Numicon 3/NZ Year 4 Planning

The overviews and links in this document will help you to get the most out of your subscription to *Numicon Online NZ*.

You can follow *Numicon* as a complete teaching programme using the long-term plan provided here.

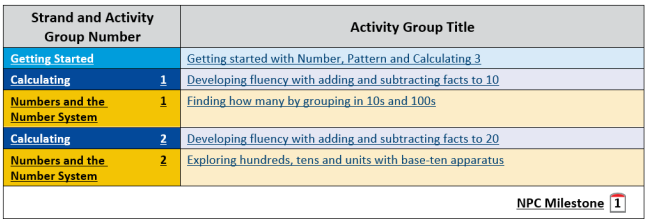
You can also access the rich bank of activities and resources to supplement your teaching. Pick a topic on the long-term plan, click on it for details and to open it in the online handbook.

Contents

Click on a link below to go straight there!

Long-term plan Page 2

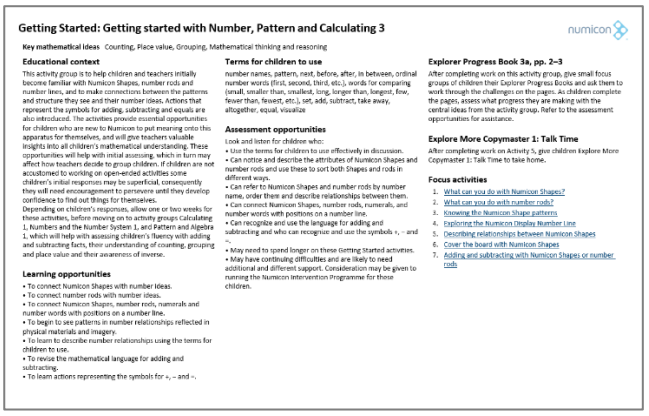
This long-term plan shows you the recommended order for teaching the Numicon 3/NZ Year 4 Activity Groups over the school year. It includes links to the overview information for each Activity Group and links to open those activities in the online handbooks. Milestone markers on the plan take you to the skills and understanding children need to be secure in to help them progress.



Strand and Activity Group Number		Activity Group Title
Getting Started		Getting started with Number, Pattern and Calculating 3
Calculating	1	Developing fluency with adding and subtracting facts to 10
Numbers and the Number System	1	Finding how many by grouping in 10s and 100s
Calculating	2	Developing fluency with adding and subtracting facts to 20
Numbers and the Number System	2	Exploring hundreds, tens and units with base-ten apparatus
		NPC Milestone 1

Details for each unit of learning Page 5

These are overviews for each Activity Group. They follow the order in the long-term plan and list every activity in the Activity Group. Log into your subscription to Numicon Online NZ first, then click on any activity to open it in the online handbook. When you're in the online handbook you can go to the Links tab and download the accompanying resources, including any Explorer Progress worksheets, photocopy masters or Explore More homework.



Getting Started: Getting started with Number, Pattern and Calculating 3

numicon

Key mathematical ideas Counting, Place value, Grouping, Mathematical thinking and reasoning

Educational context

This activity group is to help children and teachers initially become familiar with Numicon Shapes, number rods and number lines, and to make connections between the patterns and structure they see and their number ideas. Actions that represent the symbols for adding, subtracting and equals are also introduced. The activities provide essential opportunities for children who are new to Numicon to put meaning onto this apparatus for themselves, and will give teachers valuable insights into all children's mathematical understanding. These opportunities will help with initial assessing, which in turn may affect how teachers decide to group children. If children are not accustomed to working on open-ended activities some children's initial responses may be superficial, consequently they will need encouragement to persevere until they develop confidence to find out things for themselves.

Depending on children's responses, allow one or two weeks for these activities, before moving on to activity groups Calculating 1, Numbers and the Number System 1, and Pattern and Algebra 1, which will help with assessing children's fluency with adding and subtracting facts, their understanding of counting, grouping and place value and their awareness of inverse.

Learning opportunities

- To connect Numicon Shapes with number ideas.
- To connect number rods with number ideas.
- To connect Numicon Shapes, number rods, numerals and number words with positions on a number line.
- To begin to see patterns in number relationships reflected in physical materials and imagery.
- To learn to describe number relationships using the terms for children to use.
- To revise the mathematical language for adding and subtracting.
- To learn actions representing the symbols for +, – and =.

Terms for children to use

number names, pattern, next, before, after, in between, ordinal number words (first, second, third, etc.), words for comparing (small, smaller than, smallest, long, longer than, longest, few, fewer than, fewest, etc.), set, add, subtract, take away, altogether, equal, visualize

Assessment opportunities

Look and listen for children who:

- Use the terms for children to use effectively in discussion.
- Can notice and describe the attributes of Numicon Shapes and number rods and use these to sort both Shapes and rods in different ways.
- Can refer to Numicon Shapes and number rods by number name, order them and describe relationships between them.
- Can connect Numicon Shapes, number rods, numerals, and number words with positions on a number line.
- Can recognize and use the language for adding and subtracting and who can recognize and use the symbols +, – and =.
- May need to spend longer on these Getting Started activities.
- May have continuing difficulties and are likely to need additional and different support. Consideration may be given to running the Numicon Intervention Programme for these children.

Explorer Progress Book 3a, pp. 2–3

After completing work on this activity group, give small focus groups of children their Explorer Progress Books and ask them to work through the challenges on the pages. As children complete the pages, assess what progress they are making with the central ideas from the activity group. Refer to the assessment opportunities for assistance.

Explore More Copymaster 1: Talk Time

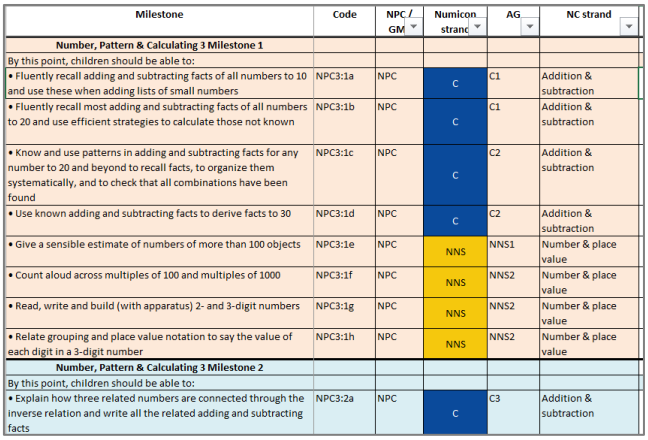
After completing work on Activity 5, give children Explore More Copymaster 1: Talk Time to take home.

Focus activities

1. What can you do with Numicon Shapes?
2. What can you do with number rods?
3. Knowing the Numicon Shape patterns
4. Exploring the Numicon Display Number Line
5. Describing relationships between Numicon Shapes
6. Cover the board with Numicon Shapes
7. Adding and subtracting with Numicon Shapes or number rods

Assessment support Page 45

Milestone statements help you assess progress throughout the year and inform your teaching and planning. They indicate the skills and understanding children need to be secure in as they progress through the teaching programme before they are able to successfully meet new ideas. This section includes a link to the set of question cards that can be used for assessment or self-assessment and to a tracking spreadsheet to help you record that information.



Milestone	Code	NPC / GM	Numicon strand	AG	NC strand
Number, Pattern & Calculating 3 Milestone 1					
By this point, children should be able to:					
• Fluently recall adding and subtracting facts of all numbers to 10 and use these when adding lists of small numbers	NPC3:1a	NPC	C	C1	Addition & subtraction
• Fluently recall most adding and subtracting facts of all numbers to 20 and use efficient strategies to calculate those not known	NPC3:1b	NPC	C	C1	Addition & subtraction
• Know and use patterns in adding and subtracting facts for any number to 20 and beyond to recall facts, to organize them systematically, and to check that all combinations have been found	NPC3:1c	NPC	C	C2	Addition & subtraction
• Use known adding and subtracting facts to derive facts to 30	NPC3:1d	NPC	C	C2	Addition & subtraction
• Give a sensible estimate of numbers of more than 100 objects	NPC3:1e	NPC	NNS	NNS1	Number & place value
• Count aloud across multiples of 100 and multiples of 1000	NPC3:1f	NPC	NNS	NNS2	Number & place value
• Read, write and build (with apparatus) 2- and 3-digit numbers	NPC3:1g	NPC	NNS	NNS2	Number & place value
• Relate grouping and place value notation to say the value of each digit in a 3-digit number	NPC3:1h	NPC	NNS	NNS2	Number & place value
Number, Pattern & Calculating 3 Milestone 2					
By this point, children should be able to:					
• Explain how three related numbers are connected through the inverse relation and write all the related adding and subtracting facts	NPC3:2a	NPC	C	C3	Addition & subtraction

Long-term plan for Numicon 3 (NZ Year 4)

There are two Numicon teaching handbooks for each year group – Number Pattern Calculating (NPC) and Geometry measurement and Statistics (GMS). Subscribers to *Numicon Online NZ* have access to a digital version of these. Print versions are also available (visit: www.edushop.nz). The units in these books are called Activity Groups. They contain a collection of activities you can use with your class.

This long-term plan shows you the recommended order for teaching the Activity Groups over the school year.
- Click on a heading in the **left** column to get all the information for that Activity Group.
- Click on an Activity Group title in the **right** column to go straight to those activities in the online handbooks.

Milestones

To help you monitor learning, the skills and understanding children need to be secure with as they progress through the programme have been captured in a series of milestone statements. Click on the milestone icons to see these. Extra support to help you use these is provided at the end of this document.

Number, Pattern and Calculating 3

Geometry, Measures and Statistics 3

Statistics and Probability Booklet 3

Each Activity Group should take around one week. However, some may take more/less time than others, so please use your professional judgment to fit the Activity Groups into your school year.

Strand and Activity Group Number		Activity Group Title
Getting Started		Getting started with Number, Pattern and Calculating 3
Calculating	1	Developing fluency with adding and subtracting facts to 10
Numbers and the Number System	1	Finding how many by grouping in 10s and 100s
Calculating	2	Developing fluency with adding and subtracting facts to 20
Numbers and the Number System	2	Exploring hundreds, tens and units with base-ten apparatus
		NPC Milestone 1
Pattern and Algebra	1	Exploring the inverse relationship between adding and subtracting
Numbers and the Number System	3	Keeping count and writing numbers down
Calculating	3	Mental methods for adding single-digit numbers
Calculating	4	Mental methods for subtracting single-digit numbers
Geometry	1	Investigating the parts and properties of polygons and polyhedra
Pattern and Algebra	2	Exploring steps of constant size through sequences of multiples
Calculating	5	Revising multiplying as repeated adding
		NPC Milestone 2
Calculating	6	Exploring multiplying through arrays
Calculating	7	Introducing dividing as 'How many … in …?'
Geometry	2	Identifying and comparing angles by size
Numbers and the Number System	4	Partitioning 2- and 3-digit numbers with and without money
Geometry	3	Sorting and classifying 2D and 3D shapes
		GMS Milestone 1
Numbers and the Number System	5	Ordering and structuring numbers to 1000
Calculating	8	Adding and subtracting multiples of 10 and 100
		NPC Milestone 3

Strand and Activity Group Number		Activity Group Title
Calculating	9	Patterns of similar adding and subtracting calculations
Pattern and Algebra	3	Reading and creating scales with different intervals
Statistics and Probability	1	Using graphs and investigating probability
Numbers and the Number System	6	Finding half way, rounding to the nearest 10 or 100
Calculating	10	Learning multiplying facts and looking for patterns
Calculating	11	Introducing the sharing structure of dividing
		NPC Milestone 4
Pattern and Algebra	4	Extending sequences and finding differences
Calculating	12	Partitioning strategies for adding and subtracting
Measurement	1	Telling the time to the minute on the 12-hour clock
Measurement	2	Exploring units of time
		GMS Milestone 2
Calculating	13	Using apparatus and imagery to introduce the written column method for adding
Calculating	14	Using apparatus and imagery to support subtracting and introducing the written column method
Calculating	15	Exploring ratio and scaling problems and introducing the short written methods of multiplying and dividing
		NPC Milestone 5
Measurement	3	Measuring accurately and calculating with metres, centimetres and millimetres
Measurement	4	Calculating and handling money
		GMS Milestone 3
Calculating	16	Making connections between dividing into equal parts and calculating with fractions
Measurement	5	Measuring and calculating with grams and kilograms
Measurement	6	Measuring and calculating with litres and millilitres
Numbers and the Number System	7	Understanding fractions of a whole and fractions as numbers
Numbers and the Number System	8	Using fraction notation to describe parts of a discrete set
Pattern and Algebra	5	Finding all possibilities and investigating a general statement
		NPC Milestone 6
Geometry	4	Using grids and grid references
		GMS Milestone 4

Getting Started: Getting started with Number, Pattern and Calculating 3

Key mathematical ideas Counting, Place value, Grouping, Mathematical thinking and reasoning

Educational context

This activity group is to help children and teachers initially become familiar with Numicon Shapes, number rods and number lines, and to make connections between the patterns and structure they see and their number ideas. Actions that represent the symbols for adding, subtracting and equals are also introduced. The activities provide essential opportunities for children who are new to Numicon to put meaning onto this apparatus for themselves, and will give teachers valuable insights into all children's mathematical understanding. These opportunities will help with initial assessing, which in turn may affect how teachers decide to group children. If children are not accustomed to working on open-ended activities some children's initial responses may be superficial, consequently they will need encouragement to persevere until they develop confidence to find out things for themselves.
Depending on children's responses, allow one or two weeks for these activities, before moving on to activity groups Calculating 1, Numbers and the Number System 1, and Pattern and Algebra 1, which will help with assessing children's fluency with adding and subtracting facts, their understanding of counting, grouping and place value and their awareness of inverse.

Learning opportunities

- To connect Numicon Shapes with number ideas.
- To connect number rods with number ideas.
- To connect Numicon Shapes, number rods, numerals and number words with positions on a number line.
- To begin to see patterns in number relationships reflected in physical materials and imagery.
- To learn to describe number relationships using the terms for children to use.
- To revise the mathematical language for adding and subtracting.
- To learn actions representing the symbols for +, − and =.

Terms for children to use

number names, pattern, next, before, after, in between, ordinal number words (first, second, third, etc.), words for comparing (small, smaller than, smallest, long, longer than, longest, few, fewer than, fewest, etc.), set, add, subtract, take away, altogether, equal, visualize

Assessment opportunities

Look and listen for children who:
- Use the terms for children to use effectively in discussion.
- Can notice and describe the attributes of Numicon Shapes and number rods and use these to sort both Shapes and rods in different ways.
- Can refer to Numicon Shapes and number rods by number name, order them and describe relationships between them.
- Can connect Numicon Shapes, number rods, numerals, and number words with positions on a number line.
- Can recognize and use the language for adding and subtracting and who can recognize and use the symbols +, − and =.
- May need to spend longer on these Getting Started activities.
- May have continuing difficulties and are likely to need additional and different support. Consideration may be given to running the Numicon Intervention Programme for these children.

Explorer Progress Book 3a, pp. 2–3

After completing work on this activity group, give small focus groups of children their Explorer Progress Books and ask them to work through the challenges on the pages. As children complete the pages, assess what progress they are making with the central ideas from the activity group. Refer to the assessment opportunities for assistance.

Explore More Copymaster 1: Talk Time

After completing work on Activity 5, give children Explore More Copymaster 1: Talk Time to take home.

Focus activities

1. What can you do with Numicon Shapes?
2. What can you do with number rods?
3. Knowing the Numicon Shape patterns
4. Exploring the Numicon Display Number Line
5. Describing relationships between Numicon Shapes
6. Cover the board with Numicon Shapes
7. Adding and subtracting with Numicon Shapes or number rods

Calculating 1: Developing fluency with adding and subtracting facts to 10

Key mathematical ideas Adding, Subtracting, Pattern, Mathematical thinking and reasoning

Educational context

This activity group revises adding and subtracting facts of numbers to 10, going on to explore efficient ways of totalling lists of numbers without counting or jotting, by grouping Numicon Shapes into tens.
Extend Activities 1, 2 and 3 for children who already have fluent recall of adding and subtracting facts to 10 by asking them to explore how many combinations can be found for any number within their working range. The challenge in all the activities can be increased by substituting number rods for Numicon Shapes. Establishing and maintaining fluency with these facts is such an important 'tool' for children's calculating that we strongly advise the practice activities should be revisited frequently until children have fluent recall.

Learning opportunities

- To develop fluency with different combinations of numbers to make given totals.
- To know when to look for patterns and that it is easier to spot them when working systematically.
- To know when to use the inverse relationship between adding and subtracting to solve problems.
- To become fluent with adding and subtracting facts of numbers to 10 and to recognize that these can be useful in many different situations.
- To experience situations when it is useful to use adding and subtracting facts of numbers to 10.
- To know that a list of numbers can be totalled in any order.

Terms for children to use

combine, add, plus, total, compare, subtract, take away, minus, difference, equals, single digit, facts, pattern, similar, different, combination, estimate, organize, systematic, group, score

Assessment opportunities

Look and listen for children who:
- Use the terms for children to use effectively in discussion.
- Are engaged and motivated to explore the activity.
- Recognize when it is important to be well organized and to work systematically, e.g. those who show adding facts in order with structural apparatus.
- Deduce when to use the inverse relationship between adding and subtracting.
- Have fluent recall of adding and subtracting facts to 10 and who know when to use these to help when adding and subtracting higher numbers.
- Can perceive a total from Numicon Shapes grouped into tens and an amount smaller than 10.
- Know when a general statement can be made because they have noticed something always happening, in this case the bigger the number the greater the number of possible combinations.
- Are able to make a reasonable estimate of the total of a list of small numbers.
- Know that a list of numbers can be totalled in any order, i.e. adding has a commutative property.

NPC Milestone 1

- Fluently recall adding and subtracting facts of all numbers to 10 and use these when adding lists of small numbers (NPC 3:1a)
- Fluently recall most adding and subtracting facts of all numbers to 20 and use efficient strategies to calculate those not known (NPC 3:1b)

Explorer Progress Book 3a, pp. 4–5

After completing work on this activity group, give small focus groups of children their Explorer Progress Books and ask them to work through the challenges on the pages. As children complete the pages, assess what progress they are making with the central ideas from the activity group. Refer to the assessment opportunities for assistance.

Explore More Copymaster 15: Around the Board

After completing work on Activity 4, give children Explore More Copymaster 15: Around the Board to take home.

Pupil Book 3, pp. 2–5

These pages in the Pupil Book provide further practice and challenging questions. You can use them to follow up the activities and deepen the learning.

Focus activities

1. Exploring ways to find all combinations
2. Finding all combinations for numbers to 10
3. Subtracting numbers from 10 and below
4. Exploring strategies for adding lists of small numbers
5. Using adding facts of 10 when finding totals
6. Solving number puzzles

Numbers and the Number System 1: Finding how many by grouping in 10s and 100s

Key mathematical ideas Counting, Place value, Mathematical thinking and reasoning

Educational context

This group of activities helps children develop a sense of the cardinal values of higher numbers and relationships between them, also making connections between grouping and place value notation. Secure understanding of these connections is an important building block for children's number work and revisiting variations of these activities at different times during the year is strongly recommended.

Learning opportunities

- To appreciate that arranging counters into groups is an efficient way to find 'how many?' without counting.
- To begin to connect grouping with place value notation.
- To continue to extend children's counting range to 100 and beyond.
- To give a sensible estimate of the size of a collection.
- To develop understanding of relationships between numbers to 100 and beyond.
- To begin to connect relationships between numbers to 100 with relationships between higher numbers.
- To write numbers beyond 100 in words.

Terms for children to use

estimate, guess, about, nearly, approximately, exactly, tens, ones, arrange, patterns, groups, more, fewer

Assessment opportunities

Look and listen for children who:

- Use the terms for children to use effectively in discussion.
- Make reasonable estimates (wild guesses suggest lack of understanding and no 'feel' for cardinal number values).
- Work systematically to organize groups of counters into Numicon 10-patterns as an efficient way to find 'how many?' without counting in ones.
- Use both their hands to build the Numicon Shape patterns from the bottom up.
- Say how many they have counted by looking at the patterns.
- Can write 2- and 3-digit numbers to label groups they have counted.
- Can count to 100 and beyond.

NPC Milestone 1

- Give a sensible estimate of numbers of more than 100 objects (NPC3:1e)

Explorer Progress Book 3a, pp. 6–7

After completing work on this activity group, give small focus groups of children their Explorer Progress Books and ask them to work through the challenges on the pages. As children complete the pages, assess what progress they are making with the central ideas from the activity group. Refer to the assessment opportunities for assistance.

Explore More Copymaster 7: Stars

After completing work on Activity 1, give children Explore More Copymaster 7: Stars to take home.

Pupil Book 3, pp. 6–9

These pages in the Pupil Book provide further practice and challenging questions. You can use them to follow up the activities and deepen the learning.

Focus activities

1. How many sweets are in the jar?
2. Using a tens and ones frame
3. Finding how many beyond 100
4. Using a hundreds, tens and ones frame

Calculating 2: Developing fluency with adding and subtracting facts to 20

Key mathematical ideas Adding, Subtracting, Pattern, Mathematical thinking and reasoning

Educational context

This activity group applies children's knowledge of adding and subtracting to 10 to build understanding and fluency to 20. The inverse relationship between adding and subtracting is explored through number trios and doubles. Children need plenty of practice to develop their fluency, so there are lots of ideas for whole class and independent practice that can be revisited often throughout the year. Number rods can be substituted for Numicon Shapes in all the activities.

Learning opportunities

- To see that patterns are easier to spot when working systematically.
- To use adding and subtracting facts to 10 to add and subtract within 20.
- To build fluent recall of adding and related subtracting facts including doubles.
- To realize that numbers can be added in any order, i.e. adding has a commutative property.
- To appreciate the importance of knowing adding and subtracting facts by heart.
- To understand that commutative property facts are equivalent, e.g. 2 + 4 = 4 + 2.

Terms for children to use

add, subtract, equals, facts, adding, subtracting, plus, take away, minus, pattern, similar, different, combination, double, trios, tens, ones, inverse, commutative, equivalent

Assessment opportunities

Look and listen for children who:
- Use the terms for children to use effectively in discussion.
- Work in an organized way to show adding or subtracting facts in order, both built with apparatus and when writing them down.
- Show that there can often be several ways to reach a solution, for example by using the commutative property of adding, and by using the inverse relationship between adding and subtracting.
- Have fluent recall of adding and subtracting facts to 10.
- Can derive (from what they know about adding and subtracting to 10) adding and subtracting facts to 20.
- Have fluent recall of adding and subtracting facts to 20.

NPC Milestone 1

- Know and use patterns in adding and subtracting facts for any number to 20 and beyond to recall facts, to organize them systematically, and to check that all combinations have been found (NPC 3:1c)
- Use known adding and subtracting facts to derive facts to 30 (NPC 3:1d)

NPC Milestone 2

- Use understanding of equivalence, the '=' symbol and knowledge of the inverse relation between adding and subtracting to solve problems where the empty box symbol represents an unknown number (NPC 3:2b)

Explorer Progress Book 3a, pp. 8–9

After completing work on this activity group, give small focus groups of children their Explorer Progress Books and ask them to work through the challenges on the pages. As children complete the pages, assess what progress they are making with the central ideas from the activity group. Refer to the assessment opportunities for assistance.

Explore More Copymaster 16: Total 20

After completing work on Activity 3, give children Explore More Copymaster 16: Total 20 to take home.

Pupil Book 3, pp. 10–13

These pages in the Pupil Book provide further practice and challenging questions. You can use them to follow up the activities and deepen the learning.

Focus activities

1. Finding ways of combining two numbers to make 20
2. Finding all combinations for numbers to 20
3. Looking for adding facts of 10 in adding facts of 20 and other multiples of 10
   Numicon Essentials **Y3/P4** Apply number facts up to 10
4. Exploring inverse relationships in adding and subtracting to 10 and 20
5. Finding all combinations for teen numbers
6. Relating adding and subtracting below 10 to adding and subtracting for teen numbers
7. Adding doubles
8. Subtracting from doubles
9. Solving missing number problems (empty box notation)
10. Using inverse when calculating change in shopping problems

Numbers and the Number System 2: Exploring hundreds, tens and ones with base-ten apparatus

Key mathematical ideas Counting, Place value, Mathematical thinking and reasoning

Educational context

This group of activities continues to explore the ideas of grouping and place value notation, beginning with an investigation in which children are set the problem of making models with only 10 cubes. The idea of grouping in 10s and 100s is reinforced through the introduction of base-ten apparatus, which all children need time to explore and discuss before they use it to represent numbers, as suggested in Activity 2.

Activity 5 introduces children to the idea of exchange using base-ten apparatus in the context of a familiar activity. As with all the work on grouping and place value, children are meeting important ideas that are fundamental to later work, so it is important to revisit them often and to make connections with real life examples, so children see that what they are learning about is useful to them.

Base-ten apparatus is widely available from educational suppliers, though not included with the starter apparatus pack. Experiences with these activities can help children to read, write, and use number names fluently. They are also an essential foundation for later calculating with higher numbers.

Learning opportunities

- To reinforce understanding that arranging objects into groups of 10 is an efficient way to find 'how many?' without counting.
- To explore the use of base-ten apparatus.
- To relate grouping to writing numbers in numerals and words.
- To give a sensible estimate of a number of objects over 100.
- To explore how many tens in 2- and 3-digit numbers.
- To explore the idea of exchange using base-ten apparatus.

Terms for children to use

estimate, guess, about, nearly, approximately, exactly, tens, ones, arrange, patterns, groups, more, fewer, partition, split, exchange, regroup

Assessment opportunities

Look and listen for children who:

- Use the terms for children to use effectively in discussion.
- Confidently use structured apparatus to build 2- and 3-digit numbers from seeing them written down and from hearing the number names.
- Name and write numbers from seeing them built with structured apparatus.
- Read and write 2- and 3-digit numbers correctly in numerals and words.
- Confidently group numbers into hundreds, tens, and ones.
- Use apparatus to organize their groups of 10.
- Know how many tens there are in any number to 1000.
- Know that, when they are working with base-ten apparatus, 10 cubes can be exchanged for a ten- stick and 10 ten-sticks can be exchanged for a flat.

NPC Milestone 1

- Count aloud across multiples of 100 and multiples of 1000 (NPC 3:1f)
- Read, write and build (with apparatus) 2- and 3-digit numbers (NPC 3:1g)
- Relate grouping and place value notation to say the value of each digit in a 3-digit number (NPC 3:1h)

Explorer Progress Book 3a, pp. 10–11

After completing work on this activity group, give small focus groups of children their Explorer Progress Books and ask them to work through the challenges on the pages. As children complete the pages, assess what progress they are making with the central ideas from the activity group. Refer to the assessment opportunities for assistance.

Explore More Copymaster 8: Robot Tens

After completing work on Activity 1, give children Explore More Copymaster 8: Robot Tens to take home.

Pupil Book 3, pp. 14–17

These pages in the Pupil Book provide further practice and challenging questions. You can use them to follow up the activities and deepen the learning.

Focus activities

1. Making models using 10 cubes and finding totals
2. Grouping in 100s
3. Exploring base-ten apparatus
4. Recognizing how many hundreds, tens and ones
5. Finding how many using base-ten apparatus beyond 100

Pattern and Algebra 1: Exploring the inverse relationship between adding and subtracting

Key mathematical ideas Pattern, Inverse, Mathematical thinking and reasoning

Educational context

This group of activities builds on children's growing fluency with adding and related subtracting facts to explore inverse and equivalence. The idea of number trios is introduced as is the idea of sets or 'families' of related facts. Empty box notation that children will have met in earlier work is taken further as children use number trios to solve missing number problems.

Learning opportunities

• To revise understanding of equivalence and use of the = symbol.
• To realize that an empty box can stand for a missing number.
• To develop fluency with adding and subtracting.
• To understand that adding has a commutative property and subtracting does not.
• To explain how three related numbers are connected through the inverse relation between adding and subtracting and that these can be called a 'number trio'.

Terms for children to use

add, more, inverse, subtract, set, equal, symbol, missing number, unknown number, number trio, connection, related, related facts, error, correct, pattern, visualize

Assessment opportunities

Look and listen for children who:
• Can use the terms for children to use effectively in discussion.
• Can give an inverse subtracting sentence in response to a related adding sentence.
• Can give an inverse adding sentence in response to a related subtracting sentence.
• Show that they understand equivalence and can use the = symbol in empty box problems, including:
◦ filling the box correctly
◦ explaining why a certain number needs to go in the box
◦ creating empty box problems for others to solve
◦ making up number stories from an 'empty box number sentence'.
• Can spot whether a set of related facts is incomplete and say what's missing.
• Evaluate their work and self-correct.

NPC Milestone 2

• Recognize when a given number is a multiple of 2, 3, 4, 5, 8 or 10 (at this stage a few children may recognize common multiples but this is not a milestone) (NPC 3:2f)

Explorer Progress Book 3a, pp. 12–13

After completing work on this activity group, give small focus groups of children their Explorer Progress Books and ask them to work through the challenges on the pages. As children complete the pages, assess what progress they are making with the central ideas from the activity group. Refer to the assessment opportunities for assistance.

Explore More Copymaster 2: Number Trios

After completing work on Activity 2, give children Explore More Copymaster 2: Number Trios to take home.

Pupil Book 3, pp. 18–21

These pages in the Pupil Book provide further practice and challenging questions. You can use them to follow up the activities and deepen the learning.

Focus activities

1. Adding, subtracting and equivalence
2. Working with number trios
3. Relating adding and subtracting
4. Recording families of related facts
5. Solving number problems (empty box notation)

Numbers and the Number System 3: Keeping count and writing numbers down

Key mathematical ideas Counting, Place value, Mathematical thinking and reasoning

Educational context

This group of activities builds on children's earlier experiences of grouping and place value, as they explore problems encountered when counting moving objects, and use the idea of tallying. The advantages of grouping over counting in ones are explored further with a close look at number lines. Investigating different ways of representing numbers opens opportunities to think about number lines and the importance of accurate recording.
It is not uncommon for children to have difficulty with numbers that involve 0, and a conversation about the role of zero as a 'place holder' is opened with the question, 'If we missed out the zero by mistake, would it matter?'

Learning opportunities

• To experiment with different ways of tallying when counting moving objects, e.g. traffic.
• To look closely at number lines, identifying multiples of 10s and 5s, and filling in a blank number line.
• To appreciate that, when counting large collections, grouping is more efficient than counting in ones.
• To realize that the value of a digit is determined by its place.

Terms for children to use

estimate, guess, about, nearly, approximately, exactly, hundreds, tens, ones, arrange, patterns, groups, more, fewer, place, value

Assessment opportunities

Look and listen for children who:
• Use the terms for children to use effectively in discussion.
• Understand that the position of numerals in relation to each other denotes their value.
• Can read aloud 2- and 3-digit numbers, including those using '0'.
• Can record 3-digit numbers quickly and accurately.
• Can use tallies to represent a count.

NPC Milestone 2

• Understand the use of zero as a place holder (NPC 3:2c)
• Count forwards and backwards in sequences of multiples within their working range (NPC 3:2e)

Explorer Progress Book 3a, pp. 14–15

After completing work on this activity group, give small focus groups of children their Explorer Progress Books and ask them to work through the challenges on the pages. As children complete the pages, assess what progress they are making with the central ideas from the activity group. Refer to the assessment opportunities for assistance.

Explore More Copymaster 9: Home Survey

After completing work on Activity 2, give children Explore More Copymaster 9: Home Survey to take home.

Pupil Book 3, pp. 22–25

These pages in the Pupil Book provide further practice and challenging questions. You can use them to follow up the activities and deepen the learning.

Focus activities

1. Counting the Grecian way!
2. A traffic survey
3. Exploring number lines and empty number lines
4. One hundred days
5. Using zero as a place holder

Calculating 3: Mental methods for adding single-digit numbers

Key mathematical ideas Adding, Mathematical thinking and reasoning

Educational context

This activity group explores what happens when adding a single digit number to a 2- or 3-digit number involves crossing a multiple of 10. The activities rely on children's ability to recognize Numicon Shapes, Numicon Shape patterns and number rods, and to use these to calculate without counting in ones. Children will also draw on their understanding of adding, place value and knowledge of adding and subtracting facts of all numbers to 10. There is much opportunity to experiment with ways of modelling the steps in the bridging process with apparatus, moving on to modelling them on an empty number line.

Learning opportunities

• To recognize that multiples of 10 are important landmarks on the number line when calculating.
• To realize that knowing adding facts of numbers to 10 helps when adding involves bridging a multiple of 10.
• To use an understanding of the close relationship between 9 and 10 when adding 9 to other numbers.
• To begin to understand that when we are adding, the amount to be added can be partitioned and the overall total will remain the same.
• To understand that sometimes it is easier to add numbers in a different order, and we can do this because adding has a commutative property.
• To find out that it can be easier to add two numbers by adjusting both of them by an equivalent amount, e.g. 8 + 9 = 7 + 10.

Terms for children to use

adding, subtracting, one more, one fewer, regroup, rearrange, adjust, 'completing to a multiple of 10', 'bridging a multiple of 10', equal to, balancing

Assessment opportunities

Look and listen for children who:
• Use the terms for children to use in conversation effectively in discussion.
• Can recognize Numicon Shape patterns up to 10 without counting and who can explain when this might be helpful, e.g. more effective than counting on or back.
• Are adding without resorting to counting (those that fall back on counting will need more practice with recognizing Numicon Shape patterns, Shapes and number rods).
• Can adjust both numbers in an adding sentence by equal amounts to make it easier to find the total.
• Can record two equivalent (balancing) adding sentences, e.g. 7 + 6 = 10 + 3.
• Can use the terms 'completing to a multiple of 10' and 'bridging a multiple of 10' to explain how they are adding in two steps

NPC Milestone 2

• Explain how three related numbers are connected through the inverse relation and write all the related adding and subtracting facts (NPC 3:2a)
• Recall and use adding and subtracting facts to 10 and the bridging strategy in any adding and subtracting calculations that involves crossing multiples of 10, and explain the steps they have taken (NPC 3:2i)

Explorer Progress Book 3a, pp. 16–17

After completing work on this activity group, give small focus groups of children their Explorer Progress Books and ask them to work through the challenges on the pages. As children complete the pages, assess what progress they are making with the central ideas from the activity group. Refer to the assessment opportunities for assistance.

Explore More Copymaster 17: Climb the Stairs

After completing work on Activity 2, give children Explore More Copymaster 17: Climb the Stairs to take home.

Pupil Book 3, pp. 26–29

These pages in the Pupil Book provide further practice and challenging questions. You can use them to follow up the activities and deepen the learning.

Focus activities

1. Adding two single-digit numbers and bridging 10
2. Adding 9 to 1-, 2- and 3-digit numbers
3. Bridging multiples of 10 when adding

Calculating 4: Mental methods for subtracting single-digit numbers

Key mathematical ideas Adding, Subtracting, Pattern, Mathematical thinking and reasoning

Educational context

This activity group explores what happens when subtracting a single digit number from a 2- or 3-digit number involves crossing a multiple of 10. The activities rely on children's ability to recognize Numicon Shapes, Numicon Shape patterns and number rods and to use these to calculate without counting in ones. Children will also draw on their understanding of subtracting, place value and knowledge of subtracting facts from all numbers to 10. There is much opportunity to experiment with ways of modelling the steps in the bridging process with apparatus, moving on to modelling them on an empty number line.

Learning opportunities

• To recognize that multiples of 10 are important landmarks on the number line when we are calculating.
• To realize that knowing subtracting facts from numbers to 10 helps when subtracting involves bridging a multiple of 10.
• To use understanding of the relationship between 9 and 10 when subtracting 9 from other numbers.
• To realize that it is sometimes easier to subtract one number from another by adjusting both of them by an equivalent amount.

Terms for children to use

subtracting, take away, difference, more, fewer, pattern, complete, leave, 'multiple of 10', 'completing to a multiple of 10', 'bridging a multiple of 10', equal to, balancing, regroup, rearrange, adjust, compensate

Assessment opportunities

Look and listen for children who:
• Use the terms for children to use in conversation effectively in discussion.
• Can use their knowledge of Numicon Shape patterns to systematically take away a given number of Numicon Coloured Counters from an amount so the answer can be seen as an organized pattern, without counting.
• Are subtracting without resorting to counting (those that fall back on counting will need more practice with recognizing Numicon Shape patterns, Shapes and number rods).
• Adjust both numbers in a subtracting number sentence by adjusting amounts to make it easier to find the total.
• Are using the inverse relationship with adding to solve subtracting questions.
• Can record two equivalent (balancing) subtractions.
• Can talk about 'going back to a multiple of 10' or 'bridging a multiple of 10' to explain how they are subtracting in two steps.

NPC Milestone 2

• Know that multiples of 10 and 100 are important milestones on the number line (NPC 3:2d)
• Know how to adjust calculations and compensate when adding and subtracting 9 and when to use this relationship (NPC 3:2h)

Explorer Progress Book 3a, pp. 18–19

After completing work on this activity group, give small focus groups of children their Explorer Progress Books and ask them to work through the challenges on the pages. As children complete the pages, assess what progress they are making with the central ideas from the activity group. Refer to the assessment opportunities for assistance.

Explore More Copymaster 18: Market Stall

After completing work on Activity 2, give children Explore More Copymaster 18: Market Stall to take home.

Pupil Book 3, pp. 30–33

These pages in the Pupil Book provide further practice and challenging questions. You can use them to follow up the activities and deepen the learning.

Focus activities

1. Subtracting from 10
2. Subtracting from multiples of 10
3. Subtracting a single-digit number
4. Bridging multiples of 10 when subtracting
5. Using Numicon Shapes when subtracting 9

Geometry 1: Investigating the parts and properties of polygons and polyhedra

Key mathematical ideas Comparing parts and properties of shapes, Rotation, Classifying shapes

Educational context

This activity group builds on children's work in the Geometry, Measurement and Statistics 2 Teaching Resource Handbook to add to their knowledge and understanding of the parts and properties of geometrical shapes as they are conventionally defined, and to begin to consider the classification of 3D as well as 2D shapes.

Children revisit their understanding of right angles and are introduced to the idea and term 'perpendicular' in this context. Through active investigation they begin to consider perpendicular sides as an invariant property of some shapes when rotated, translated, reflected or scaled, before moving on to look at 'parallel' lines and sides in a similar way.

'Horizontal' and 'vertical' are also introduced in relation to 'perpendicular'. Children make and manipulate shapes in order to explore these ideas, and are encouraged to recognize (in particular by rotating and flipping – or 'reflecting' – shapes) that 'perpendicular' and 'parallel', 'horizontal' and 'vertical' are not properties of the sides of shapes, rather they are conventional terms we use to help us understand the position and orientation of objects in space.

Children's work on 3D shapes continues as they make and build 'skeleton' shapes. They revisit their knowledge of the different parts of these shapes – faces, edges and vertices – and begin to explore the relationships between them, before being introduced to 'polyhedron' as a term and category. They also explore the properties of different 2D and 3D shapes, in particular the relative strength of pyramids and triangles (as compared to cubes and squares) in resisting distortion.

In this work children encounter a variety of new terms and concepts through investigation. Help them to develop and consolidate their understanding by encouraging them to share and talk about their ideas, to 'think out loud' and work through their reasoning with others. Explaining word origins (for instance that 'polyhedron' derives from a word meaning 'many faced') is also a way of supporting their geometrical thinking and communicating.

Learning opportunities

- To draw and make polygons using a variety of resources.
- To identify and name perpendicular, parallel, vertical and horizontal lines.
- To make skeleton polyhedra and consider the parts and properties of these shapes.
- To explore the number of faces, vertices and edges in polyhedra.
- To work systematically and make an appropriate record of any findings, e.g. a table.

Terms for children to use

horizontal, vertical, perpendicular, parallel, right angle, identical, polygon, congruent, square, oblong, rectangle, triangle, polyhedron, polyhedra, non-polyhedron, non- polyhedra, cube, cuboid, pyramid, square-based pyramid, face, vertex, vertices, edge

Assessment opportunities

Look and listen for children who:

- Use the terms for children to use in conversation effectively.
- Identify right angles and perpendicular and parallel sides in 2D shapes.
- Visualize and build 3D shapes.
- Identify faces, vertices and edges of 3D shapes.
- Find and use patterns and relationships between numbers to work out the number of faces, vertices and edges a polyhedra has.
- Work systematically and record findings, e.g. in a table when carrying out an investigation.

GMS Milestone 1

- Use resources to show, or find examples of, horizontal, vertical, parallel and perpendicular lines (GMS 3:1a)
- Build 3D skeleton shapes, relating these to named 3D shapes and shapes in their everyday environment (GMS 3:1b)
- Describe the properties of 3D shapes in different orientations, and consider the number of faces, vertices and edges (GMS 3:1c)

Explorer Progress Book 3, pp. 2–3

After completing work on this activity group, give small focus groups of children their Explorer Progress Books and ask them to work through the challenges on the pages. As children complete the pages, assess what progress they are making with the central ideas from the activity group. Refer to the assessment opportunities for assistance.

Explore More Copymaster 1: Wizard's Castle

After completing work on Activity 2, give children Explore More Copymaster 1: Wizard's Castle to take home.

Pupil Book 3, pp. 38–41

These pages in the Pupil Book provide further practice and challenging questions. You can use them to follow up the activities and deepen the learning.

Focus activities

1. Perpendicular, horizontal and vertical lines
2. Identifying and drawing parallel lines in 2D shapes
3. Building 3D skeleton shapes
4. Investigating the relationship between the number of faces, edges and vertices in any polyhedron

Pattern and Algebra 2: Exploring steps of constant size through sequences of multiples

Key mathematical ideas Pattern, Mathematical thinking and reasoning

Educational context

The activities in this group focus on building and recognizing sequences of multiples, starting with simple multiples of 1, increasing and decreasing patterns and moving on to sequences of other multiples. Building the sequences with Numicon Shapes or number rods provides a context in which to support the pattern heard in the number names and recognize the patterns recorded as written numerals. In these activities, there is much opportunity for conversation about patterns and rules that will extend children's mathematical language and thinking. These ideas are extended in Pattern and Algebra 4, and since these sequences involve repeatedly adding the same amount, the work is useful preparation for work on multiplying.

Learning opportunities

- To know that spotting patterns helps us when we are trying to understand sequences, and that spotting where a pattern is broken can help us to work out a number that is missing.
- To realize that some sequences of numbers have rules.
- To use the word 'multiple' when describing sequences of multiples and count in multiples of 2, 3, 4, 5, 8 and 10.
- To appreciate that when we want to represent a sequence, we can use lists of numerals, numbers in grids, build it with structured apparatus, etc.

Terms for children to use

increasing pattern, decreasing pattern, increasing by one, decreasing by one, descending order, ascending order, repeat, rules, sequence, ordinal number words (e.g. first, second, third), multiple, difference between, stair

Assessment opportunities

Look and listen for children who:

- Use the terms for children to use effectively in discussion.
- Show they understand the rule of a sequence by explaining it clearly, e.g. 'you step up (or down) one each time'.
- Show that they are using a pattern to identify missing numerals by explaining they can see where the pattern is broken.
- Can count in multiples of 2, 3, 4, 5, 8 and 10.

NPC Milestone 2

- Notice patterns in sequences of multiples, explain the rule for the sequence and use this to find missing numbers (NPC 3:2g)

Explorer Progress Book 3a, pp. 20–23

After completing work on this activity group, give small focus groups of children their Explorer Progress Books and ask them to work through the challenges on the pages. As children complete the pages, assess what progress they are making with the central ideas from the activity group. Refer to the assessment opportunities for assistance.
Children will also have the opportunity to complete their Learning Log (pp. 22–23) where they can reflect on the mathematics they have done so far.

Explore More Copymaster 3: Three in a Row

After completing work on Activity 2, give children Explore More Copymaster 3: Three in a Row to take home.

Pupil Book 3, pp. 34–37

These pages in the Pupil Book provide further practice and challenging questions. You can use them to follow up the activities and deepen the learning.

Focus activities

1. Patterns that increase and decrease by 1
2. Patterns that increase or decrease by 2
3. Multiple of 2 sequence
4. Multiples of 3, 4, 5, 8 and 10 sequences
5. Finding missing steps in sequences of multiples
6. Finding sequences of multiples on the 100 square

Calculating 5: Revising multiplying as repeated adding

Key mathematical ideas Multiplying, Mathematical thinking and reasoning

Educational context

This group of activities revises the introduction to multiplying from Number, Pattern and Calculating 2 (Calculating 8). We continue the use of the word 'times' because it is the word children use when learning multiplying tables. The activities allow children to revise how adding repeated groups can be represented by multiplying, the '×' symbol, and the term 'product'. There are important links between multiplying and learning about measures, e.g. when children are learning to tell the time, we can point out that when the minute hand goes round three times, three minutes will have passed. When we record standard measures, e.g. 3 m or 3 kg, this is shorthand for three times a metre or three lots of a metre and three times a kilogram or three lots of a kilogram. Later, in algebra, we use the same shorthand, e.g. 2*b*, meaning 2 × *b*.

Learning opportunities

• To understand that 'times' means how often an object or action is repeated.
• To realize that multiplying is what we do instead of adding repeated groups.
• To understand that the × symbol is called the multiplying sign (or symbol).
• To learn an action for multiplying and to read and write the '×' symbol.

Terms for children to use

times, 'how many times', repeat, group, set, add, adding, sign, symbol, multiply, multiplying, multiplication, total, lots of, groups of, sets of, product

Assessment opportunities

Look and listen for children who:
• Use the terms for children to use effectively in discussion.
• Make the connection between adding and multiplying, and can explain that multiplying is what we do instead of repeated adding.
• Can explain five times the 3-shape (or rod) as five times three and record as 5 × 3.
• Can organize their work with apparatus and record systematically.
• Can compile a multiplication table and read it.
• Can respond to and use the word 'product' to describe the outcome of multiplying.

NPC Milestone 2

• Understand that multiplying is a form of calculating used instead of repeated adding and recognize when they need to multiply to solve a problem (NPC 3:2j)
• Read multiplying number sentences (NPC 3:2k)
• Read and write multiplying sentences using the '×' symbol, model them with structured apparatus showing understanding of the word 'product' (NPC 3:2l)

Explorer Progress Book 3b, pp. 2–3

After completing work on this activity group, give small focus groups of children their Explorer Progress Books and ask them to work through the challenges on the pages. As children complete the pages, assess what progress they are making with the central ideas from the activity group. Refer to the assessment opportunities for assistance.

Explore More Copymaster 19: Pizza Maker

After completing work on Activity 2, give children Explore More Copymaster 19: Pizza Maker to take home.

Pupil Book 3, pp. 42–45

These pages in the Pupil Book provide further practice and challenging questions. You can use them to follow up the activities and deepen the learning.

Focus activities

1. Revising multiplying as repeated adding
2. Developing fluency with the language of 'times' and 'product'
3. Repeating Numicon Shape patterns to illustrate multiplying
4. Knowing when to multiply

Calculating 6: Exploring multiplying through arrays

Key mathematical ideas Multiplying, Mathematical thinking and reasoning

Educational context

This activity group develops children's understanding of the image of an array building on their earlier work in Number, Pattern and Calculating 2, Calculating 9. An array is a powerful way to model multiplying and understand its commutative property. It is recommended that teachers start a class collection of objects that show arrays and invite children to add to it by bringing in objects they find at home. In the first two activities, children build arrays to find solutions to real problems, and then relate them to multiplying sentences. In the later part of this group, children meet the associative property of multiplying in a correspondence situation which involves combining different items of clothes to make winter outfits.

Learning opportunities

• To realize that multiplying can be represented by building arrays.
• To understand the commutative and associative properties of multiplying and to make the connection that adding also has these properties.
• To realize that some number arrays can only have one row (prime numbers).
• To notice that in real-life situations the order of numbers in multiplying sentences sometimes makes a difference.
• To realize that knowing multiplication tables can help us to work out other multiplying facts.

Terms for children to use

array, product, multiplying sentence, commutative property, balances, equal, equivalent, equation, multiplication table, compare

Assessment opportunities

Look and listen for children who:
• Use the terms for children to use effectively in discussion.
• Are developing fluent recall of some multiplying facts.
• Work in an organized way to build arrays.
• Realize that there are some numbers for which they can only make rows.
• Can represent an array with two multiplying sentences.
• Are able to derive a commutative fact when given a multiplying sentence.
• Know that changing the order of numbers in multiplying sentences does not change the product.

NPC Milestone 3

• Recall most multiplying facts of 2, 3, 4, 5, 8 and 10 multiplying tables (NPC 3:3f)
• Know and use the commutative property of multiplying (NPC 3:3g)
• Represent multiplying problems with structured apparatus and arrays (NPC 3:3h)
• Know that changing the order of numbers in multiplying problems does not change the product (NPC 3:3i)

Explorer Progress Book 3b, pp. 4–5

After completing work on this activity group, give small focus groups of children their Explorer Progress Books and ask them to work through the challenges on the pages. As children complete the pages, assess what progress they are making with the central ideas from the activity group. Refer to the assessment opportunities for assistance.

Explore More Copymaster 20: Sowing Seeds

After completing work on Activity 1, give children Explore More Copymaster 20: Sowing Seeds to take home.

Pupil Book 3, pp. 46–49

These pages in the Pupil Book provide further practice and challenging questions. You can use them to follow up the activities and deepen the learning.

Focus activities

1. Making arrays and writing multiplying sentences
   Numicon Essentials **Y3/P4** Use arrays
2. Introducing the commutative property of multiplying with arrays
   Numicon Essentials **Y3/P4** Use arrays
3. Using the commutative property of multiplying when solving problems
4. Finding equivalent multiplying facts
5. Exploring the associative property

Calculating 7: Revising dividing as ‘How many … in …?’

Key mathematical ideas Dividing, Quotition structure, Inverse, Mathematical thinking and reasoning

Educational context

This activity group revises the introduction to dividing from Number, Pattern and Calculating 2, Calculating 15 as the inverse of multiplying and builds on previous work in the Pattern and Algebra strand on patterns and sequence. The activities start with a correspondence problem where children work out how many models could be built with different quantities of wheels. The inverse relationship between multiplying and dividing is introduced to help children see that, whereas multiplying involves building numbers with equal groups, dividing can ‘undo’ this. This quotition structure of dividing is sometimes called the grouping structure. The dividing symbol is introduced in Activity 2 and throughout all the activities there are many opportunities for conversations involving the specific language for dividing.

It is strongly recommended that this activity group is revisited at different times during the year and that children are given ample opportunities with the practice activities so that they become confident with these complex ideas.

Learning opportunities

- To begin to understand dividing as finding ‘how many groups there are in …’.
- To realize that there is an inverse relation between multiplying and dividing and that knowing multiplication tables can help with finding solutions to dividing problems.
- To learn an action for dividing and to read and write the ÷ symbol.
- To begin to realize that dividing can be useful for finding out how many of something we can afford.
- To experience remainders in quotition dividing and to find out that the problem itself will affect what happens to any remainder.

Terms for children to use

‘how many in’, multiplication fact, inverse, connection, product, ‘dividing … into …’, ‘How many groups of … in …?’, ‘How many … in …?’, remain, remains, remainder, times, shared

Assessment opportunities

Look and listen for children who:

- Use the terms for children to use effectively in discussion.
- Can explain multiplying as putting lots of equal groups together and dividing as undoing this by breaking the product up into equal-sized groups or parts.
- Understand that multiplication has a commutative property, and use this to help them think about dividing questions.
- Recognize that dividing can be expressed in different words: ‘by’, ‘between’, ‘shared’, ‘how many in’, etc.
- Use their knowledge of the five times table to model their working on an empty number line.
- Are able to read and write dividing sentences to express their solutions.
- Interpret the remainder as what is left after grouping.
- Are beginning to think about what to do with a remainder in different situations.

NPC Milestone 3

- Recognize that dividing can be expressed as finding ‘how many groups are there in … ?’ (NPC 3:3j)
- Read, build with structured apparatus, and write dividing number sentences using the ‘÷’ symbol (NPC 3:3k)
- Notice and explain the inverse relation between dividing and multiplying and know that they can use multiplying facts to derive dividing facts (NPC 3:3l)
- Explain and interpret a realistic context as one inviting either ‘multiplying’ or ‘dividing’ and use the inverse relation between multiplying and dividing when solving problems (NPC 3:3m)
- Know that multiplying has a commutative property and use this to help when solving dividing questions (NPC 3:3n)
- Interpret a remainder as what is left after grouping (NPC 3:3o)

Explorer Progress Book 3b, pp. 6–7

After completing work on this activity group, give small focus groups of children their Explorer Progress Books and ask them to work through the challenges on the pages. As children complete the pages, assess what progress they are making with the central ideas from the activity group. Refer to the assessment opportunities for assistance.

Explore More Copymaster 21: Mini Books

After completing work on Activity 1, give children Explore More Copymaster 21: Mini Books to take home.

Pupil Book 3, pp. 50–53

These pages in the Pupil Book provide further practice and challenging questions. You can use them to follow up the activities and deepen the learning.

Focus activities

1. How many models can we make with different numbers of wheels?
2. Using the dividing symbol
   Numicon Essentials **Y3/P4** Divide a 2-digit number by a 1-digit number with no exchanging
3. Working with 10p coins, finding ‘how many tens in’ different multiples of 10
4. Using the commutative property of multiplication when solving dividing problems
5. Finding ‘how many fives in’ different multiples of 5
   Numicon Essentials **Y3/P4** Divide a 2-digit number by a 1-digit number with no exchanging
6. Introducing remainders – how many are left over?
   Numicon Essentials **Y3/P4** Divide a 2-digit number by a 1-digit number with remainders

Geometry 2: Identifying and comparing angles by size

Key mathematical ideas Rotation, Translation, Ordering, Equivalence, Classifying shapes

Educational context

In Geometry 1 children considered right angles in relation to the perpendicular sides of shapes. In this activity group they further develop their understanding of angles, revisiting the connection between angles as amounts of turn and as the parts and properties of shapes.

In the first activity children make and observe 'journeys' around the perimeter of rectilinear shapes marked on squared grids. This involves a series of clockwise and anticlockwise quarter turns, reinforcing the link between right angles and fractions of a whole turn.

Programmable robots, if available, are a powerful way of illustrating these ideas and can help children make a valuable shift in perspective, from looking at polygons as static objects to thinking about them as the result of particular series of straight-line movements and turns.

Children then compare angles which are less than, equal to, or more than a right angle, developing the idea of angles as a relation between intersecting lines and further emphasizing the link between the static and dynamic aspects of angle. They learn the symbols used to mark angles, including the right angle symbol, and compare the sizes of angles using geo strips, in preparation for work in later years involving measurement of angles.

Children move on to consider angles in shapes and the relationship between angles and the comparative lengths of sides by making and drawing a variety of polygons. They are introduced to the terms 'regular' and 'irregular' as a way of classifying polygons according to their angles and sides.

Throughout these activities, encourage children to investigate how angles and shapes can be made and changed, and to talk about what they do and see. Use 'Why … ?' and 'What if … ?' questions to prompt them to reason logically and so to generalize from the particular examples they encounter.

Learning opportunities

- To understand an angle in terms of an amount of turn and as an amount of space which create the angle, and to quantify its size in terms of right angles and fractions of a full turn.
- To compare angles and recognize when they are smaller than, equal to, or greater than a right angle.
- To order angles by size.
- To identify the angles in a polygon and compare their sizes, recognizing this as a property of the polygon.
- To begin to recognize whether a polygon is regular or irregular.

Terms for children to use

turn, turn through, angle, right, left, clockwise, anticlockwise, quarter turn, half turn, three-quarter turn, full turn, right angle, symbol, polygon, regular, irregular, parallel, perpendicular, triangle, square, oblong, rectangle, pentagon, hexagon, heptagon, octagon, dodecagon, direction, less than, greater than, smaller, larger, size, amount, compare, order, check

Assessment opportunities

Look and listen for children who:

- Use the terms for children to use effectively.
- Recognize and visualize an amount of turn in terms of the fraction of a full turn and the number of right angles turned through.
- Make and identify angles less than, equal to, or more than a right angle, including in shapes and in different orientations.
- Identify regular and irregular instances of the same type of polygon, e.g. a hexagon.
- Order angles by size.

GMS Milestone 1

- Move objects, or themselves, to show their understanding of an angle as a description of a turn (GMS 3:1d)
- Show how the number of right angle turns relates to a half, three-quarters and full turn (GMS 3:1e)
- Manipulate resources to make and order right angles and angles greater, or less than, a right angle (GMS 3:1f)

Explorer Progress Book 3, pp. 4–5

After completing work on this activity group, give small focus groups of children their Explorer Progress Books and ask them to work through the challenges on the pages. As children complete the pages, assess what progress they are making with the central ideas from the activity group. Refer to the assessment opportunities for assistance.

Explore More Copymaster 2: Making Angles

After completing work on Activity 2, give children Explore More Copymaster 2: Making Angles to take home.

Pupil Book 3, pp. 54–57

These pages in the Pupil Book provide further practice and challenging questions. You can use them to follow up the activities and deepen the learning.

Focus activities

1. Creating instructions for making a journey around a shape
2. Linking turns and angles, and comparing the size of angles to a right angle
3. Identifying types of angles in triangles and four-sided shapes
4. Identifying regular and irregular polygons

Numbers and the Number System 4: Partitioning 2- and 3-digit numbers with and without money

Key mathematical ideas Counting, Place value, Decimals, Equivalence, Mathematical thinking and reasoning

Educational context

The activities in this group extend earlier work on place value, by encouraging children to look closely at the structure of 2- and 3-digit numbers and to realize how this helps them to split or partition the numbers into different parts. In some of the activities, children explore partitioning through money and there are opportunities for them to make connections with structured apparatus. In a first step towards decimals, children learn to use the decimal point as they record prices in pounds and pence. They also explore ways of representing a given price, reinforcing the idea that even though things might 'look different' they can have 'equal value' (equivalence).

Learning opportunities

- To understand that the places of each digit in a written number determines their value.
- To know how to partition a number into hundreds, tens and ones.
- To realize different adding and subtracting facts can be used to help with partitioning numbers in different ways.
- To know that in written prices a decimal point separates pounds from pence and be able to read and write prices.
- To learn that equivalent amounts of money can be written in several different ways.

Terms for children to use

hundreds, tens, ones, place, digit, partition, exchange, value, coins, pounds, pence, point, equivalent

Assessment opportunities

Look and listen for children who:

- Use the terms for children to use effectively in discussion.
- Can read 2- and 3-digit numerals, and use the words 'hundreds', 'tens' and 'ones' to explain the column value of each digit.
- Can partition (in different ways) numbers built with apparatus and who can record these as adding sentences, e.g. for 35 record 10 + 10 + 10 + 5 = 35, 30 + 5 = 35, 20 + 15 = 35.
- Can work from a number trio, e.g. 30, 5, 35, to devise inverse adding and subtracting number sentences, such as 30 + 5 = 35 and 35 − 5 = 30.
- Are able to find appropriate coins both from reading a 'price tag' and from hearing the price spoken, and who are able to write prices with £ and p and use the decimal point.
- Recognize all currency coins and notes.
- Understand equivalent values, e.g. 10p is equal to two 5ps, and ten 1ps, and five 2ps. Also that five £1 coins are equal to 500p or a £5 note.
- Connect adding tens and ones with Numicon Shapes to adding coin values, e.g. two 10-shapes and one 5-shape equals 25, so two 10ps and a 5p equals 25p.
- Connect building 3-digit numbers with apparatus to showing an equivalent cost in £ and p.

NPC Milestone 3

- Relate pounds and pence notation to hundreds, tens and ones (NPC 3:3c)
- Use knowledge of partitioning to solve money problems (NPC 3:3d)

Explorer Progress Book 3b, pp. 8–9

After completing work on this activity group, give small focus groups of children their Explorer Progress Books and ask them to work through the challenges on the pages. As children complete the pages, assess what progress they are making with the central ideas from the activity group. Refer to the assessment opportunities for assistance.

Explore More Copymaster 10: Game Show Prizes

After completing work on Activity 1, give children Explore More Copymaster 10: Game Show Prizes to take home.

Pupil Book 3, pp. 58–61

These pages in the Pupil Book provide further practice and challenging questions. You can use them to follow up the activities and deepen the learning.

Focus activities

1. Partitioning 2- and 3-digit numbers
2. Writing adding sentences to record partitioning in different ways
3. Representing prices with structured apparatus and coins
4. Relating money to hundreds, tens and ones; pounds and pence notation
5. Finding different ways to pay for items

Geometry 3: Sorting and classifying 2D and 3D shapes

Key mathematical ideas Sorting, Reflection, Classifying shapes

Educational context

This activity group enables children to consolidate their knowledge of the parts and properties of shapes and to develop and extend their understanding of the conventional, hierarchical classification of both 2D and 3D shapes according to these parts and properties. They do this by exploring the use of sorting diagrams – Venn, Carroll and tree diagrams – to analyse, organize and present different categorizations of 2D and 3D shapes.

This work gives children the opportunity to revisit the different ways of distinguishing shapes they have met in their work so far, for example by number of sides or vertices, the 2D shapes of faces, perpendicular and parallel sides, sizes of angles, symmetry, or according to whether shapes are polygonal or non-polygonal, polyhedral or non-polyhedral, regular or irregular. Children are required to reason logically to distinguish between and relate shape categories, and to correctly categorize a wide range of different shapes, including those fitting into more than one category and some types they may not have encountered before. This process involves them in considering a variety of equivalences and order relations, and encourages them to continue to refine their mathematical thinking and 'mental geometry'. Emphasize the importance of communicating, encouraging children to talk about what they make, see and imagine using descriptive language.

Children also begin to consider different ways of organizing data, and to think about how they handle and present information. They may have experience of using sorting diagrams through their work on Pattern and Algebra 6 in the *Number, Pattern and Calculating 2 Teaching Resource Handbook*. If so, consider challenging them to explore further, for example by choosing their own categories and making shapes that fit into them, or by sorting shapes according to more than two criteria.

Learning opportunities

- To understand how to create and use Venn, Carroll and tree diagrams.
- To describe the parts and properties of 2D and 3D shapes using increasingly precise language.
- To use understanding of angles, parallel and perpendicular lines and symmetry to help with describing and sorting 2D shapes.
- To use knowledge and understanding of the parts and properties of 2D and 3D shapes to sort and classify them.

Terms for children to use

flat 2D shape, polygon (and names of common polygons), non-polygon, vertex, vertices, side, side length, angle, equal angles, right angle, parallel, perpendicular, regular, irregular, solid 3D shape, polyhedron, polyhedra, non-polyhedron, face, surface, edge, sorting diagram, Carroll diagram, Venn diagram, tree diagram, criterion, criteria, property, attribute, group, category, set, branch, intersect, intersection

Assessment opportunities

Look and listen for children who:

- Use the terms for children to use effectively.
- Sort 2D or 3D shapes in a Venn, Carroll or tree diagram using given criteria.
- Explain their reasoning when sorting shapes or labelling a Venn, Carroll or tree diagram.
- Explain what type of shape should appear in each area of a Venn, Carroll or tree diagram.
- Identify and correct errors made in sorting 2D or 3D shapes.
- Choose appropriate criteria for sorting 2D or 3D shapes

GMS Milestone 1

- Recognize angles in 2D shapes and relate these to the properties of regular and irregular shapes (GMS 3:1g)
- Use sorting diagrams to organise 2D or 3D shapes according to criteria they have chosen, and explain their reasoning (GMS 3:1h)

Explorer Progress Book 3, pp. 6–7

After completing work on this activity group, give small focus groups of children their Explorer Progress Books and ask them to work through the challenges on the pages. As children complete the pages, assess what progress they are making with the central ideas from the activity group. Refer to the assessment opportunities for assistance.

Explore More Copymaster 3: Sorting Shapes

After completing work on Activity 2, give children Explore More Copymaster 3: Sorting Shapes to take home.

Pupil Book 3, pp. 62–65

These pages in the Pupil Book provide further practice and challenging questions. You can use them to follow up the activities and deepen the learning.

Focus activities

1. Sorting flat geometric 2D and solid geometric 3D shapes with Venn diagrams
2. Sorting flat geometric 2D and solid geometric 3D shapes with Carroll diagrams
3. Selecting an appropriate sorting diagram
4. Sorting flat geometric 2D shapes with tree diagrams
5. Sorting flat geometric 2D shapes based on symmetry

Numbers and the Number System 5: Ordering and structuring numbers to 1000

Key mathematical ideas Counting, Place value, Mathematical thinking and reasoning

Educational context

This group of activities moves children on to exploring numbers up to 1000, providing further key steps towards understanding the number system and successful calculating with higher numbers.

The first activities give opportunities to explore patterns on the 100 square, and further activities give opportunities to work beyond 100. Children should work on these further activities when they are secure with relationships between numbers to 100 and are able to read, write and build them symbolically and with models.

Through work on grouping with structured apparatus, children can notice relationships between numbers to 1000, and use these to make sensible estimates and to order them.

Learning opportunities

• To explore numbers to 1000, understand their relative values and use this to put them in order.
• To make sensible estimates of numbers of objects.
• To know that when finding numbers on the 0–1001 number line looking for patterns in the number sequence can be helpful.
• To learn to read and write 'shorthand' notations for a range of numbers, e.g. 1–50 or 30–80.
• To know that using the < and > symbols can be useful in different contexts.
• To find patterns on a 100 square, and to realize that looking for patterns can help when we are solving particular problems.

Terms for children to use

estimate, guess, about, nearly, approximately, exactly, hundreds, tens, ones, more, less, between, shorter, taller, in order, pattern, arrangement, greater than, less than

Assessment opportunities

Look and listen for children who:
• Use the terms for children to use effectively in discussion.
• Are able to say number names from reading them and show the cardinal value of written numerals by building them with structured apparatus.
• On hearing a number can build it with structured apparatus
• Can say and write a 3-digit number in numerals and words from seeing it built with structured apparatus.
• Can write 3-digit numbers correctly.
• Know where to look for numbers on the number line.
• Can use patterns on the 100 square to find numbers quickly.
• Explain the relationships between the positions of numbers on the 100 square.
• Show multiples of 100 in order on an empty number line.
• Understand the idea of a range of numbers.
• Place in order different ranges of numbers below 1000.

NPC Milestone 3

• Understand relative values of numbers to 1000, including recognizing the idea of a range of numbers and use of symbols '–', '<' and ' >' for labelling a range of numbers (NPC 3:3a)
• Partition numbers up to 1000 into hundreds, tens and ones and to derive other ways of partitioning them (NPC 3:3b)
• Relate knowledge of patterns on a 100 square to an array for 1000 and use patterns when finding numbers in different arrays and number squares (NPC 3:3e)

Explorer Progress Book 3b, pp. 10–11

After completing work on this activity group, give small focus groups of children their Explorer Progress Books and ask them to work through the challenges on the pages. As children complete the pages, assess what progress they are making with the central ideas from the activity group. Refer to the assessment opportunities for assistance.

Explore More Copymaster 11: Jigsaw 100

After completing work on Activity 2, give children Explore More Copymaster 11: Jigsaw 100 to take home.

Pupil Book 3, pp. 66–69

These pages in the Pupil Book provide further practice and challenging questions. You can use them to follow up the activities and deepen the learning.

Focus activities

1. Patterns in a 100 square
2. Relating the 100 square to the number line
3. Who is the tallest in our class?
4. Measuring metres and centimetres
5. Putting numbers in order
6. Organizing a raffle – reading and ordering 3-digit numbers
7. Using ranges of numbers to organize library books
8. Marking numbers on an empty number line
9. Marking numbers on a labelled number line
10. Beginning to understand a 'range of numbers'
11. Building a 1000 array for a class display

Calculating 8: Adding and subtracting multiples of 10 and 100

Key mathematical ideas Adding, Subtracting, Mathematical thinking and reasoning

Educational context

In order to think about efficient solutions to problems posed in these activities, children will need fluent recall of adding and subtracting facts of numbers to 10, and be able to transfer these to help them when adding and subtracting with multiples of 10 and 100. Children will also be using their understanding of place value with numbers to 100 and then to 1000.

For the activities in this group that involve money, children will need to be familiar with equivalent coin values for combinations of 10p, 20p and £1. They will also need to be familiar with strategies for bridging multiples of 10 when adding and subtracting and understand the associated language. This work is extended in Calculating 12 where children explore partitioning methods to add and subtract multiples of 10 and 100 to and from any number.

Learning opportunities

- To know that adding and subtracting facts of 10 can help when adding and subtracting multiples of 10 and 100 (ones + or − ones).
- To know that adding and subtracting facts of 10 can help when adding multiples of 10 to hundreds, tens and ones, and when subtracting multiples of 10 from hundreds, tens and ones (without crossing multiples of 10).
- To make connections between coin values and multiples of 10 and 100.

Terms for children to use

adding, subtracting, equal, hundreds, tens, ones, 'how much more', 'how much less', 'how many more', 'how many fewer', difference, 'multiples of 10', 'multiples of 100'

Assessment opportunities

Look and listen for children who:

- Use the terms for children to use effectively in discussion.
- Have fluent recall of adding and subtracting facts to 10 and can use these when adding and subtracting multiples of 10 and 100.
- Are connecting adding and subtracting multiples of 10 and 100 with coin values.
- Are relating finding the difference to finding 'how much more', 'how much less,' 'how many more', 'how many fewer'.
- Know how to add and subtract multiples of 10 to and from any 2- or 3-digit number.
- Know how to partition numbers to bridge to multiples of 10 when they are adding or subtracting single digits, or tens and ones.
- Record their ideas (note what model they use, how systematically they work).

NPC Milestone 3

- Use fluent recall of adding and subtracting facts to 10 when adding and subtracting multiples of 10 and multiples of 100, first whole tens or whole hundreds moving on to add whole tens and whole hundreds to 2- and 3-digit numbers (NPC 3:3p)

Explorer Progress Book 3b, pp. 12–13

After completing work on this activity group, give small focus groups of children their Explorer Progress Books and ask them to work through the challenges on the pages. As children complete the pages, assess what progress they are making with the central ideas from the activity group. Refer to the assessment opportunities for assistance.

Explore More Copymaster 22: Money Box

After completing work on Activity 3, give children Explore More Copymaster 22: Money Box to take home.

Pupil Book 3, pp. 70–73

These pages in the Pupil Book provide further practice and challenging questions. You can use them to follow up the activities and deepen the learning.

Focus activities

1. Using facts of 10 when adding multiples of 10 and 100
2. Finding differences between multiples of 10 and 100
3. More than and less than problems involving multiples of 10
4. More than and less than problems involving multiples of 100
5. Calculating change from multiples of 10 and 100
6. Adding and subtracting multiples of 10 to and from 2- and 3-digit numbers
7. Adding multiples of 10 and bridging hundreds
8. Subtracting multiples of 10 and bridging hundreds

Calculating 9: Patterns of similar adding and subtracting calculations

Key mathematical ideas Adding, Subtracting, Pattern, Mathematical thinking and reasoning

Educational context

As they work through the activities in this group, children will be using and applying all that they have learnt about adding and subtracting, together with their knowledge of number relationships and place value. The first focus activity has a low threshold, where children are adding and subtracting multiples of 10 in the context of saving (and spending) money, and the calculations are recorded systematically so that children can see the pattern emerging in the numerals. The focus activities then move on to look for patterns of similar calculations in several different contexts. This lays the groundwork for children to look carefully at the numbers involved in a calculation, and use what they recognize in the relationships between the numbers to think flexibly and decide whether the numbers could be adjusted to make the calculation easier.
Final focus activities provide opportunities for children to look carefully at different calculations, discuss which strategies might be used to solve them, and to practise the different methods they have explored. This activity group contains so much material that it should be revisited several times and will take longer than a week to cover. Using any of the suggestions for whole-class practice while working on other activity groups will help children to maintain fluency with calculating strategies and number facts.

Learning opportunities

- To understand patterns of similar calculations.
- To realize that patterns are easier to spot if they are recorded systematically.
- To develop understanding of equivalence.
- To understand and use compensating as an aid to calculating.
- To use known facts and place value to solve new problems (to add or subtract using facts of 10 within any decade and within hundreds) including doubles and near doubles facts.
- To solve empty-box problems.

Terms for children to use

adding, subtracting, equivalent, doubles, halves, multiples, commutative, associative, similar, patterns, adjusting, near to, more, less, difference, similar, compare, number trio, part, whole, 'complements to ten' and 'complements to one hundred' (referring to adding and subtracting facts of two numbers totalling 10 or 100)

Assessment opportunities

Look and listen for children who:
- Use the terms for children to use effectively in discussion.
- See and can continue a pattern of similar calculations.
- Are able to work systematically.
- Can spot and then know when to use a pattern of similar calculation in order to solve a calculation problem.
- Know when to adjust numbers to calculate efficiently.
- Can complete empty-box problems.

NPC Milestone 4

- Record work systematically in order to quickly spot patterns (NPC 3:4f)
- Explain how they are using place value and known number facts to solve similar calculations (NPC 3:4g)
- Use knowledge of equivalence and number relationships to adjust numbers involved in a variety of calculating situations and explain their reasoning (NPC 3:4h)
- Use fluent recall of doubles of numbers to 10 when solving problems that involve doubling and halving higher numbers (NPC 3:4i)
- Use fluent recall of adding and subtracting facts of 10 when finding complements to 100 (NPC 3:4j)

Explorer Progress Book 3b, pp. 14–15

After completing work on this activity group, give small focus groups of children their Explorer Progress Books and ask them to work through the challenges on the pages. As children complete the pages, assess what progress they are making with the central ideas from the activity group. Refer to the assessment opportunities for assistance.

Explore More Copymaster 23: Domino Doubles

After completing work on Activity 4, give children Explore More Copymaster 23: Domino Doubles to take home.

Pupil Book 3, pp. 74–77

These pages in the Pupil Book provide further practice and challenging questions. You can use them to follow up the activities and deepen the learning.

Focus activities

1. Similar calculations – ten more or less
2. Patterns of similar calculations within number trios
3. Using imagery to show equivalence in similar calculations
4. Doubling and halving in similar calculations
5. Near doubles in similar calculations
6. Complements to 100
7. Adjusting numbers to make calculations easier (compensating)
8. Further adjusting and compensating
9. Adjusting additions – non-computational reasoning
10. Adjusting subtractions – non-computational reasoning
11. Reasoning to decide on the most efficient strategy
12. Solving missing number problems

Pattern and Algebra 3: Reading and creating scales with different intervals

Key mathematical ideas Pattern, Mathematical thinking and reasoning

Educational context

In this activity group, children are bringing together knowledge of number lines with knowledge of sequences of multiples and applying this to reading scales on measuring instruments, including clock faces, and in data handling. As well as completing the suggested practice activities, remember to refer to these activities when children are measuring (time, mass, and capacity) and handling data.

Learning opportunities

- To know that sequences marked on measuring instruments are called scales.
- To be able to make connections between number lines and scales on measuring instruments.
- To realize that they can use knowledge of multiple sequences to label intervals on a scale, and to use knowledge of number relationships to read values in between marked intervals.
- To find out how to mark a bar graph with scales showing different intervals, and that it is easier to use larger intervals when working with a large amount of data.
- To realize that connections between multiples of 2 and 20; 5 and 50; and 25, 50 and 100 can be used when we want to increase or decrease the intervals on a scale.
- To count in multiples of 2, 5, 10, 20, 25, 50 and 100.

Terms for children to use

scales, measuring instruments, metre sticks, rulers, metres, centimetres, weighing scales, kilograms, grams, capacity vessels, litres, millilitres, clock face, minute hand, second hand, divisions, intervals, the difference between, the most, the least, more than, less than

Assessment opportunities

Look and listen for children who:
- Use the terms for children to use effectively in discussion.
- Are using knowledge of multiples to mark intervals on a scale.
- Are using knowledge of multiples to read scales where not
- every interval is marked.
- Are able to identify missing intervals by making connections
- with sequences of multiples.
- Can count in multiples of 2, 5, 10, 20, 25, 50 and 100

NPC Milestone 4

- Use knowledge of sequences of multiples to label intervals
- (NPC 3:4a)
- Use knowledge of number relationships to read values
- in-between marked intervals (NPC 3:4b)
- Count in multiples of 25 and 50 (NPC 3:4c)

Explorer Progress Book 3b, pp. 16–17

After completing work on this activity group, give small focus groups of children their Explorer Progress Books and ask them to work through the challenges on the pages. As children complete the pages, assess what progress they are making with the central ideas from the activity group. Refer to the assessment opportunities for assistance.

Explore More Copymaster 4: Broken Ruler

After completing work on Activity 2, give children Explore More Copymaster 4: Broken Ruler to take home.

Pupil Book 3, pp. 78–81

These pages in the Pupil Book provide further practice and challenging questions. You can use them to follow up the activities and deepen the learning.

Focus activities

1. Exploring scales on measuring instruments
2. Exploring multiples of 5 on the clock face
3. Creating bar charts with intervals of 2
4. Creating bar charts with intervals of 20
5. Exploring connections between intervals of 2 and 20
6. Exploring connections between intervals of 5 and 50
7. Creating a scale with intervals of 25

Numbers and the Number System 6: Finding halfway, rounding to the nearest 10 or 100

Key mathematical ideas Counting, Place value, Mathematical thinking and reasoning

Educational context

The activities in this group bring together children's understanding of the structure and relationships between multiples of 10 and multiples of 100 and other numbers. It also develops the work in the Pattern and Algebra 3 group of activities in which children work on sequences using measuring scales.

We often need to use rounding in everyday life, e.g. knowing whether to offer a £5 note or £10 note when paying for something, knowing which the nearest size is, etc. Therefore the activities are contextualized in measuring and scoring situations. Rounding is also useful in calculating, both when estimating the range of numbers within which a total is likely to fall, and also when deciding which calculating strategy to use.

Learning opportunities

- To develop place value understanding.
- To identify patterns in different arrangements of numbers.
- To compare and order numbers.
- To find halfway between two multiples of 10.
- To be able to round any 2- or 3-digit number to the nearest 10 or 100.

Terms for children to use

estimate, guess, about, nearly, approximately, exactly, hundreds, tens, ones, more, less, between, halfway, middle, nearest to, closest to, further away, lower, higher, compare, order, pattern, halfway between, round to, almost

Assessment opportunities

Look and listen for children who:

- Use the terms for children to use effectively in discussion.
- Confidently find numbers on the number line.
- Are able to explain relationships between the positions of numbers on the number line.
- Compare and order numbers.
- Find halfway between any multiples of 10.
- Confidently know the previous and next multiples of 10.
- Confidently know the previous and next multiples of 100.

NPC Milestone 4

- Find halfway between two multiples of 10 and two multiples of 100 (NPC 3:4d)
- Round any 2- or 3-digit number to the nearest 10 or 100 (NPC 3:4e)

Explorer Progress Book 3b, pp. 18–19

After completing work on this activity group, give small focus groups of children their Explorer Progress Books and ask them to work through the challenges on the pages. As children complete the pages, assess what progress they are making with the central ideas from the activity group. Refer to the assessment opportunities for assistance.

Explore More Copymaster 12: Running Track

After completing work on Activity 2, give children Explore More Copymaster 12: Running Track to take home.

Pupil Book 3, pp. 82–85

These pages in the Pupil Book provide further practice and challenging questions. You can use them to follow up the activities and deepen the learning.

Focus activities

1. Standing in the middle game
2. Finding halfway between multiples of 10
3. Finding halfway between multiples of 100 and 3-digit multiples of 10
4. Reading scales up to 1000
5. Estimating and measuring to the nearest metre
6. Using rounding when scoring a flying disc throwing contest
7. Rounding on the number line
8. Measuring to the nearest metre or 10 cm
9. Rounding to the nearest 100

Calculating 10: Learning multiplying facts and looking for patterns

Key mathematical ideas Multiplying, Mathematical thinking and reasoning

Educational context

This group of activities builds on earlier work on multiplying and widens children's experiences with differing forms of representation. The emphasis in the first two focus activities is on looking for patterns in sequences of multiples modelled with structured apparatus, as well as number lines and 100 squares. Children's work is recorded on empty number lines and as multiplication tables. Children are encouraged to relate multiples to products in the multiplication tables, and to recognize that some tables share common multiples.
In other activity groups, children will meet extended sequences of multiples but in this group the aim is to encourage them to become fluent with multiplication tables up to 12 × 2, 3, 4, 5, 8 and 10. By building sequences with Numicon Shapes and number rods, children have a visual image which helps them to understand connections between, and more easily recall, multiplication tables. Children will need to play the games suggested in the practice activities regularly to help them learn the multiplication tables.

Learning opportunities

• To connect sequences of multiples with products in multiplication tables.
• To realize that multiplying or dividing by 1 leaves the number being multiplied or divided unchanged.
• To realize that 'times 0' always produces 0.
• To connect ordinal and cardinal numbers.
• To realize that sometimes tables have common multiples.
• To become familiar with multiples represented with structured apparatus, the Numicon 1–100 cm Number Line, the 100 square and an empty number line.
• To develop fluent recall of the 2, 3, 4, 5, 8 and 10 times tables.

Terms for children to use

multiple, ordinal number words (first, second, third, etc.), product, times table, multiplication table, pattern, sequence, half, double

Assessment opportunities

Look and listen for children who:
• Use the terms for children to use effectively in discussion.
• Explain visual patterns of multiples, whether they are shown on a 100 square or a 0–100 number line.
• Know that when they are working with the four times table they can use the 2 times table to help them.
• Recognize that some multiples occur in (are common to) more than one multiplication table.
• Know when to multiply to help them solve a problem.

NPC Milestone 4

• Develop fluent recall of many facts from 2, 3, 4, 5, 8 and 10 times tables (NPC 3:4k)
• Recognize that some times tables have multiples in common (NPC 3:4l)
• Use doubling and halving as a strategy for deriving related multiplying facts between the 2, 4 and 8 times tables and between the 5 and 10 times tables (NPC 3:4m)

Explorer Progress Book 3b, pp. 20–23

After completing work on this activity group, give small focus groups of children their Explorer Progress Books and ask them to work through the challenges on the pages. As children complete the pages, assess what progress they are making with the central ideas from the activity group. Refer to the assessment opportunities for assistance.
Children will also have the opportunity to complete their Learning Log (pp. 22–23) where they can reflect on the mathematics they have done so far.

Explore More Copymaster 24: Frog Hop

After completing work on Activity 4, give children Explore More Copymaster 24: Frog Hop to take home.

Pupil Book 3, pp. 86–89

These pages in the Pupil Book provide further practice and challenging questions. You can use them to follow up the activities and deepen the learning.

Focus activities

1. What are times tables?
2. Investigating patterns in 2 and 10 times multiplying facts
3. Relating multiples of 2 on a number line to the 2 times table
4. Exploring relationships between the 2 and 4 times tables
5. Exploring relationships between the 2, 4 and 8 times tables
6. Looking for relationships between the 5 and 10 times tables on a 100 square

Calculating 11: Introducing the sharing structure of dividing

Key mathematical ideas Dividing partitioning structure (sharing), Mathematical thinking and reasoning

Educational context

This activity group provides an introduction to the sharing structure of dividing, and provides children with correspondence problems involving planning food and presents for a party and making sure that everyone gets a fair share. Connections are made between the sharing and grouping structures of dividing, through problems involving arrays. Children are encouraged to use the inverse relation with multiplying in all the activities. The final focus activities in this group introduce the idea of remainders in a sharing situation. It is important to be consistent in the language used when discussing the actions involved in dividing.

Learning opportunities

- To understand and use the language associated with the sharing structure of dividing.
- To find out how to model sharing dividing problems with structured apparatus and on empty number lines.
- To realize that the inverse relation between multiplying and dividing can help us to solve sharing problems.
- To see that arrays can show connections between grouping and sharing, as well as multiplying and dividing.
- To begin to realize that some sharing situations result in remainders.

Terms for children to use

parts, equal parts, divided by, divided between, divided into, 'how many … in …', multiplying, double, share, fair, groups, remainder, shared between, shared into, 'split into equal parts', divided equally

Assessment opportunities

Look and listen for children who:

- Use the terms for children to use effectively in discussion.
- Suggest modelling a sharing problem with structured apparatus or on an empty number line.
- Can show the action for the dividing sign in response to a 'sharing between' question.
- Know that, when they write dividing sentences using the ÷ symbol, the amount to be shared is always written first – whether or not the problem they are solving is expressed as '3 people share 18 sweets' or '18 sweets shared between 3 people'.
- Know how to write dividing sentences using the short division form, e.g. 3)18 =
- Are using the inverse relationship between multiplying and dividing to solve sharing dividing problems, e.g. can explain that knowing there are five 3s in 15 helps them to answer 15 shared between 3; and knowing how many 5s in 10 helps them to answer a problem where 10 is shared between 5.
- Can explain the inverse relationship between multiplying and dividing from an array, and are confident with writing number sentences for both operations.
- Can talk about remainders in sharing situations.

NPC Milestone 4

- Know that we use dividing to solve problems involving sharing as well as those involving grouping (NPC 3:4n)
- Know that there can be remainders in sharing situations (NPC 3:4o)
- Write dividing sentences in response to problems illustrated by arrays, Numicon Shapes or number rods (NPC 3:4p)
- Use the inverse relation between multiplying and dividing when solving sharing problems (NPC 3:4q)

Explorer Progress Book 3c, pp. 2–3

After completing work on this activity group, give small focus groups of children their Explorer Progress Books and ask them to work through the challenges on the pages. As children complete the pages, assess what progress they are making with the central ideas from the activity group. Refer to the assessment opportunities for assistance.

Explore More Copymaster 25: Picnic Basket

After completing work on Activity 2, give children Explore More Copymaster 25: Picnic Basket to take home.

Pupil Book 3, pp. 90–93

These pages in the Pupil Book provide further practice and challenging questions. You can use them to follow up the activities and deepen the learning.

Focus activities

1. Dividing in a sharing context
   Numicon Essentials ✧ **Y2/P3** Divide by sharing
   Numicon Essentials **Y3/P4** Divide by sharing and grouping
2. Using the language of sharing
   Numicon Essentials **Y2/P3** Divide by sharing
   Numicon Essentials **Y3/P4** Divide by sharing and grouping
3. Uniting the sharing and grouping structures of dividing using arrays
   Numicon Essentials **Y3/P4** Divide by sharing and grouping
4. Finding remainders in a sharing situation
   Numicon Essentials **Y3/P4** Divide a 2-digit number by a 1-digit number with remainders

Pattern and Algebra 4: Extending sequences and finding differences

Key mathematical ideas Pattern, Mathematical thinking and reasoning

Educational context

The activities in this group build on earlier work on the difference structure of subtracting, and on sequences including multiples. There is much opportunity to work systematically and to develop the specific vocabulary for discussing sequences and explaining rules unambiguously. The first activities in the group are made accessible to the majority of children by building the sequences with structured apparatus to help them make sense of the sequence in numerals. The level of difficulty in each of these activities can be extended to challenge all children.

Learning opportunities

• To realize the importance of taking time to look carefully for patterns in a sequence when trying to find its rule.
• To understand there are several stages to working out a rule for a sequence. When you have spotted a pattern, you can notice whether it is increasing or decreasing and then you can think about what the rule might be. They can be checked by finding the difference between a pair of consecutive numbers. Finally, you can test this by finding the difference between other pairs of consecutive numbers.
• To realize that the same sequence can be represented through different media and in different ways, e.g. with structured apparatus, numerals in a list arranged vertically, horizontally or in a grid, and that we follow the same stages to find the rule for a sequence, however it is represented.
• To use the vocabulary for describing sequences and realizing that it is important to be able to explain the rule clearly so that others can follow it, and that by following the rule the sequence can be extended and missing terms identified.

Terms for children to use

sequence, term, step, pattern, consecutive terms, multiple, rule, the sequence rule is, identify missing terms, more than, less than, difference between, sorting diagrams, ordinal number words (first, second, … tenth)

Assessment opportunities

Look and listen for children who:
• Can use the terms for children to use effectively in discussion.
• Are looking carefully at patterns and beginning to notice a rule.
• Are connecting increasing and decreasing patterns.
• Are able to compare consecutive numbers to find the difference.
• Are able to follow steps to find a rule, however the sequence is represented.
• Explain rules for sequences using the words ‘term’, ‘sequence’, ‘difference’, ‘increase’, ‘decrease’.

NPC Milestone 5

• Know that finding a constant difference is a useful strategy for finding the rule for a sequence (NPC 3:5a)

Explorer Progress Book 3c, pp. 4–5

After completing work on this activity group, give small focus groups of children their Explorer Progress Books and ask them to work through the challenges on the pages. As children complete the pages, assess what progress they are making with the central ideas from the activity group. Refer to the assessment opportunities for assistance.

Explore More Copymaster 5: Snake Sequences

After completing work on Activity 3, give children Explore More Copymaster 5: Snake Sequences to take home. with intervals of 25

Pupil Book 3, pp. 94–97

These pages in the Pupil Book provide further practice and challenging questions. You can use them to follow up the activities and deepen the learning.

Focus activities

1. Exploring the sequence of odd numbers
2. Looking for rules
3. Following rules to extend sequences
4. Identifying first difference
5. Sequences with decreasing patterns
6. Finding missing numbers in sequences
7. Identifying sequences on a 100 square

Calculating 12: Partitioning strategies for adding and subtracting

Key mathematical ideas Adding, Subtracting, Pattern, Mathematical thinking and reasoning

Educational context

This activity group draws on children's understanding of place value and adding and subtracting, as they think about ways of solving problems involving crossing multiples of 10 and 100. There is an emphasis on encouraging children to think carefully about the numbers they are working with to decide which would be the most efficient method to use. The focus activities are designed to be followed in order to build a foundation for later written methods.

Learning opportunities

• To notice which digits change when adding or subtracting multiples of 10 and 100.
• To find out how to use partitioning to help when we are adding and subtracting 2- and 3-digit numbers.
• To understand that numbers can be partitioned in different ways.
• To realize that thinking carefully about the relationships between the numbers in a problem helps when we are deciding how to partition the numbers and the best calculating method to use.

Terms for children to use

adding, subtracting, multiple, bridging, partitioning, doubling

Assessment opportunities

Look and listen for children who:
• Use the terms for children to use effectively in discussion.
• Can explain which digits change when they add or subtract multiples of 10 and 100 to or from any number.
• Use partitioning when adding or subtracting 2- and then 3-digit numbers.
• Think about which method of adding or subtracting to use when they are working on a calculating problem, and choose an efficient method.

NPC Milestone 5

• Use partitioning into hundreds, tens and ones as a strategy for adding and subtracting 2- and 3-digit numbers (NPC 3:5d)
• Use structured apparatus when adding and subtracting 2- and 3-digit numbers to show understanding of how these are partitioned, regrouped, recombined or redistributed and can transfer this to a written method of recording in columns (NPC 3:5e)

Explorer Progress Book 3c, pp. 6–7

After completing work on this activity group, give small focus groups of children their Explorer Progress Books and ask them to work through the challenges on the pages. As children complete the pages, assess what progress they are making with the central ideas from the activity group. Refer to the assessment opportunities for assistance.

Explore More Copymaster 26: Raffle Tickets

After completing work on Activity 4, give children Explore More Copymaster 26: Raffle Tickets to take home.

Pupil Book 3, pp. 98–101

These pages in the Pupil Book provide further practice and challenging questions. You can use them to follow up the activities and deepen the learning.

Focus activities

1. Developing mental strategies to add and subtract multiples of 10 and 100 to or from 2- and 3-digit numbers
2. Developing mental strategies to add 2- or 3-digit numbers without crossing multiples of 10
3. Developing mental strategies to subtract 2- or 3-digit numbers without crossing multiples of 10
4. Developing mental strategies for doubling 2-digit numbers and crossing 10s
5. Developing mental strategies to add 2-digit numbers crossing 10s
6. Crossing 10s and 100s when adding, adding ones first
7. Subtracting tens and ones from tens and ones crossing 10s

Measurement 1: Telling the time to the minute on the 12-hour clock

Key mathematical ideas Duration, Telling the time, Equivalence

Educational context

In this activity group children continue and extend their work in the *Geometry, Measurement and Statistics 2 Teaching Resource Handbook*, Measurement 7 on telling time and using clocks. In common with other measurement activity groups, there is a focus on increased precision and accuracy, as children move on from telling time on an analogue clock in 5-minute intervals to using 1-minute intervals. Alongside this, they are introduced to time displayed to the nearest minute on 12-hour digital clocks.

As part of this work children are invited to explore in more detail the relationship between hours and minutes. They are introduced to equivalent conventions for reading times: either as minutes 'past' or 'to' the hour, for example '20 to 8', or in hours and minutes past the hour, for example '7:40' – the first being most clearly displayed on an analogue clock, and the second on a digital clock.

Children are introduced here to Roman numerals in the practical context of analogue watch and clock faces. This represents an opportunity to encourage children to revisit their understanding of numbers and numerals and perhaps to think about how difficult it might be to do arithmetic with Roman numerals.

In the final activity children use what they have learned to help them calculate with times, finding the time a given number of minutes earlier or later, or the number of minutes between two given times. Adjust the numbers and steps involved to offer children a level of challenge appropriate to their growing understanding and fluency.

Throughout these activities, you can support children to develop and refine their understanding of time by providing a range of examples of clock designs and prompting them to notice the many different places and contexts in which they encounter time displays in the course of a day, including on most electronic devices and many household appliances.

Encourage them to make full use of the illustrative resources and instruments available to them, and involve them in plenty of discussion about what they do, see and imagine as they work.

Learning opportunities

- To read and interpret Roman numerals up to XII on an analogue clock.
- To tell the time to the minute on an analogue clock.
- To tell the time to the minute on a 12-hour digital clock.
- To find the time a given number of minutes earlier or later.

Terms for children to use

second, minute, hour, o'clock, how long, before, after, earlier, later, analogue, digital, Roman numerals, Arabic numerals, clock, watch

Assessment opportunities

Look and listen for children who:

- Use the terms for children to use effectively.
- Read and use Roman numerals up to XII correctly.
- Tell the time on analogue clocks using Roman and Arabic numerals.
- Tell the time on 12-hour digital clocks, including a given number of minutes earlier and later.
- Understand that there are 60 minutes in an hour.
- Understand when to say 'past' and 'to' when talking about time.

GMS Milestone 2

- Tell times to the nearest minute, both past and to, shown on analogue clocks (GMS 3:2a)
- Discuss differences and similarities between digital and analogue clocks including analogue clocks with Roman numerals, and explain how they display the time (GMS 3:2b)
- Say times shown on a 12-hour digital clock (GMS 3:2c)
- Calculate a given number of minutes earlier and later than times shown on a 12-hour digital clock (GMS 3:2d)

Explorer Progress Book 3, pp. 8–9

After completing work on this activity group, give small focus groups of children their Explorer Progress Books and ask them to work through the challenges on the pages. As children complete the pages, assess what progress they are making with the central ideas from the activity group. Refer to the assessment opportunities for assistance.

Explore More Copymaster 5: Roman Numerals

After completing work on Activity 1, give children Explore More Copymaster 5: Roman Numerals to take home.

Pupil Book 3, pp. 102–105

These pages in the Pupil Book provide further practice and challenging questions. You can use them to follow up the activities and deepen the learning.

Focus activities

1. Introducing Roman numerals
2. Telling the time with Roman numerals
3. Telling the time on a 12-hour digital clock
4. Telling the time to the nearest minute on an analogue clock
5. Finding the time a given number of minutes earlier or later (without bridging the hour)

Measurement 2: Exploring units of time

Key mathematical ideas Duration, Telling the time, Standard units, Ordering, Equivalence

Educational context

In this activity group children build on their work in Measurement 1, to consider different units of time, from seconds to millennia.
They begin with their understanding of the 12-hour clock, connecting ideas and images of 'linear' and 'cyclical' time to address the idea that there are two 12-hour cycles making up each 24-hour day. Conventional terms related to time of day, including 'midnight', 'midday', 'noon', 'a.m.' and 'p.m.', are discussed in this context. Children then move on from calculating with times within the hour, in Measurement 1, to solving problems involving bridging the hour and a 12-hour cycle, for example by working out the elapsed time between 10:30 p.m. one day and 6:30 a.m. the next.
The later activities in the group involve children in exploring the hierarchy of timescales, starting with an investigation into the number of seconds in a minute and finishing by looking at the structure of year numbers as they relate to decades, centuries and millennia. As part of this work, children order the various units of time and identify the relationships between them – the number of days in a week, and days and weeks in a year, for example – and consider the calendar in more detail, including the order of the months and the number of days in each.
Children encounter these ideas in practical and personal contexts, such as the date of their birthday or the year of their birth. You can also extend and reinforce this at other times, for example using the daily or weekly timetable and the school year to provide a meaningful context for children to make predictions and to refine their language for, and understanding of, temporal relationships and units of time.

Learning opportunities

- To become familiar with the relationship between different units of time, e.g. the number of seconds in a minute, hours in a day, days in a week, months in a year.
- To solve problems involving time, e.g. by finding elapsed time.
- To name and order the months of the year and give the number of days in each.
- To use conventional time-related vocabulary correctly, including terms such as 'a.m.' and 'p.m.', 'noon', 'midday' and 'midnight'.

Terms for children to use

second, minute, hour, day, week, month, year, leap year, how long, before, after, earlier, later, a.m., p.m., morning, afternoon, noon, midnight, analogue, digital, 12 hours,
24 hours, clock, duration, watch, elapsed time

Assessment opportunities

Look and listen for children who:
- Use the terms for children to use effectively.
- Know how many seconds there are in a minute, days in each month, months in a year.
- Compare and order different units of time.
- Compare and calculate the duration of events in 24 hours.

GMS Milestone 2

- Use terms such as midday, midnight, a.m. and p.m. to explain how time progresses and is labelled in a 24-hour day (GMS 3:2e)
- Find and compare durations of time across 24 hours, including times starting at half past the hour (GMS 3:2f)
- Compare and order units of time, and know the number of seconds in a minute, minutes in an hour and hours in a day (GMS 3:2g)
- Recall, or know how to work out, the number of days in each month and the number of days in a year, or leap year
(GMS 3:2h)

Explorer Progress Book 3, pp. 10–11

After completing work on this activity group, give small focus groups of children their Explorer Progress Books and ask them to work through the challenges on the pages. As children complete the pages, assess what progress they are making with the central ideas from the activity group. Refer to the assessment opportunities for assistance.

Explore More Copymaster 6: How Much Time?

After completing work on Activity 2, give children Explore More Copymaster 6: How Much Time? to take home.

Pupil Book 3, pp. 106–109

These pages in the Pupil Book provide further practice and challenging questions. You can use them to follow up the activities and deepen the learning.

Focus activities

1. Making sense of the 24-hour day
2. Time duration across 24 hours
3. Exploring seconds, minutes, hours, days and weeks
4. Exploring days and months in a year
5. Exploring years, decades, centuries and millennia

Calculating 13: Using apparatus and imagery to introduce the written column method for adding

Key mathematical ideas Adding, Mathematical thinking and reasoning

Educational context

This activity group brings together children's earlier work on place value, partitioning, and fluency with adding facts. A column method for adding is introduced, at a time when children are meeting numbers that are too big to add mentally. Children are encouraged to use rounding in order to help make a sensible estimate of the total before they calculate. The first focus activities involve adding numbers where it is easier to group the tens first and then the ones. In the later activities, adding involves crossing multiples of 10, where it is easier to add the ones first and then the tens. A hundreds, tens and ones abacus provides another helpful structured model for introducing a column method. The final focus activity encourages children to use their understanding of number relationships to decide whether to use a column method for adding or to add mentally.

Learning opportunities

• To learn that looking at the relationships between numbers being added helps us decide the most efficient method for adding them.
• To understand that it is often helpful to use a column method when numbers are too difficult to add mentally.
• To know that rounding numbers can help when making a sensible estimate of the total.
• To learn to use estimation as a way of checking that we have arrived at a reasonable answer.
• To relate different structured models for representing hundreds, tens and ones, in order to support pencil and paper methods.

Terms for children to use

collection, combining, group, regroup, carry, digit, total, tens, ones, partitioning, column method, estimate, base-ten apparatus

Assessment opportunities

Look and listen for children who:
• Use the terms for children to use effectively in discussion.
• Use apparatus to partition when adding 2- and 3-digit numbers, and regroup the numbers to find the total.
• Transfer action with the hundreds, tens and ones frame and base-ten apparatus to a written method of recording in columns.
• Use rounding to make a sensible estimate before they calculate, and who use this estimate to check their answer.
• Can use a hundreds, tens and ones abacus to add 3-digit numbers.

NPC Milestone 5

• Choose whether a mental or column method is the most appropriate before solving different adding and subtracting problems (NPC 3:5b)
• Use rounding when making a reasonable estimate of the possible answer to an adding or subtracting problem (NPC 3:5c)
• Add or subtract amounts of money over £1 using a written method (NPC 3:5g)

Explorer Progress Book 3c, pp. 8–9

After completing work on this activity group, give small focus groups of children their Explorer Progress Books and ask them to work through the challenges on the pages. As children complete the pages, assess what progress they are making with the central ideas from the activity group. Refer to the assessment opportunities for assistance.

Explore More Copymaster 27: Treasure Chest

After completing work on Activity 2, give children Explore More Copymaster 27: Treasure Chest to take home.

Pupil Book 3, pp. 110–113

These pages in the Pupil Book provide further practice and challenging questions. You can use them to follow up the activities and deepen the learning.

Focus activities

1. Grouping and regrouping with tens and ones
2. Adding hundreds, tens and ones
3. Adding a list of tens and ones numbers
4. Adding on a hundreds, tens and ones abacus
5. Adding amounts of money over £1 using a written method
6. Knowing when to use the column method for adding

Calculating 14: Using apparatus and imagery to support subtracting and introducing the written column method

Key mathematical ideas Adding, Subtracting, Place value, Pattern, Mathematical thinking and reasoning

Educational context

This activity group involves handling larger, more awkward calculations and bringing together everything children have already learned on subtracting before introducing the column method as a more efficient way to do subtracting when the numbers are more difficult to work with mentally. Discussion of a range of increasingly difficult subtractions is central, involving all subtraction structures. Importantly, children are asked, 'Is there anything we could do to this calculation to make it easier, before we actually do it?' Children go on to explore ways of adjusting the numbers involved, and knowing when to use a mental or a written method for subtracting.
They are introduced to the column method of subtracting in the final activities, initially with examples that do not involve redistributing and then with some carefully chosen examples that do. Children will need plenty of time to discuss and illustrate these ideas with apparatus, particularly the idea of redistribution which is developed in more detail in Number, Pattern and Calculating 4.

Learning opportunities

• To understand that thinking carefully about the relationships between numbers in a calculation is helpful when choosing whether to use a mental or written method for subtracting.
• To understand that it is useful to make an estimate before calculating, and to use this to check that the solution is reasonable.
• To understand that the inverse relationship between adding and subtracting means that addition can be used to check subtraction and vice versa.
• To begin to use the column method for subtracting.

Terms for children to use

compare, add, subtract, add on, inverse, difference, columns, digit, between, more than, less than, mental method, redistribute, exchange, written column method, estimate, check, calculate

Assessment opportunities

Look and listen for children who:
• Use the terms for children to use effectively in discussion.
• Understand that the difference between two numbers can be calculated by adding or subtracting.
• Can jot down the stages in calculating a subtracting problem.
• Use knowledge of number relationships when deciding which method to use for subtracting, and who choose the most appropriate method for particular problems.
• Can solve a subtracting problem using the column method.

NPC Milestone 5

• Illustrate mental strategies for adding and subtracting 2- and 3-digit numbers on an empty number line (NPC 3:5f)
• Use the inverse relation between adding and subtracting to check solutions to calculations (NPC 3:5h)

Explorer Progress Book 3c, pp. 10–11

After completing work on this activity group, give small focus groups of children their Explorer Progress Books and ask them to work through the challenges on the pages. As children complete the pages, assess what progress they are making with the central ideas from the activity group. Refer to the assessment opportunities for assistance.

Explore More Copymaster 28: Snail Race

After completing work on Activity 1, give children Explore More Copymaster 28: Snail Race to take home.

Pupil Book 3, pp. 114–117

These pages in the Pupil Book provide further practice and challenging questions. You can use them to follow up the activities and deepen the learning.

Focus activities

1. Finding the difference between two numbers on a number line
2. Developing mental methods and imagery for subtracting
3. Comparing methods of subtracting
4. Using imagery and apparatus to support mental methods of subtracting with 3-digit numbers when the numbers are close together
5. Introducing a column method for subtracting
6. Introducing the idea of redistribution in the column method for subtracting

Calculating 15: Exploring ratio and scaling problems and introducing the short written methods of multiplying and dividing

Key mathematical ideas Multiplying, Dividing, Mathematical thinking and reasoning

Educational context

This activity group builds on work in the earlier multiplying and dividing activity groups. Children meet the term 'multiplying by' and are introduced to the scaling structure of multiplication by building towers and then enlarging them. The ratio structure of division is introduced as children compare model towers and discuss how many times smaller one is than the other, larger one. In both structures, children explore correspondence problems, e.g. the number of beads in a necklace three times as long or the number of cubes in a tower three times smaller. Later activities give children the opportunity to generalize about multiplying and dividing by 10 and introduce them to the short written methods. Children will need plenty of time to discuss these methods and to illustrate them with apparatus.

Learning opportunities

• To relate the language 'times' and 'multiplied by' to problems that involve the scaling structure of multiplication, and the language 'divided by' to the ratio structure of division, where models are reduced to half the size and three times smaller.
• To discover the rule that multiplying by 10 has the effect of shifting all digits one place to the left, and that zero is then needed as a place holder in the ones place.
• To discover the rule that dividing by 10 has the effect of shifting all digits one place to the right.
• To use the short written methods of multiplying and dividing.

Terms for children to use

multiplied by, twice, scaling up, double, trio, divided by, times smaller, 'half the size', times bigger, times larger, times longer, equal, equally, shared by, between, groups, times smaller, 'enlarged by a scale of', short method of multiplying/ dividing, carry, regroup, redistribute

Assessment opportunities

Look and listen for children who:
• Use the terms for children to use effectively in discussion.
• Can explain that multiplying a number by 2 is the same as doubling it, and will make it twice as big.
• Are using the language 'multiplied by' when describing by how much they are enlarging a model.
• Can read multiplying sentences such as 5 × 3 = 15 by saying 'five multiplied by three equals fifteen' as well as 'five times three equals fifteen'.
• Can make up their own 'multiplied by' stories and illustrate these with a multiplying sentence.
• Can explain that dividing a number by 2 will result in making it half the size.
• Can explain that multiplying by 0 will always result in 0 and that multiplying a number by 1 will leave it unchanged.
• Can generalize about multiplying and dividing by 10.
• Can explain the short methods of multiplying and dividing

NPC Milestone 5

• Illustrate scaling up and ratio problems with structured apparatus and use the language of scaling and ratio to explain their solutions (NPC 3:5i)
• Make general statements about what happens when multiplying and dividing by 10 (NPC 3:5j)
• Illustrate and find solutions to multiplying and dividing problems involving teen numbers using structured apparatus and recall of facts (NPC 3:5k)

Explorer Progress Book 3c, pp. 12–13

After completing work on this activity group, give small focus groups of children their Explorer Progress Books and ask them to work through the challenges on the pages. As children complete the pages, assess what progress they are making with the central ideas from the activity group. Refer to the assessment opportunities for assistance.

Explore More Copymaster 29: Seal Balance

After completing work on Activity 1, give children Explore More Copymaster 29: Seal Balance to take home.

Pupil Book 3, pp. 118–121

These pages in the Pupil Book provide further practice and challenging questions. You can use them to follow up the activities and deepen the learning.

Focus activities

1. How many times taller?
2. Using Numicon Shapes to explore the language 'multiplied by'
3. How many times smaller?
4. How many times longer?
5. Multiplying and dividing by 10
6. Finding a rule for multiplying and dividing by 10
   Numicon Essentials **Y3/P4** Multiply a 2-digit number by a 1-digit number with no exchanging
7. Introducing the short-written method of multiplying
   Numicon Essentials **Y3/P4** Multiply a 2-digit number by a 1-digit number with exchanging
8. Introducing the short-written method of dividing

Measurement 3: Measuring accurately and calculating with metres, centimetres and millimetres

Key mathematical ideas Length and distance, Equivalence, Standard units

Educational context

In the *Geometry, Measurement and Statistics 2, Teaching Resource Handbook* children were introduced to centimetres and metres as standard units of length, and to measuring with centimetre and metre rulers. Here they continue to build on this work, in the practical problem-solving context of designing a flower bed for a competition.

They revisit the idea that a variety of terms can be used to refer to length, including 'length', 'width', 'height', and 'thickness', in relation to the task of measuring pieces of wood to make a frame for their flower bed. It is also in this context that children are introduced to millimetres (and the abbreviation 'mm') as a smaller standard unit which allows them to measure length more exactly. As well as encouraging the development of children's practical measuring skills this provides an informal introduction to the important concept of measurement accuracy.

Children explore the use of units, including mixed units, in more detail, making use of the relationships between them to find and record equivalents, such as 1 m 45 cm = 145 cm, and identify simple fractions, for example 50 cm as half a metre, 5 mm as half a centimetre. Explaining the origins of units' prefixes may be useful here; for example you can encourage children to link the information that 'centi-' comes from a word meaning 'hundred' and 'milli-' from a word meaning 'thousand' to the number of centimetres and millimetres in a metre.

The activities in this group encourage children to develop their mental imagery relating to measurement. Thus solving the problem of how to make their flower bed frame requires them to visualize its construction and to calculate with given (rather than measured) lengths. In relation to the number content of these activities, ensure children are comfortable with calculating, as covered in, for example, the *Number, Pattern and Calculating 3, Teaching Resource Handbook*, Calculating 8 and 9, and 12–14.

Finally, children are also invited, in these activities, to make connections between measurement and geometry, and are introduced to the idea of 'perimeter' as the distance around an object, echoing their work in Geometry 2 on making journeys around shapes.

Learning opportunities

- To use measuring instruments such as rulers, tape measures and trundle wheels accurately.
- To know there are 10 millimetres in a centimetre and to measure lengths to the nearest millimetre.
- To use abbreviations such as 'mm', 'cm' and 'm' correctly.
- To calculate the perimeter of simple shapes.
- To estimate lengths in millimetres, centimetres and metres.
- To use tally charts and pictograms to record and present data.

Words and terms for use in conversation

measure, measurement, ruler, length, width, depth, thickness, height, long, wide, smaller, larger, difference, metre, centimetre, millimetre, equivalent, longer, wood, accurate, estimate, dimensions

Assessment opportunities

Look and listen for children who:

- Use the terms for children to use effectively.
- Express lengths using more than one unit e.g. 2 cm 5 mm.
- Convert between units e.g. 20 mm = 2 cm.
- Give reasonable approximations of length.
- Add two or more lengths given in mixed units.
- Calculate the difference between two lengths.
- Calculate the perimeter of simple shapes.
- Can use a tally chart to record data correctly.
- Can construct a pictogram in which each symbol represents more than one item.

GMS Milestone 3

- Show understanding of metres, centimetres and millimetres, by making sensible estimates of lengths using suitable units (GMS 3:3a)
- Convert between metres and centimetres, and centimetres and millimetres (GMS 3:3b)
- Solve real-life measure problems by adding and subtracting lengths, including those given in mixed units (GMS 3:3c)
- Measure accurately to calculate the perimeter of rectangular shapes (GMS 3:3d)
- Complete tally charts and pictograms to collect and present data, then discuss their findings (GMS 3:3e

Explorer Progress Book 3, pp. 12–13

After completing work on this activity group, give small focus groups of children their Explorer Progress Books and ask them to work through the challenges on the pages. As children complete the pages, assess what progress they are making with the central ideas from the activity group. Refer to the assessment opportunities for assistance.

Explore More Copymaster 7: Comparing and Measuring Lengths

After completing work on Activity 4, give children Explore More Copymaster 7: Comparing and Measuring Lengths to take home.

Pupil Book 3, pp. 122–125

These pages in the Pupil Book provide further practice and challenging questions. You can use them to follow up the activities and deepen the learning.

Focus activities

1. Understanding equivalent units
2. Calculating perimeter
3. Measuring in millimetres
4. Converting between millimetres, centimetres and metres
5. Calculating with lengths
6. Collecting voting data using a tally chart and presenting it in a pictogram

Measurement 4: Calculating with pounds and pence, and handling money

Key mathematical ideas Money, Equivalence, Scaling

Educational context

In the *Geometry, Measurement and Statistics 2, Teaching Resource Handbook* children were introduced to coins and banknotes, up to the value of £20. They explored the relative values of the different denominations and looked at finding totals, paying, and giving and getting change. The activities and practices in this group build on this work to consolidate children's understanding and begin to apply it to solving a variety of problems in the practical context of planning a fictional class party.

Children begin by revisiting the relationship between pounds and pence. Based on the known equivalence of 100p = £1, they compare the relative values of the different coins and find the value in pence of the different notes. They then total and find the difference between money amounts given in 'mixed units' of pounds and pence, in order to buy and pay for party decorations. Next, in the course of buying prizes for their party, children practise totalling, rounding, and giving and checking change, then calculate how much money they have to spend as a class, how much they have spent and how much is left over altogether. Finally, they solve scaling problems in order to buy food and drinks for the party, calculating with more and larger amounts. It is also in this context that they encounter ideas related to money management, and solve the problem of their limited budget by buying in bulk.

Note that, as in the *Number, Pattern and Calculating 3, Teaching Resource Handbook* money amounts that include both pounds and pence are given using conventional decimal notation, e.g. £3.10. This is a first step towards understanding decimal notation, and provides an opportunity for children to explore place value and partitioning as well as different ways of representing the same price.

More generally, ensure that children's understanding of the numbers and calculating involved in these activities is secure, in particular that they are familiar with multiplying and dividing by 10, partitioning, and bridging when adding and subtracting. (See, in particular, Calculating 12–15 in the *Number, Pattern and Calculating 3 Teaching Resources Handbook*.)

Learning opportunities

- To use coins and notes confidently.
- To use understanding of the relative values of the different coins and notes to make up the same money amounts in different ways.
- To understand transactions involving multiple items.
- To work out change.
- To appreciate ideas such as budgeting and money management.

Terms for children to use

coin, note, money, value, pound, pence, spend, change, cost, price, budget, more, less, total, sum, difference, calculate, afford

Assessment opportunities

Look and listen for children who:

- Use the terms for children to use effectively.
- Understand the relationship between the values of coins and notes, and that £1 is worth the same as 100p or one hundred 1p coins.
- Make given values using different combinations of coins and notes.
- Calculate the change needed in a transaction.
- Work systematically to solve a mathematical problem involving money.
- Can multiply and total amounts of money.

GMS Milestone 3

- Use mathematical apparatus to model and discuss the relationship between the values of 1p, 10p and £1 coins (GMS 3:3f)
- Make given amounts of money up to £10, using the fewest coins and/or notes (GMS 3:3g)
- Calculate the total of two prices given in pounds and pence, and discuss their strategy e.g. adjusting, rounding (GMS 3:3h)
- Decide if goods are affordable, given a certain budget, and calculate the change they should receive (GMS 3:3i)

Explorer Progress Book 3, pp. 14–15

After completing work on this activity group, give small focus groups of children their Explorer Progress Books and ask them to work through the challenges on the pages. As children complete the pages, assess what progress they are making with the central ideas from the activity group. Refer to the assessment opportunities for assistance.

Explore More Copymaster 8: Giving Change

After completing work on Activity 3, give children Explore More Copymaster 8: Giving Change to take home.

Pupil Book 3, pp. 126–129

These pages in the Pupil Book provide further practice and challenging questions. You can use them to follow up the activities and deepen the learning.

Focus activities

1. Exploring the value of pound coins and notes in pence
2. Finding total amounts and paying in notes and coins
3. Receiving change
4. Adjusting and totalling money amounts
5. Buying multiple items and working out total savings

Calculating 16: Making connections between dividing into equal parts and calculating with fractions

Key mathematical ideas Dividing, Fractions as operators, Mathematical thinking and reasoning

Educational context

This activity group builds on children's earlier work on the sharing structure of division, and explores finding half and a quarter of numbers and collections of objects in a range of contexts including correspondence problems. These activities lead children to discover fractions as the results of dividing calculations and to understand the relation between unit fractions as operators and division by integers. As these ideas are difficult, and the language and notation may be unfamiliar, it is suggested that children work slowly through the activities and have as much opportunity as possible for discussion.

Learning opportunities

- To know that two equal parts of a whole are called halves, and that this can be written as $\frac{1}{2}$ and read as 'one half', or just 'half'.
- To know that even numbers can be shared equally into two whole number parts, and that an efficient way to halve larger numbers is to partition them into tens and ones and find half of each part.
- To realize that halving odd numbers will always result in one whole left over which can be split into two halves, and that when dividing an odd number of objects into two or more parts, what happens to the remainder will depend on the kinds of objects involved.
- To know that four equal parts of a whole are called quarters, and that each can be written as $\frac{1}{4}$ and read as 'one quarter'.
- To know that we can divide something into four parts by finding half and half again.
- To know that dividing by 2 is the same thing as finding $\frac{1}{2}$.
- To know that dividing by 4 is the same thing as finding $\frac{1}{4}$.

Terms for children to use

shared between, dividing, between, equal, divided into, 'share into equal parts', 'divided into equal parts', fair, remaining, left over, horizontal, split, halve, half, quarter, remainder, equals, partition, even, odd, 'half and half again'

Assessment opportunities

Look and listen for children who:
- Use the terms for children to use effectively in discussion.
- Notice that even numbers can be shared into two equal parts
- Notice that odd numbers cannot be shared equally into two parts and that there will always be 1 remaining.
- Realize that, when halving an odd number, the remaining 1 can be halved but that this may not work in a real-world situation where the objects being shared cannot physically be cut in half.
- Understand that dividing by 2 or 4 is the same as finding a half or a quarter.

NPC Milestone 6

- Fluently recall double and half facts and use these to find halves and quarters of numbers within their working range (NPC 3:6b)
- Make connections between unit fractions as operators and division by integers (e.g. connect halving and quartering with dividing by 2 and 4, and finding thirds with dividing by 3) (NPC 3:6c)
- Interpret remainders as fractions and notice that the context will affect how we deal with the remainder when dividing odd numbers into two or four parts (NPC 3:6d)
- Differentiate between finding half of a number and finding how many halves are in a number (NPC 3:6e)

Explorer Progress Book 3c, pp. 14–15

After completing work on this activity group, give small focus groups of children their Explorer Progress Books and ask them to work through the challenges on the pages. As children complete the pages, assess what progress they are making with the central ideas from the activity group. Refer to the assessment opportunities for assistance.

Explore More Copymaster 30: Hexagon Halving

After completing work on Activity 3, give children Explore More Copymaster 30: Hexagon Halving to take home.

Pupil Book 3, pp. 130–133

These pages in the Pupil Book provide further practice and challenging questions. You can use them to follow up the activities and deepen the learning.

Focus activities

1. Introducing fractions in a dividing situation
2. Halving multiples of 10
3. Halving any number
4. Finding how many halves
5. Finding a quarter by dividing into 4 parts
6. Finding how many quarters

Measurement 5: Measuring and calculating with grams and kilograms

Key mathematical ideas Mass and weight, Equivalence, Standard units, Scaling

Educational context

In the *Geometry, Measurement and Statistics 2, Teaching Resource Handbook* children were introduced to kilograms and grams as standard units, and to measuring with balance scales. In this activity group they consolidate their understanding of these units and develop their practical measuring skills in the problem-solving context of baking. In the course of this work children can weigh and handle real ingredients, and bake, decorate and sell a batch of cakes; alternatively, adapt the activities to use other resources to represent the ingredients – sand for flour, modelling dough for butter, and so on – and invite children to role-play the cake sale. Children begin by exploring the use of kitchen scales with a marked dial for weighing out ingredients. This leads them to look more closely at kilograms and grams and the relationship between these units: they identify that there are 1000 g in 1 kg and make use of scale intervals to explore what this means, finding the gram equivalents of quarter, half and three quarters of a kilogram, and recording measurements in mixed units (for instance as 1 kg 300 g). As in other areas of geometry and measurement, understanding the word origins of the conventional terms they are asked to use may be helpful to children here: encourage them to link the fact that the prefix 'kilo-' comes from a word meaning 'thousand' to the number of grams in a kilogram.

The later activities in this group invite children to solve problems by reasoning about and calculating with measures: they scale up amounts of ingredients, calculate how much of each ingredient they will have left over, and work out how many baking trays they are going to need. Finally, children conduct, or role play, a cake sale, calculating totals and change. They use this as an opportunity to collect data and represent it on a bar chart, choosing appropriate intervals for the scale.

Ensure that children's understanding of the numbers and calculating involved in these activities is secure, in particular that they are comfortable using numbers to 1000 (covered in *Number, Pattern and Calculating 3, Teaching Resource Handbook* Numbers and the Number System 5), calculating (covered in Calculating 8, 9 and 12–15), and understanding and using intervals (covered in Pattern and Algebra 3).

Learning opportunities

- To understand and use quantities in the context of a recipe.
- To weigh and compare different quantities of ingredients using a marked scale.
- To understand how to 'scale' quantities in a recipe.
- To collect, present, and interpret data to evaluate the popularity of different cakes.
- To appreciate why a graph or chart can be helpful when analysing and interpreting data.

Terms for children to use

grams, kilograms, mass, weight, larger, smaller, heavier, lighter, quantity, frequency, proportion, compare, how much, more, less, weigh, scales, equal, equivalent, ingredients

Assessment opportunities

Look and listen for children who:
- Use terms for children to use effectively.
- Read and measure out quantities of dry ingredients.
- Correctly double amounts to 'scale up' a recipe.
- Collate and read data using a tally chart.
- Create a bar chart to present data from a table.
- Use a chart to analyse data and draw conclusions.

GMS Milestone 4

- Use a dial weighing scale to measure individual amounts in 100 g increments, up to 5 kg (GMS 3:4a)
- Recognize equivalences between g and kg, e.g. 1000 g = 1 kg, 500 g = $\frac{1}{2}$ kg, 250 g = $\frac{1}{4}$ kg (GMS 3:4b)
- Find the total mass of two or more items and the difference in mass between items (GMS 3:4c)
- Interpret word problems involving mass, modelling with weights or other apparatus, as appropriate (GMS 3:4d)

Explorer Progress Book 3, pp. 16–17

After completing work on this activity group, give small focus groups of children their Explorer Progress Books and ask them to work through the challenges on the pages. As children complete the pages, assess what progress they are making with the central ideas from the activity group. Refer to the assessment opportunities for assistance.

Explore More Copymaster 9: Recipe Shopping

After completing work on Activity 4, give children Explore More Copymaster 9: Recipe Shopping to take home.

Pupil Book 3, pp. 134–137

These pages in the Pupil Book provide further practice and challenging questions. You can use them to follow up the activities and deepen the learning.

Focus activities

1. Using a dial weighing scale
2. Exploring the relationship between kilograms and grams, using a dial weighing scale
3. Scaling amounts of ingredients
4. Calculating how much left over
5. Measuring, weighing and calculating with amounts of ingredients
6. Handling money and recording sales data
7. Presenting sales data in a bar chart

Measurement 6: Measuring and calculating with litres and millilitres

Key mathematical ideas Capacity and volume, Equivalence, Standard units, Scaling

Educational context

In the *Geometry, Measurement and Statistics 2, Teaching Resource Handbook* children were introduced to litres and millilitres as standard units and made their own measuring vessel marked in fractions of a litre. In this activity group they build on their understanding of these units and continue to develop their practical measuring skills. The contexts are varied, but in each case the task has a problem-solving purpose, whether filling perfume bottles, packing for a flight or making fruit punch.

First, children are introduced to using a measuring jug to find volumes in millilitres, and use it to examine the relationship between millilitres and litres in more detail. They determine that 1000 ml = 1 ℓ, before finding the millilitre equivalents of quarter, half and three quarters of a litre. They are encouraged to consolidate their understanding through working with mixed units – for instance 1 ℓ 400 ml – which requires them to recognize the category difference between these units (that is, that adding 1 ℓ and 400 ml would not make 401 somethings, for example).

The activities also involve children in reasoning about and calculating with measures in order to solve problems: they use the scale on a measuring jug to help them add and subtract volumes, and are introduced to the idea of scaling quantities up or down in the context of deciding how to bottle a batch of perfume.

There is an opportunity here to link to children's work on units of measurement across different areas – the different 'qualities' being measured – and to draw comparisons between litres and millilitres; kilograms and grams; and millimetres, centimetres and metres. In doing so, ensure that children are able to distinguish these different areas and to recognize which unit is used in each. Continue to encourage children to use the conventional mathematical terms to communicate their ideas, and in particular to maintain the distinction between 'volume' and 'capacity'.

Learning opportunities

- To understand the relationship between litres and millilitres.
- To solve practical problems involving volume and capacity.
- To add and subtract different quantities of liquid measured in millilitres or litres.
- To estimate quantities of liquid to a reasonable degree of accuracy.

Terms for children to use

litre(s), millilitre(s), capacity, volume, container, difference, full, empty, more, less, equivalent, funnel, measuring jug, estimate, represent

Assessment opportunities

Look and listen for children who:

- Use the terms for children to use effectively.
- Appreciate that there are 1000 ml in 1 ℓ and can use this to solve addition and subtraction problems.
- Are able to measure the volume of liquid in a container to the nearest appropriate interval on a scale.
- Accurately read and measure with a scale on a measuring jug or equivalent.
- Combine units of millilitres and litres when calculating.
- Use their knowledge of multiplication to solve problems involving volume and capacity.

GMS Milestone 4

- Recall that there are 1000 ml in 1 ℓ and know, or work out,
- The volume of $\frac{1}{2}$ ℓ and $\frac{1}{4}$ ℓ in ml (GMS 3:4e)
- Understand the term capacity and make sensible estimates of volumes of liquid held in different container (GMS 3:4f)
- Measure out a precise volume of liquid using the scale on a jug or other scaled vessel (GMS 3:4g)
- Solve capacity word problems, e.g. 'What is the total volume of...?', and 'How much is left if I pour out...?' (GMS 3:4h)

Explorer Progress Book 3, pp. 18–19

After completing work on this activity group, give small focus groups of children their Explorer Progress Books and ask them to work through the challenges on the pages. As children complete the pages, assess what progress they are making with the central ideas from the activity group. Refer to the assessment opportunities for assistance.

Explore More Copymaster 10: Measuring Jug Pairs

After completing work on Activity 2, give children Explore More Copymaster 10: Measuring Jug Pairs to take home.

Pupil Book 3, pp. 138–141

These pages in the Pupil Book provide further practice and challenging questions. You can use them to follow up the activities and deepen the learning.

Focus activities

1. Reading a scale in millilitres
2. Converting fractions of a litre to millilitres
3. Adding and subtracting volumes of liquid
4. Mixed units of litres and millilitres

Numbers and the Number System 7: Understanding fractions of a whole and fractions as numbers

Key mathematical ideas Fractions, Mathematical thinking and reasoning

Educational context

Some of the key ideas involving fractions are very challenging: children who are secure in relationships between whole numbers will be better able to meet these challenges confidently. In this activity group, children explore fractions through investigating realistic situations where one unit or whole is divided into parts.

Children will be building on earlier work on division, exploring relationships between wholes and their parts, comparing smaller and larger parts and finding equivalences. Through these activities they learn to read, write and order proper fractions including unit and non-unit fractions as numbers and will meet new language to communicate their ideas.

There are many opportunities for misunderstanding fractions. At a simple level, confusing 'whole' and 'hole', having difficulty hearing and saying the fricative sounds in words like 'sixths' and 'sevenths'. At a higher level, knowing when to use the words 'numerator' and 'denominator' and relating these to fraction notation.

Learning opportunities

- To know that fractions can be placed on the number line between whole numbers (integers).
- To read and write fractions in words and fraction notation.
- To use specific vocabulary for fraction notation, to understand that the denominator tells us what kind of fraction it is and that the numerator tells us how many of those parts are represented.
- To know that when a whole shape is halved in different ways, the halves may look different but they are all equivalent in area.
- To notice that the greater the number of parts a whole is divided into, the smaller each of the parts becomes.
- To connect ordinal number names with names for fractions, and to realize that the name of the fraction (i.e. the denominator) tells us how many parts a whole has been divided into.
- To add and subtract fractions with the same denominator.

Terms for children to use

half, quarter, three quarters, parts, whole, fraction, 'one of four equal parts', 'one of two equal parts', equal shares, equal parts, section, circular, divisions, divide, 'share equally into', numerator, denominator, ordinal number words e.g. third, fourth, fifth, sixth, sevenths.

Assessment opportunities

Look and listen for children who:

- Use the terms for children to use effectively in discussion.
- Can read proper fractions, including unit and non-unit fractions and interpret them as 'one of two equal parts', 'three of four equal parts'.
- Explain where to mark fractions on a number line and can do this consistently.
- Use the term 'numerator' to describe the number of fractional parts and 'denominator' as the type of fractional parts.
- Notice that the greater the number of equal parts of any whole, the smaller each part becomes.
- Can write adding and subtracting sentences for fractions with the same denominator.

NPC Milestone 6

- Connect ordinal number names with names for fractions and understand that the denominator (i.e. the name of the fraction) tells us how many parts a whole has been divided into and the numerator tells us how many of those parts are represented (NPC 3:6a)
- Know that fractions have places on the number line between whole numbers (integers)(NPC 3:6f)
- Know that the greater the number of parts a number is divided into, the smaller each of the parts becomes (NPC 3:6g)

Explorer Progress Book 3c, pp. 16–17

After completing work on this activity group, give small focus groups of children their Explorer Progress Books and ask them to work through the challenges on the pages. As children complete the pages, assess what progress they are making with the central ideas from the activity group. Refer to the assessment opportunities for assistance.

Explore More Copymaster 13: Fill the Squares

After completing work on Activity 3, give children Explore More Copymaster 13: Fill the Squares to take home.

Pupil Book 3, pp. 142–145

These pages in the Pupil Book provide further practice and challenging questions. You can use them to follow up the activities and deepen the learning.

Focus activities

1. Dividing wholes into equal parts
2. Comparing a part with the whole
   Numicon Essentials **Y3/P4** Compare and order unit fractions
   Extension: Numicon Essentials ✧ **Y4/P5** Partition a mixed number
3. Comparing smaller and larger parts
   Numicon Essentials **Y3/P4** Compare and order unit fractions
4. Using non-unit fractions to name several parts of a whole and to write adding and subtracting sentences
   Numicon Essentials **Y3/P4** Understand the whole (using objects)
   Numicon Essentials **Y3/P4** Compare and order non-unit fractions
5. Understanding fractions as numbers on a number line
6. Exploring simple equivalences
7. Exploring equivalence with number rods
   Numicon Essentials **Y3/P4** Identify and represent equivalent fractions using bar models

Numbers and the Number System 8: Using fraction notation to describe parts of a discrete set

Key mathematical ideas Fractions, Mathematical thinking and reasoning

Educational context

The activities in this group bring together work on representing fractions of a whole (Numbers and the Number System 7), with work on sharing division (Calculating 11) to find fractions of a discrete set. The activities include a playful context to explore equivalent fractions, where pirates are finding half of different amounts of gold coins. Children will be using ordinal number words, which can be difficult for them to distinguish because of the fricative sounds. Children will also be using the terms numerator and denominator when they are talking about unit and non-unit proper fractions and exploring links between dividing by integers and fractions as operators.

Learning opportunities

- To understand that a set is often a collection of objects or ideas that has at least one common attribute.
- To identify fractions as equal parts of a whole.
- To use Numicon Shapes and number rods to represent proper fractions.
- To add and subtract fractions with the same denominator.
- To recognize that half can be represented by different equivalent fractions.
- To recognize and name fractions where sets have been shared into twelfths, sixths and thirds.
- To use the terms numerator and denominator when describing both unit and non-unit or proper fractions.
- To make a connection between fractions as operators and dividing by integers.

Terms for children to use

fraction, part, whole, set, equal, 'one out of a set of three', numerator, denominator, ordinal number words e.g. third, fourth, fifth, sixth, sevenths

Assessment opportunities

Look and listen for children who:

- Use the terms for children to use in conversation effectively in discussion.
- Can use the terms numerator and denominator to describe fraction notation with unit fractions and proper fractions.
- Can name fractions of a whole (unit fractions and non-unit or proper fractions).
- Can write a list of fractions equivalent to $\frac{1}{2}$.
- Can add and subtract fractions with the same denominators.
- Can make links between finding fractions of a set and dividing by an integer.

NPC Milestone 6

- Know that half can be represented by different equivalent fractions (NPC3:6h)
- Illustrate written fractions with apparatus and can write a fraction in response to seeing it built with apparatus (NPC3:6i)
- Add and subtract fractions with the same denominator within one whole Shape and within one set (NPC3:6j)

Explorer Progress Book 3c, pp. 18–19

After completing work on this activity group, give small focus groups of children their Explorer Progress Books and ask them to work through the challenges on the pages. As children complete the pages, assess what progress they are making with the central ideas from the activity group. Refer to the assessment opportunities for assistance.

Explore More Copymaster 14: Big Wheel

After completing work on Activity 4, give children Explore More Copymaster 14: Big Wheel to take home.

Pupil Book 3, pp. 146–149

These pages in the Pupil Book provide further practice and challenging questions. You can use them to follow up the activities and deepen the learning.

Focus activities

1. Exploring fractions of a set
   Numicon Essentials **Y3/P4** Find unit fractions of a set of objects
2. Using apparatus to represent part-whole relationships of unit fractions $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$, $\frac{1}{5}$, $\frac{1}{6}$, $\frac{1}{7}$, $\frac{1}{8}$, $\frac{1}{9}$, $\frac{1}{10}$
   Simplification: Numicon Essentials ✦ **Y2/P3** Unit and non-unit fractions
3. Representing unit and non-unit fractions with Numicon Shapes or number rods
   Simplification: Numicon Essentials ✦ **Y2/P3** Unit and non-unit fractions
   Numicon Essentials **Y3/P4** Find non-unit fractions of a set of objects
4. Recognize and write fractions of a set in a range of contexts
   Numicon Essentials **Y3/P4** Find non-unit fractions of a set of objects
5. Writing adding and subtracting sentences with fractions with the same denominator
   Numicon Essentials **Y3/P4** Add fractions
   Numicon Essentials **Y3/P4** Subtract fractions
6. Finding half of a set and exploring equivalent fractions
7. Making links between finding fractions of a set and dividing by integers
   Numicon Essentials **Y3/P4** Reason with fractions of an amount
8. Recognizing and naming fractions of a total or quantity
   Numicon Essentials **Y3/P4** Reason with fractions of an amount

Pattern and Algebra 5: Finding all possibilities and investigating a general statement

Key mathematical ideas Pattern, Mathematical thinking and reasoning

Educational context

The activities in this group are all about problem solving, giving children opportunities to work systematically, to reason logically and to communicate their ideas as they seek solutions to problems. The activities start with action, using structured apparatus, coins or dice. All children can join in and gradually realize that, in order to find solutions, they will need to work out systems that create order, making what could otherwise be a chaotic situation predictable.

Learning opportunities

• To understand that finding all possibilities requires working systematically, e.g. starting with the smallest number.
• To explore different ways of organizing the recording of possibilities, e.g. in an ordered list or table.
• To use methods to track which possibilities have and have not been tried.
• To use methods to check for any repeats and to decide when all possibilities have been found.
• To make and test general statements.

Terms for children to use

set, combinations, possibilities, rule, system, systematically, different, totals, ordered list, consecutive, table, estimate, predict, eliminate, code, rule, 'it could be or could not be … because', 'it will or won't work … because', 'if … then …', 'if this … then that would only work if …, so …, in that case … always/sometimes/never'

Assessment opportunities

Look and listen for children who:
• Use the terms for children to use effectively in discussion.
• Plan how to start their investigation.
• Reason that it is helpful to organize their work systematically, e.g. to find all combinations, notice patterns, make predictions.
• Develop their own ways of recording systematically, and also use conventional ways, e.g. an ordered list or table.
• Are checking results.
• Understand a general statement.
• Are able to make a generalization, i.e. noticing a rule emerging and explaining why something will always happen.

NPC Milestone 6

• Investigate suitable problems and work systematically to show that they have tried and tested all possibilities (NPC 3:6k)
• Choose efficient recording systems (NPC 3:6l)
• Express a general statement and explain their reasoning (NPC 3:6m)

Explorer Progress Book 3c, pp. 20–23

After completing work on this activity group, give small focus groups of children their Explorer Progress Books and ask them to work through the challenges on the pages. As children complete the pages, assess what progress they are making with the central ideas from the activity group. Refer to the assessment opportunities for assistance.
Children will also have the opportunity to complete their Learning Log (pp. 22–23) where they can reflect on the mathematics they have done so far.

Explore More Copymaster 6: Numicon Towers

After completing work on Activity 2, give children Explore More Copymaster 6: Numicon Towers to take home.

Pupil Book 3, pp. 150–153

These pages in the Pupil Book provide further practice and challenging questions. You can use them to follow up the activities and deepen the learning.

Focus activities

1. Finding all the possibilities with three colours
2. Finding all the combinations of two Shapes where both are unknown
3. Finding all the possibilities with coins
4. Finding possibilities with two dice
5. Investigating a general statement about consecutive numbers

Geometry 4: Using grids and grid references

Key mathematical ideas Translation, Direction and orientation in movement

Educational context

In Geometry 2 children made informal use of squared grids when exploring shape and began to look at angles in terms of amount of turn. In this activity group they build on these experiences to further develop their knowledge of position and direction, using grids and grid square references to describe location and movement in two-dimensional space. This provides a foundation for their use of coordinates in the *Geometry, Measurement and Statistics 4 Teaching Resource Handbook*, Geometry 4.

The focus throughout is on straight-line movement ('translation'), beginning with children describing movement around a grid in order to solve maze problems. They are introduced to grid references in the familiar context of positioning and moving Numicon Shapes and Pegs on a Baseboard, and begin to specify translations in simple terms, as (for example) 'two squares along, five up' and by naming grid squares, for instance as 'B5'. You can encourage them to recognize equivalent translations by asking questions such as, 'Can you find another way to get to the same square?' Children are also introduced to the magnetic compass and compass directions. They distinguish between using the points of the compass and general terms such as 'forwards' or 'backwards', 'left' or 'right' for direction finding, and make connections between angles, turns and compass points.

A range of contexts, including maps and a variety of games, are used to give the ideas children encounter here meaning and relevance. There are a number of opportunities to reinforce this, for example through using maps of the local area, by talking about direction and movement as children move around the classroom or school, and by making cross- curricular connections with work in science, geography, or design and technology.

Learning opportunities

- To describe and identify precisely the position, direction and movement of objects on a squared grid.
- To use grid references to describe and identify the position of objects on a grid.
- To work systematically to solve problems involving the position, direction and movement of objects on a grid, and check findings.

Terms for children to use

maze, route, path, solution, grid, grid square, grid reference, row, column, vertical, horizontal, parallel, perpendicular, reference point, left, right, up, down, forward, back, above, below, next to, bottom, foot, top, instruction, position, direction, movement, move, check, test, attempt, precise, accurate, opposite, reverse

Assessment opportunities

Look and listen for children who:

- Use the terms for children to use effectively.
- Find and describe routes through a maze.
- Predict and describe the movement of an object on a grid.
- Describe or identify the position of an object on a grid using a grid reference, e.g. 'F5'.
- Work systematically to solve a problem and check results.

GMS Milestone 4

- Present data that they have collected in tables and scaled bar charts (GMS 3:4i)
- Notice patterns in tables and bar charts, e.g. 'the difference between the most and least popular is...' (GMS 3:4j)
- Identify positions on a grid, using letter/number grid references, e.g. D6 (GMS 3:4k)
- Describe movements on a grid with increasing accuracy, e.g. forward 2, left 1, down 3 (GMS 3:4l)

Explorer Progress Book 3, pp. 20–21

After completing work on this activity group, give small focus groups of children their Explorer Progress Books and ask them to work through the challenges on the pages. As children complete the pages, assess what progress they are making with the central ideas from the activity group. Refer to the assessment opportunities for assistance. Children will also have the opportunity to complete their Learning Log (pp. 22–23) where they can reflect on the mathematics they have done so far.

Explore More Copymaster 4: Battleshapes

After completing work on Activity 3, give children Explore More Copymaster 4: Battleshapes (enlarged to A3) to take home.

Pupil Book 3, pp. 154–157

These pages in the Pupil Book provide further practice and challenging questions. You can use them to follow up the activities and deepen the learning.

Focus activities

1. Describing movements on a squared grid
2. Compass points
3. Using grid references to find position on a map
4. Describing movements on a Baseboard
5. Using grid references to describe positions on a Baseboard

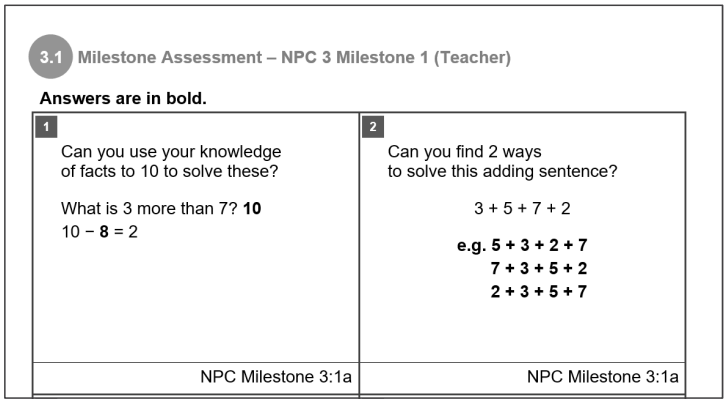
Assessment support

The Explorer Progress Book pages will help you record and assess learning throughout the programme. Here are two additional tools to support you with assessment. Log on to your Numicon Online NZ subscription and click on the name of the resource below to open it.

Milestone Assessment cards

Materials for children's self-assessment: question cards, category cards, a quick guide, milestone statements, Teaching Progression and answers. NOTE: This resource is provided as a zip file. Download, right-click and click 'Extract' to open the files.

The question cards are also provided on the next page of this document.



3.1 Milestone Assessment – NPC 3 Milestone 1 (Teacher)

Answers are in bold.

1	2
Can you use your knowledge of facts to 10 to solve these? What is 3 more than 7? **10** 10 − **8** = 2	Can you find 2 ways to solve this adding sentence? 3 + 5 + 7 + 2 **e.g. 5 + 3 + 2 + 7** **7 + 3 + 5 + 2** **2 + 3 + 5 + 7**
NPC Milestone 3:1a	NPC Milestone 3:1a

Milestone Assessment Tracking

A detailed tracking sheet for assessing your class.

Milestone	Code	NPC / GM	Numicon strand	AG	NC strand
Number, Pattern & Calculating 3 Milestone 1					
By this point, children should be able to:					
• Fluently recall adding and subtracting facts of all numbers to 10 and use these when adding lists of small numbers	NPC3:1a	NPC	C	C1	Addition & subtraction
• Fluently recall most adding and subtracting facts of all numbers to 20 and use efficient strategies to calculate those not known	NPC3:1b	NPC	C	C1	Addition & subtraction
• Know and use patterns in adding and subtracting facts for any number to 20 and beyond to recall facts, to organize them systematically, and to check that all combinations have been found	NPC3:1c	NPC	C	C2	Addition & subtraction
• Use known adding and subtracting facts to derive facts to 30	NPC3:1d	NPC	C	C2	Addition & subtraction
• Give a sensible estimate of numbers of more than 100 objects	NPC3:1e	NPC	NNS	NNS1	Number & place value
• Count aloud across multiples of 100 and multiples of 1000	NPC3:1f	NPC	NNS	NNS2	Number & place value
• Read, write and build (with apparatus) 2- and 3-digit numbers	NPC3:1g	NPC	NNS	NNS2	Number & place value
• Relate grouping and place value notation to say the value of each digit in a 3-digit number	NPC3:1h	NPC	NNS	NNS2	Number & place value
Number, Pattern & Calculating 3 Milestone 2					
By this point, children should be able to:					
• Explain how three related numbers are connected through the inverse relation and write all the related adding and subtracting facts	NPC3:2a	NPC	C	C3	Addition & subtraction

Milestone Assessment cards

Click on a Numicon milestone below to jump to the question cards that relate to it.

Milestone	Milestone statements	
NPC Milestone 1	Fluently recall adding and subtracting facts of all numbers to 10 and use these when adding lists of small numbers	NPC3:1a
	Fluently recall most adding and subtracting facts of all numbers to 20 and use efficient strategies to calculate those not known	NPC3:1b
	Know and use patterns in adding and subtracting facts for any number to 20 and beyond to recall facts, to organize them systematically, and to check that all combinations have been found	NPC3:1c
	Use known adding and subtracting facts to derive facts to 30	NPC3:1d
	Give a sensible estimate of numbers of more than 100 objects	NPC3:1e
	Count aloud across multiples of 100 and multiples of 1000	NPC3:1f
	Read, write and build (with apparatus) 2- and 3-digit numbers	NPC3:1g
	Relate grouping and place value notation to say the value of each digit in a 3-digit number	NPC3:1h
NPC Milestone 2	Explain how three related numbers are connected through the inverse relation and write all the related adding and subtracting facts	NPC3:2a
	Use understanding of equivalence, the '=' symbol and knowledge of the inverse relation between adding and subtracting to solve problems where the empty box symbol represents an unknown number	NPC3:2b
	Understand the use of zero as a place holder	NPC3:2c
	Know that multiples of 10 and 100 are important milestones on the number line	NPC3:2d
	Count forwards and backwards in sequences of multiples within their working range	NPC3:2e
	Recognize when a given number is a multiple of 2, 3, 4, 5, 8 or 10 (at this stage a few children may recognize common multiples but this is not a milestone)	NPC3:2f
	Notice patterns in sequences of multiples, explain the rule for the sequence and use this to find missing numbers	NPC3:2g
	Know how to adjust calculations and compensate when adding and subtracting 9 and when to use this relationship	NPC3:2h
	Recall and use adding and subtracting facts to 10 and the bridging strategy in any adding and subtracting calculations that involves crossing multiples of 10, and explain the steps they have taken	NPC3:2i
	Understand that multiplying is a form of calculating used instead of repeated adding and recognize when they need to multiply to solve a problem	NPC3:2j
	Read multiplying number sentences	NPC3:2k
	Read and write multiplying sentences using the '×' symbol, model them with structured apparatus showing understanding of the word 'product'	NPC3:2l

Milestone	Milestone statements	
GMS Milestone 1	Use resources to show, or find examples of, horizontal, vertical, parallel and perpendicular lines	GMS3:1a
	Build 3D skeleton shapes, relating these to named 3D shapes and shapes in their everyday environment	GMS3:1b
	Describe the properties of 3D shapes in different orientations, and consider the number of faces, vertices and edges	GMS3:1c
	Move objects, or themselves, to show their understanding of an angle as a description of a turn	GMS3:1d
	Show how the number of right angle turns relates to a half, three-quarters and full turn	GMS3:1e
	Manipulate resources to make and order right angles and angles greater, or less than, a right angle	GMS3:1f
	Recognize angles in 2D shapes and relate these to the properties of regular and irregular shapes	GMS3:1g
	Use sorting diagrams to organise 2D or 3D shapes according to criteria they have chosen, and explain their reasoning	GMS3:1h
NPC Milestone 3	Understand relative values of numbers to 1000, including recognizing the idea of a range of numbers and use of symbols '–', '<' and ' >' for labelling a range of numbers	NPC3:3a
	Partition numbers up to 1000 into hundreds, tens and units and to derive other ways of partitioning them	NPC3:3b
	Relate pounds and pence notation to hundreds, tens and units	NPC3:3c
	Use knowledge of partitioning to solve money problems	NPC3:3d
	Relate knowledge of patterns on a 100 square to an array for 1000 and use patterns when finding numbers in different arrays and number squares	NPC3:3e
	Recall most multiplying facts of 2, 3, 4, 5, 8 and 10 multiplying tables	NPC3:3f
	Know and use the commutative property of multiplying	NPC3:3g
	Represent multiplying problems with structured apparatus and arrays	NPC3:3h
	Know that changing the order of numbers in multiplying problems does not change the product	NPC3:3i
	Recognize that dividing can be expressed as finding 'how many groups are there in … ?'	NPC3:3j
	Read, build with structured apparatus, and write dividing number sentences using the '÷' symbol	NPC3:3k
	Notice and explain the inverse relation between dividing and multiplying and know that they can use multiplying facts to derive dividing facts	NPC3:3l
	Explain and interpret a realistic context as one inviting either 'multiplying' or 'dividing' and use the inverse relation between multiplying and dividing when solving problems	NPC3:3m
	Know that multiplying has a commutative property and use this to help when solving dividing questions	NPC3:3n
	Interpret a remainder as what is left after grouping	NPC3:3o
	Use fluent recall of adding and subtracting facts to 10 when adding and subtracting multiples of 10 and multiples of 100, first whole tens or whole hundreds moving on to add whole tens and whole hundreds to 2- and 3-digit numbers	NPC3:3p

Milestone	Milestone statements	
NPC Milestone 4	Use knowledge of sequences of multiples to label intervals	NPC3:4a
	Use knowledge of number relationships to read values in-between marked intervals	NPC3:4b
	Count in multiples of 25 and 50	NPC3:4c
	Find halfway between two multiples of 10 and two multiples of 100	NPC3:4d
	Round any 2- or 3-digit number to the nearest 10 or 100	NPC3:4e
	Record work systematically in order to quickly spot patterns	NPC3:4f
	Explain how they are using place value and known number facts to solve similar calculations	NPC3:4g
	Use knowledge of equivalence and number relationships to adjust numbers involved in a variety of calculating situations and explain their reasoning	NPC3:4h
	Use fluent recall of doubles of numbers to 10 when solving problems that involve doubling and halving higher numbers	NPC3:4i
	Use fluent recall of adding and subtracting facts of 10 when finding complements to 100	NPC3:4j
	Develop fluent recall of many facts from 2, 3, 4, 5, 8 and 10 times tables	NPC3:4k
	Recognize that sometimes tables have multiples in common	NPC3:4l
	Use doubling and halving as a strategy for deriving related multiplying facts between the 2, 4 and 8 times tables and between the 5 and 10 times tables	NPC3:4m
	Know that we use dividing to solve problems involving sharing as well as those involving grouping	NPC3:4n
	Know that there can be remainders in sharing situations	NPC3:4o
	Write dividing sentences in response to problems illustrated by arrays, Numicon Shapes or number rods	NPC3:4p
	Use the inverse relation between multiplying and dividing when solving sharing problems	NPC3:4q
GMS Milestone 2	Tell times to the nearest minute, both past and to, shown on analogue clocks	GMS3:2a
	Discuss differences and similarities between digital and analogue clocks including analogue clocks with Roman numerals, and explain how they display the time	GMS3:2b
	Say times shown on a 12-hour digital clock	GMS3:2c
	Calculate a given number of minutes earlier and later than times shown on a 12-hour digital clock	GMS3:2d
	Use terms such as midday, midnight, a.m. and p.m. to explain how time progresses and is labelled in a 24 hour day	GMS3:2e
	Find and compare durations of time across 24 hours, including times starting at half past the hour	GMS3:2f
	Compare and order units of time, and know the number of seconds in a minute, minutes in an hour and hours in a day	GMS3:2g
	Recall, or know how to work out, the number of days in each month and the number of days in a year, or leap year	GMS3:2h

Milestone	Milestone statements	
NPC Milestone 5	Know that finding a constant difference is a useful strategy for finding the rule for a sequence	NPC3:5a
	Choose whether a mental or column method is the most appropriate before solving different adding and subtracting problems	NPC3:5b
	Use rounding when making a reasonable estimate of the possible answer to an adding or subtracting problem	NPC3:5c
	Use partitioning into hundreds, tens and ones as a strategy for adding and subtracting 2- and 3-digit numbers	NPC3:5d
	Use structured apparatus when adding and subtracting 2- and 3-digit numbers to show understanding of how these are partitioned, regrouped, recombined or redistributed and can transfer this to a written method of recording in columns	NPC3:5e
	Illustrate mental strategies for adding and subtracting 2- and 3-digit numbers on an empty number line	NPC3:5f
	Add or subtract amounts of money over £1 using a written method	NPC3:5g
	Use the inverse relation between adding and subtracting to check solutions to calculations	NPC3:5h
	Illustrate scaling up and ratio problems with structured apparatus and use the language of scaling and ratio to explain their solutions	NPC3:5i
	Make general statements about what happens when multiplying and dividing by 10	NPC3:5j
	Illustrate and find solutions to multiplying and dividing problems involving teen numbers using structured apparatus and recall of facts	NPC3:5k
GMS Milestone 3	Show understanding of metres, centimetres and millimetres, by making sensible estimates of lengths using suitable units	GMS3:3a
	Convert between metres and centimetres, and centimetres and millimetres	GMS3:3b
	Solve real-life measure problems by adding and subtracting lengths, including those given in mixed units	GMS3:3c
	Measure accurately to calculate the perimeter of rectangular shapes	GMS3:3d
	Complete tally charts and pictograms to collect and present data, then discuss their findings	GMS3:3e
	Use mathematical apparatus to model and discuss the relationship between the values of 1p, 10p and £1 coins	GMS3:3f
	Make given amounts of money up to £10, using the fewest coins and/or notes	GMS3:3g
	Calculate the total of two prices given in pounds and pence, and discuss their strategy e.g. adjusting, rounding	GMS3:3h
	Decide if goods are affordable, given a certain budget, and calculate the change they should receive	GMS3:3i

Milestone	Milestone statements	
NPC Milestone 6	Connect ordinal number names with names for fractions and understand that the denominator (i.e. the name of the fraction) tells us how many parts a whole has been divided into and the numerator tells us how many of those parts are represented	NPC3:6a
	Fluently recall double and half facts and use these to find halves and quarters of numbers within their working range	NPC3:6b
	Make connections between unit fractions as operators and division by integers (e.g. connect halving and quartering with dividing by 2 and 4, and finding thirds with dividing by 3)	NPC3:6c
	Interpret remainders as fractions and notice that the context will affect how we deal with the remainder when dividing odd numbers into two or four parts	NPC3:6d
	Differentiate between finding half of a number and finding how many halves are in a number	NPC3:6e
	Know that fractions have places on the number line between whole numbers (integers)	NPC3:6f
	Know that the greater the number of parts a number is divided into, the smaller each of the parts becomes	NPC3:6g
	Know that half can be represented by different equivalent fractions	NPC3:6h
	Illustrate written fractions with apparatus and can write a fraction in response to seeing it built with apparatus	NPC3:6i
	Add and subtract fractions with the same denominator within one whole Shape and within one set	NPC3:6j
	Investigate suitable problems and work systematically to show that they have tried and tested all possibilities	NPC3:6k
	Choose efficient recording systems	NPC3:6l
	Express a general statement and explain their reasoning	NPC3:6m
GMS Milestone 4	Use a dial weighing scale to measure individual amounts in 100 g increments, up to 5 kg	GMS3:4a
	Recognize equivalences between g and kg, e.g. 1000 g = 1 kg, 500 g = $\frac{1}{2}$ kg, 250 g = $\frac{1}{4}$ kg	GMS3:4b
	Find the total mass of two or more items and the difference in mass between items	GMS3:4c
	Interpret word problems involving mass, modelling with weights or other apparatus, as appropriate	GMS3:4d
	Recall that there are 1000 ml in 1 ℓ and know, or work out, the volume of $\frac{1}{2}$ ℓ, $\frac{1}{4}$ ℓ and $\frac{3}{4}$ ℓ in ml	GMS3:4e
	Understand the term capacity and make sensible estimates of volumes of liquid held in different containers	GMS3:4f
	Measure out a precise volume of liquid using the scale on a jug or other scaled vessel	GMS3:4g
	Solve capacity word problems, e.g. “What is the total volume of...?”, and “How much is left if I pour out...?”	GMS3:4h
	Present data that they have collected in tables and scaled bar charts	GMS3:4i
	Notice patterns in tables and bar charts, e.g. “the difference between the most and least popular is...”	GMS3:4j
	Identify positions on a grid, using letter/number grid references e.g. D6	GMS3:4k
	Describe movements on a grid with increasing accuracy, e.g. forward 2, left 1, down 3	GMS3:4l

3.1 Milestone Assessment – NPC 3 Milestone 1 (Pupil)

Answers are on the answer pages that follow.

1

Can you use your knowledge of facts to 10 to solve these?

What is 3 more than 7?

10 − □ = 2

NPC Milestone 3:1a

2

Can you find 2 ways to solve this adding sentence?

3 + 5 + 7 + 2

NPC Milestone 3:1a

3

Can you find 5 pairs of numbers that equal 20?

NPC Milestone 3:1b

4

Can you subtract each of the teens numbers from 20?

NPC Milestone 3:1b

5

11 + 9 = 20

Can you make 3 other adding or subtracting number sentences using these numbers?

NPC Milestone 3:1c

6

Jack said, “There are 15 pairs of adding facts that total 15.”

Do you agree? Can you list all your answers?

NPC Milestone 3:1c

3.1 Milestone Assessment – NPC 3 Milestone 1 (Pupil)

Answers are on the answer pages that follow.

7

Can you use known facts to solve these?

$4 + 16 + \square = 30$

$5 + \square + 17 = 30$

$48 - 6 - \square = 30$

$25 + 15 - \square = 30$

NPC Milestone 3:1d

8

Can you find three different ways of making 30 using three numbers?

NPC Milestone 3:1d

9

Amy's jar contains 108 marbles. Can you estimate how many marbles there would be in 5 jars?

NPC Milestone 3:1e

10

Can you work out how many classes in our school would give a total of more than 100 children?

NPC Milestone 3:1e

11

Can you continue to count in 100s from 250 to 1000?

NPC Milestone 3:1f

12

Can you work out what 300 more than 203 is?

NPC Milestone 3:1f

3.1 Milestone Assessment – NPC 3 Milestone 1 (Pupil)

Answers are on the answer pages that follow.

13

Can you use base-ten apparatus to build the number 346, and then write this number in words?

NPC Milestone 3:1g

14

Can you write five hundred and four in digits?

NPC Milestone 3:1g

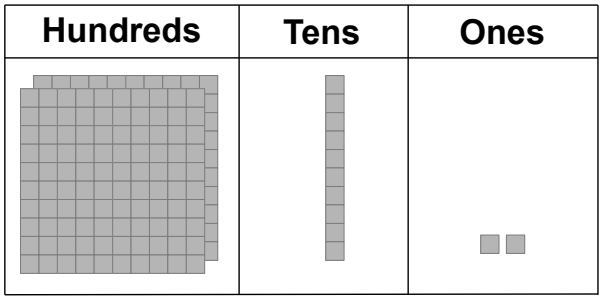
15

I have 64 tens sticks. How many groups of 100 can I make?

NPC Milestone 3:1h

16

Can you say how many 10s are in this picture?



NPC Milestone 3:1h

3.1 Milestone Assessment – NPC 3 Milestone 1 (Teacher)

Answers are in bold.

1

Can you use your knowledge of facts to 10 to solve these?

What is 3 more than 7? **10**

10 − **8** = 2

NPC Milestone 3:1a

2

Can you find 2 ways to solve this adding sentence?

3 + 5 + 7 + 2

e.g. 5 + 3 + 2 + 7
7 + 3 + 5 + 2
2 + 3 + 5 + 7

NPC Milestone 3:1a

3

Can you find 5 pairs of numbers that equal 20?

e.g. 1 and 19, 2 and 18, 3 and 17, etc.

NPC Milestone 3:1b

4

Can you subtract each of the teens numbers from 20?

e.g. 20 − 19 = 1, 20 − 18 = 2, 20 − 17 = 3, etc.

NPC Milestone 3:1b

5

11 + 9 = 20

Can you make 3 other adding or subtracting number sentences using these numbers?

9 + 11 = 20
20 − 11 = 9
20 − 9 = 11

NPC Milestone 3:1c

6

Jack said, “There are 15 pairs of adding facts that total 15.”

Do you agree? Can you list all your answers?

0 + 15 = 15, 1 + 14 = 15 ...

There are 16 pairs of adding facts that total 15.

NPC Milestone 3:1c

3.1 Milestone Assessment – NPC 3 Milestone 1 (Teacher)

7

Can you use known facts to solve these?

4 + 16 + **10** = 30
5 + **8** + 17 = 30
48 − 6 − **12** = 30
25 + 15 − **10** = 30

NPC Milestone 3:1d

8

Can you find three different ways of making 30 using three numbers?

e.g. 10 + 10 + 10 = 30
10 + 9 + 11 = 30
10 + 8 + 12 = 30

NPC Milestone 3:1d

9

Amy's jar contains 108 marbles. Can you estimate how many marbles there would be in 5 jars?

A multiple of 10 between 500 and 550. The children may have calculated the answer as 540. When estimating we would want them to focus on a multiple of 10.

NPC Milestone 3:1e

10

Can you work out how many classes in our school would give a total of more than 100 children?

If you have less than 30 in a class then the answer will be 4. Just over 30 will give an answer of 3.

You may need to adapt the answer to your context.

NPC Milestone 3:1e

11

Can you continue to count in 100s from 250 to 1000?

350, 450, 550, 650, 750, 850, 950

Some children may say 950 or 1050 which you could then discuss.

NPC Milestone 3:1f

12

Can you work out what 300 more than 203 is?

503

NPC Milestone 3:1f

13

Can you use base-ten apparatus to build the number 346, and then write this number in words?

Children build the number using equipment then write it as: three hundred and forty-six.

NPC Milestone 3:1g

14

Can you write five hundred and four in digits?

504

NPC Milestone 3:1g

15

I have 64 tens sticks. How many groups of 100 can I make?

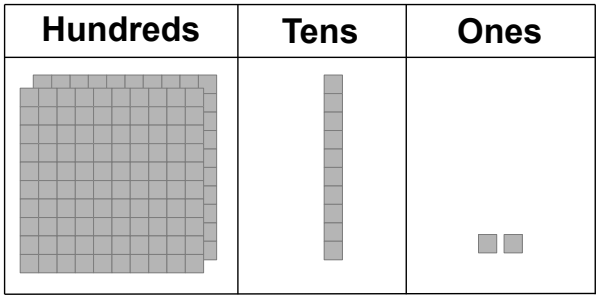
6

NPC Milestone 3:1h

16

Can you say how many 10s are in this picture?

1



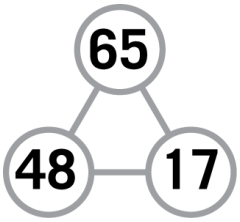
NPC Milestone 3:1h

3.2 Milestone Assessment – NPC 3 Milestone 2 (Pupil)

Answers are on the answer pages that follow.

1

Can you write the family of facts for this trio?



NPC Milestone 3:2a

2

24 + 17 = 41

Can you write 2 number sentences using the inverse operation?

NPC Milestone 3:2a

3

Can you solve these without calculating?

52 = 28 + 24

28 = ☐ − 24

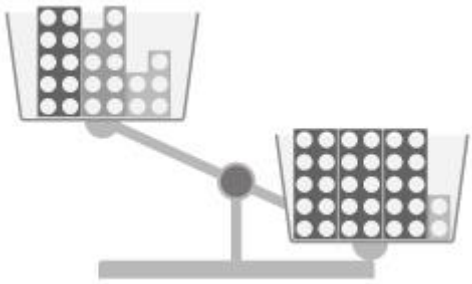
52 = 24 + ☐

☐ = 52 − 28

NPC Milestone 3:2b

4

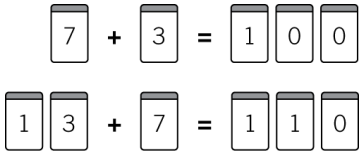
Can you work out which Shape should be added to make the pans balance?



NPC Milestone 3:2b

5

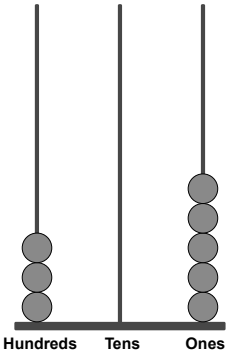
Can you add zeroes to the number cards to make these sentences true?



NPC Milestone 3:2c

6

Can you work out what number is represented on the abacus?



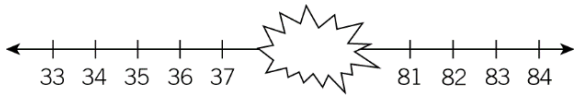
NPC Milestone 3:2c

3.2 Milestone Assessment – NPC 3 Milestone 2 (Pupil)

Answers are on the answer pages that follow.

7

Can you work out how many multiples of 10 are missing?



NPC Milestone 3:2d

8

All the children from your school are in the playground. How could you arrange the children so that you can count them quickly and efficiently?

NPC Milestone 3:2d

9

Can you count forwards in multiples of 4 up to the 12th multiple?

NPC Milestone 3:2e

10

Can you start at 36 and count backwards in 3s to 0?

NPC Milestone 3:2e

11

60 49 32 14 25 90 75 18 21 53

Can you say which numbers above are multiples of 2,
which are multiples of 5 and
which are multiples of 10?

NPC Milestone 3:2f

12

60 48 32 14 25 90 75 18 21 64

Can you say which numbers above are multiples of 3,
which are multiples of 4 and
which are multiples of 8?

NPC Milestone 3:2f

3.2 Milestone Assessment – NPC 3 Milestone 2 (Pupil)

Answers are on the answer pages that follow.

13

44 48 52 __ 60 __ 68 __

Can you write the missing numbers and the rule for this sequence?

NPC Milestone 3:2g

14

__ __ __ 85 90 95 100 __

Can you write the missing numbers and the rule for this sequence?

NPC Milestone 3:2g

15

Can you solve this calculation using a mental strategy?

157 − 9 = ☐

NPC Milestone 3:2h

16

Can you rewrite this calculation to make it easier to solve?

346 + 9 = ☐ + ☐ − ☐ = ☐

NPC Milestone 3:2h

17

Can you use a bridging strategy to solve this calculation? Can you write the steps you took to solve it?

226 + 7

NPC Milestone 3:2i

18

Can you use a bridging strategy to solve this calculation? Can you write the steps you took to solve it?

324 − 6

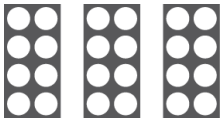
NPC Milestone 3:2i

3.2 Milestone Assessment – NPC 3 Milestone 2 (Pupil)

Answers are on the answer pages that follow.

19

Can you write 2 different types of number sentence for this picture?



NPC Milestone 3:2j

20

If one alien has 3 eyes, can you write a calculation to show how many eyes 7 aliens have?

NPC Milestone 3:2j

21

Can you read this sentence?

12×4

NPC Milestone 3:2k

22

Can you work out the product of 6 times 8?

NPC Milestone 3:2k

23

$4 + 4 + 4 + 4 + 4 = 20$

Can you write the multiplying fact for this sentence?

NPC Milestone 3:2l

24

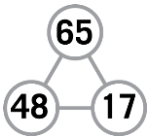
Can you use apparatus to make a model to show 5 lots of 8?

NPC Milestone 3:2l

3.2 Milestone Assessment – NPC 3 Milestone 2 (Teacher)

1

Can you write the family of facts for this trio?



48 + 17 = 65
17 + 48 = 65
65 − 17 = 48
65 − 48 = 17

NPC Milestone 3:2a

2

24 + 17 = 41

Can you write 2 number sentences using the inverse operation?

41 − 17 = 24
41 − 24 = 17

NPC Milestone 3:2a

3

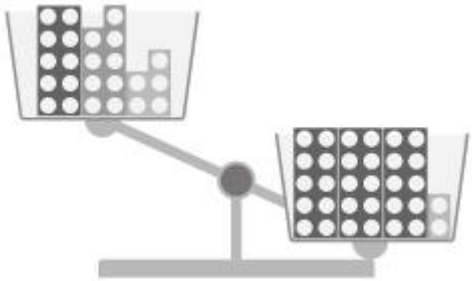
Can you solve these without calculating?

52 = 28 + 24
28 = **52** − 24
52 = 24 + **28**
24 = 52 − 28

NPC Milestone 3:2b

4

Can you work out which Shape should be added to make the pans balance?

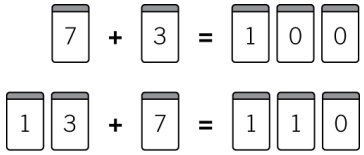


8-shape

NPC Milestone 3:2b

5

Can you add zeroes to the number cards to make these sentences true:

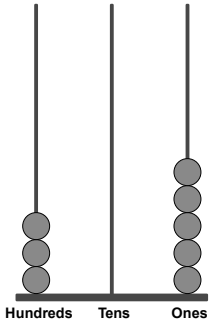


7**0** + 3**0** = 100
1**0**3 + 7 = 110

NPC Milestone 3:2c

6

Can you work out what number is represented on the abacus?

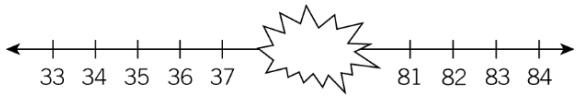


305

NPC Milestone 3:2c

7

Can you work out how many multiples of 10 are missing?



40, 50, 60, 70, 80, or five multiples of 10

NPC Milestone 3:2d

8

All the children from your school are in the playground. How could you arrange the children so that you can count them quickly and efficiently?

Depending on the size of your school, children might count in 10s, 20s, 25s or 100s.

NPC Milestone 3:2d

9

Can you count forwards in multiples of 4 up to the 12th multiple?

4, 8, 12, 16, 20, 24, 28, 32, 36, 40, 44, 48

NPC Milestone 3:2e

10

Can you start at 36 and count backwards in 3s to 0?

36, 33, 30, 27, 24, 21, 18, 15, 12, 9, 6, 3, 0

NPC Milestone 3:2e

11

60 49 32 14 25 90 75 18 21 53

Can you say which numbers above are multiples of 2,
which are multiples of 5 and
which are multiples of 10?

2s: 60, 32, 14, 90, 18;
5s: 60, 25, 90, 75;
10s: 60, 90

NPC Milestone 3:2f

12

60 48 32 14 25 90 75 18 21 64

Can you say which numbers above are multiples of 3,
which are multiples of 4 and
which are multiples of 8?

3s: 60, 48, 90, 75, 18, 21;
4s: 60, 48, 32, 64;
8s: 48, 32, 64

NPC Milestone 3:2f

13

44 48 52 **56** 60 **64** 68 **72**

Can you write the missing numbers and the rule for this sequence?

Sequence is +4

NPC Milestone 3:2g

14

70 75 80 85 90 95 100 **105**

Can you write the missing numbers and the rule for this sequence?

Sequence is +5

NPC Milestone 3:2g

15

Can you solve this calculation using a mental strategy?

157 − 9 = **148**

Children may take away 10 and then add 1.

NPC Milestone 3:2h

16

Can you rewrite this calculation to make it easier to solve?

346 + 9 = **345 + 10 − 1 = 54**

NPC Milestone 3:2h

17

Can you use a bridging strategy to solve this calculation? Can you write the steps you took to solve it?

226 + 7

226 + 4 + 3 = 233

NPC Milestone 3:2i

18

Can you use a bridging strategy to solve this calculation? Can you write the steps you took to solve it?

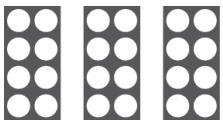
324 − 6

324 − 4 − 2 = 318

NPC Milestone 3:2i

19

Can you write 2 different types of number sentence for this picture?



8 + 8 + 8 = 24

3 × 8 = 24

NPC Milestone 3:2j

20

If an alien has 3 eyes, can you write a calculation to show how many eyes 7 aliens have?

7 × 3 = 21

NPC Milestone 3:2j

21

Can you read this sentence?

12 × 4

12 lots of 4

NPC Milestone 3:2k

22

Can you work out the product of 6 times 8?

48

NPC Milestone 3:2k

23

4 + 4 + 4 + 4 + 4 = 20

Can you write the multiplying fact for this sentence?

5 × 4

NPC Milestone 3:2l

24

Can you use apparatus to make a model to show 5 lots of 8?

e.g. 5 lots of 8-shapes

NPC Milestone 3:2l

3.1 Milestone Assessment – GMS 3 Milestone 1 (Pupil)

Answers are on the answer pages that follow.

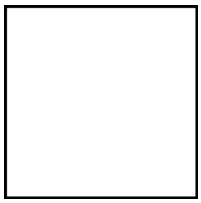
1

Can you point to an example of a horizontal line and an example of a vertical line in the classroom?

GMS Milestone 3:1a

2

Can you label a square to say which lines are perpendicular and which are parallel?



GMS Milestone 3:1a

3

Can you build a skeleton octahedron?

GMS Milestone 3:1b

4

Can you find examples of 3 different 3D shapes in the classroom and name them?

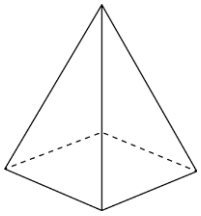
GMS Milestone 3:1b

3.1 Milestone Assessment – GMS 3 Milestone 1 (Pupil)

Answers are on the answer pages that follow.

5

Can you count how many faces, edges and vertices this shape has?



GMS Milestone 3:1c

6

Here is a face from a 3D shape. Can you name three different 3D shapes which have a face like this?

GMS Milestone 3:1c

7

Can you give instructions to a friend, using the terms clockwise and anti-clockwise, to draw any quadrilateral on cm-squared paper?

GMS Milestone 3:1d

8

Can you turn anti-clockwise until you are facing the opposite direction and then describe the fraction of your turn?

GMS Milestone 3:1d

3.1 Milestone Assessment – GMS 3 Milestone 1 (Pupil)

Answers are on the answer pages that follow.

9

Can you say how many right angles are equal to half a turn and a whole turn?

GMS Milestone 3:1e

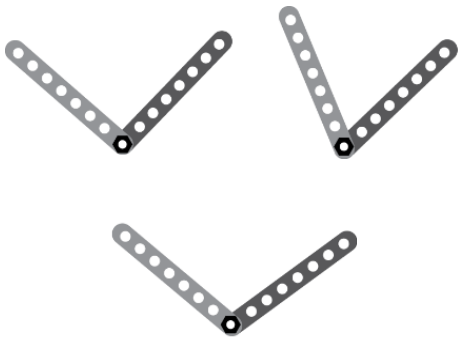
10

Can you use apparatus to show three-quarters of a turn?

GMS Milestone 3:1e

11

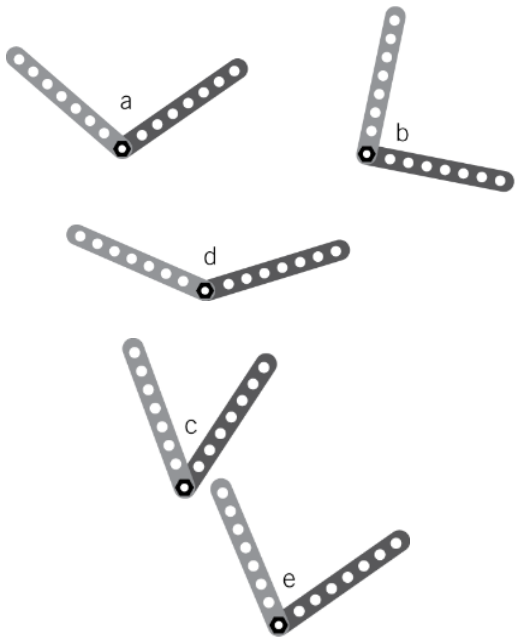
Can you say whether each of these angles is smaller than a right angle, a right angle, or greater than a right angle?



GMS Milestone 3:1f

12

Can you order these from smallest to largest angle?



GMS Milestone 3:1f

3.1 Milestone Assessment – GMS 3 Milestone 1 (Pupil)

Answers are on the answer pages that follow.

13

Can you make an angle checker to check whether a 2D shape has angles that are all the same size?

GMS Milestone 3:1g

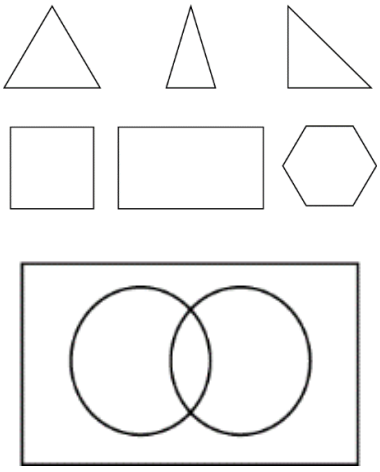
14

Can you use apparatus to make a regular and an irregular pentagon?

GMS Milestone 3:1g

15

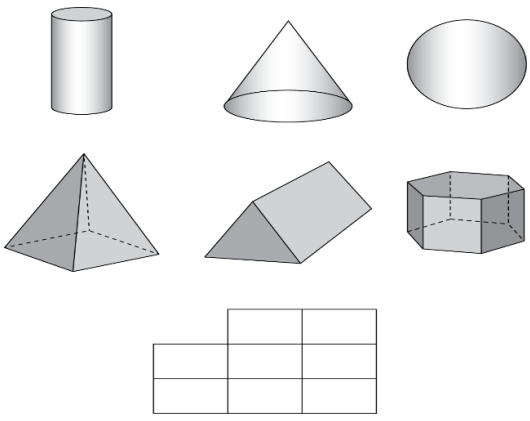
What criteria could you use to sort these 2D shapes so that all regions of the Venn diagram have some shapes in them? Can you explain your choice?



GMS Milestone 3:1h

16

What criteria could you use to sort these 3D shapes so that all regions of the Carroll diagram have some shapes in them?
Can you explain your choice?



GMS Milestone 3:1h

3.1 Milestone Assessment – GMS 3 Milestone 1 (Teacher)

1

Can you point to an example of a horizontal line and an example of a vertical line in the classroom?

Use your professional judgement to determine whether the child is accurate with this question.

GMS Milestone 3:1a

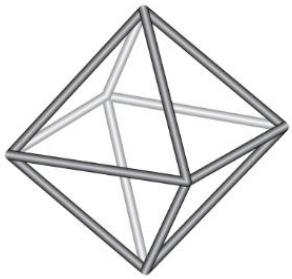
2

Can you label a square to say which lines are perpendicular and which are parallel?

GMS Milestone 3:1a

3

Can you build a skeleton octahedron?



GMS Milestone 3:1b

4

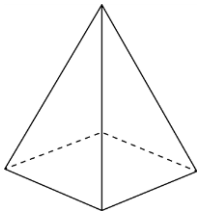
Can you find examples of 3 different 3D shapes in the classroom and name them?

Use your professional judgement to determine whether the child is accurate with this question.

GMS Milestone 3:1b

5

Can you count how many faces, edges and vertices this shape has?



5 faces, 8 edges and 5 vertices

GMS Milestone 3:1c

6

Here is a face from a 3D shape. Can you name three different 3D shapes which have a face like this?

Octahedron; Tetrahedron; Triangular prism; _____ based pyramid (not triangular if tetrahedron is offered).

GMS Milestone 3:1c

7

Can you give instructions to a friend, using the terms clockwise and anti-clockwise, to draw any quadrilateral on cm-squared paper?

Use your professional judgement to determine whether the child is accurate with this question.

GMS Milestone 3:1d

8

Can you turn anti-clockwise until you are facing the opposite direction and then describe the fraction of your turn?

$\frac{1}{2}$ **turn**

GMS Milestone 3:1d

9

Can you say how many right angles are equal to half a turn and a whole turn?

Half turn: 2; whole turn: 4

GMS Milestone 3:1e

10

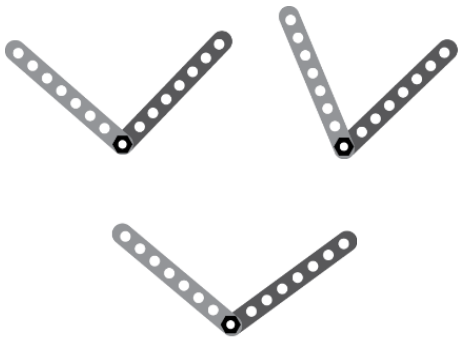
Can you use apparatus to show three-quarters of a turn?

Children could use geo strips, geo sticks, straws, rods, clock hands.

GMS Milestone 3:1e

11

Can you say whether each of these angles is smaller than a right angle, a right angle, or greater than a right angle?

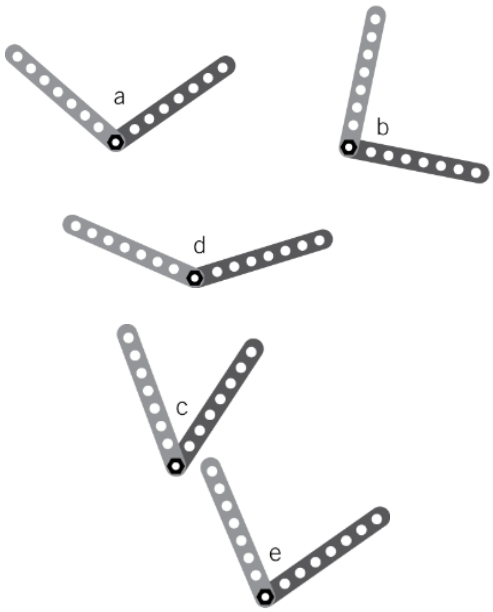


right angle, smaller, greater

GMS Milestone 3:1f

12

Can you order these from smallest to largest angle?



c, e, b, a, d

GMS Milestone 3:1f

13

Can you make an angle checker to check whether a 2D shape has angles that are all the same size?

Use your professional judgement to determine whether the child is accurate with this question.

GMS Milestone 3:1g

14

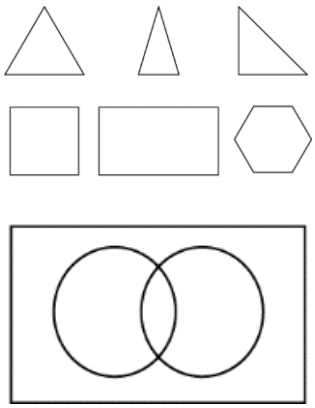
Can you use apparatus to make a regular and an irregular pentagon?

Children could use geo strips, straws, rods.

GMS Milestone 3:1g

15

What criteria could you use to sort these 2D shapes so that all regions of the Venn diagram have some shapes in them? Can you explain your choice?



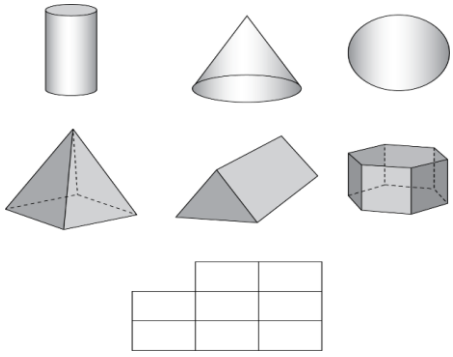
The criteria can be different from those you have used in class.

See GMS 3 Teaching Resource Handbook, pp. 42 and 44–5.

GMS Milestone 3:1h

16

What criteria could you use to sort these 3D shapes so that all regions of the Carroll diagram have some shapes in them?
Can you explain your choice?



The criteria can be different from those you have used in class.

See GMS 3 Teaching Resource Handbook, pp. 43–5.

GMS Milestone 3:1h

3.3 Milestone Assessment – NPC 3 Milestone 3 (Pupil)

Answers are on the answer pages that follow.

1

34, 304, 434, 433, 344, 343, 403, 43

Can you write these numbers in order, using the < symbol?

NPC Milestone 3:3a

2

Can you explain how you would order any 3-digit numbers from largest to smallest?

NPC Milestone 3:3a

3

Can you partition 482 in 3 different ways?

NPC Milestone 3:3b

4

Can you use your knowledge of partitioning to work out the missing number?

$621 = 303 + 212 + \square$

NPC Milestone 3:3b

5

Can you work out how many pence are equal to £5·05?

NPC Milestone 3:3c

6

Can you write the total amount in pounds?

NPC Milestone 3:3c

3.3 Milestone Assessment – NPC 3 Milestone 3 (Pupil)

Answers are on the answer pages that follow.

7

A pack of pencils costs £1·19.

What coins could you use to pay exactly for 1 pack?

Can you find two other ways to do this?

NPC Milestone 3:3d

8

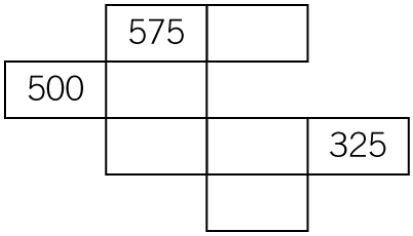
A bag of carrots costs 46p.

Can you work out the fewest number of coins you could use to pay for them exactly?

NPC Milestone 3:3d

9

Can you copy this picture and complete the missing numbers?



NPC Milestone 3:3e

10

Can you say which square is closest to 856?

620	640	660	680	700
720	740	760	780	800
820	840	860	880	900

NPC Milestone 3:3e

11

Can you copy and complete the grid?

×	3	8
4		
6		

NPC Milestone 3:3f

12

Can you think of 3 numbers that are in the 2, 4 *and* 8 times tables?

NPC Milestone 3:3f

3.3 Milestone Assessment – NPC 3 Milestone 3 (Pupil)

Answers are on the answer pages that follow.

13

Can you use 5 × 4 = 20 to solve ☐ × 5 = 20?

NPC Milestone 3:3g

14

For each of the calculations, can you write a different multiplying sentence that uses the same numbers and gives the same answer?

12 × 3 = 36

10 × 4 = 40

6 × 5 = 30

NPC Milestone 3:3g

15

Can you use the pan balance to show two multiplying sentences with the same product?

NPC Milestone 3:3h

16

The product is 32. Can you use counters to show all the arrays you can make?

NPC Milestone 3:3h

17

Can you say why it is true that 3 × 5 × 10 has the same product as 10 × 5 × 3?

NPC Milestone 3:3i

18

Can you write the missing numbers to make this statement true?

☐ × 6 = 8 × ☐

NPC Milestone 3:3i

3.3 Milestone Assessment – NPC 3 Milestone 3 (Pupil)

Answers are on the answer pages that follow.

19

Can you work out how many groups of 3 there are in 21?

NPC Milestone 3:3j

20

There are 60 sweets in a bag. Can you work out how many portions of 5 sweets there are?

NPC Milestone 3:3j

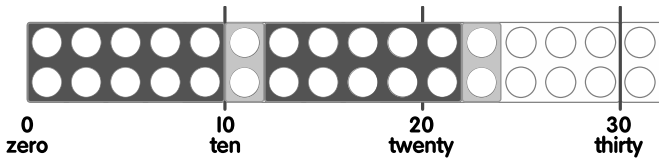
21

Can you use the Numicon Shapes to show how many 8s there are in 56?

NPC Milestone 3:3k

22

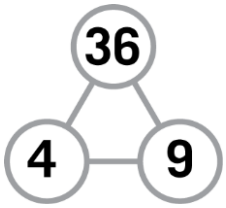
Can you write the dividing calculation this picture shows?



NPC Milestone 3:3k

23

Can you write the family of facts for this trio?



NPC Milestone 3:3l

24

Can you use 7 × 5 = 35 to solve

35 ÷ ☐ = 5 and

☐ ÷ 5 = 7?

NPC Milestone 3:3l

3.3 Milestone Assessment – NPC 3 Milestone 3 (Pupil)

Answers are on the answer pages that follow.

25

Ice lollies are sold in boxes of 4.
How many boxes will be needed for 28 children to have a lolly each?
Can you write the number sentence you used to solve this question?

NPC Milestone 3:3m

26

12 children are going to the cinema. There are 3 spare seats in each car.

How many cars are needed for the children to travel in?

Can you write the number sentence you used to solve this question?

NPC Milestone 3:3m

27

$80 \div 10 = 8$

Can you write the missing numbers in this statement?

I know that in 80 there are __ 10s or __ 8s.

NPC Milestone 3:3n

28

Adam says he can solve any dividing question by using his times tables facts. Can you work out what times table fact he would use to solve $27 \div 9$?

NPC Milestone 3:3n

29

There are 20 stickers in a pack.
If the stickers are shared between 6 children, how many stickers will each child get?
Write your calculation.

NPC Milestone 3:3o

30

Can you say how many 10s are in 42?

NPC Milestone 3:3o

3.3 Milestone Assessment – NPC 3 Milestone 3 (Pupil)

Answers are on the answer pages that follow.

31

Can you say what facts you would use to help you solve 200 + 600 + 200?

NPC Milestone 3:3p

32

Can you calculate 276 − 40?

NPC Milestone 3:3p

3.3 Milestone Assessment – NPC 3 Milestone 3 (Teacher)

1

34, 304, 434, 433, 344, 343, 403, 43

Can you write these numbers in order, using the < symbol?

34 < 43 < 304 < 343 < 344 < 403 < 433 < 434

NPC Milestone 3:3a

2

Can you explain how you would order any 3-digit numbers from largest to smallest?

An explanation that focuses on looking at the most significant digit, followed by the next significant digit until the ones digit is considered.

NPC Milestone 3:3a

3

Can you partition 482 in 3 different ways?

400 + 80 + 2
400 + 40 + 42
440 + 40 + 2

Plus any additional variations that do not include reordering.

NPC Milestone 3:3b

4

Can you use your knowledge of partitioning to work out the missing number?

621 = 303 + 212 + **106**

NPC Milestone 3:3b

5

Can you work out how many pence are equal to £5·05?

505

NPC Milestone 3:3c

6

Can you write the total amount in pounds?

£2·78

NPC Milestone 3:3c

7

A pack of pencils costs £1·19.

What coins could you use to pay exactly for 1 pack?

Can you find two other ways to do this?

e.g. £1·00 + 10p + 5p + 2p + 2p;
£1·00 + 5p + 5p + 5p + 2p + 2p;
50p + 50p + 10p + 5p + 2p + 2p;
50p + 20p + 20p + 20p + 5p + 2p + 2p

NPC Milestone 3:3d

8

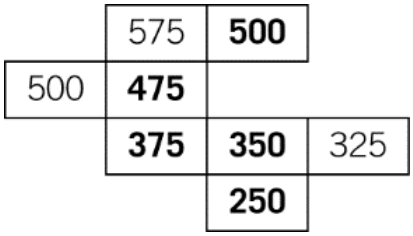
A bag of carrots costs 46p.
Can you work out the fewest number of coins you could use to pay for them exactly?

4 coins: 20p + 20p + 5p + 1p

NPC Milestone 3:3d

9

Can you copy this picture and complete the missing numbers?



NPC Milestone 3:3e

10

Can you say which square is closest to 856?

620	640	660	680	700
720	740	760	780	800
820	840	860	880	900

860

NPC Milestone 3:3e

11

Can you copy and complete the grid?

×	3	8
4	**12**	**32**
6	**18**	**48**

NPC Milestone 3:3f

12

Can you think of 3 numbers that are in the 2, 4 *and* 8 times tables?

Any from 8, 16, 24, 32, 40, 48, 56, 64, 72, 80, 88, 96.

NPC Milestone 3:3f

13

Can you use 5 × 4 = 20 to solve ☐ × 5 = 20?

4 × 5 = 20

NPC Milestone 3:3g

14

For each of the calculations, can you write a different multiplying sentence that uses the same numbers and gives the same answer?

12 × 3 = 36 **3 × 12**
10 × 4 = 40 **4 × 10**
6 × 5 = 30 **5 × 6**

NPC Milestone 3:3g

15

Can you use the pan balance to show two multiplying sentences with the same product?

e.g. 2 × 10 = 10 × 2
2 × 10 = 4 × 5
3 × 4 = 2 × 6

NPC Milestone 3:3h

16

The product is 32. Can you use counters to show all the arrays you can make?

1 × 32
2 × 16
4 × 8

NPC Milestone 3:3h

17

Can you say why it is true that 3 × 5 × 10 has the same product as 10 × 5 × 3?

3 × 5 = 15
15 × 10 = 150
10 × 5 = 50
50 × 3 = 150

NPC Milestone 3:3i

18

Can you write the missing numbers to make this statement true?

8 × 6 = 8 × **6**

NPC Milestone 3:3i

19

Can you work out how many groups of 3 there are in 21?

7

NPC Milestone 3:3j

20

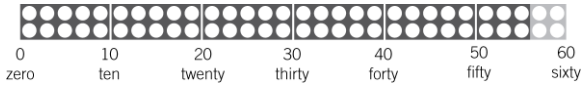
There are 60 sweets in a bag. Can you work out how many portions of 5 sweets there are?

12

NPC Milestone 3:3j

21

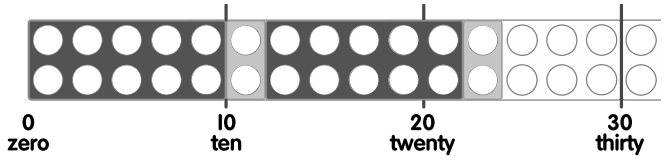
Can you use the Numicon Shapes to show how many 8s there are in 56?



NPC Milestone 3:3k

22

Can you write the dividing calculation this picture shows?

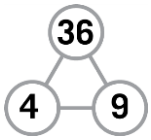


24 ÷ 2 = 12

NPC Milestone 3:3k

23

Can you write the family of facts for this trio?



36 ÷ 9 = 4
36 ÷ 4 = 9
9 × 4 = 36
4 × 9 = 36

NPC Milestone 3:3l

24

Can you use 7 × 5 = 35 to solve
35 ÷ ☐ = 5 and
☐ ÷ 5 = 7?

35 ÷ **7** = 5 and
35 ÷ 5 = 7

NPC Milestone 3:3l

3.3 Milestone Assessment – NPC 3 Milestone 3 (Teacher)

25

Ice lollies are sold in boxes of 4.
How many boxes will be needed for 28 children to have a lolly each?
Can you write the number sentence you used to solve this question?

7 boxes

28 ÷ 4 = 7 or 4 × 7 = 28

NPC Milestone 3:3m

26

12 children are going to the cinema. There are 3 spare seats in each car.
How many cars are needed for the children to travel in?
Can you write the number sentence you used to solve this question?

4 cars

12 ÷ 3 = 4 or 3 × 4 = 12

NPC Milestone 3:3m

27

80 ÷ 10 = 8

Can you write the missing numbers in this statement?

I know that in 80 there are **8** 10s or **10** 8s.

NPC Milestone 3:3n

28

Adam says he can solve any dividing question by using his times tables facts. Can you work out what times table fact he would use to solve 27 ÷ 9?

9 × 3 = 27

NPC Milestone 3:3n

29

There are 20 stickers in a pack.
If the stickers are shared between 6 children, how many stickers will each child get?
Write your calculation.

3 stickers

20 ÷ 6 = 3 r 2

NPC Milestone 3:3o

30

Can you say how many 10s are in 42?

4 r 2

NPC Milestone 3:3o

31	32
Can you say what facts you would use to help you solve 200 + 600 + 200? **6 + 2 + 2 or 6 + 4 or similar**	Can you calculate 276 − 40? **236**
NPC Milestone 3:3p	NPC Milestone 3:3p

3.4 Milestone Assessment – NPC 3 Milestone 4 (Pupil)

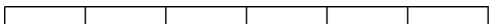
Answers are on the answer pages that follow.

1

Can you label the scale?

NPC Milestone 3:4a

2

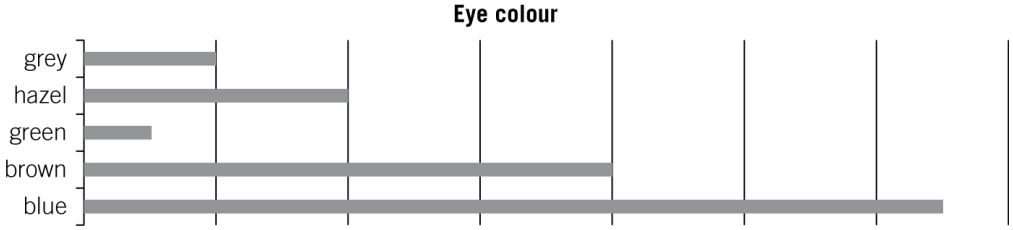


Can you label the scale and include 15 as one of the divisions?

NPC Milestone 3:4a

3

Some children took part in a survey. Here are the results.

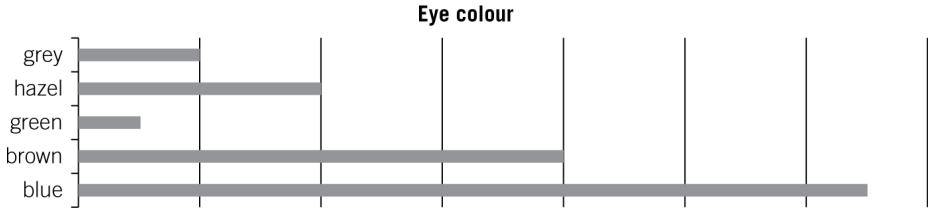


4 children have hazel eyes. How many children have blue eyes?
How many children took part in this survey altogether?

NPC Milestone 3:4b

4

Some children took part in a survey. Here are the results.



4 children have hazel eyes.
How many children took part in this survey altogether?

NPC Milestone 3:4b

3.4 Milestone Assessment – NPC 3 Milestone 4 (Pupil)

Answers are on the answer pages that follow.

5

Can you copy this scale and label it from 300 to 450?

NPC Milestone 3:4c

6

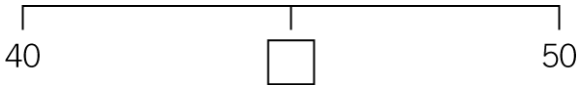
1000 950 ☐ ☐ ☐ 750

Can you write the missing numbers in the sequence?

NPC Milestone 3:4c

7

Can you write the number that is halfway between 40 and 50?



NPC Milestone 3:4d

8

Can you say what number is halfway between 660 and 670?

NPC Milestone 3:4d

9

Can you draw a diagram to prove why 67 rounds to 70?

NPC Milestone 3:4e

10

Can you explain how you would round 350 to the nearest 100?

NPC Milestone 3:4e

3.4 Milestone Assessment – NPC 3 Milestone 4 (Pupil)

Answers are on the answer pages that follow.

11

3 + 5 = 8
13 + 5 = 18
23 + 5 = 28

Can you write the next 3 calculations that follow this pattern?

NPC Milestone 3:4f

12

29 − 3 = 26
39 − 3 = 36
59 − 3 = 56
69 − 3 = 66

Zak worked systematically.
Can you say if you agree?

NPC Milestone 3:4f

13

Can you explain how knowing 4 + 5 = 9 can help you to solve 54 + 5?

NPC Milestone 3:4g

14

Can you explain how you would solve 78 − 3?

NPC Milestone 3:4g

15

40 + 16 = 56

Can you use this fact to find 3 new balancing calculations?

40 + 16 = ☐ + ☐
40 + 16 = ☐ + ☐
40 + 16 = ☐ + ☐

NPC Milestone 3:4h

16

☐ + 23 = 18 + ☐

Can you complete the calculation and then explain the choices you made?

NPC Milestone 3:4h

3.4 Milestone Assessment – NPC 3 Milestone 4 (Pupil)

Answers are on the answer pages that follow.

17

Can you work out double 46?

NPC Milestone 3:4i

18

Can you explain how you would halve 78?

NPC Milestone 3:4i

19

Can you solve this calculation?

$100 - 45 = \square$

NPC Milestone 3:4j

20

Can you solve this calculation?

$77 + \square = 100$

NPC Milestone 3:4j

21

Can you work out how many 3s there are in 21, 27 and 36?

NPC Milestone 3:4k

22

Can you work out how many 8s there are in 56, 72 and 96?

NPC Milestone 3:4k

3.4 Milestone Assessment – NPC 3 Milestone 4 (Pupil)

Answers are on the answer pages that follow.

23

Can you write the missing numbers?

In 20 there are __ 1s,
__ 2s,
__ 4s,
__ 5s,
__ 10s and
__ 20s.

NPC Milestone 3:4l

24

Can you say 4 numbers that are in both the 2 and the 3 times tables?

NPC Milestone 3:4l

25

Can you use 6 × 4 to help you solve 6 × 8?
If so, can you explain how it helps?

NPC Milestone 3:4m

26

120 ÷ 10 = 12

□ ÷ 5 = 12

Can you explain the link between ÷ 10 and ÷ 5?

NPC Milestone 3:4m

27

Jill and 3 of her friends are sharing a packet of 28 sweets.
Can you work out how many sweets they will each get if they share them equally?

NPC Milestone 3:4n

28

How many groups of 4 are there in 36? Can you write the number sentence for this question?

NPC Milestone 3:4n

3.4 Milestone Assessment – NPC 3 Milestone 4 (Pupil)

Answers are on the answer pages that follow.

29

28 pencils are shared equally between 6 children.
Can you work out how many pencils each child will receive?

NPC Milestone 3:4o

30

A bag of 58 marbles is shared equally between 6 children.

How many marbles will they get each, and how many will be left over?
Can you write a number sentence for this question?

NPC Milestone 3:4o

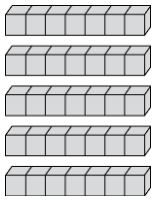
31

Can you write a sharing story for this array?

NPC Milestone 3:4p

32

Can you write 2 dividing sentences for this array?



NPC Milestone 3:4p

33

$40 \div \square = 5$

Can you explain how you would solve this calculation?

NPC Milestone 3:4q

34

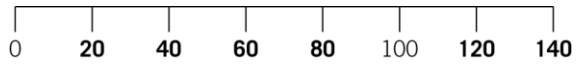
$24 \div 3 = 8$

Can you say the 2 multiplying sentences to go with this dividing calculation?

NPC Milestone 3:4q

3.4 Milestone Assessment – NPC 3 Milestone 4 (Teacher)

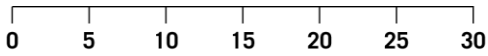
1



Can you label the scale?

NPC Milestone 3:4a

2

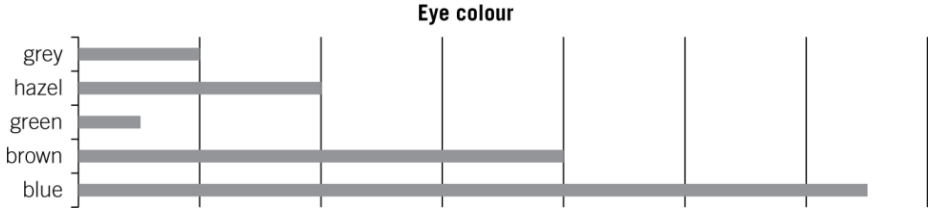


Can you label the scale and include 15 as one of the divisions?

NPC Milestone 3:4a

3

Some children took part in a survey.
Here are the results.

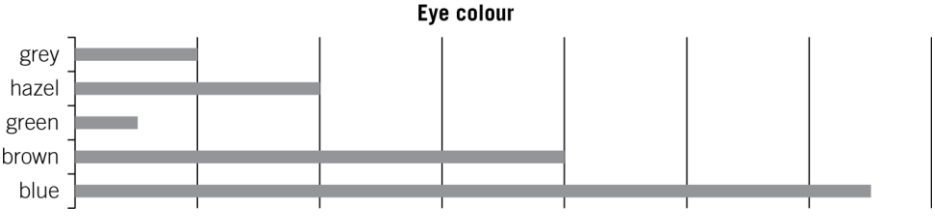


4 children have hazel eyes. How many children have blue eyes? **13**
How many children took part in this survey altogether? **28**

NPC Milestone 3:4b

4

Some children took part in a survey. Here are the results.



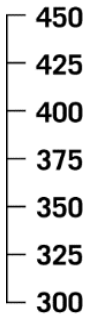
4 children have hazel eyes.
How many children took part in this survey altogether? **28**

NPC Milestone 3:4b

3.4 Milestone Assessment – NPC 3 Milestone 4 (Teacher)

5

Can you copy this scale and label it from 300 to 450?



NPC Milestone 3:4c

6

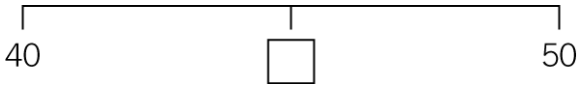
1000 950 **900 850 800** 750

Can you write the missing numbers in the sequence?

NPC Milestone 3:4c

7

Can you write the number that is halfway between 40 and 50?



45

NPC Milestone 3:4d

8

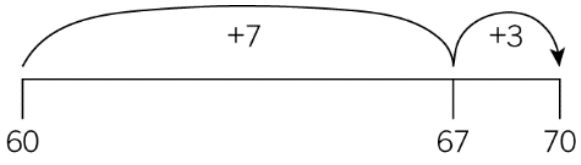
Can you say what number is halfway between 660 and 670?

665

NPC Milestone 3:4d

9

Can you draw a diagram to prove why 67 rounds to 70?



Or a comparison model showing 60, 67 and 70.

NPC Milestone 3:4e

10

Can you explain how you would round 350 to the nearest 100?

An explanation that includes 350 is between 300 and 400. When rounding 350 we would go to 400 as numbers that are 50+ round up.

NPC Milestone 3:4e

3.4 Milestone Assessment – NPC 3 Milestone 4 (Teacher)

11

3 + 5 = 8
13 + 5 = 18
23 + 5 = 28

Can you write the next 3 calculations that follow this pattern?

33 + 5 = 38
43 + 5 = 48
53 + 5 = 58

NPC Milestone 3:4f

12

29 − 3 = 26
39 − 3 = 36
59 − 3 = 56
69 − 3 = 66

Zak worked systematically.
Can you say if you agree?

No. Zak missed 49 − 3 = 46 from his sequence.

NPC Milestone 3:4f

13

Can you explain how knowing 4 + 5 = 9 can help you to solve 54 + 5?

An explanation that includes 54 + 5 being 50 more than 4 + 5 = 9, because the difference between 4 and 54 is 50.

Or, the ones being the same in each calculation so only the tens change.

NPC Milestone 3:4g

14

Can you explain how you would solve 78 − 3?

An explanation that includes count back 3 or 8 − 3.

NPC Milestone 3:4g

15

40 + 16 = 56

Can you use this fact to find 3 new balancing calculations?

Three different regroups/partitions that do not include reordering, e.g.

40 + 16 = 50 + 6
40 + 16 = 52 + 4
40 + 16 = 30 + 26, etc.

NPC Milestone 3:4h

16

☐ + 23 = 18 + ☐

Can you complete the calculation and then explain the choices you made?

17 + 23 = 18 + 22 or any other combination that balances.

NPC Milestone 3:4h

3.4 Milestone Assessment – NPC 3 Milestone 4 (Teacher)

17 Can you work out double 46? **92**	**18** Can you explain how you would halve 78? **An explanation that includes halving 70 and halving 8 to get 39 or halving 80 and adjusting.**
NPC Milestone 3:4i	NPC Milestone 3:4i
19 Can you solve this calculation? 100 − 45 = **55**	**20** Can you solve this calculation? 77 + **23** = 100
NPC Milestone 3:4j	NPC Milestone 3:4j
21 Can you work out how many 3s there are in 21, 27 and 33? **7, 9, 11**	**22** Can you work out how many 8s there are in 56, 72 and 96? **7, 9, 12**
NPC Milestone 3:4k	NPC Milestone 3:4k

3.4 Milestone Assessment – NPC 3 Milestone 4 (Teacher)

23

Can you write the missing numbers?

In 20 there are **20** 1s,
10 2s,
5 4s,
4 5s,
2 10s and
1 20.

NPC Milestone 3:4l

24

Can you say 4 numbers that are in both the 2 and the 3 times tables?

e.g. 6, 12, 18, 24, etc.

NPC Milestone 3:4l

25

Can you use 6 × 4 to help you solve 6 × 8?
If so, can you explain how it helps?

An explanation that uses the relationship between 4 and 8, e.g. 6 × 4 is half of 6 × 8 so I need to double it to find the answer.

NPC Milestone 3:4m

26

120 ÷ 10 = 12
60 ÷ 5 = 12

Can you explain the link between ÷ 10 and ÷ 5?

An explanation that uses the relationship between 5 and 10, e.g. there will be half as many groups of 5, as 5 is half of 10 or the dividend will be half the value.

NPC Milestone 3:4m

27

Jill and 3 of her friends are sharing a packet of 28 sweets.
Can you work out how many sweets they will each get if they share them equally?

7

NPC Milestone 3:4n

28

How many groups of 4 are there in 36? Can you write the number sentence for this question?

36 ÷ 4 = 9

NPC Milestone 3:4n

3.4 Milestone Assessment – NPC 3 Milestone 4 (Teacher)

29

28 pencils are shared equally between 6 children.
Can you work out how many pencils each child will receive?

4 (do not accept $4\frac{1}{2}$)

NPC Milestone 3:4o

30

A bag of 58 marbles is shared equally between 6 children.
How many marbles will they get each, and how many will be left over?
Can you write a number sentence for this question?

9 marbles each and 4 left over
58 ÷ 6 = 9 r 4

NPC Milestone 3:4o

31

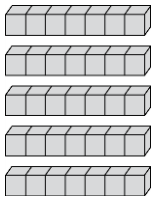
Can you write a sharing story for this array?

An answer that includes 24 being shared between 4 or 6.

NPC Milestone 3:4p

32

Can you write 2 dividing sentences for this array?



35 ÷ 5 = 7
35 ÷ 7 = 5

NPC Milestone 3:4p

33

40 ÷ **8** = 5

Can you explain how you would solve this calculation?

An answer that shows an understanding of commutativity: either how many 5s in 40, or 5 'whats' makes 40.

NPC Milestone 3:4q

34

24 ÷ 3 = 8

Can you say the 2 multiplying sentences to go with this dividing calculation?

3 × 8 = 24
8 × 3 = 24

NPC Milestone 3:4q

3.2 Milestone Assessment – GMS 3 Milestone 2 (Pupil)

Answers are on the answer pages that follow.

1

Can you say the time shown on this clock?

GMS Milestone 3:2a

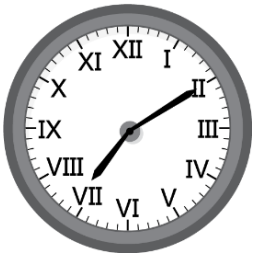
2

Can you say the time shown on this clock?

GMS Milestone 3:2a

3

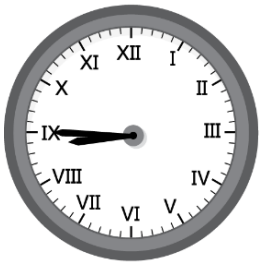
Can you explain what is the same and what is different about these clocks?



GMS Milestone 3:2b

4

Can you explain what is the same about these two clocks?



GMS Milestone 3:2b

3.2 Milestone Assessment – GMS 3 Milestone 2 (Pupil)

Answers are on the answer pages that follow.

5

Can you say the time shown on this digital clock?

GMS Milestone 3:2c

6

Can you say the time shown on this digital clock?

GMS Milestone 3:2c

7

Can you work out what time it will be 20 minutes after 10:23?

GMS Milestone 3:2d

8

Can you work out what the time was a quarter of an hour (15 minutes) before 23 minutes to 6?

GMS Milestone 3:2d

3.2 Milestone Assessment – GMS 3 Milestone 2 (Pupil)

Answers are on the answer pages that follow.

9

Can you think of a different way to say 12 noon?

GMS Milestone 3:2e

10

Can you say if quarter past 3 in the afternoon is an a.m. or p.m. time?

GMS Milestone 3:2e

11

It is 3:00 p.m.
Can you work out how many hours this is after 9:30 a.m.?

GMS Milestone 3:2f

12

It is half past 4 in the afternoon.
Can you work out what time it was 8 hours before?

GMS Milestone 3:2f

3.2 Milestone Assessment – GMS 3 Milestone 2 (Pupil)

Answers are on the answer pages that follow.

13

Can you work out how many hours there are in 2 days?

GMS Milestone 3:2g

14

Can you work out how many seconds there are in $1\frac{1}{2}$ minutes?

GMS Milestone 3:2g

15

Can you say which 4 months have 30 days?

GMS Milestone 3:2h

16

Can you explain how a leap year is different to a non-leap year?

GMS Milestone 3:2h

3.2 Milestone Assessment – GMS 3 Milestone 2 (Teacher)

1

Can you say the time shown on this clock?

28 minutes past 7

GMS Milestone 3:2a

2

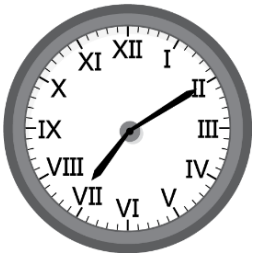
Can you say the time shown on this clock?

9 minutes to 3

GMS Milestone 3:2a

3

Can you explain what is the same and what is different about these clocks?

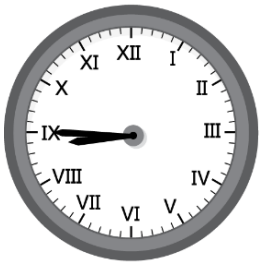


One has (Arabic) numerals; the other uses Roman numerals, but they both show the same time: ten past 7.

GMS Milestone 3:2b

4

Can you explain what is the same about these two clocks?



They both show the same time: quarter to 9.

GMS Milestone 3:2b

5

Can you say the time shown on this digital clock?

Twenty to one (in the morning) or twelve forty a.m.

GMS Milestone 3:2c

6

Can you say the time shown on this digital clock?

Seven minutes past 12.

GMS Milestone 3:2c

7

Can you work out what time it will be 20 minutes after 10:23?

10:43

GMS Milestone 3:2d

8

Can you work out what the time was a quarter of an hour (15 minutes) before 23 minutes to 6?

22 minutes past 5

GMS Milestone 3:2d

9 Can you think of a different way to say 12 noon? **midday**	**10** Can you say if quarter past 3 in the afternoon is an a.m. or p.m. time? **p.m.**
GMS Milestone 3:2e	GMS Milestone 3:2e
11 It is 3:00 p.m. Can you work out how many hours this is after 9:30 a.m.? **$5\frac{1}{2}$ hours**	**12** It is half past 4 in the afternoon. Can you work out what time it was 8 hours before? **08:30 a.m.**
GMS Milestone 3:2f	GMS Milestone 3:2f

13

Can you work out how many hours there are in 2 days?

48 hours (2 × 24)

GMS Milestone 3:2g

14

Can you work out how many seconds there are in $1\frac{1}{2}$ minutes?

90 seconds (60 × $1\frac{1}{2}$)

GMS Milestone 3:2g

15

Can you say which 4 months have 30 days?

April, June, September, November

GMS Milestone 3:2h

16

Can you explain how a leap year is different to a non-leap year?

A leap year has 366 days while a non-leap year has 365 days. There is one extra day in February in a leap year.

GMS Milestone 3:2h

3.5 Milestone Assessment – NPC 3 Milestone 5 (Pupil)

Answers are on the answer pages that follow.

1

☐, 139, 133, 127, ☐, ☐

Can you write the missing numbers? What is the rule for this sequence?

NPC Milestone 3:5a

2

Can you write a number sequence with 5 terms with a step size of +7?

NPC Milestone 3:5a

3

655 − 123

Would you solve this calculation using a mental or written method? Can you explain your choice?

NPC Milestone 3:5b

4

48 + 55 + 127

Can you explain how you would solve this calculation?

NPC Milestone 3:5b

5

Can you estimate the answer to 150 − 72?

NPC Milestone 3:5c

6

Can you use rounding to estimate the total of 28 + 41 + 37?

NPC Milestone 3:5c

3.5 Milestone Assessment – NPC 3 Milestone 5 (Pupil)

Answers are on the answer pages that follow.

7

Can you use partitioning to solve 342 + 125?

NPC Milestone 3:5d

8

Can you explain how you can use a mental strategy to solve 486 − 154?

NPC Milestone 3:5d

9

Can you use base-ten apparatus to make a model to show how you would solve 268 + 127?

NPC Milestone 3:5e

10

Can you use the Numicon Shapes to show how you would solve 67 − 38?

NPC Milestone 3:5e

11

Can you work out how much further on 126 km is from 83 km?

NPC Milestone 3:5f

12

Can you use a number line to solve 864 − 828?

NPC Milestone 3:5f

3.5 Milestone Assessment – NPC 3 Milestone 5 (Pupil)

Answers are on the answer pages that follow.

13

Can you solve this money calculation?

£1·36 + £2·48

NPC Milestone 3:5g

14

Can you solve this money calculation?

£4·53 − £2·67

NPC Milestone 3:5g

15

Can you use the inverse operation to check this calculation?

$$\begin{array}{rrrr} & 9 & 4 & 3 \\ - & 6 & 1 & 9 \\ \hline & 3 & 3 & 6 \end{array}$$

NPC Milestone 3:5h

16

Can you use the inverse operation to check this calculation?

$$\begin{array}{rrrr} & 5 & 8 & 6 \\ + & 3 & 6 & 3 \\ \hline & 9 & 4 & 9 \\ & {\scriptstyle 1} & & \end{array}$$

NPC Milestone 3:5h

17

A large model house is made from 96 cubes and a smaller model house is made from 12 cubes. Can you work out how many times bigger the large model is?

NPC Milestone 3:5i

18

This pattern is used to tile a kitchen.

Can you work out how many tiles are needed to make it 6 times as long? How many tiles will be grey?

NPC Milestone 3:5i

3.5 Milestone Assessment – NPC 3 Milestone 5 (Pupil)

Answers are on the answer pages that follow.

19

What is the effect when you multiply by 10? Can you use this calculation to help you explain?

7 × 10

NPC Milestone 3:5j

20

Can you finish this sentence?
“When I divide a multiple of 10 by 10 … ”

NPC Milestone 3:5j

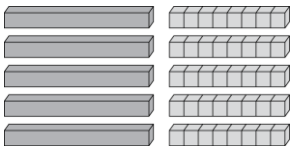
21

4 children decide to share out their stickers equally between them.
They have 72 stickers.
Can you make a model to show this and record it as a short dividing calculation?

NPC Milestone 3:5k

22

Can you write the short multiplying calculation that this model shows?



NPC Milestone 3:5k

3.5 Milestone Assessment – NPC 3 Milestone 5 (Teacher)

1

145, 139, 133, 127, **121**, **115**

Can you write the missing numbers? What is the rule for this sequence?

The rule is −6.

NPC Milestone 3:5a

2

Can you write a number sequence with 5 terms with a step size of +7?

Any number sequence where the rule is +7, e.g. 0, 7, 14, 21, 28 or 12, 19, 26, 33, 40.

NPC Milestone 3:5a

3

655 − 123

Would you solve this calculation using a mental or written method? Can you explain your choice?

A mental method can be used as there is no exchanging involved.

NPC Milestone 3:5b

4

48 + 55 + 127

Can you explain how you would solve this calculation?

Partitioning or sequencing could be used, e.g.

100 + 110 + 20 = 230

or

127 + 90 + 13 = 230

NPC Milestone 3:5b

5

Can you estimate the answer to 150 − 72?

An estimate will be 80, using nearest multiples of 10.

NPC Milestone 3:5c

6

Can you use rounding to estimate the total of 28 + 41 + 37?

110, using nearest multiples of 10.

NPC Milestone 3:5c

7

Can you use partitioning to solve 342 + 125?

300 + 100 = 400
40 + 20 = 60
2 + 5 = 7
400 + 60 + 7 = 467

NPC Milestone 3:5d

8

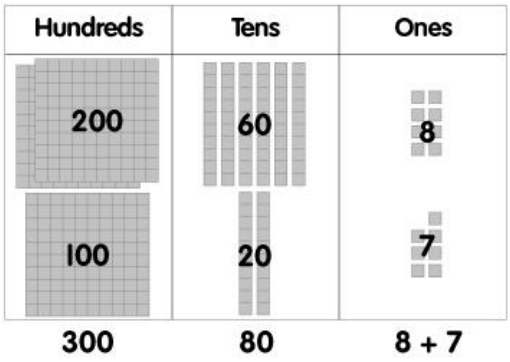
Can you explain how you can use a mental strategy to solve 486 − 154?

Subtract the ones, then the tens, then the hundreds.
No exchanging is needed.
The answer is 332.

NPC Milestone 3:5d

9

Can you use base-ten apparatus to make a model to show how you would solve 268 + 127?



NPC Milestone 3:5e

10

Can you use the Numicon Shapes to show how you would solve 67 − 38?

Use Numicon Shapes to add, ensuring that the 15 units are exchanged for one 10-shape and one 5-shape before adding the tens and ones.

NPC Milestone 3:5e

11

Can you work out how much further on 126 km is from 83 km?

43 km

NPC Milestone 3:5f

12

Can you use a number line to solve 864 − 828?

36

NPC Milestone 3:5f

13

Can you solve this money calculation?

£1·36 + £2·48

£3·84

NPC Milestone 3:5g

14

Can you solve this money calculation?

£4·53 − £2·67

£1·86

NPC Milestone 3:5g

15

Can you use the inverse operation to check this calculation?

$$\begin{array}{rrrr} & 9 & 4 & 3 \\ - & 6 & 1 & 9 \\ \hline & 3 & 3 & 6 \end{array}$$

336 + 619 = 955, so the calculation is incorrect.

The correct answer is 324.

NPC Milestone 3:5h

16

Can you use the inverse operation to check this calculation?

$$\begin{array}{rrrr} & 5 & 8 & 6 \\ + & 3 & 6 & 3 \\ \hline & 9 & 4 & 9 \\ & {\scriptstyle 1} & & \end{array}$$

949 − 363 = 586

or 949 − 586 = 363

The calculation is correct.

NPC Milestone 3:5h

17

A large model house is made from 96 cubes and a smaller model house is made from 12 cubes. Can you work out how many times bigger the large model is?

8

NPC Milestone 3:5i

18

This pattern is used to tile a kitchen.

Can you work out how many tiles are needed to make it 6 times as long? How many tiles will be grey?

30 tiles; 12 are grey.

NPC Milestone 3:5i

19

What is the effect when you multiply by 10? Can you use this calculation to help you explain?

7 × 10

All the digits move one place to the left, so in 7 × 10 the 7 moves from the ones into the tens place.

NPC Milestone 3:5j

20

Can you finish this sentence?
"When I divide a multiple of 10 by 10, …

… I shift the digits to the right in the place value chart."

NPC Milestone 3:5j

21

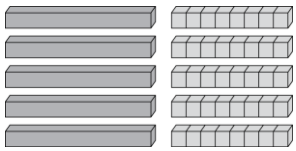
4 children decide to share out their stickers equally between them.
They have 72 stickers.
Can you make a model to show this and record it as a short dividing calculation?

$$4\overline{)72} \quad 18$$

NPC Milestone 3:5k

22

Can you write the short multiplying calculation that this model shows?



1 8
× 5
9 0

NPC Milestone 3:5k

3.3 Milestone Assessment – GMS 3 Milestone 3 (Pupil)

Answers are on the answer pages that follow.

1

Can you estimate the height of the classroom door?
What would you use to measure it?

GMS Milestone 3:3a

2

Can you estimate the length of the long side of a Numicon 10-shape?
What would you use to check?

GMS Milestone 3:3a

3

Can you convert this length in mm into cm and mm?

725 mm = ☐ cm ☐ mm

GMS Milestone 3:3b

4

Can you convert this length in cm into m and cm?

☐ cm = 2 m 85 cm

GMS Milestone 3:3b

3.3 Milestone Assessment – GMS 3 Milestone 3 (Pupil)

Answers are on the answer pages that follow.

5

A length of ribbon measures 1 m 36 cm.

If you cut a length of 84 cm, what length is left?

GMS Milestone 3:3c

6

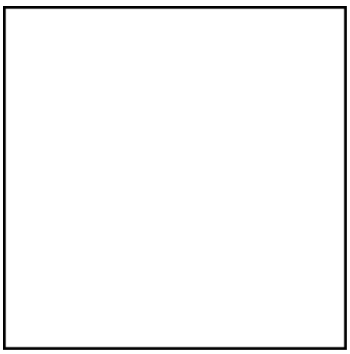
Tia swam one 25 m length and two 15 m widths.

How far did she swim altogether?

GMS Milestone 3:3c

7

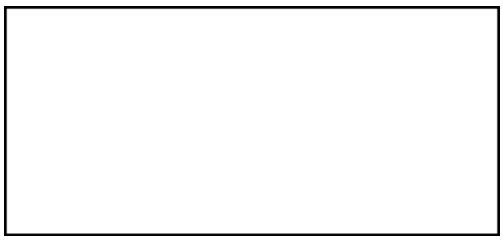
Can you measure the perimeter of this rectangle, in centimetres?



GMS Milestone 3:3d

8

Can you measure the perimeter of this rectangle, in millimetres?



GMS Milestone 3:3d

3.3 Milestone Assessment – GMS 3 Milestone 3 (Pupil)

Answers are on the answer pages that follow.

9

Complete the tally chart using the pictogram.

One car represents 2 vehicles.
How many vehicles passed the school in 30 minutes?

A survey of the vehicles passing school in 30 minutes	
car	𝍸
bicycle	||
tractor	
motorbike	|||
lorry	𝍸
bus	|

If the children had completed their survey for another 15 minutes, how many more vehicles do you think might have passed?

A survey of the vehicles passing school in 30 minutes	
car	
bicycle	
tractor	
motorbike	
lorry	
bus	

GMS Milestone 3:3e

10

Can you work out how many 1p coins are equivalent to £5·06?

GMS Milestone 3:3f

11

Can you work out how many 10p coins are equivalent to £6·70?

GMS Milestone 3:3f

3.3 Milestone Assessment – GMS 3 Milestone 3 (Pupil)

Answers are on the answer pages that follow.

12

Can you work out how to make £4·83 with the fewest number of coins?

GMS Milestone 3:3g

13

Can you work out how to make £7·56 with the fewest number of coins?

GMS Milestone 3:3g

14

A teddy bear costs £4·75 and a ball costs £2·95.
How much would both items cost?
Can you explain how you worked it out?

GMS Milestone 3:3h

15

How much would a drink at 65p, a packet of crisps at 45p and a sandwich at £1·20 cost altogether? Can you show how you found the total?

GMS Milestone 3:3h

3.3 Milestone Assessment – GMS 3 Milestone 3 (Pupil)

Answers are on the answer pages that follow.

16

Max wants to buy his dad 2 books at £4·35 each and a bar of chocolate at £1·18. He has £10. Can you work out if he will have enough money?

GMS Milestone 3:3i

17

You have £5 to spend. Can you work out if you have enough money to buy a notepad at 78p, a ruler at 68p, a pack of pens at £1·25 and a pencil case at £2·29?

GMS Milestone 3:3i

3.3 Milestone Assessment – GMS 3 Milestone 3 (Teacher)

1

Can you estimate the height of the classroom door?
What would you use to measure it?

Any reasonable estimate, around 2 m, in m or cm, using a metre rule or tape measure to measure it.

GMS Milestone 3:3a

2

Can you estimate the length of the long side of a Numicon 10-shape?
What would you use to check?

Any reasonable estimate, around 12 cm, using a ruler to measure it.

GMS Milestone 3:3a

3

Can you convert this length in mm into cm and mm?

725 mm = **72** cm **5** mm

GMS Milestone 3:3b

4

Can you convert this length in m and cm into cm?

285 cm = 2 m 85 cm

GMS Milestone 3:3b

5

A length of ribbon measures 1 m 36 cm.

If you cut a length of 84 cm, what length is left?

52 cm

GMS Milestone 3:3c

6

Tia swam one 25 m length and two 15 m widths.

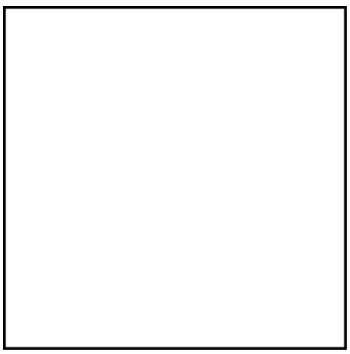
How far did she swim altogether?

55 m

GMS Milestone 3:3c

7

Can you measure the perimeter of this rectangle, in centimetres?

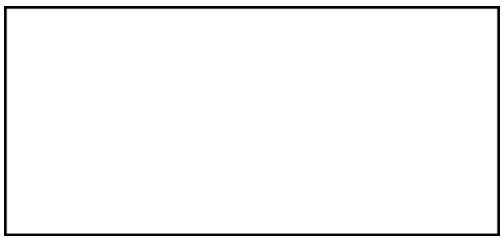


18 cm

GMS Milestone 3:3d

8

Can you measure the perimeter of this rectangle, in millimetres?



190 mm

GMS Milestone 3:3d

9

Complete the tally chart using the pictogram.

One car represents 2 vehicles.
How many vehicles passed the school in 30 minutes? **26**

A survey of the vehicles passing school in 30 minutes	
car	𝍸 𝍸 ||
bicycle	||
tractor	|
motorbike	|||
lorry	𝍸 ||
bus	|

If the children had completed their survey for another 15 minutes, how many more vehicles do you think might have passed?

A survey of the vehicles passing school in 30 minutes	
car	
bicycle	
tractor	
motorbike	
lorry	
bus	

Approximately 13

GMS Milestone 3:3e

10

Can you work out how many 1p coins are equivalent to £5·06?

506

GMS Milestone 3:3f

11

Can you work out how many 10p coins are equivalent to £6·70?

67

GMS Milestone 3:3f

12

Can you work out how to make £4·83 with the fewest number of coins?

2 × £2, 1 × 50p, 1 × 20p, 1 × 10p, 1 × 2p, 1 × 1p

GMS Milestone 3:3g

13

Can you work out how to make £7·56 with the fewest number of coins?

3 × £2, 1 × £1, 1 × 50p, 1 × 5p, 1 × 1p

GMS Milestone 3:3g

14

A teddy bear costs £4·75 and a ball costs £2·95.
How much would both items cost? Can you explain how you worked it out?

£7·70

(£4·75 + £3 − 5p or something similar)

GMS Milestone 3:3h

15

How much would a drink at 65p, a packet of crisps at 45p and a sandwich at £1·20 cost altogether? Can you show how you found the total?

£2·30

(£1·20 + £1 + 5p + 5p or something similar)

GMS Milestone 3:3h

16	17
Max wants to buy his dad 2 books at £4·35 each and a bar of chocolate at £1·18. He has £10. Can you work out if he will have enough money? **Yes, and he will get 12p change.**	You have £5 to spend. Can you work out if you have enough money to buy a notepad at 78p, a ruler at 68p, a pack of pens at £1·25 and a pencil case at £2·29? **Yes, exactly the right amount of money.**
GMS Milestone 3:3i	GMS Milestone 3:3i

3.6 Milestone Assessment – NPC 3 Milestone 6 (Pupil)

Answers are on the answer pages that follow.

1

$\frac{1}{7}$

Can you say this fraction aloud?
What does the 1 mean?
What does the 7 mean?

NPC Milestone 3:6a

2

$\frac{6}{6}$

What does the bottom 6 mean in this fraction?
What does the top 6 mean?
Can you explain when we might see this fraction?

NPC Milestone 3:6a

3

Can you use apparatus to show how you can find a quarter of 68?

NPC Milestone 3:6b

4

Can you work out what is half of 86?

NPC Milestone 3:6b

5

What is a quarter of 36? Can you explain how you would work this out?

NPC Milestone 3:6c

6

Can you explain how to find a third of 21?

NPC Milestone 3:6c

3.6 Milestone Assessment – NPC 3 Milestone 6 (Pupil)

Answers are on the answer pages that follow.

7

There are 9 cakes to share equally between 4 people. How many cakes will they each get?
Can you write a fraction sentence for this calculation?

NPC Milestone 3:6d

8

There are 15 pens in a pack. If the pens were shared between 2 people, how many pens would they each get?
Can you write a dividing sentence for this calculation?

NPC Milestone 3:6d

9

Taj says, “You find how many halves there are in a number by doubling it.” Is this sometimes true, always true or never true? Can you use examples in your answer?

NPC Milestone 3:6e

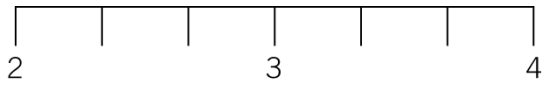
10

Can you work out whether there are more halves or fewer halves in 28 than in half of 28?

NPC Milestone 3:6e

11

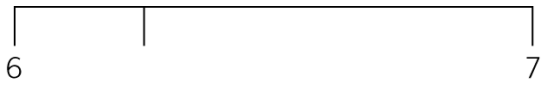
Can you write the labels for the marks on this number line?



NPC Milestone 3:6f

12

Can you write the label for the marked point on this number line?



NPC Milestone 3:6f

3.6 Milestone Assessment – NPC 3 Milestone 6 (Pupil)

Answers are on the answer pages that follow.

13

I have 2 cakes that are exactly the same size. I cut 1 into quarters and 1 into fifths. Can you work out which will be the larger slice:

$\frac{1}{4}$ or $\frac{1}{5}$?

NPC Milestone 3:6g

14

Is it always true that the greater the denominator the smaller the fractional part?
Can you explain your answer?

NPC Milestone 3:6g

15

Can you write the missing numerator?

$\frac{1}{2} = \frac{\square}{10}$

NPC Milestone 3:6h

16

Can you write 3 fractions that are the same as $\frac{1}{2}$?

NPC Milestone 3:6h

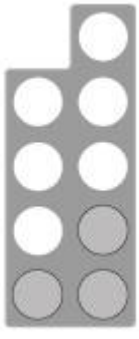
17

Can you use the Numicon Shapes to show $\frac{3}{8}$?

NPC Milestone 3:6i

18

Can you say what fraction is covered?



NPC Milestone 3:6i

3.6 Milestone Assessment – NPC 3 Milestone 6 (Pupil)

Answers are on the answer pages that follow.

19

Can you work out the answer to this calculation?

$$\frac{9}{10} - \frac{4}{10} = \square$$

NPC Milestone 3:6j

20

Can you use the Numicon Shapes to show $\frac{1}{5} + \frac{3}{5}$?

NPC Milestone 3:6j

21

There are 4 silver coins in a purse. What possible totals could there be? Can you set your work out so that you can be sure you have found all the possibilities?

NPC Milestone 3:6k

22

The answer is 21. By adding 2 numbers, can you work out how many ways you can make this total?

NPC Milestone 3:6k

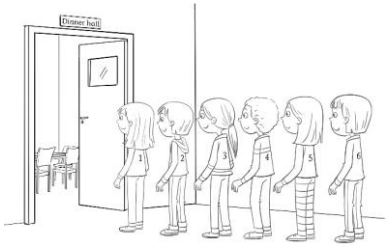
23

Can you record all the ways to make 10 by adding 3 numbers?

NPC Milestone 3:6l

24

6 children line up for lunch. Can you work out how many ways there are of arranging these children in a line? Think of the best way to organize your work.



NPC Milestone 3:6l

3.6 Milestone Assessment – NPC 3 Milestone 6 (Pupil)

Answers are on the answer pages that follow.

25

Can you make a statement about the numbers in the 5 times table?

NPC Milestone 3:6m

26

Annie says, “When you add 3 numbers together you always get an odd number.” Using examples, can you explain if Annie is correct?

NPC Milestone 3:6m

3.6 Milestone Assessment – NPC 3 Milestone 6 (Teacher)

1

$\frac{1}{7}$

Can you say this fraction aloud?
What does the 1 mean?
What does the 7 mean?

One seventh. The one is one of seven equal parts of the whole.

NPC Milestone 3:6a

2

$\frac{6}{6}$: What does the bottom 6 mean in this fraction? What does the top 6 mean? Can you explain when we might see this fraction?

The top 6 means there are 6 parts and the bottom 6 means that there are six parts in the whole so $\frac{6}{6}$ means one whole.

NPC Milestone 3:6a

3

Can you use apparatus to show how you can find a quarter of 68?

Use Numicon Shapes or number rods to show four lots of 17.

NPC Milestone 3:6b

4

Can you work out what is half of 86?

43

NPC Milestone 3:6b

5

What is a quarter of 36? Can you explain how you would work this out?

9: explanation could include using multiplying facts to work out 36 ÷ 4.

NPC Milestone 3:6c

6

Can you explain how to find a third of 21?

7: to find a third, divide the number by 3. The 3 times table could be used to help.
21 ÷ 3 = 7

NPC Milestone 3:6c

3.6 Milestone Assessment – NPC 3 Milestone 6 (Teacher)

7

There are 9 cakes to share equally between 4 people. How many cakes will they each get?
Can you write a fraction sentence for this calculation?

$$\frac{1}{4} \text{ of } 9 = 2\frac{1}{4}$$

NPC Milestone 3:6d

8

There are 15 pens in a pack. If the pens were shared between 2 people, how many pens would they each get?
Can you write a dividing sentence for this calculation?

$$15 \div 2 = 7\frac{1}{2}$$

7 pens with one left over.

NPC Milestone 3:6d

9

Taj says, “You find how many halves there are in a number by doubling it.” Is this sometimes true, always true or never true? Can you use examples in your answer?

Yes this is always true, e.g. there are 12 halves in 6; 34 halves in 17, 45 halves in $22\frac{1}{2}$, etc.

NPC Milestone 3:6e

10

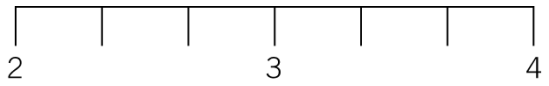
Can you work out whether there are more halves or fewer halves in 28 than in half of 28?

There are more halves in 28 (56 halves) than in 14 (28 halves).

NPC Milestone 3:6e

11

Can you write the labels for the marks on this number line?

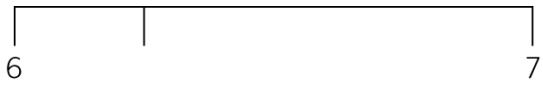


$$2,\ 2\frac{1}{3},\ 2\frac{2}{3},\ 3,\ 3\frac{1}{3},\ 3\frac{2}{3},\ 4$$

NPC Milestone 3:6f

12

Can you write the label for the marked point on this number line?



$$6\frac{1}{4}$$

NPC Milestone 3:6f

13

I have 2 cakes that are exactly the same size. I cut 1 into quarters and 1 into fifths. Can you work out which will be the larger slice:

$\frac{1}{4}$ or $\frac{1}{5}$?

A quarter will be the larger slice.

NPC Milestone 3:6g

14

Is it always true that the greater the denominator the smaller the fractional part?
Can you explain your answer?

Yes, as the denominator tells us how many parts the whole is divided into, so the larger the denominator, the more parts it has, and so each part will be smaller.

NPC Milestone 3:6g

15

Can you write the missing numerator?

$\frac{1}{2} = \frac{\mathbf{5}}{10}$

NPC Milestone 3:6h

16

Can you write 3 fractions that are the same as $\frac{1}{2}$?

Any equivalent fraction,

e.g. $\frac{2}{4}$, $\frac{3}{6}$, $\frac{4}{8}$

NPC Milestone 3:6h

17

Can you use the Numicon Shapes to show $\frac{3}{8}$?

$\frac{3}{8}$

NPC Milestone 3:6i

18

Can you say what fraction is covered?

$\frac{3}{9}$

NPC Milestone 3:6i

19

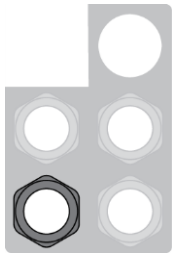
Can you work out the answer to this calculation?

$$\frac{9}{10} - \frac{4}{10} = \mathbf{\frac{5}{10}}$$

NPC Milestone 3:6j

20

Can you use the Numicon Shapes to show $\frac{1}{5} + \frac{3}{5}$?



NPC Milestone 3:6j

21

There are 4 silver coins in a purse. What possible totals could there be? Can you set your work out so that you can be sure you have found all the possibilities?

4 × 50p = £2; 4 × 20p = 80p;
4 × 10p = 40p; 4 × 5p = 20p;
3 × 50p + 1 × 20p = £1.70 and so on.
This could be set out in a table.

NPC Milestone 3:6k

22

The answer is 21. By adding 2 numbers, can you work out how many ways you can make this total?

20 + 1; 19 + 2; 18 + 3; 17 + 4, and so on.

NPC Milestone 3:6k

23

Can you record all the ways to make 10 by adding 3 numbers?

Any systematic way of recording, e.g. 8 + 1 + 1;
7 + 2 + 1;
6 + 3 + 1;
6 + 2 + 2;
5 + 4 + 1;
5 + 3 + 2 and so on.

NPC Milestone 3:6l

24

6 children line up for lunch. Can you work out how many ways there are of arranging these children in a line? Think of the best way to organize your work.

Use your professional judgement to determine whether the child is accurate and systematic with this question.

NPC Milestone 3:6l

25	26
Can you make a statement about the numbers in the 5 times table? **Any relevant statement, e.g. All the numbers in the 5 times table end on a 0 or a 5.**	Annie says, “When you add 3 numbers together you always get an odd number.” Using examples, can you explain if Annie is correct? **Annie is not correct. If you add three odd numbers together the answer is always odd, e.g. 1 + 1 + 1 = 3, but if you add two odd numbers and one even number, the answer is always even, e.g. 1 + 1 + 2 = 4.**
NPC Milestone 3:6m	NPC Milestone 3:6m

3.4 Milestone Assessment – GMS 3 Milestone 4 (Pupil)

Answers are on the answer pages that follow.

1

Can you use a dial weighing scale to measure your maths book to the nearest 100 g?

GMS Milestone 3:4a

2

Can you use a dial weighing scale to measure any 3 items to the nearest 100 g?

GMS Milestone 3:4a

3

Can you write the equivalent mass, in g?

$\frac{1}{4}$ kg = ☐ g

GMS Milestone 3:4b

4

Can you work out how many grams are in $1\frac{1}{2}$ kg?

GMS Milestone 3:4b

3.4 Milestone Assessment – GMS 3 Milestone 4 (Pupil)

Answers are on the answer pages that follow.

5

Can you work out the missing amount?

300 g + ☐ g = 1 kg

GMS Milestone 3:4c

6

I eat $\frac{1}{4}$ of my 200 g chocolate bar.

Can you work out how much it now weighs?

GMS Milestone 3:4c

7

An apple weighs about 100 g. Can you work out the total mass of 6 apples?

GMS Milestone 3:4d

8

An orange weighs about 130 g and an apple weighs about 100 g. What will the difference be between their total mass if I have 3 of each fruit? Can you use apparatus to show the difference?

GMS Milestone 3:4d

3.4 Milestone Assessment – GMS 3 Milestone 4 (Pupil)

Answers are on the answer pages that follow.

9

Can you work out how many ml are in $\frac{3}{4}$ ℓ?

GMS Milestone 3:4e

10

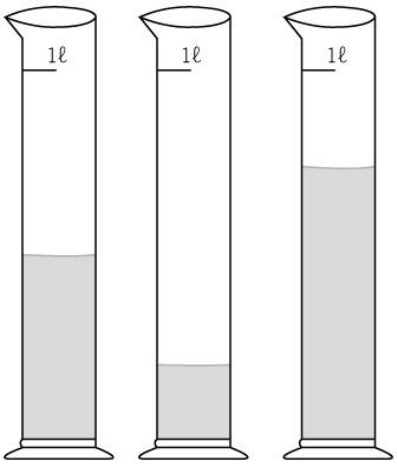
Can you write the missing amount?

1ℓ is equivalent to ☐ ml

GMS Milestone 3:4e

11

Can you estimate the volume of water held in each container?



GMS Milestone 3:4f

12

Can you complete this sentence to give the definition of capacity?

Capacity is …

GMS Milestone 3:4f

3.4 Milestone Assessment – GMS 3 Milestone 4 (Pupil)

Answers are on the answer pages that follow.

13

Can you measure out 400 ml of water using a measuring jug?

GMS Milestone 3:4g

14

Can you measure out 650 ml of water using a measuring cylinder?

GMS Milestone 3:4g

15

A bottle of medicine contains the equivalent of 12 teaspoons.
A teaspoon holds 5 ml. Can you work out the total volume of medicine (in ml) in the bottle?

GMS Milestone 3:4h

16

Can you work out how much is left from a 2 ℓ bottle of juice if I pour out five 250 ml servings?

GMS Milestone 3:4h

3.4 Milestone Assessment – GMS 3 Milestone 4 (Pupil)

Answers are on the answer pages that follow.

17

What is the most popular number of letters in the first names of the children in our class?

Can you think of the best way to collect the data?

GMS Milestone 3:4i

18

Can you draw a bar chart to represent the data that you collected about the number of letters in first names?

GMS Milestone 3:4i

19

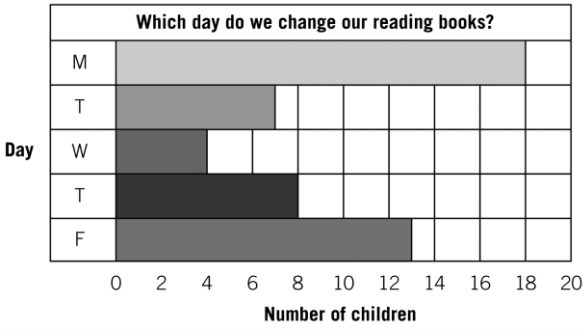
Can you work out the difference between the most and the least common fruit?

The fruit we like best	
Fruit	**Number of children**
apples	9
oranges	6
pears	8
bananas	18
grapes	19

GMS Milestone 3:4j

20

Can you write 3 comparing statements about the bar chart?



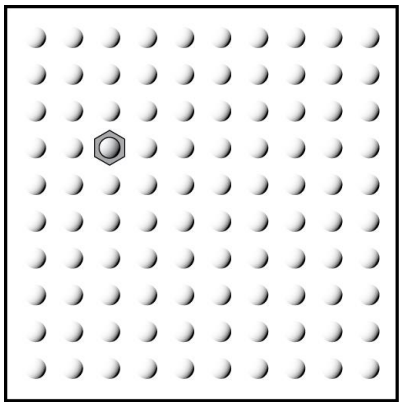
GMS Milestone 3:4j

3.4 Milestone Assessment – GMS 3 Milestone 4 (Pupil)

Answers are on the answer pages that follow.

21

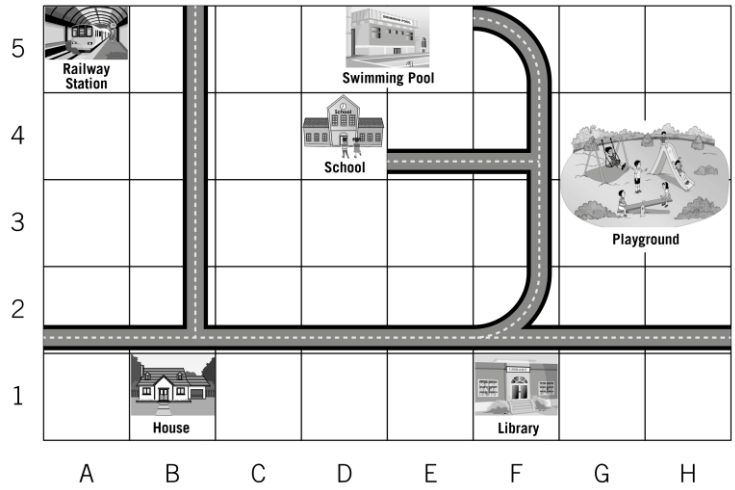
Can you give instructions to a friend for the position of this peg?



GMS Milestone 3:4k

22

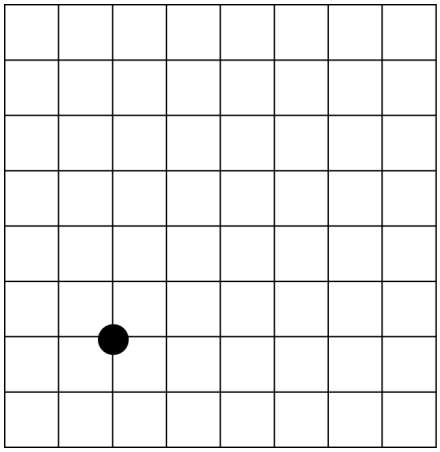
Can you give the grid references of the school, the house, the library and the railway station?



GMS Milestone 3:4k

23

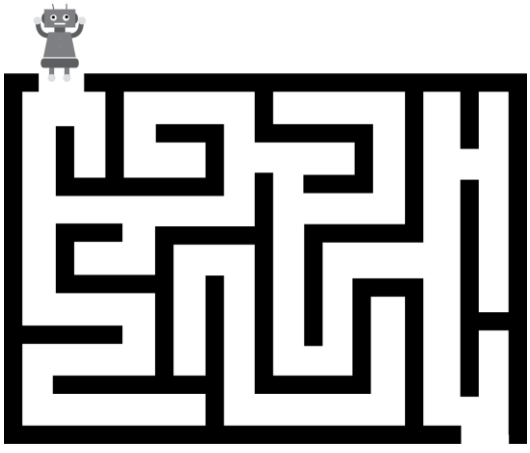
Can you give instructions, using compass points, for a friend to draw an oblong on this grid?



GMS Milestone 3:4l

24

Can you give the robot directions through this maze using right, left, up and down?



GMS Milestone 3:4l

3.4 Milestone Assessment – GMS 3 Milestone 4 (Teacher)

1

Can you use a dial weighing scale to measure your maths books to the nearest 100 g?

Answers will vary but ensure the answer is given to the nearest 100 g.

GMS Milestone 3:4a

2

Can you use a dial weighing scale to measure any 3 items to the nearest 100 g?

Answers will vary but ensure the answers are given to the nearest 100 g.

GMS Milestone 3:4a

3

Can you write the equivalent mass, in g?

$\frac{1}{4}$ kg = **250** g

GMS Milestone 3:4b

4

Can you work out how many grams are in $1\frac{1}{2}$ kg?

1500 g

GMS Milestone 3:4b

5

Can you work out the missing amount?

300 g + **700** g = 1 kg

GMS Milestone 3:4c

6

I eat $\frac{1}{4}$ of my 200 g chocolate bar.

Can you work out how much it now weighs?

150 g

GMS Milestone 3:4c

7

An apple weighs about 100 g. Can you work out the total mass of 6 apples?

Approximately 600 g

GMS Milestone 3:4d

8

An orange weighs about 130 g and an apple weighs about 100 g. What will the difference be between their total mass if I have 3 of each fruit? Can you use apparatus to show the difference?

90 g

GMS Milestone 3:4d

9

Can you work out how many ml are in $\frac{3}{4}$ ℓ?

750 ml

GMS Milestone 3:4e

10

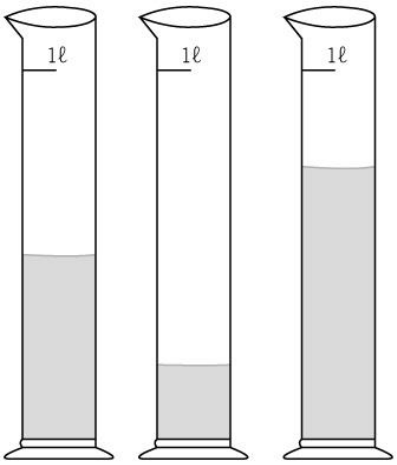
Can you write the missing amount?

1 ℓ is equivalent to **1000** ml

GMS Milestone 3:4e

11

Can you estimate the volume of water held in each container?



500 ml, 200 ml, 750 ml

GMS Milestone 3:4f

12

Can you complete this sentence to give the definition of capacity?

Capacity is **the amount that a container can hold.**

GMS Milestone 3:4f

13 Can you measure out 400 ml of water using a measuring jug? **Ensure that the scale is read correctly and the measurement is accurate.**	**14** Can you measure out 650 ml of water using a measuring cylinder? **Ensure that the scale is read correctly and the measurement is accurate.**
GMS Milestone 3:4g	GMS Milestone 3:4g
15 A bottle of medicine contains the equivalent of 12 teaspoons. A teaspoon holds 5 ml. Can you work out the total volume of medicine (in ml) in the bottle? **60 ml**	**16** Can you work out how much is left from a 2 ℓ bottle of juice if I pour out five 250 ml servings? **750 ml**
GMS Milestone 3:4h	GMS Milestone 3:4h

17

What is the most popular number of letters in the first names of the children in our class?

Can you think of the best way to collect the data?

A tally chart would be a good way to collect this data.

GMS Milestone 3:4i

18

Can you draw a bar chart to represent the data that you collected about the number of letters in first names?

Check that the bar chart accurately shows the numbers collected in the tally chart.

GMS Milestone 3:4i

19

Can you work out the difference between the most and the least common fruit?

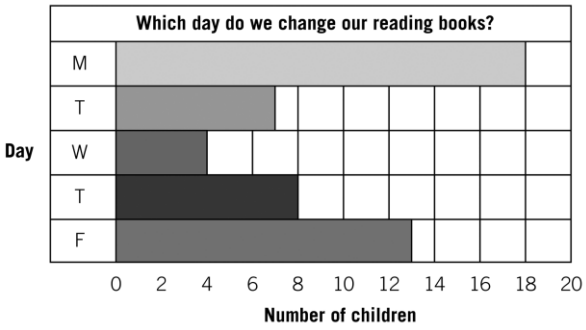
The fruit we like best	
Fruit	**Number of children**
apples	9
oranges	6
pears	8
bananas	18
grapes	19

13

GMS Milestone 3:4j

20

Can you write 3 comparing statements about the bar chart?

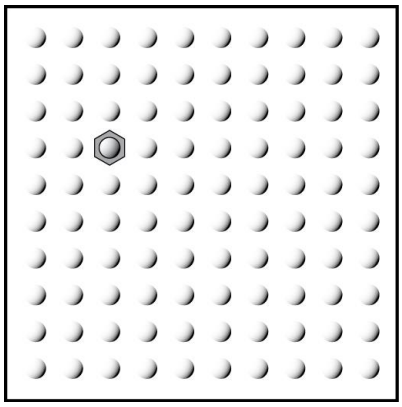


Any statements that accurately compare data from the bar chart, e.g. 10 more children change their reading book on Monday than on Thursday.

GMS Milestone 3:4j

21

Can you give instructions to a friend for the position of this peg?

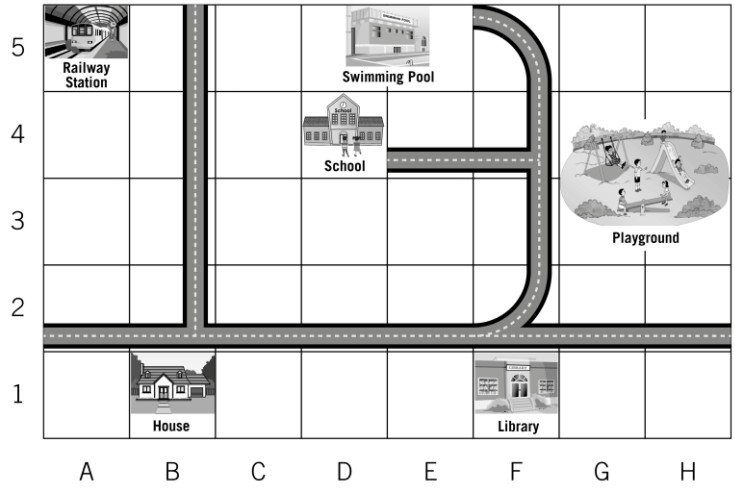


Any accurate instructions, e.g. third column in from the left, fourth row down.

GMS Milestone 3:4k

22

Can you give the grid references of the school, the house, the library and the railway station?

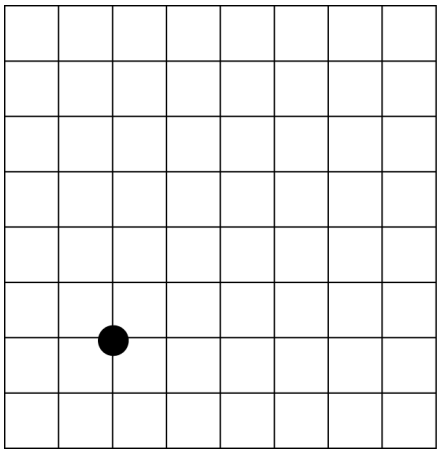


School: D4; house: B1; library: F1; railway station: A5

GMS Milestone 3:4k

23

Can you give instructions, using compass points, for a friend to draw an oblong on this grid?

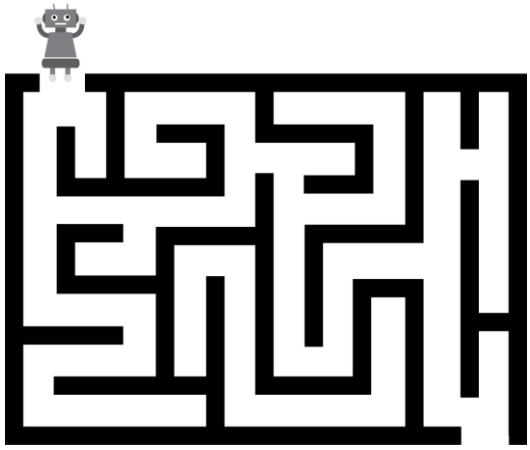


Any accurate instructions that begin at the black dot. The oblong can be any size.

GMS Milestone 3:4l

24

Can you give the robot directions through this maze using right, left, up and down?



Left, down, right, up, right, down, right, up, right, down, right, down.

GMS Milestone 3:4l