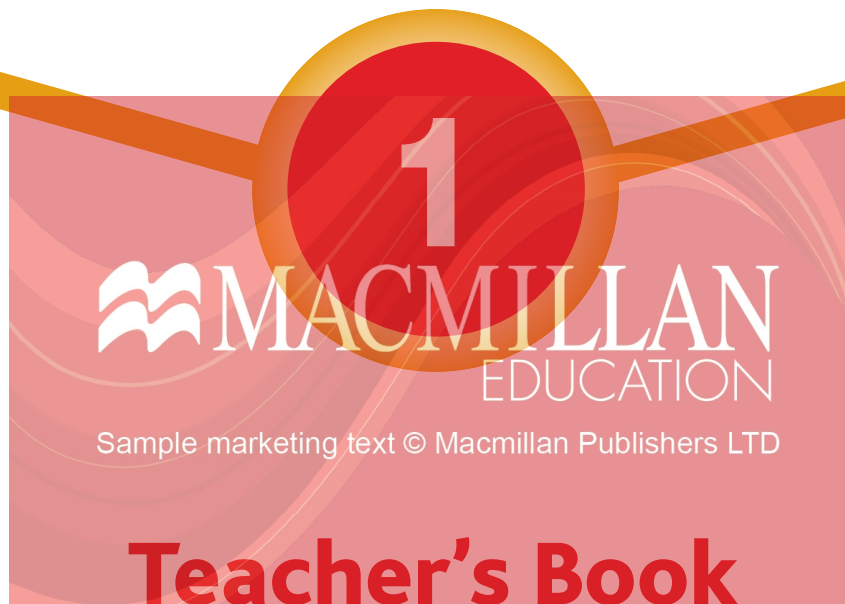


Macmillan Mathematics



Paul Broadbent & Mary Ruddle



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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 areas 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 algebra, 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.

Boys and girls (sorting): Ask about eight pupils out to the front. Ask the class to suggest a way of putting them into two groups, and then the pupils at the front organise themselves accordingly. Ask for another way in which to sort the pupils so that the pupils at the front rearrange themselves into new groups.

Sort them out: Repeat 'Boys and girls' using a variety of criteria for sorting then discuss the groups, e.g. 'Which is the largest/smallest group?' 'How many more in the largest group?'

Point and count: Make a number of marks on the board, (the number appropriate to the stage in learning). Point to each mark in turn as the class counts them together. Repeat, asking different pupils to do the pointing.

Hide it (one-to-one correspondence): Ask five pupils each to bring a book to the front. Ask them to face the class with the books behind their backs. Ask the class, 'How many pupils? How many books?'

One each (one-to-one correspondence): Ask a small number of pupils to come to the front. Ask another pupil to bring enough objects so that he or she can give one to each. Repeat with different pupils and objects.

Hands up (reading and writing numbers): Write numbers on the board, e.g. 1, 2, 3, 4, 5. 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.

Hold up (reading and writing numbers): Ask pupils to write a given number and hold it up for you to see.

Fingers and thumbs (conservation of number): Ask pupils to hold up three fingers (thumbs can be included). Ask them to hold up three different fingers and then another three fingers. Repeat with other numbers.

One more (conservation of number): Ask a pupil to stand at the front. Ask the class, 'How many pupils?' Ask another pupil to the front. 'How many pupils now?' Encourage pupils to answer without counting. Repeat, asking one more pupil out each time, emphasising that there is no need to count the new group because the previous group number was known, they just need to add 1 more.

Zero!: Ask pupils to count from zero to an appropriate number and then count back, clapping with each number.

What's the order?: 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. Ask the class to suggest which should come first, second etc. Write the numbers out in the order suggested. Ask, 'Is this correct?' Alter, if necessary.

Start here: As a class, count on from different starting numbers, e.g. start at 3 and count to 9. Develop to include counting back to the starting number.

Steps: As a class, count on from a given starting number in steps of 2 and then back. Use other steps, e.g. 5, 10.

Arrows away: Show an appropriate 2-digit number using two arrow cards, e.g. 35. Ask, 'What is this number? What does the 3 mean?' (thirty or 3 tens). Move the top arrow card to reveal 30 on the card beneath. Replace the top card. 'What is the value of the 5?' (5 ones or units). Repeat with other 2-digit numbers.

Halves: Ask an even number of pupils to come out to the front. Ask them to form two groups. Ask 'Is this group half of the pupils? How do you know?' Ask the pupils at the front to make two equal groups if they were unequal.

Quarters: Ask 8 or 12 pupils to come out to the front. Repeat 'Halves' above for four groups.

Hidden fingers (addition/subtraction facts for 5 or 10): Hold up one or two hands, palms facing you. Ask pupils, 'How many fingers (including thumbs) can you see?' Hide a number of fingers by bending them down towards you. 'How many can you see now? How many can't you see?' Repeat, hiding different numbers of fingers.

Flash facts (addition and subtraction facts): Ask questions such as $2 + 2$, $5 + 3$, $6 - 2$, $9 - 4$ for pupils to answer by holding up a number card when you give a signal, e.g. a clap. Develop to additions and subtractions within 20.

Pairs for sums (addition facts): Give an appropriate number. Pupils choose two numbers which have that total when added together. They could use number cards and hold them up or write two numbers and hold them up.

My way (adding and subtracting 2-digit numbers mentally): Write a 2-digit addition or subtraction on the board for pupils to work out mentally. Ask volunteers to explain their method. Record their method on the board, e.g. for $26 + 12$, 'I added 26 and 10 which is 36.' (Record $26 + 10 = 36$) 'Then I counted on 2 more to 38.' (Record $36 + 2 = 38$)

Name it: Describe a shape to the class using mathematical properties, e.g. 'This shape has three faces. Two of its faces are circles. It can roll. What is the name of the shape?'

Pupil's Book 1A

Block A Sorting and counting to 9

Maths Topic	National Standards from Government Guidelines	
Unit	Curriculum area	End of year objectives / success criteria
1 Sets and counting	Numbers and numerical operations Algebra, relations and functions	<ul style="list-style-type: none"> ● Identify and describe a set. ● Classify things into sets according to certain criteria. ● Compare between two sets of things by matching the elements of both sets. ● Comprehend that a number is an expression of the quantity of things contained in a set. ● Count fluently and comprehensively. ● Identify the number of things in small groups up to 9.
2 Numbers to 9	Numbers and numerical operations	<ul style="list-style-type: none"> ● Comprehend that a number is an expression of the quantity of things contained in a set. ● Relate between what a number represents, its figure and its name and use this to deal with simple everyday situations. ● Arrange a group of numbers and display (represent) them on a number line. ● Recognise the numerical order of numbers.
3 Comparing and ordering	Numbers and numerical operations Algebra, relations and functions	<ul style="list-style-type: none"> ● Recognise the concept of zero. ● Identify the empty set without explicitly naming it. ● Arrange a group of numbers and display (represent) them on a number line. ● Recognise the numerical order of numbers. ● Identify the number of things in small groups up to 9. ● Relate between what a number represents, its figure and its name and use this to deal with simple everyday situations.
4 Assess and review	Activities to monitor, assess, evaluate and consolidate pupils' knowledge and understanding.	

During this block of work, pupils will experience:

- 1 Sorting up to 9 objects from a collection
- 2 Counting up to 9 objects and matching to a numeral
- 3 Reading numbers to 9
- 4 Writing numbers to 9
- 5 Recognising zero as an empty set
- 6 Ordering numbers 0 to 9

Unit 1 Sets and counting

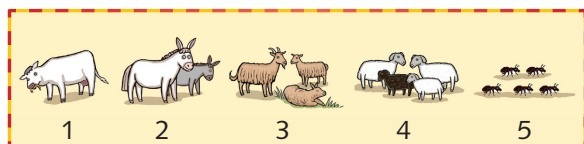
<p>Term 1 Block A Sorting and counting to 9 Unit 1 Sets and counting Unit 2 Numbers to 9 Unit 3 Comparing and ordering Unit 4 Assess and review</p>	<p>Objectives <i>At the end of the unit, students should be able to...</i></p> <ul style="list-style-type: none"> ● Identify and describe a set. ● Classify things into sets according to certain criteria. ● Compare between two sets of things by matching the elements of both sets. ● Comprehend that a number is an expression of the quantity of things contained in a set. ● Count fluently and comprehensively. ● Identify the number of things in small groups up to 9.
<p>Vocabulary one, two, three, four, five, number, next, altogether, count, how many?, sort, group, match, set</p>	<p>Lessons</p> <ol style="list-style-type: none"> 1 Sorting and counting to 5 2 Sorting and re-sorting 3 Matching 4 Numbers to 3 5 Numbers 4 and 5
<p>Oral and mental starters Boys and girls (sorting) Point and count Hold up Fingers and thumbs</p>	<p>Resources It would be useful to have a display table with small containers such as boxes, bowls, saucers etc., each with a set of objects for pupils to count, e.g. 3 cubes, 2 buttons, 1 ball, 4 counters, 5 small toys. Have a card for each number (1–5) so that individual pupils can come out, count the objects and place the appropriate card with each set. A large number line on the wall numbered 1–5 in numerals and words, and pictures illustrating the numbers would be helpful. Counting materials for each child, such as counters, cubes, buttons etc. <i>Pupil's Book pages 4–13</i></p>
<p>Prior learning Some pupils will have experienced counting and sorting in everyday activities at home, but this cannot be assumed for all pupils.</p>	<p>Background notes Practical experience of sorting objects into two sets and then comparing the size of the two collections by counting will help pupils to understand the concepts involved in this unit. Young pupils can often recite numbers in order without understanding how those numbers relate to a set of objects. They need to understand that:</p> <ul style="list-style-type: none"> ● the reason for counting is to find the exact number of objects; ● each number in a count relates to one object in a set; ● each object in the set must be included in the count; ● the last number in the count represents the total number of objects.
<p>End of unit evaluation Check that the pupils are able to:</p> <ol style="list-style-type: none"> 1 Sort objects from a collection and match to numerals. 2 Read numbers to 5. 3 Write the numbers 1 to 5 on the board or in their exercise book. 	<p>Supporting the topic Explain that the pupils will be learning how to count and recognise and write numbers to 5. Use every opportunity to count small numbers of things together in the classroom, such as pupils in a small group, objects from the display table, pictures, windows etc. Discuss situations in everyday life when things need to be counted, e.g. the number of plates needed for a family at mealtimes.</p>

Lesson 1 Sorting and counting to 5

Pupil's Book pages 4 and 5 Oral and mental starter: Boys and girls (sorting)

Unit 1 Sets and counting

Sorting and counting to 5



- 1 Sort the animals into groups.
Count the different animals.



4

5

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Activities

- Talk about the main picture on pages 4 and 5. Ask 'What animals can you see? How many legs does a donkey have?'
- Look at the pictures at the top of page 4. Explain that these animals have been sorted into groups. Ask, 'How many goats are there? How many ants?'
- Check that pupils are counting correctly. If necessary, demonstrate by drawing a number of objects on the board (one, two, three, four, or five) and then touch each one in turn as you count. Repeat with different drawings, asking individuals to come out and count the objects.
- Ask, 'Which group has two animals in it? Which group has four? Which has one?' etc. and record these on the board. Say the numbers together.
- Focus on the main picture together again. Explain that there are other ways in which the animals could be sorted. Ask pupils to suggest another way, and then count the number in that group.
- Explain that one animal can be part of several groups: it may be a cow, a white animal and an animal eating. The animals can be sorted by size. Explain that some animals look different but are the same type.

Answers

1 4 sheep, 3 goats, 4 mice, 5 ants, 5 butterflies, 3 donkeys, 1 cow,
1 dog, 3 egrets, 2 chickens

Try this


- 2 animals are sleeping
- 4 animals are in the shelter

Lesson 2 Sorting and re-sorting


Pupil's Book pages 6 and 7 Oral and mental starter: Point and count

Sorting and re-sorting


These toys have been sorted.




The toys have been sorted in a different way.



1 Sort these in different ways. Count the number in each set.

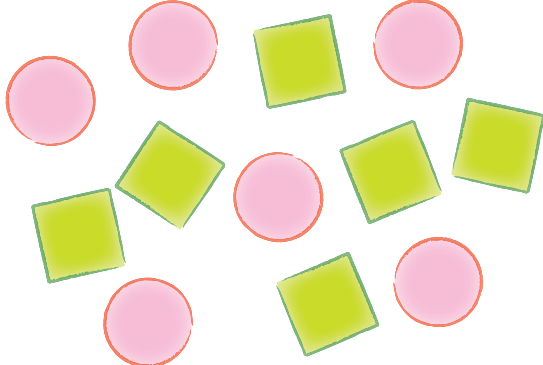


☐ forks ☐ red things



☐ small things ☐ knives

2 Sort these shapes.



Draw them in two sets.

Activities

- Talk about the balls and bricks at the top of page 6. If possible, provide some balls (or circles) and bricks (or squares) of different colours and sizes to demonstrate sorting to the class and model in different ways.
- Count the balls and the bricks. Write the numbers on the board and compare the amounts. Ask which set has more objects and which has fewer. Check that pupils understand this, using other examples as necessary.
- Ask pupils to sort the objects in different ways by colour and size. Once again, record the numbers and compare the sets.
- Talk about the sets of knives and forks on page 6, discussing the different ways that these can be sorted. Then ask pupils to record the numbers to match.

Answers

1 a) 4 b) 2 c) 4 d) 4

2 Check the shapes have been sorted into squares and circles.

10

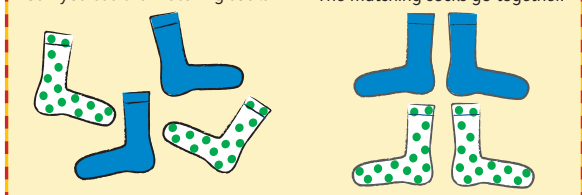
Lesson 3 Matching

Pupil's Book pages 8 and 9 Oral and mental starter: Hold up (numbers 1–3)

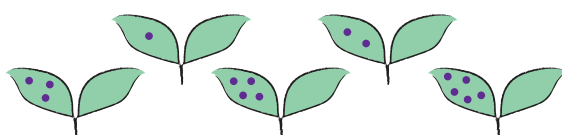
Matching

Can you see the matching socks?

The matching socks go together.



1 a) Draw spots to make matching pairs.



b) Join matching numbers of ants.



2 Draw lines to join the matching shoes.



3 Colour and join the matching socks.



Try this

Draw lines to match the items that go together.



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Activities

- Remind the class of the sorting from Lesson 2 to reinforce their understanding.
- Look at the picture of the socks and ask the class to match the pairs.
- Discuss how each pair of leaves can be made to match.
- Discuss the household items, asking pupils to identify each picture. Ask for one example of items that go together from the picture.
- Ask pupils to suggest things which would go together with items you say, e.g. 'What could go with a hairbrush? With a pillow? With a kennel? With a mop?'

Answers

- 1 a) Check that there are the same number of spots on both leaves.
b) Check that matching numbers of ants have been joined.
- 2 Check that matching shoes have been joined.
- 3 Check the socks are coloured in matching pairs.

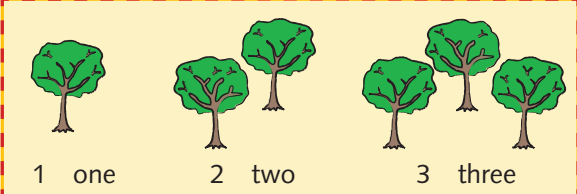
Try this

Lock and key, bat and ball, cup and saucer, spoon and ball, pen and paper, toothbrush and paste

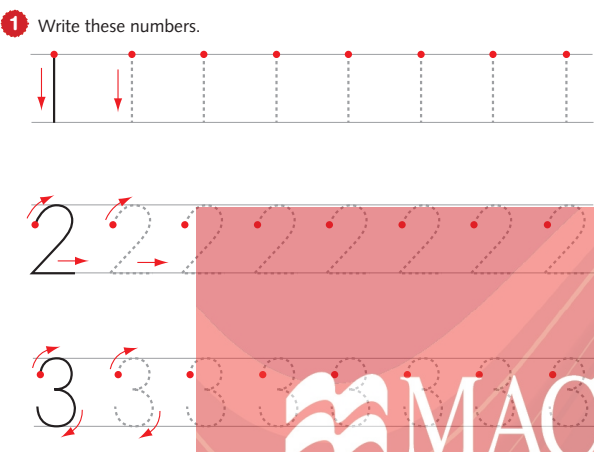
Lesson 4 Numbers to 3

Pupil's Book pages 10 and 11 Oral and mental starter: Hold-up (numbers 1–3)

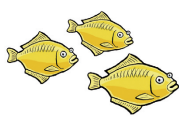
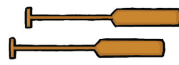

Numbers to 3



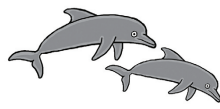


1 Write these numbers.




2 Count how many are in each group. Join the group to the correct number.

1
 2
 3

Try this
How many flowers are in each pot?



Activities

- Discuss the picture of the trees at the top of page 10. Point out that each number is shown as a word and as a numeral.
- Ask three pupils out to the front. Count them with the class. Ask one pupil to stand apart and then walk back to his chair. Count together the number remaining. Repeat the activity until only one pupil remains. Ask, 'How many pupils are left?'
- Ask the class to hold up one finger, one hand, etc.
- Talk about things that come in twos, such as arms, ears. Ask the class to hold up two thumbs, two hands, point to two eyes. Ask them to suggest other pairs they have, e.g. socks, shoes, feet etc.
- Draw three shapes on the board then count them with the class. Ask a pupil to come out and draw three more shapes. Repeat with a few more pupils.
- Ask the class to hold up three fingers, three objects, etc.
- Demonstrate writing 1, 2 and 3 on the board, stressing the starting point and the writing direction in each case. Ask the class to write 1, 2 and 3 'in the air' as you write them again on the board.
- Ask pupils to put their fingers on each dot on page 10, and then trace over the numerals, following the direction of the arrows. Repeat using pencils.

Answers

- 1 Check that the numbers have been written accurately.
- 2 Check that the numbers and matching numbers of objects have been joined.


Try this

- a) 1 b) 3 c) 2 d) 2 e) 1 f) 3

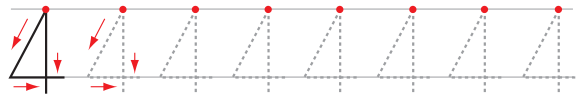
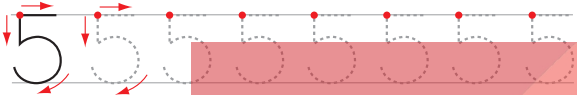
Lesson 5 Numbers 4 and 5

Pupil's Book pages 12 and 13 Oral and mental starter: Fingers and thumbs


Numbers 4 and 5



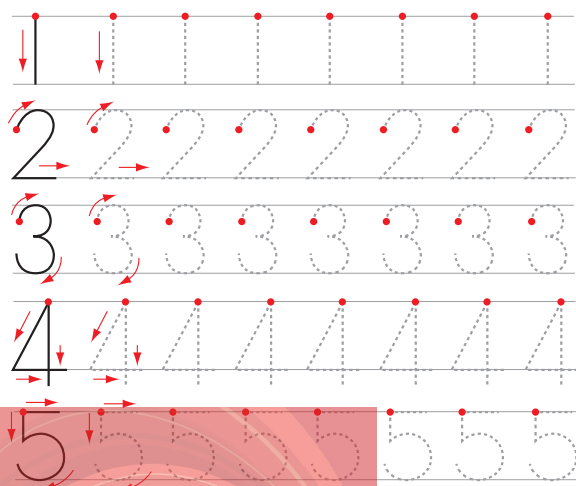
1 Write these numbers.

2 How many spots are on each box?

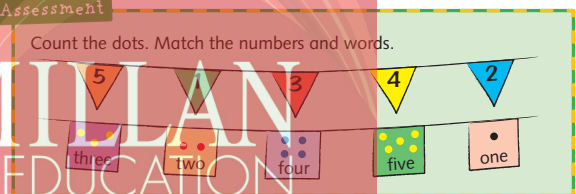


3 Practise writing these numbers.



Assessment

Count the dots. Match the numbers and words.



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Activities

- Discuss the balloons on page 12. Point out that each number is shown as a word and as a numeral.
 - Indicate numbers 1, 2, 3, 4 and 5 on the class number line as pupils say them together.
 - Ask a pupil to draw four rings on the board, another to draw four crosses, another four biscuits etc. Each time ask the class to count as the pupil points to his or her shapes in turn.
 - Ask pupils to name objects that illustrate 4, e.g. wheels on a car, corners on a square.
 - Write a large 4 on the board, emphasising starting points and direction. Ask the class to write 4 'in the air' as you write another 4 on the board.
 - Draw five crosses in a row on the board and count them together. 'What other patterns can be made with 5?' For example:
- X X X X

X

X X X

X X
- Write a large 5 on the board, emphasising starting points and direction. Ask the class to write 5 'in the air' as you write another 5 on the board.
 - Ask pupils to suggest examples of objects that illustrate 5, e.g. toes on one foot, points on a star.
 - Pupils who finish early could draw a picture to illustrate the number 4 or 5.
- Answers**
- 1 Check that the numbers have been written accurately.
 - 2 a) 4 b) 5 c) 5 d) 4 e) 4 f) 5
 - 3 Check that the numbers have been written accurately.
- Assessment**
- Check that the numbers and words have been joined correctly.