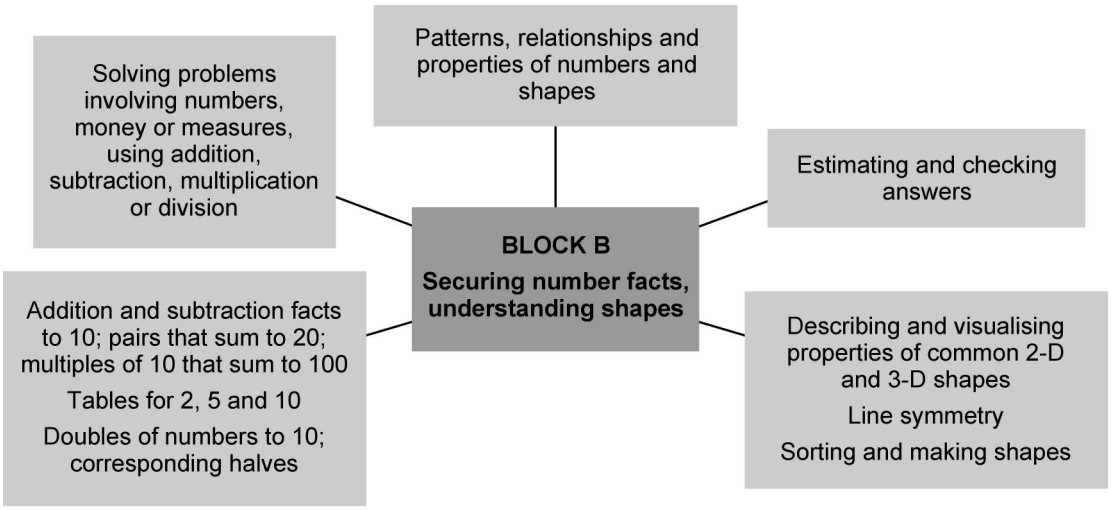
Year 2: Block B — Three 3-week units

Securing number facts, understanding shapes



Objectives End-of-year expectations (key objectives) are highlighted	Units		
	1	2	3
• Describe patterns and relationships involving numbers or shapes, make predictions and test these with examples	✓	✓	✓
• Solve problems involving addition, subtraction, multiplication or division in contexts of numbers, measures or pounds and pence	✓	✓	✓
• Derive and recall all addition and subtraction facts for each number to at least 10, all pairs with totals to 20 and all pairs of multiples of 10 with totals up to 100	✓	✓	✓
• Understand that halving is the inverse of doubling and derive and recall doubles of all numbers to 20, and the corresponding halves	✓		✓
• Derive and recall multiplication facts for the 2, 5 and 10 times-tables and the related division facts; recognise multiples of 2, 5 and 10	✓	✓	✓
• Read and write two-digit and three-digit numbers in figures and words; describe and extend number sequences and recognise odd and even numbers		✓	
• Use knowledge of number facts and operations to estimate and check answers to calculations	✓		✓
• Visualise common 2-D shapes and 3-D solids; identify shapes from pictures of them in different positions and orientations; sort, make and describe shapes, referring to their properties	✓	✓	✓
• Identify reflective symmetry in patterns and 2-D shapes and draw lines of symmetry in shapes		✓	

Speaking and listening objectives for the block

Objectives	Units		
	1	2	3
• Listen to others in class, ask relevant questions and follow instructions	✓		

Objectives	Units		
	1	2	3
• Use language and gesture to support the use of models, diagrams or displays when explaining		✓	
• Tell real or imagined stories (using conventions of familiar story language)			✓

Opportunities to apply mathematics in science

Activities		Units		
		1	2	3
2b	Plants and animals in the local environment: Count pairs of leaves on twigs and work out the number of leaves using multiplication.	✓		
2a	Health and growth: Collect information regarding food likes and dislikes by tallying in fives.		✓	
2b	Plants and animals in the local environment: Count the number of groups of three leaves in a patch of clover, and work out the total number of leaves using multiplication.			✓

Key aspects of learning: focus for the block

Enquiry	**Problem solving**	Reasoning	**Creative thinking**
Information processing	Evaluation	Self-awareness	Managing feeling
Social skills	Communication	**Motivation**	Empathy

Vocabulary

problem, solution, calculate, calculation, operation, inverse, answer, method, explain, predict, reason, pattern, relationship, sort, classify, property

add, subtract, multiply, divide, sum, total, difference, plus, minus, half, halve, halved, double, doubled, multiple, odd, even

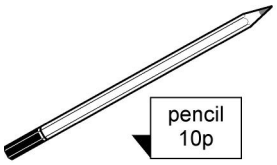
square, rectangle, rectangular, triangle, triangular, circle, circular, pentagon, hexagon, octagon, pyramid, cube, cuboid, sphere, cone, cylinder, face, corner, edge, side, flat, curved, surface, straight, round, shape, hollow, solid, line of symmetry, fold, mirror line, reflection

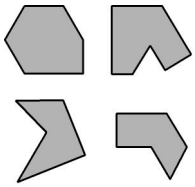
Building on previous learning

Check that children can already:

- describe simple patterns and relationships involving numbers or shapes
- solve problems involving counting, adding, subtracting, doubling or halving in the context of numbers, measures or money; recognise the value of coins
- recall addition and subtraction facts to 10 and doubles of all numbers to at least 10
- use informal written methods to add or subtract a one-digit number or multiple of 10 to or from a two-digit number, recording an addition or subtraction number sentence
- name common 2-D shapes and 3-D solids and describe their features
- use diagrams to sort objects into groups according to a given criterion

Unit 2B1 3 weeks

Objectives *Children's learning outcomes in italic*	Assessment for learning
• Describe patterns and relationships involving numbers or shapes, make predictions and test these with examples *I can sort a set of 3-D shapes* *I can continue a number pattern* *I can explain how I know*	Show me the shapes that have: at least one rectangular face, one curved face, eight corners, … We have worked out that 3 + 5 = 8 and 13 + 5 = 18. Without calculating, tell me what 23 + 5 will be. What about 63 + 5? Write the missing digits to make this correct. □0 + 2□ = 33
• Solve problems involving addition, subtraction, multiplication or division in contexts of numbers, measures or pounds and pence *I can solve a problem involving money*	What do you look for when deciding the best order for adding numbers? Mina and Ben play a game. Mina scores 70 points. Ben scores 42 points. How many more points does Mina score than Ben? Show me on the 100-square how to work out the answer. Now show me on an empty number line. Anna has 54p. She buys as many pencils as she can.  How much money will she have left? Use the coins to show me how to work out the answer.
• Derive and recall all addition and subtraction facts for each number to at least 10, all pairs with totals to 20 and all pairs of multiples of 10 with totals up to 100 *I can recall number facts for each number up to 10*	Look at this number sentence: □ + ◇ = 7. What could the two missing numbers be? What else? Tell me all the pairs of numbers that make 7. How do you know you have told me them all?
• Derive and recall multiplication facts for the 2, 5 and 10 times-tables and the related division facts; recognise multiples of 2, 5 and 10 *I can count in steps of 2, 5 or 10*	What is the multiple of 10 before 70? What three numbers come next: 35, 40, 45, …? What is the next even number after 24?
• Understand that halving is the inverse of doubling and derive and recall doubles of all numbers to 20, and the corresponding halves *I know that if I double a number then halve the answer I get back to the number I started with*	I think of a number and double it. The answer is 18. What number was I thinking of? Explain how you know.
• Use knowledge of number facts and operations to estimate and check answers to calculations *I can check the answer to an addition by doing a related subtraction*	You know that 7 + 8 = 15. Write down three other number sentences using these numbers. What is the answer to 37 + 8? How can I check? Only one of these sums is correct. Which one is it? Explain how you know. 25 + 7 = 30 18 + 5 = 28 10 + 10 = 19 19 + 6 = 25 12 + 4 = 14

Objectives *Children's learning outcomes in italic*	Assessment for learning
• Visualise common 2-D shapes and 3-D solids; identify shapes from pictures of them in different positions and orientations; sort, make and describe shapes, referring to their properties *I can look at pictures of 2-D shapes and name them*	How do you know that this shape is a square? What is special about it? Two of these shapes are not hexagons. Which are they?  Here are five identical triangles. Use some or all of the triangles to make a bigger triangle.  Is there another way to do it?
• Listen to others in class, ask relevant questions and follow instructions *I can listen to others when they speak to the class and ask a question about what they have said*	Listen to Robert as he talks about the shape that he has made. I am holding a shape behind my back. Try to find out what it is. Ask me questions about it, but I will only answer 'yes' or 'no'.

Learning overview

Children **know addition and subtraction facts for each number up to 10** and are learning which pairs of numbers make 20. They consolidate and use these number facts to add or subtract quickly, for example using the fact that 7 – 3 = 4 to find 57 – 3. They understand that addition and subtraction are inverses, and apply this knowledge in a number of ways. For example, they recognise that if you add 5 to a number and then subtract 5 you end up where you started; they state the addition fact linked to any subtraction fact and vice versa; they use addition to check the answer to subtraction calculations and subtraction to check addition.

Children know that addition can be done in any order. They begin to use efficient methods for addition and subtraction; for example, to work out 5 + 47 they start at 47 and count on 5. They count from zero in steps of 2, 5 or 10, describing patterns in the count. They identify even and odd numbers. They identify multiples of 5 and 10, appreciating that multiples of 5 end in 0 or 5 and multiples of 10 end in 0.

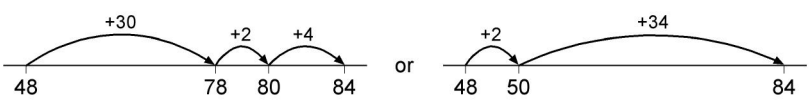
Children recall doubles of all numbers to 10. They recognise that if you double a number then halve the answer you get back to where you started, and use this to find halves of numbers to 20.

Children use the appropriate operation to **model and solve a word problem**, such as:

A mango costs 48p. A pineapple costs 36p more than a mango. How much is a pineapple?

For example, they use practical equipment, a 100-square or empty number line to help them to make decisions. They record calculations using the plus (+), minus (–) and equals (=) signs. They explain their answers and describe their methods, for example using an empty number line.

48 + 36 = 84



Children use **patterns, relationships and properties to solve number puzzles**, such as:

How many dominoes have a total number of spots that is odd?

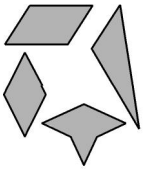
On a 100-square, what is the biggest number with a digit sum of 9?

Children explore **properties of shapes**. For example, they sort a set of **3-D solids** according to whether or not each solid possesses a given property, such as whether or not it has a rectangular face. They use their knowledge of shape names and properties, for example to predict which 3-D shapes will roll and which will slide when placed on a slope. They recognise and name shapes in different positions and orientations, including in pictures.

Children extend their understanding of properties of a range of **2-D shapes** including pentagons, hexagons and octagons, both regular and irregular. They use mathematical vocabulary to name, classify and describe some features of shapes, such as the number of sides and whether the shape has a right angle. They draw and make shapes, for example using pinboards to make shapes with five straight sides (pentagons) and then identifying those with a right angle.

Unit 2B2 — 3 weeks

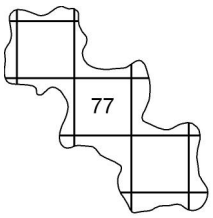
Objectives *Children's learning outcomes in italic*	**Assessment for learning**
• Describe patterns and relationships involving numbers or shapes, make predictions and test these with examples *I can complete a symmetrical picture by drawing the 'other half'*	What is special about the way I have ordered these counters? Can you make a different pattern using the same counters? Can you make me a pattern where the eighth counter is blue? Is that the only way it could be done? What is wrong with this pattern? Can you put it right? Is this picture/object symmetrical? How can you check? I have begun to make a symmetrical shape with these coloured blocks. Can you complete the shape? How can you check that it is symmetrical?
• Solve problems involving addition, subtraction, multiplication or division in contexts of numbers, measures or pounds and pence *I can decide which calculations to do to solve a problem*	Rosie spent 24p. She spent 8p more than Suzy. How much did Suzy spend? What calculation is needed? How did you decide? How did you work out the calculation? How did you record it? Look at this next problem. What do you need to find out? How do you know you need to add/subtract/double/halve? What clues are there?
• Derive and recall all addition and subtraction facts for each number to at least 10, all pairs with totals to 20 and all pairs of multiples of 10 with totals up to 100 *I can recall number facts for each number up to 10* *I know which pairs of numbers make 20*	How many different pairs of numbers can you remember that have a total of 20? How can you be sure you have remembered them all? Look at these multiples of 10. Which pair of numbers has a total of 100? Are there any other possibilities? 10 20 30 40 50 60 70 80 90 □ + ◇ = 100. What two numbers could go in the boxes? Are there any other possibilities?
• Derive and recall multiplication facts for the 2, 5 and 10 times-tables and the related division facts; recognise multiples of 2, 5 and 10 *I know some of the number facts in the 2, 5 and 10 times-tables* *I know that multiples of 2 are even numbers*	What are the missing numbers? □ × 2 = 16 10 × □ = 40 □ × ◇ = 20 How do you know? Harriet knows that 2 × 10 = 20. What is 2 × 11? How do you know? Which are the even numbers in this list? 13 4 12 8 19 16 Draw rings around all the multiples of 5. 45 20 54 17 40
• Read and write two-digit and three-digit numbers in figures and words; describe and extend number sequences and recognise odd and even numbers *I can describe the patterns in a set of calculations* *I can explain how I know*	I have made a three-digit number with some cards.  Write all the other three-digit numbers that you can make with the same cards. [Point to one of the numbers.] Write this number in words. Think of an even number which is more than 20 and less than 40. Write the two missing numbers in this sequence. □ 41 43 45 47 49 □ 53

Objectives *Children's learning outcomes in italic*	Assessment for learning
• Visualise common 2-D shapes and 3-D solids; identify shapes from pictures of them in different positions and orientations; sort, make and describe shapes, referring to their properties *I can use a construction kit to make a model of a 3-D solid that I know*	Describe the shape or solid in the cloth bag as you feel it. What might it be? Why? How do you know this shape is a …? How do you know this shape isn't a …? Imagine a cube. Four faces are yellow; the rest are blue. How many faces are blue? Describe this shape/solid to a friend. Can they guess what it is? Sort these 2-D shapes. Put all the pentagons in this circle. Now choose another way to sort them. What do all the shapes that you have put in the circle have in common?
• Identify reflective symmetry in patterns and 2-D shapes and draw lines of symmetry in shapes *I can make a symmetrical pattern using coloured tiles* *I can draw a line of symmetry on a shape*	Two of these shapes have no lines of symmetry. Which are they?  This shape has been folded in half along the dotted line. Imagine opening it up. How many sides does the opened shape have? Draw the shape that you think will be made when the folded shape is opened up.  Look at the symmetrical picture that I have given you. Draw a line of symmetry on it.
• Use language and gesture to support the use of models, diagrams or displays when explaining *I know the proper names of a cube, a cylinder, a cone and a pyramid* *I can point to parts of them as I describe them*	Hold your shape up and describe it to the class. Point to its features when you talk about them. Sort these shapes. Point to one of your shapes and explain why you have placed it in that group.

Learning overview

Children consolidate their ability to **read and write two- and three-digit numbers**, using practical equipment such as arrow cards and number grids.

They identify missing numbers in a 100-square.



Children use their knowledge of addition and subtraction facts for numbers to 10 to find **sums and differences of multiples of 10**, for example 80 – 50. They recognise **pairs of multiples of 10 that total 100**. They use their knowledge of pairs of numbers that sum to 10 to identify what must be added to any two-digit number to reach the next multiple of 10. For example, they know that

56 + 4 = 60 because 6 + 4 = 10. They describe the patterns in the sequence 0 + 20 = 20, 1 + 19 = 20, predict the next calculation in the sequence and continue the pattern to generate all the pairs of numbers with a total of 20.

Children use their knowledge and experience of counting from zero in steps of 2, 5 and 10 to learn the **2, 5 and 10 multiplication facts**. They answer questions such as: *How many twos make 12?* and recognise that this can be recorded as 12 ÷ 2. They recognise multiples of 2, 5 and 10; they know that multiples of 2 are called *even* numbers and that numbers which are not even are *odd*.

Children choose and use appropriate calculations to **solve problems and puzzles involving all four operations**, supporting their methods with practical equipment or drawings. They record their thinking using jottings, including number lines. For example, they use jumps on a number line to solve problems such as:

17 people are on a bus. 8 more get on and 3 get off. How many people are on the bus now?

You have 50 litres of water. How many 10-litre buckets can you fill?

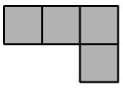
Desi needs 18 balloons. The shop sells balloons in packs of 5. How many packs does he need to buy?

Children make and describe **symmetrical patterns**, for example, using ink blots or pegboards. They recognise symmetry in objects and pictures; they check for symmetry with a mirror or by folding. They complete a symmetrical picture by making or drawing the 'other half', and solve puzzles involving symmetry. For example, they place two red squares, two green squares and two blue squares in a line so that the squares make a symmetrical pattern, and explore the number of different ways of doing it.

Children **make and draw 2-D shapes, patterns and 3-D models**, and explore their properties. For example, they use construction kits to make simple 3-D shapes and count the number of edges or corners. They understand and use appropriate vocabulary to describe the properties of shape, for example selecting from a group of shapes those that match a particular description.

Unit 2B3 3 weeks

Objectives *Children's learning outcomes in italic*	Assessment for learning
• Describe patterns and relationships involving numbers or shapes, make predictions and test these with examples *I can describe and continue the pattern for a set of numbers or shapes*	Investigate different ways of making 50p using only silver coins. How many different ways can you find? Record each different way of doing it.
• Solve problems involving addition, subtraction, multiplication or division in contexts of numbers, measures or pounds and pence *I can decide which calculations are needed to solve a two-step word problem*	Look at the number line. It shows the sum that Peter did.  Which of these sums did Peter do? Tick it. 5 + 7 + 2 = 14 5 + 6 + 3 = 14 5 + 5 + 4 = 14 5 + 8 + 1 = 14 Ella's dad washes some cars. He uses 12 buckets of water. Each bucket has 5 litres of water. How many litres of water does he use altogether? Show me how to use cubes to work out the answer. Now show me how to work out the answer using a number line. There are 60 sweets in a bag. 20 sweets are red. 16 sweets are yellow. The rest are green. How many sweets are green? Show me how you worked out the answer. Make up a story that would mean that you needed to work out 2 × 9 then add 16.
• Derive and recall all addition and subtraction facts for each number to at least 10, all pairs with totals to 20 and all pairs of multiples of 10 with totals up to 100 *I know which pairs of numbers make 20* *I know all the pairs of multiples of 10 that make 100*	Look at this number sentence: □ + ◇ = 20. What could the two missing numbers be? What else? Can you tell me all the pairs of numbers that make 20?
• Understand that halving is the inverse of doubling and derive and recall doubles of all numbers to 20, and the corresponding halves *I know the doubles of all the numbers up to 20*	I'm thinking of a number. I've halved it and the answer is 15. What number was I thinking of? Explain how you know.
• Derive and recall multiplication facts for the 2, 5 and 10 times-tables and the related division facts; recognise multiples of 2, 5 and 10 *I know my 2, 5 and 10 times-tables and can work out the division facts that go with them* *I can tell if a number is a multiple of 2, 5 or 10*	Sita worked out the correct answer to 9 × 5. Her answer was 45. Show how she could have worked out her answer. Harry worked out the correct answer to 20 ÷ 5. His answer was 4. Show how he could have worked out his answer.

Objectives *Children's learning outcomes in italic*	Assessment for learning
• Use knowledge of number facts and operations to estimate and check answers to calculations *I can check answers to calculations involving doubling by halving the answer*	Ling wants to check her answer to this addition. 45 + 28 = 73 Which of these tells Ling that her answer is correct? A 73 + 45 = 118 B 73 – 45 = 28 C 28 + 73 = 91 D 45 – 28 = 17 How can I check the answer to half of 28 is 14?
• Visualise common 2-D shapes and 3-D solids; identify shapes from pictures of them in different positions and orientations; sort, make and describe shapes, referring to their properties *I can match familiar solids to their pictures*	Look at these two shapes. What is the same about them? What is different? Watch as I slowly reveal a shape from behind a 'wall'. What could it be? How do you know? What could it not be? Why? This shape is made from four identical squares touching edge to edge.  Make different shapes from four identical squares touching edge to edge. Record each different shape that you make.
• Tell real or imagined stories (using conventions of familiar story language) *I can make up a story to fit a calculation and tell it to a group or to the class*	Tell me a story that would mean that you had to work out this calculation: 45 – 8 = 37

Learning overview

Children continue to extend their **knowledge and use of number facts**, and use partitioning and number bonds to add and subtract numbers mentally to answer questions such as 60 – ☐ = 52 or 35 = 20 + ☐. They make jottings where appropriate to support their thinking.

Children **count in steps of equal size** from different starting numbers and **find missing numbers in sequences** such as 35, 38, 41, ☐, 47, ☐. They derive quickly **multiplication and division facts for the 2, 5 and 10 times-tables** and use these to answer questions such as: *I have 14 socks. How many pairs is that?* They recall doubles of all numbers to 20 and corresponding halves. They recognise that **halving is the inverse of doubling**.

Children identify **properties of numbers**, describing 42, for example, as 'between 40 and 50, 'even' or 'not odd', or 'has a ones digit of 2'. They use their knowledge of properties of numbers to identify a secret number, asking questions which will be answered 'yes' or 'no', such as: *Is it a multiple of 5?* or *Is it an even number?* They give **examples to match statements about numbers** such as: *When I double a number, the answer is even*.

Children solve one- and two-step word problems involving money and measures, using all four operations, such as:

There are 5 kg of pears in a box. How many kilograms are there in three boxes?

Daniel bought three bananas for 15p each. How much change did he get from 50p?

Ella has 24 litres of water. A bucket holds 5 litres. How many buckets are needed to hold all the water?

They explain how they identify the necessary calculations. They use **inverse operations** to check answers; for example, they check 72 – 8 = 64 by working out 64 + 8 = 72, or they check 18 ÷ 2 = 9 by working out that double 9 is 18.

Children use their problem-solving skills and knowledge and understanding of number facts and properties to **solve puzzles** such as:

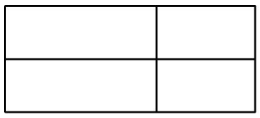
Put 15 buttons in three boxes so that each box has 3 more buttons than the one before.

Three birds laid some eggs. Each bird laid an odd number of eggs. Altogether they laid 19 eggs. How many eggs did each bird lay? Find different ways to do it.

Children **describe shapes** referring to a range of properties. They recognise that the corners of squares and rectangles are right angles and identify 2-D shapes that are symmetrical. They **sort and classify shapes** using criteria such as: 'has 6 faces', 'has at least one triangular face' or 'has at least one curved edge'. They ask 'yes' or 'no' questions about a hidden shape in order to identify it. They use mathematical language related to shapes in their contributions to discussions with one another and in class.

Children match 3-D shapes to pictures of them and **make and draw shapes and patterns**. For example, they use interlocking cubes to make shapes shown in pictures or they combine four squares to make a new shape then count the number of edges of the new shape. They program a floor robot to travel in a square. They discuss and solve puzzles and problems involving shape, such as:

How many rectangles can you count in this diagram?



What about this diagram?