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Introduction

Macmillan Mathematics is a complete mathematics scheme for pupils from Grades 1 to 6. It is written not only to develop a thorough understanding of mathematics, but also to foster interest, enthusiasm and confidence in mathematics. Its mathematical structure provides progression and development of concepts to ensure continuity and curriculum coverage.

Components

- The **Teacher's Book** gives clear guidance on planning, practical activities and the use of the pupil's material for each unit of work.
- The **Pupil's Book** provides a clear explanation of the key steps needed to learn specific skills and concepts, as well as practice, reinforcement and enrichment activities to consolidate these skills and concepts.
- The **Pupil's CD-ROM** provides further reinforcement and assessment of the skills and concepts developed within each unit, with the provision of interactive exercises.

Planning and organisation

For each grade, the curriculum has been organised into six blocks of work that are developed over the year. Each block is split into four teaching units. A teaching unit consists of a week of lessons, and covers the set of objectives that guide planning, teaching and students' learning. The fourth unit in each block is an 'assess and review' unit. This provides an opportunity for pupils to use and apply the skills and concepts learnt in the previous three units, and also allows teachers to assess and monitor pupils' progress. Those pupils who are not keeping up with their peers can then receive the additional attention and support they need.

Teaching sequence

Term 1

September	October	November	December
Block A	Block B	Block C	

Term 2

January	February	March	April	May
Block D	Block E		Block F	

Successful teaching and learning with Macmillan Mathematics

Macmillan Mathematics is intended to be used in the context of quality-first teaching, with activities to support the teacher in their efforts to develop pupils' learning, confidence and love of mathematics. The authors give these principles to outline their thoughts on teaching and learning mathematics:

- 1 Plan and provide a balanced, practical experience that incorporates the acquisition, consolidation and application of knowledge and skills, with opportunities to use and extend thinking and reasoning.
- 2 Model ways to explore mathematics. Look for patterns, rules and properties. Direct pupils' learning by providing examples that enable them to identify appropriate methods and understand rules and ideas.
- 3 Give pupils the opportunity to consolidate their learning, with frequent and regular periods of practice that are short, sharp and focused.
- 4 Ensure that pupils recognise how their learning builds on previous learning and help them to see connections. Ensure that they feel appropriately supported and challenged by the work they are given.
- 5 Engage with pupils' thinking. Give them sufficient time for discussion and time to think about their ideas and methods by prompting and by asking probing questions.
- 6 Demonstrate the correct use of mathematical vocabulary and the interpretation and use of symbols, images, diagrams and models as tools to support pupils' mathematical thinking and communication.
- 7 Share the excitement of mathematics, capturing pupils' imagination by teaching creatively and with enthusiasm.

Structure of Teacher's Book

Objectives: The objectives from the Syllabus covered by a particular unit.

Vocabulary: The key words to use and develop with pupils. List these on the wall or board for the pupils to read.

Lessons: The focus for each lesson. Share this with your pupils at the start of each lesson.

Oral and mental starters: Suggested starter activities for the first 5 minutes of each lesson (see below).

Resources: Practical resource suggestions to help support the teaching and learning of this unit.

Prior learning: The step before this unit of work. Use this as a basis for some questions at the start of the unit to assess the pupils' prior knowledge and understanding.

Background notes: Linking theory with practice, this briefly outlines some common difficulties and misconceptions for this unit of work and gives key teaching points.

Supporting the topic: Lists suggestions for using and applying the mathematics in real-life situations.

End of unit evaluation: Learning outcomes for this unit of work, with key area of assessment linked to the objectives.

This unit overview is followed by lesson notes containing practical activities and references to the pupil's book.

Oral and mental starters

These are suggestions for whole class mental maths activities for the first 5 or 10 minutes of each lesson. They are interactive and lively oral activities, with questions, games and practical activities that actively involve the pupils. They enable pupils to become confident and agile with mental calculation and number, as well as consolidating work done on shape, measures and handling data. The starters have a number of purposes.

- They can prepare the pupils for the unit of work ahead, rehearsing and sharpening skills. For example, for a unit on fractions of amounts you may plan mental starters on division facts to support their understanding.
- They can be used as a method of 'keeping sharp' the skills and concepts introduced in previous units. For example, an oral starter on names and properties of 2D shapes, 4 weeks after teaching shape, will remind pupils of that teaching and consolidate their learning.
- They reinforce the importance of the language of mathematics, with regular re-visiting of vocabulary.
- They allow you to quickly assess pupils' knowledge and understanding of an area you intend to teach in the main part of the lesson. For example, before teaching subtraction of 2-digit numbers, you could ask oral questions on adding tens to check pupils' understanding.

Basic resources such as number cards, counters and number lines are important. Once you have used some of the activities, refine and develop them and plan your own starters to support your teaching.

Hands up (reading and writing numbers to 99 999): Write a set of appropriate numbers on the board, e.g. 71 903, 6450, 9710, 5678, 8038, 20 555, 90 000. Ask a pupil to come out and point to a given number. Ask the class to raise their hands if they agree. Repeat using other given numbers and pupils.

Hold up (reading and writing numbers to 99 999): Ask each pupil to write a given number, and then hold it up for you to see. Repeat with other numbers.

What's the order? (ordering numbers to 99 999): Write a set of numbers in random order on the board. Explain that pupils have to put the numbers in order, starting with the smallest number. Write the numbers out in the order suggested. Ask, 'Is this correct?' Alter the order, if necessary.

Start here: Ask the class to count on from different starting numbers, e.g. start at 61 487 and count to 61 509. Develop to include counting back to the starting number.

Steps: Ask the class to count on from a given starting number in 4s and then back. Use different steps as appropriate, e.g. 3s, 9s, 10s, 50s, 100s, 1000s.

Arrows away (place value to 99 999): Show an appropriate number, using arrow cards, e.g. 43 578. 'What is this number? What does the 4 mean?' (40 thousands) Show the bottom card to reveal 40 000 and then replace. 'What does the 3 mean?' (3 thousands) Show the card to reveal 3000 and then replace. Repeat with the other digits.

Flash facts (addition, subtraction and multiplication facts): Ask number fact questions (e.g. $15 + 4$, $17 - 6$, 2×7 , $27 \div 3$) for pupils to answer together or by holding up a number card when you give a signal, e.g. a clap. Pause before your signal, and then reduce the time as confidence increases.

Pairs for sums: Give an appropriate number, e.g. 73. Pupils choose two numbers that have that total when added together. They could write two numbers and hold them up, or give individual answers orally.

Product pairs: As 'Pairs for sums' but pupils show two numbers that make the given number when multiplied.

My way (calculating mentally): Write a calculation on the board for pupils to work out mentally, e.g. $46 + 25$, $158 - 26$, 50×5 , $100 \div 20$. After a moment, ask for the answer, and then ask volunteers to explain how they worked it out. Record the method on the board as each explanation is given, e.g. for $46 + 25$, 'I added 46 and 20, which is 66' (record $46 + 20 = 66$), then I added 5 to give 71' (record $66 + 5 = 71$).

Name it (identifying shapes from descriptions): Describe a shape to the class, using mathematical properties (but don't show the shape), e.g. 'This shape has 3 faces. Two of its faces are circles. It can roll. What is the name of the shape?'

Double it: Give a few numbers for the class to double and respond together. Then call a name and give a number for the named pupil to double. Repeat several times with a few numbers for the class, and then one for the named pupil.

Halve it: Give even numbers for pupils to halve, as a whole class, or individually, or a mixture of both.

Quarter it: Give multiples of 4 for pupils to quarter, as a whole class, or individually.

Tell me a story: Write a calculation on the board, e.g. $125 - 8 = 117$, $140 + 28 = 168$, $15 \times 6 = 90$, $36 \div 4 = 9$. Ask pupils to make up a 'number story' in which the calculation is used. Invite a few pupils to tell their stories.

What's the question? Provide an appropriate number, e.g. 24. Say, 'The answer is 24. What's the question?' Pupils give number statements that have 24 as the answer, e.g. 6×4 , 12×2 , $26 - 2$, $\frac{1}{2}$ of 48, $1000 - 976$ etc. Record each on the board. Aim to collect as many suggestions as possible within a time limit.

Language (understanding mathematical vocabulary): Give instructions or ask questions using the mathematical vocabulary being developed such as: multiply, multiple, product, divide, plus, total, sum, subtract, difference, approximate, estimate, round up/down, equivalent fraction, simplest form, like fractions, area, perimeter, polygon, line, ray, segment, likely, unlikely, even chance, e.g. 'Multiply 3 by 5. What is the difference between 16 and 36? What is the name of a polygon with 5 sides? Which of these is a ray? Which is a segment?'

In time: Set the teaching clock to a time. Ask pupils to give the time in both analogue and digital form (e.g. twenty-five past 10, 10:25). Ask, 'What time is half/quarter of an hour later? What time will it be in 2 hours?'

Pupil's Book 3A

Block A Numbers and addition

Maths Topic	National Standards from Government Guidelines	
Unit	Curriculum area	End of year objectives / success criteria
1 Numbers to 9999	Understanding numbers, methods of displaying them and the relations between them	<ul style="list-style-type: none"> ● Identify 1000 and its multiples. ● Name place value of digits of numbers to 9999. ● Determine the value of a digit in a given number. ● Read and write any figure up to 9999. ● Read any 4-digit number on an abacus. ● Display any 4-digit number on a drawn abacus. ● Compare 4-digit numbers and order.
2 5-digit numbers	Understanding numbers, methods of displaying them and the relations between them	<ul style="list-style-type: none"> ● Identify 10 000 and its multiples. ● Name place value of digits of numbers to 99 999. ● Determine the value of a digit in a given number. ● Read and write any figure up to 99 999. ● Read any 5-digit number on an abacus. ● Display any 5-digit number on a drawn abacus. ● Compare 5-digit numbers and order.
3 Addition	<p>Understanding Numerical Operations and the relations between them</p> <p>Calculate skilfully and make reasonable assessments</p> <p>Use of symbols and shapes to display simple mathematical situations</p>	<ul style="list-style-type: none"> ● Add two or more 4-digit numbers and then 5-digit numbers, with or without renaming. ● Choose the basic operation needed to solve a mathematical or everyday problem (word problems). ● Use different and suitable methods for addition of numbers, like Mental Math or written methods. ● Use approximation to check answers. ● Use a calculator to check answers. ● Identify examples showing the properties of addition without explicitly naming them. (At first, do not exceed 4-digit numbers, and then 5-digit numbers).
4 Assess and review	Revision and assessment of Units 1, 2 and 3: problems, formative and summative assessment. Monitor, assess, evaluate and consolidate pupils' knowledge and understanding.	

During this block of work, pupils will experience:

- 1 Reading and writing numbers to 9999 then 99 999
- 2 Reading and displaying 4-digit then 5-digit numbers on an abacus
- 3 Understanding place value in numbers to 9999 then 99 999
- 4 Comparing and ordering numbers to 9999 then 99 999
- 5 Rounding 3-, 4- and 5-digit numbers to the nearest 10 and the nearest 100
- 6 Adding two 3-, 4- or 5- digit numbers without renaming
- 7 Adding two numbers with renaming
- 8 Adding three numbers
- 9 Solving word problems involving addition of 4-digit numbers

Unit 1 Numbers to 9999

<p>Term 1 Block A Numbers and addition Unit 1 Numbers to 9999 Unit 2 5-digit numbers Unit 3 Addition Unit 4 Assess and review</p>	<p>Objectives <i>At the end of the unit, students should be able to...</i></p> <ul style="list-style-type: none">● Identify 1000 and its multiples.● Name the place value of the digits of a number up to 9999.● Determine the value of a digit in a given number up to 9999.● Read and write any figure up to 9999.● Read any 4-digit number using (displayed on) an abacus.● Display any 4-digit number on a drawn abacus.● Compare between 4-digit numbers and arrange (order) them.
<p>Vocabulary names for numbers to 9999, thousands, hundreds, tens, units, digits, place value, abacus, compare, order, less than, greater than</p>	<p>Lesson</p> <ol style="list-style-type: none">1 Thousands, hundreds, tens and units2 Reading and writing numbers3 Using an abacus4 Comparing numbers5 Putting numbers in order
<p>Oral and mental starters Hands up What's the order? Arrows away Start here Hold up</p>	<p>Resources Abacus Arrow cards to 9999 <i>Pupil's Book pages 4–13</i></p>
<p>Prior learning Counting, reading, writing and ordering numbers to 999; counting in tens to 100 and 100s to 900; understanding place value in 3-digit numbers</p>	<p>Background notes This unit revises and develops learning undertaken in Grade 2 to understand numbers to 9999. The concept of place value can be very difficult for some pupils to grasp. It needs careful teaching with much reinforcement to ensure that all pupils are confident in their understanding in order to avoid errors in calculation. The use of materials such as an abacus and arrow cards is very helpful in the development of this concept.</p>
<p>End of unit evaluation Check that the pupils are able to:</p> <ol style="list-style-type: none">1 Read and write numbers to 9999.2 Know the value of each digit in a 4-digit number.3 Compare and order numbers to 9999.	<p>Supporting the topic Discuss situations in everyday life in which 4-digit numbers are used, e.g. prices to \$ 9999, distances between Cairo and other capital cities, population of towns etc.</p>

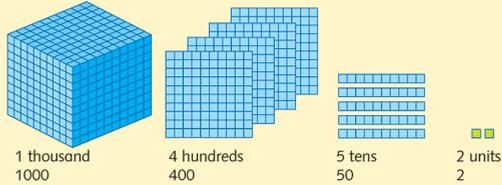
Lesson 1 Thousands, hundreds, tens and units

Pupil's Book pages 4 and 5 Oral and mental starter: Hands up (numbers to 999)

Unit 1 Numbers to 9999

Thousands, hundreds, tens and units

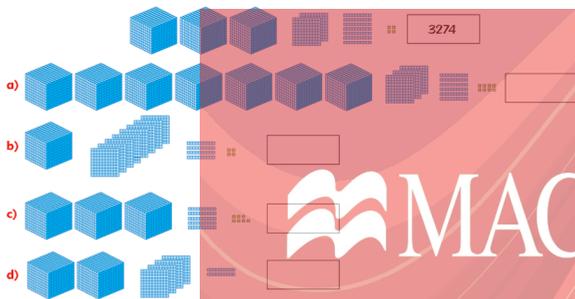
These show thousands, hundreds, tens and units.



$$1452 = 1000 + 400 + 50 + 2$$

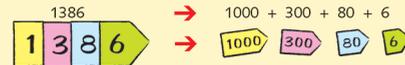


1 Write the numbers shown on each mat.



2 Write the number shown by each arrow card.

Example



- a)
- b)
- c)
- d)
- e)
- f)
- g)
- h)

3 Draw a line to join the matching numbers and words.

- | | |
|--|------|
| three thousand, three hundred and thirty-three | 2202 |
| two thousand, two hundred and two | 300 |
| three thousand | 2012 |
| two thousand and twelve | 2020 |
| three hundred | 3333 |
| two thousand and twenty | 3000 |

Try this

Write the number that is 1 more than each of these. The first has been done for you.

- a) 9099 b) 9909 c) 9009
- d) 9990 e) 9999

Activities

- Hold up an abacus showing 985. Ask the class to 'read' the number, and then to count from 985 to 999 as you move beads. What comes after 999? How can we show 1000 on the abacus? Take suggestions. Remove all beads from the spikes and place one bead onto the thousands spike. Ask, 'What will the next two numbers be?'
- Write 1000, 1001, 1002 on the board. Ask the class to continue the count to 1020 as you record the numbers on the board.
- Use the introduction on page 4 to show how the place value blocks and arrow cards reflect the number.
- Show 368, using arrow cards. Ask the class to 'read' it. Place a 2000 card behind the other cards. 'What is the number now? What does the 3 mean? What is the value of the 6? How many thousands

are there?' Repeat for other 3-digit numbers and a thousands card.

- At the end of the lesson ask the class to count in 10s to 100, in 100s to 1000, in 1000s to 9000.

Answers

- 1 a) 7368 b) 1844 c) 3057 d) 2420
2 a) 8723 b) 6970 c) 3589 d) 9254
e) 7418 f) 1379 g) 2045 h) 8862

- 3 three thousand, three hundred and thirty-three → 3333
two thousand, two hundred and two → 2202
three thousand → 3000
two thousand and twelve → 2012
three hundred → 300
two thousand and twenty → 2020

Try this

- a) 9100 b) 9910 c) 9010 d) 9991 e) 10000

Lesson 2 Reading and writing numbers

Pupil's Book pages 6 and 7 Oral and mental starter: What's the order? (to 999)

Reading and writing numbers

Example 1
 $4163 = 4000 + 100 + 60 + 3$

Th	H	T	U
4	1	6	3

The 4 stands for 4000
 The 1 stands for 100
 The 6 stands for 60
 The 3 stands for 3

4163

4163 is read as four thousand, one hundred and sixty-three

Example 2
 $2756 = 2000 + 700 + 50 + 6$

Th	H	T	U
2	7	5	6

The 2 stands for 2000
 The 7 stands for 700
 The 5 stands for 50
 The 6 stands for 6

2756

2756 is read as two thousand, seven hundred and fifty-six

1 Read these. Write each as a number.

a) three thousand, nine hundred and twenty-five

b) nine thousand, four hundred and seventy-nine

c) two thousand, eight hundred and thirty-four

d) seven thousand, five hundred and sixty-one

e) four thousand, two hundred and sixteen

f) one thousand, three hundred and ninety-seven

2 Write each of these numbers as words.

a) 7854 _____

b) 1533 _____

c) 4981 _____

d) 6225 _____

e) 3198 _____

f) 5002 _____

3 Look at each number. Circle the digit that matches the value.

a) 7393 three hundred

b) 9929 nine thousand c) 3202 two hundred

d) 7880 eighty e) 5557 five hundred

f) 2020 2 thousand g) 1166 sixty

4 Write the value of the red digit in words.

Example
 7458 → seven thousand
 1326 → three hundred
 4092 → ninety
 6185 → five

a) 2970 _____

b) 8361 _____

c) 5495 _____

d) 1832 _____

e) 7604 _____

f) 4217 _____

g) 9583 _____

h) 6055 _____

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Activities

- Look at page 6 and go through the introduction with the class. Relate how the way in which the number is written in words reflects the value of each digit as shown at the beginning of each example.
- Write some 4-digit numbers on the board and ask pupils to read them together, e.g. 8493, 2507, 7036, 1510. Each time ask for the value of each digit in random order.
- Say a few 4-digit numbers and ask different pupils to record them in numerals on the board, e.g. 3714, 6904, 2085, 1002. Ask the class to raise their hands if they agree. Take each number in turn and ask, 'How many thousands are there? How many hundreds? How many tens? How many units?' Write each number in words below or alongside the number in figures.
- At the end of the lesson ask the class to count in tens to 100, in 100s to 1000 then in 1000s to 9000.

Answers

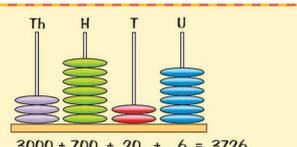
- 1 a) 3925 b) 9479 c) 2834
 d) 7561 e) 4216 f) 1397
- 2 a) seven thousand, eight hundred and fifty-four
 b) one thousand, five hundred and thirty-three
 c) four thousand, nine hundred and eighty-one
 d) six thousand, two hundred and twenty-five
 e) three thousand, one hundred and ninety-eight
 f) five thousand and two
- 3 a) 9929 b) 3202 c) 7880
 d) 5557 e) 2020 f) 1166
- 4 a) two thousand b) three hundred c) ninety
 d) eight hundred e) four f) ten
 g) nine thousand h) five

Lesson 3 Using an abacus

Pupil's Book pages 8 and 9 Oral and mental starter: Arrows away

Using an abacus

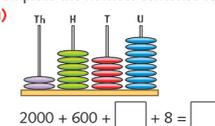
This abacus shows the number 3726.



$3000 + 700 + 20 + 6 = 3726$

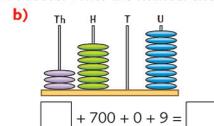
1 Complete the number sentence for each abacus. Write the number shown.

a)



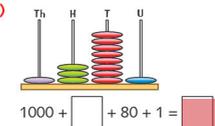
$2000 + 600 + \square + 8 = \square$

b)



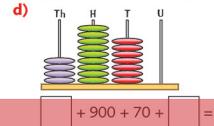
$\square + 700 + 0 + 9 = \square$

c)



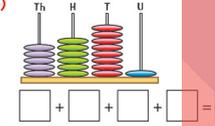
$1000 + \square + 80 + 1 = \square$

d)



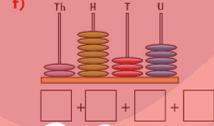
$\square + 900 + 70 + \square = \square$

e)



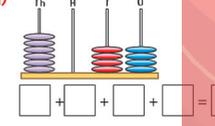
$\square + \square + \square + \square = \square$

f)



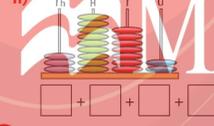
$\square + \square + \square + \square = \square$

g)



$\square + \square + \square + \square = \square$

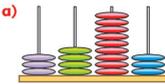
h)



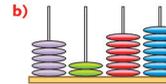
$\square + \square + \square + \square = \square$

2 Write the number shown on each abacus.

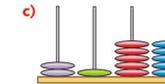
a)



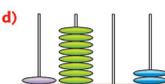
b)



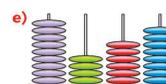
c)



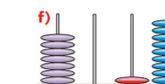
d)



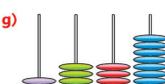
e)



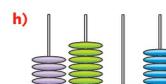
f)



g)

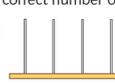


h)

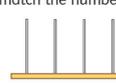


3 Draw the correct number of beads on each abacus to match the number.

a) 1426



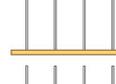
b) 3351



c) 6240



d) 5307



e) 1022



f) 3450



Which different numbers can you make on this abacus with 4 beads?

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Activities

- Ask the class to count in hundreds as you place one bead at a time on the hundreds spike on an abacus. 'What happens when we reach 900? How can we show 100 more than 900?' Demonstrate replacing the nine hundred beads with one thousand bead. Emphasise that 10×100 is 1000.
- Show a few 4-digit numbers on the abacus, ask the class to read them, then indicate particular spikes and ask for the number represented by the beads on them.
- Look at page 8 and go through the introduction with the class.
- At the end of the lesson ask pupils who did 'Try this' to write one of their numbers on the board until all possible numbers have been recorded. Each time ask the class to read the number together.

Answers

1 a) $2000 + 600 + 50 + 8 = 2658$
 b) $3000 + 700 + 0 + 9 = 3709$
 c) $1000 + 300 + 80 + 1 = 1381$
 d) $4000 + 900 + 70 + 0 = 4970$
 e) $5000 + 600 + 80 + 1 = 5681$
 f) $2000 + 700 + 30 + 5 = 2735$
 g) $6000 + 0 + 40 + 4 = 6044$
 h) $3000 + 900 + 70 + 2 = 3972$

2 a) 3493 b) 5267 c) 2155 d) 1802
 e) 9468 f) 7019 g) 1337 h) 4605

3 Check that beads on each abacus match numbers.

Try this
 4, 13, 112, 1111, 40, 400, 4000, 130, 1300, 1120, 121, 1210, 211, 2110, 31, 310, 3100, 3010, 1201, 1102, 2101, 1030, 1003, 3001, 22, 220, 2200, 202, 2002, 2020

11

Lesson 5 Putting numbers in order

Pupil's Book pages 12 and 13 Oral and mental starter: Hold up

Putting numbers in order

When you put numbers in order, write them under each other. This makes it easier. Make sure you line up the units.

Put these numbers in order.

981 985 962 1039 1055

Compare the thousands, then the hundreds, then the tens and then the units.

962 981 985 1039 1055

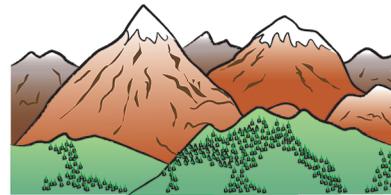
1 Write the numbers in each group in order. Start with the smallest number.

- a)
 b)
 c)
 d)

2 Write each set of numbers in order. Start with the largest number.

- a)
 b)
 c)
 d)

3 These are the heights of some mountains. The list is in alphabetical order. Write the mountains in order of height. Start with the highest mountain.



Mountain	Height
Aconcagua	6960 m
Chappal Waddi	2409 m
Cook	3766 m
Everest	8848 m
K2	8611 m
Kilimanjaro	5893 m
Lenin Peak	7134 m
McKinley	6914 m

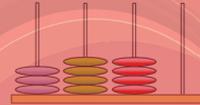
Assessment

Look at these numbers.

3482 3502 3414 3440 3424

1 Which number is three thousand, four hundred and fourteen?

2 Which number does this abacus show?



3 Which number is $3000 + 400 + 80 + 2$?

4 Write the missing number? $3490 < \text{ } < \text{ }$

MACMILLAN EDUCATION

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Activities

- Draw columns headed Th, H, T and U on the board. Ask a volunteer to give a 3-digit number and say in which columns the digits should be placed. Record the number in the appropriate columns. Ask another volunteer to give a larger number and repeat recording the number below the previous number in the columns. Continue until there are six numbers in order, the last three being 4-digit numbers.
- Repeat the previous activity, starting with a large 4-digit number, asking for smaller numbers each time and ending with three 3-digit numbers.
- Look at page 12 and go through the introduction with the class. Stress that in questions 2 and 3 the numbers should be placed in order, starting with the highest and ending with the lowest.

Answers

- 1 a) 1101, 1102, 1201, 1211 b) 3955, 3956, 3965, 3966
 c) 4780, 4783, 4786, 4789 d) 7927, 7934, 7947, 7973
- 2 a) 2473, 1829, 1817, 1568, 620
 b) 8220, 3602, 3000, 2856, 2374
 c) 9391, 9011, 1103, 930, 319
 d) 6544, 5674, 4765, 4756, 567

3

Mountain	Height
Everest	8848 m
K2	8611 m
Lenin Peak	7134 m
Aconcagua	6960 m

Mountain	Height
McKinley	6914 m
Kilimanjaro	5893 m
Cook	3766 m
Chapal Waddi	2409 m

Assessment

- 1 3414 2 3440 3 3482 4 3502