4}{4} \) make a whole and \( \frac{1}{2} \) and \( \frac{2}{4} \) are equivalent

2Nn18 Recognise which shapes are divided in halves and quarters and which are not

2Nn19 Find halves and quarters of shapes and small numbers of objects

Vocabulary

Whole, part, fraction, equal, unequal, equivalent, half, halves, quarter, quarters

Resources

Objects that can be cut into pieces; flashcards with key words and fraction notation; shapes made up of different parts.

Mental warm-up activities

Select suitable activities from the mental warm-ups activity bank.

Concepts that may be unfamiliar in this topic

Fractional parts

This topic teaches the students that shapes and groups of objects can be divided into parts and that some of those parts are equal. Equal parts are called ‘fractions’. The students will learn to recognise that shapes (and small groups of objects) can be divided into two equal parts to form halves and four equal parts to form quarters. The link between making halves and quarters and dividing the shape (or group) into 2 or 4 equal parts should be made overt.

Fraction notation

Although the students worked with halves in Stage 1, this is the first time they will be expected to use fraction notation such as \( \frac{1}{2} \). You may want to teach them that this indicates 1 of 2 equal parts and that notation such as \( \frac{3}{4} \) means three of four equal parts.
Teaching ideas

Practical activities

Teach the concept of a whole and parts to the class. You can do this by showing a wide range of pictures and objects cut into pieces. Show them that the pieces can be put together to make a whole. For example, have a picture of a house that you have previously cut into three pieces, or a slice of bread cut into four pieces. Say things like: ‘This picture of a house has been cut into three parts. We can put the parts together to make a whole’ and ‘These four pieces of bread can be put together to make a whole slice’. Explain that sometimes the parts can be equal. Stress that this means they are the same size and that they will fit exactly on top of each other. Demonstrate this using a sheet of paper. Fold it in half and show the students that the two halves are exactly the same size. You can also cut a paper plate into four equal pieces to show them quarters.

Give each student a sheet with a square divided into half and a square divided into four quarters. Explain that the first square is divided into two equal parts. Revise the name ‘half’ and teach the fraction notation 1/2. Use flashcards to label half of a shape and display this in the classroom. Repeat this for a quarter.

Get the students to colour half the square and label it. Repeat this for a quarter.

Ask the students to draw half a shape. Once they have done this, they should give their drawing to a friend. Their friend should draw the other half. Remind them that the two halves should be equal. Repeat this, but get the students to draw a quarter of a cake. The friend should draw another quarter of the cake. Again stress that the quarters should be equal. Let the students label the parts of the completed drawings.

Give the students a set of 2D shapes (squares, rectangles, circles and triangles). Let them investigate how to divide the shapes into halves and quarters by folding.

Using the Workbook

Let the students work in pairs to colour and complete page 3.

Let the students work independently to colour half of each group on page 4 and complete the sentences. Check their answers.

Have the students work independently to complete the first part of page 5. Let them work in pairs to discuss how best to divide the shapes in the second part. Focus on the idea of four equal parts, rather than straight lines and identical shares at this point.

Let the students work independently to complete page 6. Observe that they have understood the concept of quarters.
Use page 7 to assess whether students have grasped the concept of halves and quarters and that they know the difference between these fractions.

Page 8 focuses on equivalence through problem solving. Let the students work together on this page and allow them to talk about what they think.

Assessment questions to ask
- How many parts are there in this whole?
- Are these parts equal?
- Is this a half?
- Is this a quarter?
- What fraction is this (display $\frac{1}{2}$, $\frac{1}{4}$, $\frac{3}{4}$ on cards)?
- How can we tell if a shape is divided into half?
- How can we tell if a shape is divided into quarters?

Common errors and misconceptions
Students may struggle to understand that the two halves or four quarters of a whole must be exactly the same size, particularly as the word ‘half’ is used fairly casually in everyday life. Give them plenty of practical experience of folding and cutting shapes of different sizes to reinforce this concept.

Be aware that half of a shape does not have to be symmetrical. Folding a rectangle diagonally will produce two halves, but the fold line is not a mirror line. The halves are the same size, but they don’t fit on top of each other as they would in a square.

## 2 Counting to 100

<table>
<thead>
<tr>
<th>Objectives</th>
<th>Workbook 2B pp 9–11</th>
</tr>
</thead>
<tbody>
<tr>
<td>2Nn1 Count, read and write number to at least 100 and back again</td>
<td></td>
</tr>
<tr>
<td>2Nn3 Count on in ones and tens from single- and two-digit numbers and back again</td>
<td></td>
</tr>
<tr>
<td>2Nn5 Begin to count on in small constant steps such as threes and fours</td>
<td></td>
</tr>
<tr>
<td>2Nn9 Say a number between any given neighbouring pairs of multiples of 10, e.g. 40 and 50</td>
<td></td>
</tr>
</tbody>
</table>
Vocabulary
Number names to 100, ones, tens, threes, fours, between, multiple

Resources needed
Number strips; 1–100 number grid, number line to 100; 1–100 cards; number spinners; counters; pile of counters for each pair of students

Mental warm-up activities
Select a range of activities from the mental warm-ups activity bank.

Concepts that may be unfamiliar in this topic
There are no fundamentally new concepts in this topic. The students will build on the work they have already done on numbers and extend the range of numbers they work with to 100.

Teaching ideas
Practical activities

Once you have taught the numbers, point to any number and ask the students to say it. Alternatively, say the name of a number and get different students to point to it on the chart.

Cover up some numbers on the large chart and ask the students to count, including that number in their count. You can also use this as a quiz to ask students to work out and say the numbers you have covered up.

Use cards with the numbers 1 to 100 on them. Let the students choose cards at random and say the number. You can extend this by asking them to say the number before and/or after the number they have chosen.

Use a number spinner made from two paper plates as before, but include multiples of 10 to 90. Let the students take turns to spin the arrows and let them say and write the numbers they have made. You can also use arrow cards to do this activity.

Reinforce the ordering of numbers orally by asking questions such as ‘What is the number after 65?’ ‘What is the number before 89?’ and so on. Have the students build the answers using arrow cards.

Use the 1–100 square to show counting up and back in tens. Start at different places, make sure students know they are counting on in 10s when they go down a row and that they recognise each number is ‘10 more’ than the previous one and vice versa.
Give the class some ‘riddles’ and let them work out what the number is. For example:

- I am a number with 3 in the units place and I am between 40 and 50. What am I?
- I have two digits, 6 and 3. I am between 30 and 40. What number am I?
- I am between 20 and 30, I am even and I am bigger than 25. What number could I be?

Prepare a range of statements about numbers and read these out to the class. The students must say whether the statement is true or false. If it is false, you may like to ask them to correct it. For example:

- 43 is ten more than 33
- 72 is between 60 and 70
- 45 is one less than 44. And similar.

Write sets of five or so consecutive numbers (for example, 81, 82, 83, 84, 85) in a random order on the board. Get students to come up and to draw lines to join the numbers in order. They should say each number as they join it.

Give the students a spread of number cards (say from 50 to 60, or 55 to 65) in a mixed-up order and get them to place these in a row in the correct order. Encourage them to do this from memory, but allow them to refer to the displayed number chart or number line as they need to.

Use a blank 1–100 grid and a counter. Make sure all the students can see clearly. Place a counter in any position on the number board and ask students to guess what the number is.

**Using the Workbook**

Complete the number chart on page 9 to make sure that the children can read and write the numbers from 1 to 100. Use the number sequences to informally assess whether the students can count from any two-digit number in the range.

Let the students work in pairs to discuss how to work out the missing numbers on page 10 and then have them complete the sequences independently. Spend some time as a class discussing what the counting steps are in each set of stones.

Allow the students to model the steps or count on a chart or number line as they complete the activities on page 11.
Assessment questions to ask

- What number is this (point to a number on the chart)?
- Show me the number (say any number in the range).
- What number comes before/after (say any number in the range)?
- What number is missing from the sequence 35, 40, . . . , 50?
- Count on from (a given number) to (another higher number).

Common errors and misconceptions

Some students may reverse the numbers, saying 62 instead of 26 and so on. This is particularly problematic in students whose first language may not be English and for whom numbers may have been expressed differently. Watch out for this and give children who do this additional practice.

3 Units of time

<table>
<thead>
<tr>
<th>Objective</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2Mt1</td>
<td>Know the units of time (seconds, minutes, hours, days, weeks, months and years)</td>
</tr>
<tr>
<td>2Mt2</td>
<td>Know the relationships between consecutive units of time</td>
</tr>
<tr>
<td>2Mt5</td>
<td>Know and order the days of the week and the months of the year</td>
</tr>
<tr>
<td>2Nn11</td>
<td>Recognise and use ordinal numbers up to at least the 10th number and beyond</td>
</tr>
</tbody>
</table>

Note: this chapter deals with days, weeks, months and years, other units are covered later on.

Vocabulary

Day, week, month, year, names of months, names of days, first, second, third, fourth (up to twelfth)

Resources

Calendar large enough to display; flashcards with months of the year and days of the week on them.

Mental warm-up activities

Select a range of activities from the mental warm-ups activity bank.
Concepts that may be unfamiliar in this topic

Months of the year

Students may already know the months of the year from their everyday lives. This year they will need to know the order of the months as well as the fact that there are 12 months in one year. Note that they do not need to know how to read and make sense of a calendar at this stage, although this is a suitable resource for displaying and teaching the names of months.

You will need to consider local customs and traditions when ordering days of the week and relate this to when the weekend is in your country. Generally the first day of week is the first day after the weekend. Focus on which day comes before/after another to avoid misunderstanding (for example, Tuesday comes after Monday, no matter how the week is divided up locally). Similarly be aware of whether or not children celebrate birthdays or not when you are working through this topic.

Teaching ideas

Practical activities

- Revise the names of days of the weeks using flashcards. Display each one and ask the students to say the name. Show a day and ask which day comes before/after that day to reinforce the order of days.

- Use a large display calendar to teach students the names of the months and the sequence in which they occur. Students should be familiar with how to express a date and be able to write the date correctly (they do this on each workbook page).

- Revise ordinal numbers (first, second, third, etc.) using days of the week and months of the year.

Using the Workbook

- Let the students work on their own to complete page 12. Use their completed work to assess how much they know about basic units of time. Revise or teach any concepts they seem to have difficulty with.

- Let the students complete the first part of page 13 independently to assess that they are able to order the months of the year. Let the students work in pairs to complete the problem solving activity and make sure they realise that the date doesn’t impact on the order of the months.

Assessment questions to ask

- What is the first day of the week?
- Which day comes after/before Friday?
- How many days are in a week?
- What is the first month of the year? What is the last month of the year?
In which month were you born?
Which month comes between June and August?
What is the month after March called?

Common errors and misconceptions

Students often have trouble remembering the number of days in the different months of the year. They should use the following rhyme to remind them:

‘30 days have September, April, June and November;
all the rest have 31, excepting February alone;
which has 28 days clear and 29 in each leap year.’

4 Place value to 100

<table>
<thead>
<tr>
<th>Objective</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2Nn6</td>
<td>Know what each digit represents in two-digit numbers; partition into tens and ones</td>
</tr>
</tbody>
</table>

Vocabulary
Digit, tens, ones, partition

Resources
Arrow cards, straws, rubber bands; beans; cups; Cuisenaire rods; place value cards; place value chart.

Mental warm-up activities
Select a range of activities from the mental warm-ups activity bank.

Concepts that may be unfamiliar in this topic
No new concepts are taught in this unit, but students are expected to apply what they know about place value in two-digit numbers to partition numbers in the higher number range.

You need to ensure that the students have their own set of arrow cards at this stage and that they are able to use these to build and partition numbers (into tens and ones).
Teaching activities

Practical activities

You can adapt any of the activities from page 70 of this Teacher’s Guide to the higher number range used here.

Using the Workbook

- Use page 14 to assess whether the students can work with place value in the higher number range.
- Let the students complete page 15 independently. Extend the page using different numbers and let the students build their own numbers.

Assessment questions to ask

- How many units are in 60?
- How many units are in 80?
- What is the value of ‘2’ in the number 52?
- What is the value of ‘8’ in the number 87? And similar.

Common errors and misconceptions

Some students have difficulty interpreting the value of the digits in a two-digit number. For example, if asked the value of the ‘4’ in the number 47 the students will say it is 4. It will help their understanding if students think of a two-digit number as the sum of so many tens and so many units, i.e. the number 47 as the sum of 40 + 7. Using arrow cards to build and partition numbers will help in this regard.

5 Position and movement

<table>
<thead>
<tr>
<th>5: Position and movement</th>
<th>Workbook 2B pp 16–17</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Objectives</strong></td>
<td></td>
</tr>
<tr>
<td>2Gp1</td>
<td>Follow and give instructions involving position, direction and movement</td>
</tr>
</tbody>
</table>

Vocabulary

Left, right, turn

Resources needed

No specific resources are needed for this topic.
Mental warm-up activities

Select a range of activities from the mental warm-ups activity bank.

Concepts that may be unfamiliar in this topic

Left and right turns

The students should already have some experience of position and they worked with turns in stage 1. This work revises the basic concept of following directions and also reinforces and formalises the idea of left and right.

Teaching ideas

Practical activities

- Play some movement games that involve the students moving around the classroom. Give them verbal instructions to get to a location.
- Revise the use of position words (prepositions) by asking the students to describe the position of an object using the words on, in, behind, under, next to, etc.
- Set out a trail of arrows in a large space (outside, or the school hall). Include arrows pointing forwards, backwards, left and right. Seat the students at the start of the trail. Choose a student to follow the trail and ask him or her to say what they are doing as he or she moves along the trail (I am going forward, I am turning left, and so on). The other students should check that the person describing the trail is correct. Let the students change the route and repeat the process. If they struggle to ‘imagine’ walking the trail, allow them to physically walk it to check their directions.
- Mark out a simple path including right-angled turns on the floor. Let the students take turns to walk the path while a partner describes the turns being made, left or right.
- Set up a street plan on the floor using masking tape or chalk. Let the students take turns to direct their partner to follow a route with a toy car.
- Let the students describe the route from the classroom to different places in the school.

Using the Workbook

- Let the students work independently to complete page 16. Check that they know their left from their right. If they struggle, remind them that they are left- or right-handed.
- Let the students work in pairs to find their way through the maze and complete page 17.
Assessment questions to ask

- Which way am I going?
- What direction is this?
- Tell me how to get from X to Y (a given route).
- Draw arrows to show this route (give them a route).
- Describe this movement.

Common errors and misconceptions

Students may struggle with the concepts of left and right, particularly if they are not oriented in the same way as the direction arrows they are following. Encourage them to turn mazes or maps so that they are facing the direction of travel if needs be.

6 Counting patterns

<table>
<thead>
<tr>
<th>Objectives</th>
<th>2Nn1</th>
<th>Count, read and write numbers to at least 100 and back again</th>
</tr>
</thead>
<tbody>
<tr>
<td>2Nn3</td>
<td>Count on in ones and tens from single- and two-digit numbers and back again</td>
<td></td>
</tr>
<tr>
<td>2Nn4</td>
<td>Count in twos, fives, and tens, and use grouping twos, fives or tens to count larger groups of objects</td>
<td></td>
</tr>
<tr>
<td>2Nn5</td>
<td>Begin to count on in small constant steps such as threes and fours</td>
<td></td>
</tr>
<tr>
<td>2Nn7</td>
<td>Find 1 or 10 more/less than any two-digit number</td>
<td></td>
</tr>
<tr>
<td>2Nn9</td>
<td>Say a number between any given neighbouring pairs of multiples of 10, e.g. 40 and 50</td>
<td></td>
</tr>
<tr>
<td>2Nn10</td>
<td>Place a two-digit number on a number line marked off in multiples of 10</td>
<td></td>
</tr>
<tr>
<td>2Nn12</td>
<td>Order numbers to 100; compare two numbers using the &lt; and &gt; signs</td>
<td></td>
</tr>
<tr>
<td>2Nn14</td>
<td>Understand even and odd numbers and recognise these up to at least 20</td>
<td></td>
</tr>
<tr>
<td>2Nc4</td>
<td>Learn and recognise multiples of 2, 5 and 10 and derive the related division facts</td>
<td></td>
</tr>
<tr>
<td>2Nc6</td>
<td>Relate counting on/back in tens to finding ten more/less than any two-digit number and then to adding and subtracting other multiplies of 10, e.g. 75 – 30</td>
<td></td>
</tr>
<tr>
<td>2Nc10</td>
<td>Solve number sentences such as 27 + □ = 30</td>
<td></td>
</tr>
<tr>
<td>2Nc12</td>
<td>Add pairs of two-digit numbers</td>
<td></td>
</tr>
</tbody>
</table>
Vocabulary
Ones, twos, fives, tens, number names to 100, even, odd, number pattern, smaller than, greater than, between

Resources needed
Arrow cards, number lines; number tracks; beads; counters; blank 1–100 chart; number cards

Mental warm-up activities
Select a range of activities from the mental warm-ups activity bank.

Concepts that may be unfamiliar in this topic
Placing numbers on a number line marked in multiples of ten only
In this topic the students will need to use their number sense and understanding of counting to begin to work out where a number will go on a number line when the divisions are not given. To do this, they need to judge where the number lies in relation to the nearest multiples of ten. The focus at this stage is on working out more or less where the number lies relative to given numbers, and not on measuring and working out exactly where to place it.

Teaching ideas
Practical activities
You can adapt any of the practical activities from pages 42–44 and 65–66 of this Teacher’s Guide to suit the higher number range.

Using the Workbook
Let the students colour the number chart on page 18 independently. Once they have done this, have them work in pairs through the number pattern activities.

Let the students work in pairs to complete page 19. Make sure they are confident skip-counting beyond 50.

Let the students work independently to complete the table on page 20. Once they have done this, let them complete the addition and subtraction facts in a timed fashion. Spend some time discussing how they found their answers.

The students should know the < and > signs by now, but revise these before they attempt page 21. Let them work independently to complete the first part. Allow them to work in pairs and to discuss their strategies and reasoning for the problem solving activity.
Work through the example on page 22 with the class before asking them to complete the number lines on their own. Let them exchange their completed pages with a partner and discuss how they decided where the numbers should go.

**Assessment questions to ask**
- Starting on . . . and making three jumps of (2, 5 or 10) on the number line, what number will you land on?
- How many groups of (2/5/10) do you need to make (a given number)?
- What is ten more than (any multiple of ten)?
- What is ten less than (any multiple of ten)?

**Common errors and misconceptions**
Students may struggle to place numbers on the number line because they are afraid of getting the ‘wrong’ answer. Keep reminding them that they are showing ‘more or less’ where the number will go on the line and model this yourself. Allowing them to swap number lines will allow them to see that slightly different positions are possible (and acceptable).

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### 7 Telling and measuring time

<table>
<thead>
<tr>
<th>7: Telling and measuring time</th>
<th>Workbook 2B pp 23–28</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Objectives</strong></td>
<td></td>
</tr>
<tr>
<td>2Mt1</td>
<td>Know the units of time (seconds, minutes, hours, days, weeks, months and years)</td>
</tr>
<tr>
<td>2Mt2</td>
<td>Know the relationships between consecutive units of time</td>
</tr>
<tr>
<td>2Mt3</td>
<td>Read the time to the half hour on digital and analogue clocks</td>
</tr>
<tr>
<td>2Mt4</td>
<td>Measure activities using seconds and minutes</td>
</tr>
<tr>
<td></td>
<td>Note that days and weeks were covered earlier. Further work on time can be found in Workbook 2C</td>
</tr>
</tbody>
</table>

**Vocabulary**
Second, minute, hour, time, analogue clock, long (minute) hand, short (hour) hand, digital clock, o’clock, half past

**Resources**
Analogue clock and digital clock, both large enough for display purposes; materials for students to make clock faces.
Mental warm-up activities

Select a range of activities from the mental warm-ups activity bank.

Concepts that may be unfamiliar in this topic

Relationship between consecutive units of time

This year the students will need to formalise their knowledge of units of time and understand that seconds are smaller than minutes; minutes are smaller than hours and so on. They should also realise that there are 60 seconds in one minute and 60 minutes in one hour.

Telling time to the half hour

Students are expected to be able to read time to the half hour on analogue and digital clocks. This means they have to understand how the hour and minute hand show time on an analogue clock and also that :30 means 30 minutes past, or half past the hour, on a digital clock.

Measuring time in seconds and minutes

Students will need to use their own watches, mobile phones or stopwatches to time short events in seconds and minutes. Obviously they need to know the difference between these units before they can work with them.

Teaching ideas

Practical activities

Before you begin this unit, spend some time making the students aware of how long a second is. (It takes about a second to say one-thousand and one.) Display a digital clock, or have the students observe their own watches or phones to see what happens in a minute. If possible show them that the second hand of a clock makes 60 small moves around the clock face in one minute. Similarly, the seconds display of a digital clock or timer will count to 60 in one minute. Teach the class that 60 seconds are equivalent to 1 minute and that 60 minutes are equivalent to 1 hour.

Students could make large clock faces (20 cm in diameter) using: a paper party plate or a tin lid as a template from which to cut a cardboard disk; a strip of cardboard from which to make hands; and a paper fastener to hold the hands in place.

Students could make a digital clock by writing numbers on cards and arranging the cards in a suitable order so, for example, ten o’clock would be represented by 10 00.

Students then work in pairs. One student says a time and the other student has to move the hands on a clock face to show the time on the hour and half hour. Alternatively (and more accurately) get one student to set the time on a clock face and the other student has to say the time.
Students work in pairs using a digital clock. One says the time and the other sets the display using a 12-hour display option.

Students should already be familiar with the time on the hour, but it is worth spending some time reviewing the time on the hour using both an analogue clock and a digital clock. Show students the positions of the hands on an analogue clock at 1 o’clock, 2 o’clock, etc. to 12 o’clock. Repeat this with a digital clock.

Demonstrate to students that, starting from 12, it takes exactly one hour for the minute (long) hand of a clock to move once around. They should already be familiar with the fraction ‘one half’ so you can use this to introduce the idea that a half way around is ‘half past the hour’.

Using the Workbook

Let the students work independently to complete page 23. Check that they know the relationship between seconds, minutes and hours before moving on.

Use page 24 to introduce and teach the concept of measuring time. If possible, use a stopwatch or clock and have the students do the activities on this page. Let them measure how long each one takes. Once they have circled the answers, ask them to suggest something that would take as long as the uncircled time in each pair.

Relate the time ‘half an hour’ to school events, such as a period, or a break time so that the students have some concept of how long half an hour is. Let them complete and then discuss the activities on page 25. Discuss how they could check that the times are correct.

Once you have made sure the students know how to tell time on the half hour, let the students work in pairs to complete page 26.

Use pages 27 and 28 to assess whether or not the students can tell the time on both analogue and digital clocks. Give additional practice to those who cannot.

Assessment questions to ask

- How many minutes in an hour?
- Which is longer: 3 seconds or 3 minutes?
- Can you write your name 1000 times in a second? A minute? An hour?
- How many hours are there in a day?
- What time is it on a clock when the big hand points to 12 and the little hand points to 3?
- What time is it when the clock reads 10:30?
- When the time is 04:30, is it half past four or half to four?
Can you tell me three things you do that take you more than/less than a minute?

Common errors and misconceptions

Some students may own digital watches and may be able to tell the time correctly using them. Do not assume that they can tell the time equally well from an analogue clock. The ability to interpret the positions of the hands on an analogue clock is a different skill from reading a digital display.

8 Division

<table>
<thead>
<tr>
<th>8: Division</th>
<th>Workbook 2B pp 29–30</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Objectives</strong></td>
<td></td>
</tr>
<tr>
<td>2Nc18</td>
<td>Understand division as grouping and use the divide sign</td>
</tr>
<tr>
<td></td>
<td>Note: the division sign is introduced in Workbook 2C.</td>
</tr>
</tbody>
</table>

Vocabulary

Equal groups, shared equally, sharing, divide.

Resources needed

Number lines; number tracks; beads; counters; egg cups or other divided containers.

Mental warm-up activities

Select a range of activities from the mental warm-ups activity bank.

Concepts that may be unfamiliar in this topic

There are no totally new concepts in this topic as it involves further work on grouping sets, building on earlier work on making equal groups and getting students to carry out equal sharing. The students are asked to group one amount (24) in different ways, to begin to establish simple division facts.

Teaching ideas

Practical activities

Let students find different ways of dividing a number of counters into equal-sized sets. The numbers 12, 16, 24 and 36 will provide students with lots of different ways.

Adapt the other practical division activities from pages 55–56 as necessary to support learning.
**Using the Workbook**

- Let the students complete page 29 on their own. Encourage them to draw the objects if they need to, and allow them to model the sharing with counters and containers if they struggle.

- Let the students work through page 30 in pairs. If they are confused working on paper, let them model situations with a set of 24 counters.

**Assessment questions to ask**

- 12 sweets are shared equally between 3 people. How many sweets does each person get? What if another person came along and wanted an equal share?
- How many sets of 6 can be made from 24?
- There are 16 sweets in a bag. How many boys would get 4 sweets each if they were shared equally?

**Common errors and misconceptions**

Some students struggle to make the connection between multiplication and division and between division and repeated subtraction (making groups). Lots of practice with concrete objects and number lines at this early stage will help them to consolidate the ideas and make it easier for them to understand the inverse nature of multiplication and division as they progress through the stages.

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### 9 Multiplication

<table>
<thead>
<tr>
<th>9: Multiplication</th>
<th>Workbook 2B pp 31–34</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Objectives</strong></td>
<td></td>
</tr>
<tr>
<td>2Nc4</td>
<td>Learn and recognise multiples of 2, 5 and 10 and derive the related division facts</td>
</tr>
<tr>
<td>2Nc16</td>
<td>Understand multiplication as repeated addition and use the × sign</td>
</tr>
<tr>
<td>2Nc17</td>
<td>Understand multiplication as describing an array</td>
</tr>
</tbody>
</table>

**Vocabulary**

Times, multiply, multiplication sign, counting by, row, column, grid

**Resources needed**

Number lines; number tracks; Cuisenaire rods; beans; straws; counters; times tables; demonstration multiplication grid; multiplication grids.

**Mental warm-up activities**

Select a range of activities from the mental warm-ups activity bank.
Concepts that may be unfamiliar in this topic

Using the multiplication sign to write times tables facts

This unit formalises earlier skip counting and pattern work to begin to establish formal work on times tables. The multiplication sign is introduced and used to write number sentences for multiplications.

Teaching ideas

Practical activities

- Students arrange beans (counters, etc.) in sets of 2 and sets of 10. They then combine with others to add up the number of beans in one set, two sets, etc.

- Students experiment with beads to build arrays to prove to themselves that 2 sets of 4 contain the same as 4 sets of 2. They should think of other examples like this.

- Students in pairs test each other on the 2×, 5× and 10× tables.

- Arrange a ‘times table’ competition by dividing students into teams of four or five and getting them to write questions on the known tables which they use to test other teams.

- Get students to make 10 groups of 2 using counters. Ask the class how many counters are in one group of 2, two groups of 2, etc. Write the total down on the board each time. Ask students if they can see a pattern.

- Get students to make 10 groups of 10 using counters. Ask the class how many counters are in one group of 10, two groups of 10, etc. Write the total down on the chalkboard each time. Ask students if they can see a pattern.

- Reinforce the pattern obtained by counting in tens using a number line. Show students that, starting at zero and jumping 10 each time, they get the same pattern of numbers as when they added the sets of 10 together. Summarise the 10 times table with a whole-class session.

- Demonstrate the use of multiplication grids.

Using the Workbook

- Let the students work in pairs to complete page 31.

- Let the students work independently to complete page 32 and use it to assess how well they know their two times table. Point out to the students that seven groups of two dots could also be viewed as two groups of seven dots to help them see that multiplication is commutative (7 × 2 = 2 × 7). The term commutative is not important at this level, what is important is that students begin to realise that the order of elements in a multiplication does not affect the answer –
they can multiply 7 by 2 or 2 by 7 and the result will be 14. For those students who struggle with this, you may like to have them build both calculations using counters and let them add the counters in the two models to check that they both equal 14 (in this example).

Let the students work in pairs to complete page 33. Allow them to use physical counters or a 1–100 grid if they need to.

Let the students work independently to complete page 34. Remind students that $5 \times 10$ means 'five tens' and if necessary use a place value chart to show that we write the five in the tens column and place a zero in the units column as a place holder. Make sure the students recognise that all multiples of ten have a zero in the units place.

**Assessment questions to ask**

- What is $2 \times 3$, etc.?
- Starting on 20 and making three jumps of 10 along a number line, what numbers do you land on?
- How many groups of 10 are needed to make 40?
- Write another multiplication sentence that has the same answer as $2 \times 5$.

**Common errors and misconceptions**

It is essential that students are familiar with their times tables. Rote learning of tables at this stage will provide students with a resource that will be useful throughout the rest of their lives. If tables are neglected at this stage, students will be hindered in their progress later in their mathematics course.

### 10 Position and movement

<table>
<thead>
<tr>
<th>10: Position and movement</th>
<th>Workbook 2B pp 35–39</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Objectives</strong></td>
<td></td>
</tr>
<tr>
<td>2Gp1</td>
<td>Follow and give instructions involving position, direction and movement</td>
</tr>
<tr>
<td>2Gp2</td>
<td>Recognise whole, half and quarter turns, both clockwise and anti-clockwise</td>
</tr>
<tr>
<td>2Gp3</td>
<td>Recognise that a right angle is a quarter turn</td>
</tr>
</tbody>
</table>

**Vocabulary**

Right, left, straight, turn, quarter-turn, half-turn, whole turn, right angle, forwards, backwards, straight, clockwise, anti-clockwise
Resources
An ‘angles’ area with materials that students can use to explore angles, such as clock faces with moving hands, cardboard strips joined with paper fasteners, sandboxes for drawing in; flashcards with positional words; masking tape; sheets of paper with arrows on them; toy cars or people.

Mental warm-up activities
Select a range of activities from the mental warm-ups activity bank.

Concepts that may be unfamiliar in this topic
Clockwise and anti-clockwise
Students worked with left and right as directions in previous lessons. Make sure they understand that clockwise and anti-clockwise are simply other methods of describing the direction of a turn.

Right angles are quarter turns
Students have already turned corners and worked with turns in different ways. This unit extends their understanding and provides the vocabulary necessary to talk about position and movement in a straight line and at right angles. They will make their own right angle and use it to measure angles to assess whether they are right-angled or not.

Teaching ideas
Practical activities

If you feel students need more practical movement experience, adapt the activities on page 85 to include right angles and repeat them here.

Set up an ‘angles’ area with materials that students can use to explore angles. Include items as listed in the Resources paragraph above. Encourage the students to explore angles and turns.

Fold a large piece of paper to make a right angle. Relate the turns in the path to that. Ask the students to find examples of right angles in the classroom and encourage them to name shapes that contain right angles.

Make up an obstacle course including clockwise and anti-clockwise right-angled turns. Allow the students to follow the route and then have them draw it. Once they have drawn it, they should describe it to a partner. Encourage them to use the term ‘right angle’ where appropriate.

Using the Workbook
Work through page 35 with the class (or with smaller groups). Use a clock face or paper plate with an arrow pointing to show the turns as necessary. Allow students to model the turns if they need to.

Let the students complete page 36 independently and then have them compare their answers with a partner. Let them discuss their solutions if they get different numbers of turns and encourage them to reach agreement.
Use page 37 to assess whether the students can make and use a right angle. Give them plenty of practical hands-on measuring experience before they tackle the Workbook activity.

Let the students complete page 38 independently and then have them compare their answers with a partner. Let them find their own solutions if they get different numbers of turns for an answer.

Let the students work in pairs to complete page 39. If you have time, you can let them compare answers with another pair and resolve any differences.

**Assessment questions to ask**
- Which way am I going?
- What direction is this?
- Is this a half a turn?
- Is this a right angle? How do you know?
- Tell me how to get from X to Y (a given route).
- Draw arrows to show this route (give them a route).
- Describe this movement.

**Common errors and misconceptions**
Students may struggle with the concepts of clockwise and anti-clockwise, particularly if they are not oriented in the same way as the direction arrows they are following. Encourage them to turn mazes or maps so that they are facing the direction of travel if needs be and allow them to refer to a clockface or watch as necessary.

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**11 Adding sets of numbers**

<table>
<thead>
<tr>
<th>11: Adding sets of numbers</th>
<th>Workbook 2B pp 40–42</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Objectives</strong></td>
<td></td>
</tr>
<tr>
<td>2Nc8</td>
<td>Add four or five small numbers together</td>
</tr>
</tbody>
</table>

**Vocabulary**
Add, total, sum, reorder, count on

**Resources**
Number lines, counters.

**Mental warm-up activities**
Select a range of activities from the mental warm-ups activity bank.
Concepts that may be unfamiliar in this topic

The concepts in this topic are not new. The students already know that you can add single-digit numbers together by adding in parts or in any order. This work develops the idea that you can use the number facts you already know (bonds to 10) to make adding sets of numbers easier. This is an important strategy and it is one that students will build on and extend in the higher stages.

Teaching ideas

Practical activities

Any of the previously used activities on combining sets can be adapted to work with four or five numbers. Continue to work at a practical concrete level until you are sure that the students are confident with adding sets of numbers and they can use various methods to perform these additions.

You may need to revise bonds to 10 and pairs that make 20 before tackling this work. Also remind the students that they can add numbers in any order and re-order additions to make it easier. Remind them that they can use a number line to help them count on (in ones and in chunks).

Using the Workbook

Work through the examples on page 40 with the class, do the jotting work as you go to show them which pairs you are adding (draw arrows). Let the students work independently to complete the sums before allowing them to discuss their strategies in pairs. Bear in mind that some students may simply add consecutive numbers in their head without making pairs and allow for this. Help students who are still counting on in ones and not grouping or making tens by showing them how much faster and efficient it is to use the strategies.

Show the students how to count on in groups of ones on a number line by working through the example on page 41 with the class. Let them complete the additions on their own.

Use page 42 as a consolidation task. Observe the students as they work to see what strategies they use.

Assessment questions to ask

Assess orally by asking the students to give a total for four or five numbers and to give sets of numbers that will make a given total.

Common errors and misconceptions

Make sure the students realise that they can add the numbers in any order. Use concrete apparatus to demonstrate this if they seem unsure.
12 Adding multiples of 10

<table>
<thead>
<tr>
<th>Objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td>2Nc3</td>
</tr>
<tr>
<td>2Nc6</td>
</tr>
<tr>
<td>2Nc10</td>
</tr>
</tbody>
</table>

Vocabulary
Add, subtract, total, target

Resources needed
1–100 grid; base 10 blocks; Unifix cubes or other resources grouped in tens.

Mental warm-up activities
Select a range of activities from the mental warm-ups activity bank.

Concepts that may be unfamiliar in this topic
The concepts in this chapter should be familiar to students as they have previously learned number facts and worked with 1 and 10 more/less than a number. The aim here is to revise and consolidate facts, extend mental strategies and apply skills to work with larger numbers. The students may also begin to jump in larger steps along the number line when they add or subtract numbers. If you think they are ready for this, you should model it as you do examples with the class.

Teaching ideas
Practical activities

Spend some time reviewing the addition and subtraction facts that students are expected to know at this stage and remind them of the strategies they can use for adding and subtracting numbers mentally.

The students should know:
• pairs that make 10 (bonds)
• number fact to 20 (19 + 1, 18 + 2, etc.)
• plus one facts (counting on to find the number ‘after’)
• facts for near doubles (numbers that are 1 apart), so for 5 + 6 think double 5 plus 1.

Use number strips, number lines and number tracks to assist with adding and subtracting.

Demonstrate the use of the 1–100 number grid as a tool and method for carrying out addition and subtraction. Show students that each step down the number grid adds 10 and each step to the right adds one. Show them how to add two numbers by moving down and right across the grid. Show students that each step up the number grid takes 10 away and each step to the left takes one away. Show them how to subtract one number from another by moving up and left across the grid.

Revise skip counting in tens. Spend some time using the grid and counting in tens from different multiples of ten. Count forwards and backwards. Ask questions such as: ‘If I start at 50, how many tens must I count to reach 100?’ and so on. Repeat this for subtraction as well.

Work with physical apparatus so that the students develop the idea that adding 6 tens and 4 tens is similar to adding 6 and 4.

Using the Workbook

Let the students work together to solve the target puzzles on page 43. Let them work independently to complete the addition and subtraction number sentences.

Work through the number line and the number grid methods of adding using the example on page 44 before asking students to complete the addition sums independently.

Work through the number line and the number grid methods of subtracting using the example on page 45 before asking students to complete the subtractions independently.

Let the students work in pairs to complete the number puzzles on page 46. Allow them to refer to the 1–100 grid as they need to.

Assessment questions to ask

• What is (a multiple of 10) plus (a multiple of 10)?
• What is 100 minus (a multiple of 10)?
• What is (any two-digit number) plus (a multiple of 10)?
• What is (any two-digit number) minus (a multiple of 10)?
• How can I quickly count on/back 40 on a number line?
• How can I quickly add 40 to any number on the 1–100 grid?
13 Doubling and halving

<table>
<thead>
<tr>
<th>Objectives</th>
</tr>
</thead>
</table>
| 2Nc5 | Find and learn doubles for all numbers up to 10 and also 15, 20, 25 and 50  
| 2Nc20 | Find doubles of multiples of 5 up to double 50 and corresponding halves  
| 2Nc21 | Double two-digit numbers  

Vocabulary
Half, double

Resources needed
Number chart; low-value coins; counters.

Mental warm-up activities
Select a range of activities from the mental warm-ups activity bank.

Concepts that may be unfamiliar in this topic
The only new idea introduced here is that of doubling and halving larger numbers. There are no new concepts involved in this beyond the terminology. Be careful of trying to halve odd numbers at this stage as this is not required.

Teaching ideas
Practical activities

Orally revise $2 \times$ table and all doubles to 10.

Give each group a small amount of money in coins. Ask them to work out how much money they have. Then ask them to work out how much money they would have if their amount was doubled.

Draw a set of price tickets (within a given number range) on the board. Tell the students that there is a half-price sale. Ask them to work out half the cost of each item.

Let students write down five prices of their own (give them a number range to work in). Let them work out the price of two of each item (given that you would pay double for two).
Give each student a small number of counters. Ask them to double their number and write it down. Allow them to model this with other counters if they need to, but show them that they can count in twos to find the answer quickly. Let them double the answer again.

**Using the Workbook**

Let the students work independently to solve the problems on page 47. Allow them to use counters to model the answers if they need to.

Use arrow cards to model partitioning a number in order to double it. Encourage students to use their own arrow cards as they need to as they work through page 48.

The last question is a little more challenging as it involves working with a higher number range. If students struggle with this, remind them to partition the number and to double the 3 to get 6 and then to double the 60 to get 120 (remind them that they know this because double 6 is 12). They then recombine the digits to get an answer of 126.

**Assessment questions to ask**

- What is double (any number)?
- What is half of (any number)?
- I have (an amount of money). I give my sister half. How much is left?
- I have (an amount of money). My dad gives me the same amount. How much do I have now?

**Common errors and misconceptions**

Some students may get confused when you ask them to halve an amount because they think of a half as a fraction. Explain that half of an amount is the same as dividing the amount into two equal parts (groups) to try to make sense of the concept.
Note that many of the number and calculation objectives for the stage have been introduced already. In this Workbook, the facts and strategies are revised and consolidated as students begin to work in a higher number range, particularly when calculating. Aim to help the students progress towards more effective strategies for calculating as you work through these activities, including using blank number lines to jump in increasingly larger chunks to add and/or subtract. Continue to allow students who are struggling to use manipulatives as they need to, while you try to move them to greater reliance on mental strategies and jottings without pushing them into methods that they are not ready to use at this stage.

## 1 Addition

<table>
<thead>
<tr>
<th>Objectives</th>
<th>Workbook 2C pp 3–8</th>
</tr>
</thead>
<tbody>
<tr>
<td>2Nc7</td>
<td>Use the = sign to represent equality, e.g. $17 + 3 = 16 + 4$</td>
</tr>
<tr>
<td>2Nc8</td>
<td>Add four or five small numbers together</td>
</tr>
<tr>
<td>2Nc9</td>
<td>Recognise the use of a symbol such as □ or Δ to represent an unknown, e.g. $□ + Δ = 10$</td>
</tr>
<tr>
<td>2Nc11</td>
<td>Add and subtract a single digit to and from a two-digit number</td>
</tr>
<tr>
<td>2Nc12</td>
<td>Add pairs of two-digit numbers</td>
</tr>
<tr>
<td>2Nc14</td>
<td>Understand that addition can be done in any order, but subtraction cannot</td>
</tr>
</tbody>
</table>

### Vocabulary

Unit, ten, set, number track, addition, subtraction, number line

### Resources needed

Number strips; 1–100 number grid; number line to 100; 1–100 cards; straws; beads; elastic bands; beans; cups; 100 bead strings; counting sticks; Cuisenaire rods.

### Mental warm-up activities

Select a range of activities from the mental warm-ups activity bank. It may be useful to choose activities that revise bonds to 10 and 20 as students will be using these facts as they work through the topic.
Concepts that may be unfamiliar in this topic

Jumping along a number line in progressively larger chunks

Students already know how to count on and back and how to show jumps on a blank number line to help them. The examples in this topic continue to use this method, but they show two jumps only – one jump taking in all the tens and another taking in all the ones. Students may initially struggle with this, but it is the natural progression in adding and subtracting and they should at very least understand what it means (even if they continue to use smaller jumps on their own).

Teaching ideas

Practical activities

Display a large 1–100 chart in class and, if possible, prepare laminated/wipe clean versions for students. Revise counting on in 1s and 10s on the chart, reminding the students that moving down a row is 10 more and moving across is 1 more. Repeat for counting back.

Students could play board games like snakes and ladders in which there is a board resembling a 1–100 number grid. This will give them practice in simple addition and allow them to become familiar with the repeating pattern of numbers.

A 1–100 number grid could be drawn on an area of the playground using chalk. Groups of students could be given instructions to move position on the grid corresponding to adding or taking away numbers.

The 1–100 number grid provides students with yet another method to carrying out addition and subtraction. Show them that each step down the number grid adds ten and each step to the right adds one unit. Show them how to add two numbers by moving down and right across the grid. Show that each step up the number grid takes 10 away and each step to the left takes one away. Show them how to subtract one number from another by moving up and left across the grid.

Using the Workbook

Let the students play the clip toss game on page 3 to revise adding small numbers mentally. This game allows them to automatically bridge 10, which makes it easier for them to add larger two-digit numbers in the next activities. Discuss in advance with the class what the rules of the game will be. For example, if you toss a paper clip and it lands on more than one block, you can move it to the largest number.

Let the students work in pairs to complete page 4. Encourage them to talk to each other and to explain how they add the numbers. Encourage the use of number lines and jottings to support calculation.
Page 5 shows a different approach to addition using a number line. This method doesn’t really require the students to think about regrouping as they simply pass the tens that they are bridging. Make sure the students show the jumps on the blank number lines.

Demonstrate the addition on page 6 using arrow cards and a blank number line. Do some additional examples with the class if they seem to struggle with the ideas. Let the students complete the work on their own and then discuss their strategies and solutions as a class.

Let the students work in pairs to complete page 7 once you have shown them how to add on the 1–100 grid.

Let the students work independently to complete page 8. Use this as an opportunity to assess whether they are able to add two two-digit numbers confidently.

**Assessment questions to ask**

- How many tens and how many units in the number 29?
- A number is composed of three tens and six units. What is the number?
- What number is missing from the sequence 72, 73, . . . , 75?
- What symbol is used for add?
- What is 23 take away 14?
- What number appears immediately above 73 on a 1–100 number grid?

**Common errors and misconceptions**

As we read from left to right, some students may have an initial tendency, when adding or subtracting, to add or subtract tens first and then units. In simple examples that do not involve regrouping this doesn’t matter but, it is sensible to get students into the habit of working from the right to left.

### 2 3D shapes

<table>
<thead>
<tr>
<th>Objectives</th>
<th>Workbook 2C pp 9–12</th>
</tr>
</thead>
<tbody>
<tr>
<td>2Gs2 Sort, name, describe and make 3D shapes (e.g. cubes, cuboids, cones, cylinders, spheres and pyramids) referring to their properties; recognise 2D drawings of 3D shapes</td>
<td></td>
</tr>
<tr>
<td>2Gs4 Find examples of 2D and 3D shape and symmetry in the environment</td>
<td></td>
</tr>
<tr>
<td>2Dh2 Use Carroll and Venn diagrams to sort numbers or objects using one criterion; begin to sort numbers and objects using two criteria; explain choices using appropriate language, including ‘not’</td>
<td></td>
</tr>
</tbody>
</table>
Vocabulary
Cube, cuboid, cone, sphere, cylinder, pyramid, Venn diagram, overlapping

Resources needed
Everyday objects to show 3D shapes (note that the pyramid is not a common everyday shape although you may find some tetra packs that are this shape, some candles and some gift and sweet containers may be pyramid shaped); large hoops or elastic bands to make overlapping Venn diagrams; materials for building shapes (clay and construction toys, also frames with straws and sticky putty).

Mental warm-up activities
Select a range of activities from the mental warm-ups activity bank.

Concepts that may be unfamiliar in this topic
Pyramids
The pyramid shape is introduced in this stage. Bear in mind that a pyramid is any shape with a flat base and triangular faces which meet at a point (the apex). The base of the pyramid can be any shape. The number of triangular faces depends on how many sides the base has. Square-based pyramids (like the Egyptian pyramids) will have four triangular faces. You don’t need to go into detail at this level, but some students may ask why different pyramids have different number of faces and you need to be able to explain.

Venn diagrams with overlapping sections
Last year the students sorted shapes and numbers into non-overlapping circles because they were sorting using only one criterion. This year they will begin to sort items using two criteria and therefore they will need to work with overlapping circles.

Teaching ideas
Practical activities
You can adapt and re-use any of the activities on pages 58–59 of this Teacher Guide to introduce and revise the concepts related to 3D shapes. Try to include at least one activity in which the students actually make their own 3D shapes.

Do some practical sorting tasks with the class to revise the concept of a Venn diagram. You can sort objects by shape and colour, shape and size, yellow and red fruits, and vegetable leaves with straight and curved edges, etc.
Using the Workbook

Let the students work independently to complete page 9. Check their answers to make sure they recognise and can name 3D shapes.

Revise the concept of ‘not’ using page 10. Let the students complete the work and then ask them which shapes can roll and which shape cannot roll.

Work through the examples on page 11 as a class, answering the questions orally. Use this to teach the concept that a Venn diagram can have an overlapping section and that objects in that overlap must meet two different conditions. In Riedwan’s example, the shapes in the overlap have both flat faces and curved faces.

Let the students work independently or in pairs to complete the sorting tasks on page 12. Check their work to see that they have grasped the concepts.

Assessment questions to ask

• What shape is a box of cereal?
• What flat shapes form a cylinder?
• How many faces does this pyramid have?
• Name a shape which has all flat faces.
• Name a shape that has flat and curved faces.
• How could you group these shapes into sets? (Show the students a set of shapes as you ask this.) How do you decide if a shape fits into a set or not?
• How many faces/edges/vertices does this shape have?
• Describe this shape to me.
• Can I add this shape to this circle on the Venn diagram? Why or why not?

Common errors and misconceptions

Students may be confused about the difference between a cube and a cuboid, and should be reminded that a cube is a special type of cuboid in which all of the sides are exactly the same length. Similarly, students may be confused by the difference between a pyramid and a cone and should be reminded that a pyramid has triangular faces which meet at edges, whilst a cone has only one curved surface that comes to a point (the vertex or apex of the cone).

Some students may be confused by the terminology of 3D shapes. Regularly use and reinforce the correct terms by playing games that involve the students describing shapes or listening to descriptions to identify shapes.

Students may struggle to work out what criteria are used to place shapes in the overlapping circles in a Venn diagram. Lots of practice with real objects will help them to see that the overlapping space meets the criteria of both circles, and that objects in this space are those which could fit into both circles.
107

3 Subtraction

### Objectives

<table>
<thead>
<tr>
<th>Objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td>2Nc11: Add and subtract a single digit to and from a two-digit number</td>
</tr>
<tr>
<td>2Nc13: Find a small difference between pairs of two-digit numbers</td>
</tr>
<tr>
<td>2Nc14: Understand that addition can be done in any order, but subtraction cannot</td>
</tr>
<tr>
<td>2Nc15: Understand subtraction as both difference and take away</td>
</tr>
</tbody>
</table>

### Vocabulary

Add, subtract, count on, count back, addition, subtraction, sum, total, difference, left over

### Resources needed

Counters as necessary, 1–100 grids, number lines.

### Mental warm-up activities

Select suitable activities from the mental warm-ups activity bank or focus on subtracting using the number chart and number lines.

### Concepts that may be unfamiliar in this topic

**Subtraction as difference**

The basic concepts in this chapter should be familiar to students as they have previously learned number facts and worked with 1 and 10 more/less than a number. The aim here is to revise and consolidate facts, extend mental strategies and apply skills to work with larger numbers. Once that has been done, the students explore the idea of finding the difference between two numbers, initially using concrete examples, and then by calculation.

**Checking subtraction by adding**

Students already know that addition facts produce related subtraction facts. In this section we will build on this to show them how to use inverse operations to check the results of a subtraction. For example, if $10 - 3 = 7$, then $7 + 3$ must be 10.
Teaching ideas

Practical activities

Revise subtraction facts for all numbers to 20. Reiterate mental strategies such as counting back and bridging tens as you revise these.

Revise the use of the 1–100 number grid as a tool and method for carrying out subtraction. Show students that each step up the number grid subtracts 10 and each step to the left subtracts one. Show them how to subtract a number by moving up and left across the grid.

Play a memory game to reinforce number facts and equivalent forms of the same calculation. Make a set of cards with simple additions, subtractions and totals on them. For example these cards can be used to revise facts to 10.

<table>
<thead>
<tr>
<th>4 + 3</th>
<th>3 + 4</th>
<th>10 – 3</th>
<th>7</th>
<th>8 – 5</th>
<th>4 + 4</th>
<th>10 – 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1</td>
<td>3</td>
<td>5</td>
<td>7</td>
<td>8</td>
<td>10</td>
</tr>
<tr>
<td>5 + 5</td>
<td>6 + 4</td>
<td>9 – 2</td>
<td>10 – 5</td>
<td>9 – 9</td>
<td>10 + 0</td>
<td>8 – 3</td>
</tr>
<tr>
<td>7 – 0</td>
<td>5 – 4</td>
<td>6 + 4</td>
<td>4 + 6</td>
<td>3 + 7</td>
<td>7 + 3</td>
<td>6 + 0</td>
</tr>
</tbody>
</table>

Cut these out, and shuffle them. Students play in small groups. The cards are all laid out face down and students take turns to turn over two cards. If they are equivalent, the student can remove them and score a point. If not, they turn the cards back over and the next student takes a turn. Continue until all the cards are turned over. Adapt the activity for numbers to 20.

Use two specially marked dice to play subtraction games for numbers to 20. Mark one die with the numbers 4, 5, 6, 7, 8 and 9, the other with 15, 16, 17, 18, 19 and 20. Subtraction games must include the instruction to subtract the smaller number from the greater at this stage.

Using the Workbook

Once you have revised the basic number facts, let the students work on their own to complete page 13. Spend some time talking through the problems that students make up as a class.

Work through the examples on page 14 with the class. Then, ask the students to work on their own to complete the subtractions. Observe them as they work to check that they can subtract using a number line and 1–100 grid.

Let the students work in pairs or small groups to complete page 15. Read through the worded problem with the class if necessary and
make sure they understand what to do. Discuss the strategies that students use to find the difference.

Work through the teaching activities on page 16 with the class. Let the students work independently to solve and then check the calculations.

Assessment questions to ask
- What is 20 – 8? and so on.
- What is the missing number in the calculation 16 – 5 = . . . ?
- What symbol is used for subtract?
- What is 20 take away 14?
- Find four pairs of numbers with a difference of 5.
- Make up five subtraction sums that have an answer of 15.

Common errors and misconceptions
Students will struggle if they cannot quickly recall basic addition and subtraction facts. Assist them to learn and memorise these by providing a range of activities to practice these on a regular basis.

4 2D shapes

<table>
<thead>
<tr>
<th>4: 2D shapes</th>
<th>Workbook 2C pp 17–23</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Objectives</strong></td>
<td></td>
</tr>
<tr>
<td>2Gs1</td>
<td>Sort, name, describe, visualise and draw 2D shapes (e.g. squares, rectangles, circles, regular and irregular pentagons and hexagons) referring to their properties; recognise common 2D shapes in different positions and orientations</td>
</tr>
<tr>
<td>2Gs4</td>
<td>Find examples of 2D and 3D shape and symmetry in the environment</td>
</tr>
</tbody>
</table>

Vocabulary
Square, rectangle, triangle, pentagon, hexagon, sides, vertices, right angles

Resources needed
Examples of shapes to show students; cardboard to make tangram cut-outs; pin-boards and elastic bands.

Mental warm-up activities
Select suitable activities from the mental warm-ups activity bank.
Concepts that may be unfamiliar in this topic

Pentagons and hexagons

In this topic, the students will learn the names of some new shapes (pentagons and hexagons) and develop their understanding of their properties. They then revise the properties of other shapes and tabulate these to see that the number of sides is equal to the number of corners.

Teaching ideas

Practical activities

You can adapt any of the shapes activities from pages 62–63 as needed for this unit.

 Spend some time making shapes with elastic bands on pin-boards. Give the students instructions and have them make the shape accordingly. For example, make a shape with three sides, make a shape with five sides, make a shape with a right angle in it, and so on. This will help them with the grid drawing activity later on.

 Use the Workbook pages with patterns and pictures as the basis of a shape search in the local environment. You can extend the concept of shapes by playing a game as you do so. Ask questions related to shapes you find. For example: ‘This wheel is a circle. Would a square be a good shape for a wheel? Why or why not?’

Using the Workbook

 Let the students work independently to find and colour the pentagons on page 17.

 Let the students work in pairs to identify and point out the pentagons on page 18. Once they have done this, let them colour the picture.

 Let the students work independently to find and colour the hexagons on page 19.

 Let the students work in pairs to identify and point out the hexagons on page 20. Once they have done this, let them colour the picture.

 Do some practical activities related to page 21. It is important that you let the students actually build the shapes. Note that the bottom right-hand shape is possibly only with overlapping triangles (3). Once the students have built their shapes, have them count the sides and name the shapes 1–3 as pentagons/hexagons. Explore and draw other possible shapes.

 You may want to complete page 22 as a class, asking different students to find the answers, as a summary of properties of shapes. Give the students a chance to verbalise the pattern in the table and make sure they can see that the number of sides and vertices are equal.
Let the students attempt page 23 on their own. If possible, have pin-boards and elastic bands available for them to try out shapes before they draw them.

**Assessment questions to ask**

- What shape is this?
- How many sides does a (shape) have?
- How many vertices does a (shape) have?
- If a shape has . . . sides, how many vertices will it have?
- If a shape has . . . vertices, how many sides will it have?
- Is this a right angle?
- Which of these shapes (show some examples) have right angles in them?
- How many right angles are there in a square/rectangle?

**Common errors and misconceptions**

Students may find it difficult to identify pentagons and hexagons which are concave. Encourage them to build shapes like these using sticks or elastic bands and show them that it is the number of sides that determines the shape, not whether it points in or out.

---

## 5 Division

<table>
<thead>
<tr>
<th>5: Division</th>
<th>Workbook 2C pp 24–29</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Objectives</strong></td>
<td></td>
</tr>
<tr>
<td>2Nc4</td>
<td>Learn and recognise multiples of 2, 5 and 10 and derive the related division facts</td>
</tr>
<tr>
<td>2Nc18</td>
<td>Understand division as grouping and use the ÷ sign</td>
</tr>
<tr>
<td>2Nc22</td>
<td>Work out multiplication and division facts for the 3× and 4× tables</td>
</tr>
<tr>
<td>2Nc23</td>
<td>Understand that division can leave some left over</td>
</tr>
</tbody>
</table>

**Vocabulary**

Shared equally, sharing, subtract, ÷, equal groups, divide, division

**Resources needed**

Number lines; number tracks; beads; counters.

**Mental warm-up activities**

Select suitable activities from the mental warm-ups activity bank.
Concepts that may be unfamiliar in this topic

The division sign

In this unit, the concept of division is extended to include the method of repeated subtraction. The division sign is introduced and used in number sentences to consolidate the concept. Once students are confident with the use of the sign, they will develop their own set of multiplication and related division facts for the 2 and 10 times tables.

Teaching ideas

Practical activities

Use a number line to show how a number can be divided into sets of equal size. For example, start at 16 and come down in jumps of four to zero; since it requires four jumps, four sets can be made. Let the students complete activities involving putting objects into sets using beans (counters) or a number line.

Introduce the idea of dividing an amount into equal groups and the symbol ‘÷’ to represent this. Rewrite the different ways of sharing 12 equally using the ÷ sign.

\[
12 \div 2 = 6 \\
12 \div 3 = 4 \\
12 \div 4 = 3 \\
12 \div 6 = 2
\]

Students should become familiar with this format by completing the Workbook activities using the division sign.

Using the Workbook

Let the students work independently to complete page 24. Use this to assess how well they remember the concept of making equal groups taught earlier.

Work through the example on page 25 with the class and then let the students complete the calculations to show that they grasp the concepts.

Demonstrate repeated subtraction as a series of number sentences before asking the students to complete page 26 in pairs.

Once you have taught the division sign, ask the students to complete page 27 on their own. Let them work together on the problem solving activity and have a class feedback around it.

Let the students work in pairs to complete the division facts activity on page 28.

Let the students work in pairs to complete page 29. Check the answers as a class and have a drill and practice session around it.
**Assessment questions to ask**
- How many groups of . . . can I make from . . .?
- What is . . . divided by . . .?

**Common errors and misconceptions**
Students may initially find it difficult to understand the meaning of the ‘÷’ sign. Use worded problems that include ‘make equal groups’ or ‘grouped into’ before using the sign and the term ‘divide’.

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### 6 Position and movement

<table>
<thead>
<tr>
<th>6: Position and movement</th>
<th>Workbook 2C pp 30–31</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Objectives</strong></td>
<td></td>
</tr>
<tr>
<td>2Gp1</td>
<td>Follow and give instructions involving position, direction and movement</td>
</tr>
</tbody>
</table>

**Vocabulary**
Left, right, next to, closest to, top, bottom, key, symbols

**Resources**
Colouring equipment; boxes and other clean, used containers; toy cars or small dolls; brown paper.

**Mental warm-up activities**
Select suitable activities from the mental warm-ups activity bank.

**Concepts that may be unfamiliar in this topic**
There are no new concepts in this topic. Students will continue to develop their understanding of position and direction using models and simple maps drawn in plan view.

**Teaching ideas**

**Practical activities**

Let the students work in groups to design a village using the boxes and containers. Let them use the cars or dolls to follow a route through their town, describing the route as they follow it. Then let them pretend to be a bird flying over the town. Ask them to describe what the bird will see.
Give each group of students some squares or rectangles cut from brown paper. Ask them to make a bird’s eye view map of the classroom by sticking the shapes onto paper to represent the desks. Let them draw in any other features they want to include.

Using the Workbook

Let the students work in pairs to complete the activities on page 30.

Let the students work independently to draw the symbols on the map on page 31. Once they have done this, let them work with a partner to compare maps. Allow them to discuss any differences and the reasons for these.

Assessment questions to ask

- Adapt any of the questions in the Workbook to assess how well the students can read and interpret a map.

Common errors and misconceptions

Students sometimes find the concept of a plan view difficult because they don’t generally get to view things from above. Let them physically look at shapes and objects from the top and have them trace round them to help them see that you just see the shape, and that the top of a shape (or roof of a building) obscures the view of everything underneath it.

7 Money

<table>
<thead>
<tr>
<th>7: Money</th>
<th>Workbook 2C pp 32–38</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Objectives</strong></td>
<td></td>
</tr>
<tr>
<td>2Nc3</td>
<td>Find all pairs of multiples of 10 with a total of 100 and record the related addition and subtraction facts</td>
</tr>
<tr>
<td>2Nc8</td>
<td>Add four or five small numbers together</td>
</tr>
<tr>
<td>2Mm1</td>
<td>Recognise all coins and notes</td>
</tr>
<tr>
<td>2Mm2</td>
<td>Use money notation</td>
</tr>
<tr>
<td>2Mm3</td>
<td>Find the coins and notes required to pay a given amount; work out change</td>
</tr>
</tbody>
</table>
Note that we have used a generic form of cents and dollars in this unit. You will need to support this work using coins and notes as appropriate from your own country. If you do not use cents and dollars, explain to the students that many countries use cents and dollars, and that they need to be able to work with these currencies.

Bear in mind that the addition and subtraction requirements at this stage only involve pairs of one- and two-digit numbers, although the students can add groups of small numbers; also stick to whole numbers for calculations and not decimal values.

Vocabulary
Money, currency, coins, notes, value, units, dollars, cents, worth, value, cost, buy, sell, pay

Resources needed
Samples of coins and notes from your own country; enough real coins for use in the classroom; stones wrapped up in three colours of paper (or buttons in three different colours); mocked up banknotes.

Teaching ideas
Practical activities

Encourage the students to talk about their own experiences with money. This allows you to introduce or reinforce the terms ‘coins’ and ‘notes’ and to see how much they already know. Ask the students to say what they think is a large amount of money and what they think is a small amount of money.

Have examples of each coin to show the students. Pass the coins around and get students to describe the coins as they handle them. For example, this is a 1c coin, it is brown and it has a picture of a hummingbird on it. Repeat this for all the cent coins, giving different students a chance to describe the coins. Use the words ‘cents’ and ‘coins’ regularly. Make sure they can read the word ‘cents’ on the coins and that they can find the name of their country on the back of the coin (if applicable).

Talk about the symbols used on the coins and discuss how they help us to recognise our own money.

Do some coin rubbings. Place a piece of paper over the coin and shade it lightly with a pencil. If you like, the students can cut these out and make pretend coins to use in class.
Introduce the notes. Discuss how the colour and symbols help us to recognise the different amounts and stress that different notes have different values. Let the students draw and colour some notes (roughly, there is no need for detail).

Work in groups. Give each student a coin. Have them discuss their coins in groups. Let them tell each other what their coin is called, how much it is worth, what they could buy with it, what they could not buy with it and so on.

Describe coins to the class. Have them guess which coin you are describing. Say things like: ‘It is about this big’ (show them), ‘It is brown’, ‘It has a picture of a hummingbird on it, what is it?’

Give each group a pile of 5c and 1c coins. Tell them that each student is to have ten cents. Let them make 10c in any way they can. Discuss the different ways of making 10c (ten 1c, five 1c + one 5c, two 5c).

Ask how else we could get 10c (one 10c).

Use the coloured stones to make a shop. Explain that the stones are different prices (red is 1c, blue is 5c and green is 10c, for example). Give each student 15c to spend. Let them work out all the possible combinations of stones they could buy. Next, tell them a blue stone costs 15c. Let them draw all the ways in which they could pay for it using coins.

Give each student 5c. Draw a sweet on the board and write 7c next to it. Ask the students how much more money they need to buy the sweet. Repeat this several times with different starting amounts and different prices. Once you are sure students can work out the difference, repeat this with a lower amount and ask how much change they will get. For example, they have 5c and they want to buy a toffee for 3c. How much change will they get?

Give each student a ‘purse’ with some paper coins in it (1c, 5c and 10c). Let the students take turns to be the shopkeeper. Give the shopkeeper the stones to sell. Let the students take turns to buy stones and pay for them. The shopkeeper can give change.

Using the Workbook

Let the students work in pairs to complete page 32. Remind them that they do not need to make accurate drawings of the coins and notes from your country; colours and values are good enough at this stage.

Let the students work in pairs to find the coins that add up to 50c on page 33. Remember that the additions here are well within their number range.
Make sure the students know and understand that $1 is equivalent to 100 cents before asking them to work in pairs to complete the matching activity on page 34.

Let the students work in pairs to complete the problems on page 35. Let them demonstrate how they made 38c and 47c using the code.

Let the students work independently to solve the problems on page 36. Check the answers as a class and let the students explain their methods.

Although page 37 focuses on banknotes, the skill involved is adding multiples of 10. The students can use a 1–100 grid or a number line marked in tens to help them find the answers.

Let the students work in pairs to complete page 38. Point out that knowing how much change you are supposed to get can help you in your own life.

**Assessment questions to ask**
- What coin is this?
- Is this coin from (your country)? How do you know?
- What note (bill) is this?
- Is this note (bill) from (your country)? How do you know?
- What is the value of this coin?
- What can I buy with this coin?
- How many . . . cent coins make . . . cents?
- What coins can I use to make . . . cents?
- I have . . .. I have to pay . . .. How much more money do I need?
- I have . . .. I pay . . .. How much change do I get?

**Common errors and misconceptions**

Students may confuse the concept of dollar bills with dollar coins, depending on what is in use locally. Explain to them that some countries use coins while others use notes.

Some students may have difficulty remembering which coin is which. They may also find it difficult to grasp the concept of the value of a coin or note. Help them by talking about which can buy more.

Some students may initially not see that combinations of coins can be worth the same as one coin of a different amount. Practical activities in which they build up amounts using smaller denominations will help them to develop this concept.
8 Symmetry

<table>
<thead>
<tr>
<th>Objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td>2Gs3 Identify reflective symmetry in patterns and 2D shapes; draw lines of symmetry</td>
</tr>
<tr>
<td>2Gs4 Find examples of 2D and 3D shapes and symmetry in the environment</td>
</tr>
</tbody>
</table>

Vocabulary
Triangle, square, rectangle, pentagon, hexagon, sides, vertices, angles, symmetry, mirror line, axis of symmetry

Resources needed
Large symmetrical shapes to display lines of symmetry (isosceles triangle, equilateral triangle, square, rectangle, pentagon, hexagon); mirrors; coloured paper or card; scissors, pin-boards (if possible, if not, dotted paper).

Mental warm-up activities
Select suitable activities from the mental warm-ups activity bank. Students will not be doing any calculating in this topic, so you might want to focus on calculation activities.

Concepts that may be unfamiliar in this topic
Completing shapes about a line of symmetry and drawing reflections of shapes
Previously students were expected to identify basic line symmetry. Now they will work with shapes and patterns that are symmetrical to draw in the lines of symmetry. Some students will struggle to visualise this, and you may need to let them use mirrors to find the reflection or to trace the shapes and fold them to find the other half. This work will help them in later years when they deal with transformations more formally.

Teaching ideas
Practical activities
Introduce the concept of symmetry by pointing out things in the classroom which have lines of symmetry. Use a rectangular sheet of paper to demonstrate to students that, by folding the paper in half
along its length, one half fits exactly on top of the other therefore the fold is along a line of symmetry. Repeat this by folding the paper along its width. It is also worthwhile showing students that folding the sheet along a diagonal produces two halves equal in size, but the fold is not along a line of symmetry as one half does not fit exactly on top of the other. Do some practical folding activities with the class.

Let the students find examples of symmetry in the environment (patterns in tiles, plane shapes, fabric designs, buildings) and in nature (leaves, butterflies and other animals). (Bear in mind that natural objects are never completely symmetrical as you do this though.) If possible, take digital photographs and use these to make a classroom display of symmetrical patterns and shapes. If it is not possible to take students outside, prepare a whiteboard presentation of symmetrical objects. You will find lots of examples on the Internet.

Students can make a scrap book by sticking in pictures of symmetrical shapes used in designs and patterns cut from magazines and other publications. Students should be asked to bring magazines into school prior to this activity.

Students should cut out shapes in paper or card and explore whether they have any lines of symmetry by seeing if it is possible to fold one half of a shape exactly on top of the other.

Students could use a mirror to draw shapes with one line of symmetry.

Using the Workbook

Let the students work in pairs to choose and colour the symmetrical shapes on page 39.

Let the students complete the activities on page 40 to make sure they understand the concept of symmetry. Allow them to trace and fold the shapes if they need to.

Use page 41 of the Workbook to assess that the students can identify symmetrical patterns and draw a line of symmetry on a pattern.

Assessment questions to ask

- Where is the line of symmetry down your body?
- Name something else that has a line of symmetry.
- How many ways can you fold a rectangular sheet of paper exactly onto itself?
- How many lines of symmetry does a circle have?
- Which of these capital letters are symmetrical?
Common errors and misconceptions

Students should appreciate that a shape only has a line of symmetry if it can be folded along this line and one half of the shape fits exactly on top of the other. Some students are confused by lines drawn on some figures which divide them in equal halves, but are not lines of symmetry because one half doesn’t fit exactly on top of the other. Folding a rectangle along its diagonals is such an example.

9 More adding and multiplying

<table>
<thead>
<tr>
<th>Objectives</th>
<th>Workbook 2C pp 42–44</th>
</tr>
</thead>
<tbody>
<tr>
<td>2Nn4</td>
<td>Count in twos, fives and tens, and use grouping twos, fives or tens to count larger groups of objects</td>
</tr>
<tr>
<td>2Nc4</td>
<td>Learn and recognise multiples of 2, 5 and 10 and derive the related division facts</td>
</tr>
<tr>
<td>2Nc16</td>
<td>Understand multiplication as repeated addition and use the × sign</td>
</tr>
<tr>
<td>2Nc17</td>
<td>Understand multiplication as describing an array</td>
</tr>
<tr>
<td>2Nc19</td>
<td>Use counting in twos, fives or tens to solve practical problems involving repeated addition</td>
</tr>
</tbody>
</table>

Vocabulary

Count in fives, multiplying by 5, multiple

Resources needed

Counters; sets of five objects.

Mental warm-up activities

Select suitable activities from the mental warm-ups activity bank.

Concepts that may be unfamiliar in this topic

This topic consolidates previous skip-counting experience in fives, so that the students begin to develop their 5 times table. It also revises multiples of five and reinforces the use of the term ‘multiple’.

Teaching ideas

Practical activities

Any of the skip-counting and multiplication activities from pages 65–66 can be adapted for this topic.
Using the Workbook

Let the students work independently to complete the join the dots (counting in fives) on page 42 and use this to assess their ability to count in fives. Let them work in pairs to count the money, making sure they distinguish between dollars and cents in their answers.

Demonstrate using real objects that adding three groups of five is the same as saying ‘three times 5’. Then let the students work independently to complete page 43.

Let the students work in pairs to complete page 44.

Assessment questions to ask

- What is 5 times . . .?
- How many five cent pieces in . . . cents?
- Which of these numbers are multiples of five: 10, 15, 22, 25, 51? How do you know?

Common errors and misconceptions

Make sure that the students are beginning to learn their 5 times table facts by heart.

10 More measurement

<table>
<thead>
<tr>
<th>10: More measurement</th>
<th>Workbook 2C pp 45–49</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Objectives</strong></td>
<td></td>
</tr>
<tr>
<td>2M1.1</td>
<td>Estimate, measure and compare lengths, weights and capacities, choosing and using suitable uniform non-standard and standard units and appropriate measuring instruments.</td>
</tr>
<tr>
<td>2M1.2</td>
<td>Compare lengths, weights and capacities using the standard units: centimetre, metre, gram, kilogram and litre.</td>
</tr>
</tbody>
</table>

Vocabulary

Ruler, estimate, measure, long, wide, centimetre, metre, more than, less than, about, kilogram, gram, balance, scale, capacity, litre.

Resources needed

Rulers and examples of objects to measure, A kilogram mass (either a mass piece or a kilogram bag of sugar or flour); a kitchen scale marked in grams, small object with a mass of about 100 grams; a selection of real items to compare; balance scales; variety of domestic containers, such as drinks.
bottles of capacity $\frac{1}{4}$ litre, $\frac{1}{2}$ litre, 1 litre, 2 litres, etc., which are marked with their capacity in litres; containers such as cups, beakers, etc., which are not marked with their capacity; bowls, water or sand; holds more/less spinner.

**Mental warm-up activities**

Select suitable activities from the mental warm-ups activity bank.

**Concepts that may be unfamiliar in this topic**

**The metre**

The larger unit of measure, the metre, is introduced in this topic. Use a metre stick or rule to show the students how long a metre is in reality. For most young children, a metre is about the distance of their outstretched arms. Let them compare this with a metre rule to see. If students ask, explain that 100 centimetres are equivalent to 1 metre.

**Grams**

The smaller unit of measure, the gram is introduced here although students are only expected to compare masses against an item of 100 grams. There are 1000 grams in a kilogram, but the students do not work in that number range, rather, show them what 100 grams looks like and discuss which items weight more or less than that. Make sure they realise that a kilogram is heavier than 100 grams.

**Litres**

Many students will have seen capacities given in litres (and other units) on the information labels of domestic containers but perhaps not understood their significance. In this unit students are introduced to the concept of capacity as the amount of a substance that will fit in a container and the litre as the unit of capacity.

**Teaching ideas**

**Practical activities**

*Adapt any of the practical activities measuring length from page 72 to work with metres.*

- Use a small kitchen scale to measure out 100 grams of different substances. If you find a fruit or vegetable that has a mass of approximately 100 grams, you can use that to compare the mass of the same fruits and vegetables of different sizes.

- Give each group of students a few small objects and have them arrange them in order from heaviest to lightest and vice versa. Let them estimate which items are heavier than 100 grams and then verify their estimates by measuring.

- Remind the students how to use a scale to balance a mass of one kilogram. Discuss what happens to the pans when the opposing mass is more than, equal to, or less than a kilogram.
Students to work in groups. Each group should be given a set of similar containers and a bowl of water or sand. The students can compare the capacities of two containers by filling one with water or sand and then pouring it into the other to see if the second container has a smaller or greater capacity than the first. Carry out all of the activities in this topic.

Prior to studying this topic, students should be asked to examine information labels on various containers at home and look for any mention of ‘litre’. Any empty containers should be brought to class for use in practical activities.

Students to work in groups. Each group should be given a set of several containers. They should arrange the containers in order of increasing capacity as judged by eye. Then, they should read the capacities of the containers. If they have the containers in the correct order they will see that the number of litres increases.

Students to work in pairs. Each pair should be given a set of several containers of different capacity and a holds more/less spinner. One student should select a container and spin the arrow. Depending on the outcome, the other student must select a container that holds more or less.

Using the Workbook

Let the students work on their own to complete the first activity on page 45. Be sure to explain to students that the diagram is not drawn to scale. Let them work in groups or pairs to do the practical measuring task. Discuss their answers as a class.

Students can work on their own or in pairs to draw items for the table on page 46. Encourage them to weight the items to check their answers if necessary.

Use page 47 to revise and consolidate measuring in kilograms. Let the students work in pairs to do the actual measuring.

Once you have taught the concept of a litre, let the students complete page 48 independently. Check their answers to make sure they have some concept of how much a litre is.

Let the students work in pairs with practical equipment to complete page 49.

Assessment questions to ask

- How long/high do you think this . . . is?
- Is this . . . longer or shorter than 1 m?
- How long/high is this . . . in metres?
- Is this more than/less than one kilogram?
- What has the same weight as 100 grams?
• What happens to the pan with the heavier item?
• What happens to the pans if the items have the same mass?
• What does ‘l’ stand for?
• Arrange the following in increasing order of capacity (give various containers).
• How many of these bottles (give example) are needed to fill a 1-litre bottle?
• How many 1-litre bottles are needed to fill this container (give a container)?

Common errors and misconceptions

Estimating length may remain difficult for some students. Discuss how they can improve their estimating skills by comparing objects to known lengths.

Estimating mass, particularly in 100 grams, may be difficult for some students. Discuss how they can improve their estimating skills by comparing objects to known masses. Encourage them to hold items (hold one in each hand) and compare them.

Students may see a variety of capacity units used on the contents labels of containers including millilitres (ml) and centilitres (cl), centimetres cubed (cm³) and decimetres cubed (dm³). No attempt should be made to explain them at this stage, as this will only lead to confusion. Students should be told that the litre is a large unit and that, for smaller quantities, a smaller unit is sometimes used.

### 11 Number problems

<table>
<thead>
<tr>
<th>Objective</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2Nn11</td>
<td>Recognise and use ordinal numbers up to at least the 10th number and beyond</td>
</tr>
<tr>
<td>2Nc9</td>
<td>Recognise the use of a symbol such as □ or Δ to represent an unknown, e.g. □ + Δ = 10</td>
</tr>
<tr>
<td>2Nc10</td>
<td>Solve number sentences such as 27 + □ = 3</td>
</tr>
</tbody>
</table>

Note: Various problem solving objectives are also addressed in this topic

### Vocabulary

Missing number, missing sign, operation, win, draw, total

### Resources needed

No special resources are needed.
Mental warm-up activities
Select suitable activities from the mental warm-ups activity bank.

Concepts that may be unfamiliar in this topic
No new concepts are introduced here although students are expected to develop their confidence in problem solving skills.

Teaching ideas

Using the Workbook

- Let the students attempt page 50 independently.
- Use page 51 to assess calculation skills and to check that the students can use ordinal numbers. Allow them to work in pairs to complete the table if they need to. Discuss how they worked out their answers.

Assessment questions to ask
- Ask questions related to ‘how’ students solved the problems and ask them to describe the strategies they used to find the solutions.

Common errors and misconceptions
Make sure that the students know what to do before they attempt to solve problems. If necessary, spend some time discussing how to proceed with the class before they move on.

12 Data handling

<table>
<thead>
<tr>
<th>12: Data handling</th>
<th>Workbook 2C pp 52–56</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Objectives</strong></td>
<td></td>
</tr>
<tr>
<td>2Dh1</td>
<td>Answer a question by collecting and recording data in lists and tables, and representing it as block graphs and pictograms to show results</td>
</tr>
</tbody>
</table>

Vocabulary
Pictogram, block graph, key, symbol, tally, tally table

Resources
No special resources are needed.
Mental warm-up activities

Select suitable activities from the mental warm-ups activity bank.

Concepts that may be unfamiliar in this topic

Tallies

Early on students used tick marks to record items as they counted them. Now that they are able to count in fives, it is sensible to introduce tally marks. Make sure they realise that they have to make one mark per item counted (for example // for two items) and that the fifth tally is the ‘gate’ that indicates a group of five (i.e. four is //// and five is ////).

Teaching ideas

Practical activities

Adapt the graphing activities from pages 50–51 as necessary for this topic.

- Demonstrate how to use a tally by counting the boys and girls in the class and recording the results on the board using tallies.
- Let one student count the number of desks in the classroom by going around touching each desk and saying the number (one, two, three, etc.). As the student says each number, make a tally and score each fifth one. Show the children how to count by fives and then count on to find the total.

Using the Workbook

- Use page 52 to assess students’ understanding of block graphs. The problem solving activity on the page introduces the idea that axes can be subdivided in different increments, not just 1, 2, 3, etc.
- Use page 53 to assess students’ understanding of pictograms and symbols.
- Work through the weather graph activity on page 54 as a class. Discuss how the information could be collected. You may want to draw up a class version of the data table and use it to record the information for the week.
- Once you have demonstrated and taught how to use tallies, have the students work in pairs to complete page 55.
- Use page 56 to assess understanding of tallies and students’ abilities to draw a block graph.
Assessment questions to ask

- Adapt any of the questions in these activities to assess understanding.

Common errors and misconceptions

Make sure that the students understand that a tally is only scored when you reach a count of five and that they can see how to add in fives and count on to get a total.