Hillsborough primary school
Maths Content and progression

Algebra

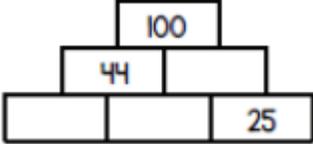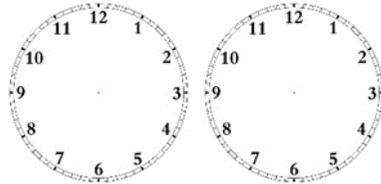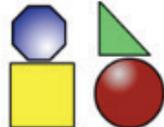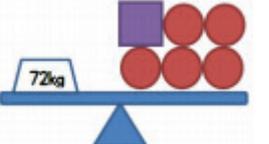| Algebra					
Equations					
Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
solve one-step problems that involve addition and subtraction, using concrete objects and pictorial representations, and **missing number problems** such as 7 = □ - 9 (Copied from addition and subtraction)	recognise and use the inverse relationship between addition and subtraction and use this to check calculations and **missing number** problems.	solve problems, including **missing number** problems, using number facts, place value, and more complex addition and subtraction.		use the properties of rectangles to deduce related facts and find **missing lengths and angles** (copied from Geometry: Properties of Shapes)	express missing number problems algebraically
		solve problems, including **missing number** problems, involving multiplication and division, including integer scaling			
	recall and use addition and subtraction facts to 20 fluently, and derive and use related facts up to 100				find pairs of numbers that satisfy number sentences involving two unknowns
Formulae					
					use simple formulae
					recognise when it is possible to use **formulae** for area and volume of shapes (copied from Measurement)
Sequences					
Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
sequence events in chronological order using language such as: before and after, next, first, today, yesterday, tomorrow, morning, afternoon and evening (copied from Measurement)	compare and sequence intervals of time (copied from Measurement)				generate and describe linear number sequences
	order and arrange combinations of mathematical objects in patterns (copied from Geometry: position and direction)				

Year 1.

NC Objective	Learning Objectives	Pre-Learning	Methods from Calculation Policy	Key Questions for GDS
Solve one-step problems that involve addition and subtraction, using concrete objects and pictorial representations, and **missing number problems** such as 7 = □ - 9	Know what the = sign means. Know that the amounts on each side of the = sign must total the same amount. Work out a calculation such as 5 + 3 = □ Work out a calculation such as □ = 5 + 3 Work out calculations such as 7 = 9 - □ Vocabulary How many more to make …? How many more is … than … ? How much more is … ? How many fewer is … than … ? How much less is … ?	See addition and subtraction Strand	See addition and subtraction Strand	Take 10 away from 18 and then add 3 to your answer. How many do you have now? Helen went to play with Katie. Helen had 10 stickers and she gave Katie 4 of them. Katie already had 4 stickers of her own. Which of the two girls had the most stickers to play with?
Sequence events in chronological order using language such as: before and after, next, first, today, yesterday, tomorrow, morning, afternoon and evening	Sequence events in chronological order using language Vocabulary Before after yesterday tomorrow today next last	See measurement strand	See measurement strand	Write these in the order you would do them in a day. Get up in the morning. Go to bed at night Go to school. Have lunch Only write the word in bold.

Year 2.

NC Objective	Learning Objectives	Pre-Learning	Methods from Calculation Policy	Key Questions for GDS
Recognize and use the inverse relationship between addition and subtraction and use this to check calculations and **missing number** problems.	Understand that subtraction can 'undo' an addition. Understand that addition can 'undo' a subtraction. Use the facts I know to work out a missing number. Use the inverse to check calculations Vocabulary Sequence continue pair predict pattern pair, rule	See number ,addition and subtraction	See number ,addition and subtraction	I think of a number. I take away 7 and add 2. My answer is 15. What is my number? In the pyramid the two numbers below add to the make the number above. Complete the pyramid 100 44 25
Recall and use addition and subtraction facts to 20 fluently, and derive and use related facts up to 100	Recall addition number facts to 20 fluently. Recall subtraction number facts to 20 fluently. Use these addition and subtraction facts to 20 to derive related facts to 100. Apply my knowledge of number bonds to 10 and 20 to add multiples of 10. Apply my knowledge of number bonds to 10 and 20 to find pairs of numbers that total 100.	See number ,addition and subtraction	See number ,addition and subtraction	Look at the following 67 = 100 – 33 33 = 100 – 67 67 + 33 = 100 33 + 67 = 100 Make a similar pattern using the numbers 74, 26 and 100. Can you complete the boxes so each row and column adds up to 100? 20 _ 50 30 40 _ _ _ _

	Mentally add pairs of numbers up to 100. Vocabulary Numbers to one hundred, hundreds, partition, recombine, more/less			
Compare and sequence intervals of time	Identify events that happen at specific times in the day. Sequence every day events by the times that they happen. I know that a second is a very short period of time, a minute is longer and an hour is longer still. Use the language of second, minute and hour reasonably accurately. Vocabulary Quarter past… Quarter to…	See measurement	See measurement	A film finishes 2 hours after it starts. It finishes at 5.30. What time did it start? Show the time on the clock faces. It's 6 o'clock. Kelsey's favourite TV show starts in 20 minutes. It is a 45 minutes show. What time does the TV show finish?
Order and arrange combinations of mathematical objects in patterns	Vocabulary	See geometry: position and direction strand	See geometry: position and direction strand	What are the missing numbers? 4, 7, 10, ? , 16, ? 25, ?, 15, 10, ? Use a circle, a square and a triangle to make repeating pattern. Describe how your pattern progresses. How many different sequences can you make from the shapes below?

Year 3.

NC Objective	Learning Objectives	Pre-Learning	Methods from Calculation Policy	Key Questions for GDS
Solve problems, including **missing number** problems, using number facts, place value, and more complex addition and subtraction.	Read a question carefully and identify the key information I need to solve it. Draw or explain the problem so I know what it is asking. Identify the calculation I need to do. Identify the most efficient method and carry out the calculation. Check my answer using the inverse or an estimate. Answer the question in context. (£.p etc.) Vocabulary Relationship Addition Subtraction calculate estimate inverse	See numbers ,addition and subtraction strand	See numbers ,addition and subtraction strand	Solve the following Here is a balance. Here is another balance. Work out the value of
Solve problems, including **missing number** problems, involving multiplication and division, including integer scaling	Read a question carefully and identify the key information I need to solve it. Draw or explain the problem so I know what it is asking. Identify the calculation I need to do.	See multiplication and division strand	See multiplication and division strand	Children should be able to use their multiplication and division skill to solve the following word problem Use the numbers 1 - 8 to fill the circles below:

	Identify the most efficient method and carry out the calculation. Check my answer using the inverse or an estimate. Answer the question in context. <u>Vocabulary</u> Product Multiplies of four eight etc			 Sam is planting onions in the vegetable plot in his garden. He arranges the onions into rows of 4 and has two left over. He then arranges them into rows of 3 and has none left over. How many onions might he have had? Explain your reasoning.

Year 4.				
NC Objective	Learning Objectives	Pre-Learning	Methods from Calculation Policy	Key Questions for GDS
	Vocabulary			

Year 5.				
NC Objective	Learning Objectives	Pre-Learning	Methods from Calculation Policy	Key Questions for GDS
Use the properties of rectangles to deduce related facts and find **missing lengths and angles**	Know opposite sides in a rectangle are equal. Know that a rectangle has four equal right angles. Find missing angles if an angle is divided. Find missing lengths using my knowledge of the properties of a rectangle. Vocabulary Formula Angle Direction Position Dimension Perimeter Area	See geometry : position and direction	See geometry : position and direction	Solve the following problem A shape is made up of a square and rectangle. The perimeter of the shape is 70cm. The area of the square is 121cm². What is the area of the rectangle?

Year 6.

NC Objective	Learning Objectives	Pre-Learning	Methods from Calculation Policy	Key Questions for GDS
Use simple formulae	Follow addition and subtraction formulae. I can follow multiplication and division formulae. Vocabulary formulae equation unknown variable	Recap simple calculation using the four operations + - x ÷	Calculate the value of the letter in each equation <table><tr><td>3a =15</td><td>a=5</td></tr><tr><td>5b=10</td><td>b=2</td></tr><tr><td>63=9c</td><td>c=7</td></tr><tr><td>12d=48</td><td>d=4</td></tr></table> 15÷3=5 3x5=15 63÷9=7 9x7=63 a=5 a=5 c=7 c=7 Remember each letter should always have a value. You are finding the unknown	Find the total of the missing rows and columns. 54 46 48
Generate and describe linear number sequences A **linear sequence** of numbers is where the **difference between the values** of neighbouring terms is constant. The **relationship** can be generated in two ways: the sequence-generating rule can be recursive, i.e. one number in the sequence is generated from the preceding number (e.g. by adding 3 to the preceding number), or ordinal, i.e. the position of the number in the sequence generates the number (e.g. by multiplying the	Describe and continue numbers sequences using addition and subtraction. Describe and continue numbers sequences using multiplication and division. Describe and continue numbers sequences using negative numbers. Describe and continue numbers sequences using decimal numbers. Vocabulary Linear number sequence, substitute, variables, symbol, known values	Remind children of sequencing and how to find rules to complete a sequence. Remind children that a symbol can have a value. Remind children of using negative numbers. Remind children of using decimal numbers	Complete the following linear number sequence The formula 4n+1 can be used to generate the numbers in this sequence. Fill in the table below: <table><tr><th>erm</th><th>Calculation</th><th>Value</th></tr><tr><td>1st</td><td>4 × 1 + 1</td><td>5</td></tr><tr><td>2nd</td><td></td><td>9</td></tr><tr><td>5th</td><td></td><td></td></tr><tr><td>10th</td><td></td><td>41</td></tr><tr><td>20th</td><td>4 × 20 + 1</td><td></td></tr></table> <table><tr><th>term</th><th>Calculate</th><th>Value</th></tr><tr><td>1st</td><td>4x1+1</td><td>5</td></tr><tr><td>2nd</td><td>4x2+1</td><td>9</td></tr><tr><td>5th</td><td>4x5+1</td><td>21</td></tr><tr><td>10th</td><td>4x10+1</td><td>41</td></tr><tr><td>20th</td><td>4x20+1</td><td>81</td></tr></table> Children must understand the word	On New Year's Eve, Polly has £3·50 in her money box. On 1 January she puts 30p into her money box. On 2 January she puts another 30p into her money box. She continues putting in 30p every day. On what date is there exactly £8 in Polly's money box? On what date does Polly's money box first contain more than £15? Write a sequence-generating rule for working out the amount of money in the money box on any day. NB use questions eg Why? What will happen if …? <mark>When applicable</mark>

			'term' and 'value'	
position by 3, and then subtracting 2).				
Express missing number problems algebraically	Write known rules algebraically, e.g. a + b = b + a. Work out equations involving missing amounts, e.g. if 2x – 1 = 9 what is x? Work out calculations when given value of 2 letters, e.g. What is 2a + 3b if a=2 and b=5. Vocabulary Linear number sequence, substitute, variables, symbol, known values	No previous learning		Using the values of the shape below, how many ways can you combine them to make different totals? = 5 = 8 = 2 Which of the following statements do you agree with? Explain your decisions. There is a whole number that satisfies the symbol sentence 5 × – 3 = 42 There is a whole number that satisfies the symbol sentence 5 + × 3 = 42 There is a whole number that solves the equation 10 – x = 4x There is a whole number that solves the equation 20 ÷ x = x
Find pairs of numbers that satisfy number sentences involving two unknowns	Work out the value of one unknown number when given the value of another in an equation, e.g. What is 'b' if a =3 n an equation a + 3 = b + 2? Work out the value of one unknown number when given the value of another in an equation, e.g. what is 'b' if a is 2 in an equation; 3a + 2 = 3b -1?		Children should become familiar with the key words which will help to answer and solve questions Question-**Length of rope** Pavel has a length of rope that is 9m long. He is asked to cut the rope into 2 pieces, each piece being a whole number of metres in length. He asks: "If the 2 lengths into which I cut the rope are represented	Calculate the following by finding the unknown a and b stand for whole numbers. a + b = 1000 and a is 150 greater than b. Work out the possible values of a and b. x and y are both whole positive numbers. When multiplied together
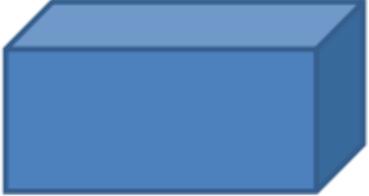
			by a and b, then how can I represent this as an equation?"	they make an odd number under 20 What could x and y be?
	Vocabulary *Linear number sequence, substitute, variables, symbol, known values*		$a + b = 9$ What can all the values of a and b be? Can you spot a pattern? $a = 8, b = 1$ $a = 7, b = 2$ $a = 6, b = 3$ $a = 5, b = 4$ $a = 4, b = 5$ $a = 3, b = 6$ $a = 2, b = 7$ $a = 1, b = 8$	
Enumerate all possibilities of combinations of two variables.	Understand that letters or symbols are simply a way to represent a number. Know that the equal sign means balance. Find different ways of making a number using addition or subtraction, e.g. $a + b = 12$ could be $5 + 7 = 12$. Find different ways of making a number using multiplication and division e.g. $ab = 12$ could be $3 \times 4 = 12$	No previous learning	**All the values** 1. In this equation, a and b are different whole numbers between 20 and 30. Write all the calculations that show all the possible values of a and b in the equation: $a - b = 7$ $a = 29, b = 22;$ $a = 28, b = 21$ Teacher could ask- Why a could not be 25? **Possible combination** 2. Find all the possible combinations: a. The total of 2 numbers is 17. The numbers are between 6 and 11. $7 + 10; 8 + 9$	Solve the following problem The volume of a cuboid is 152cm3. The length of the cuboid is 8cm. What could the width and depth of the cuboid be? 8cm
	Vocabulary *Linear number sequence, substitute, variables, symbol,*			
	known values *Possibilities* *Combination*			