

Camps Hill Problem Solving Progression:



There are 5 types of problems:

- **Word Problems**

These can vary from the number of operations steps required to solve it and whether they are open or closed ended questions.

Closed problems are those that only require the application of previously acquired knowledge and open-ended problems are those used in mathematical investigations where the answer is unrestricted and is determined by the ability, imagination and perseverance of the child.

- **Finding all the possibilities**

These problems aim to develop the children's systematic approach to problem solving. They need to check for repeats in their answers, have a systematic way of recording e.g. ordered list or table and have to have a way of knowing when all possibilities have been found.

- **Logic puzzles**

These are used to develop the children's skills of deductive reasoning. It requires a step-by-step approach where each step and decision follows logically from the previous step. E.g. Sudoku puzzle.

- **Finding rules and describing patterns**

These are important for encouraging children to work towards developing generalisations in mathematics. E.g. when adding two odd numbers, do they always produce an even number?

- **Diagrams/visual problems**

These are based on diagrams or are presented in a visual manner.

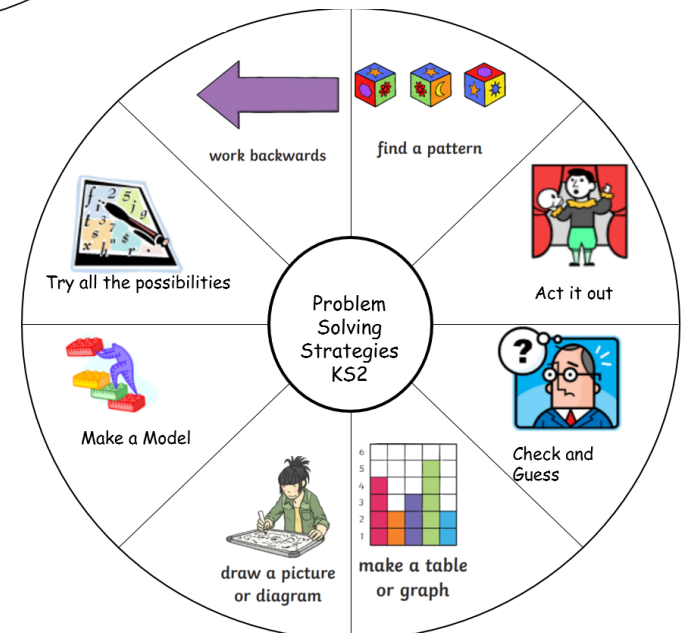
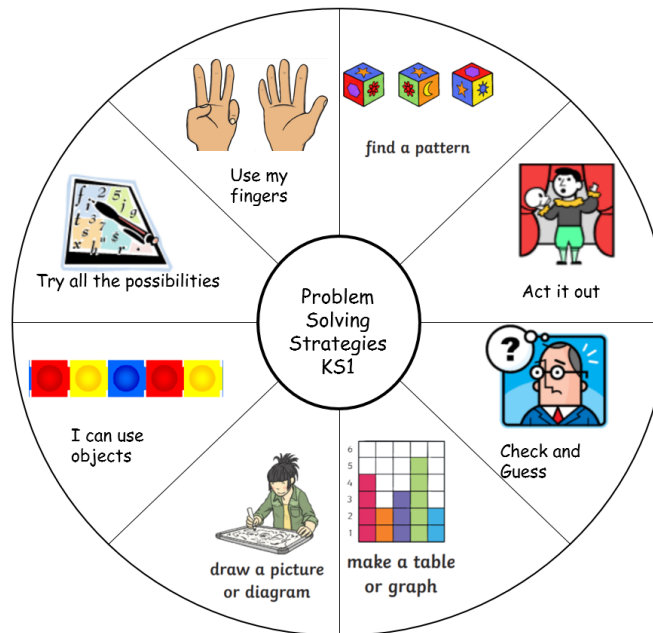
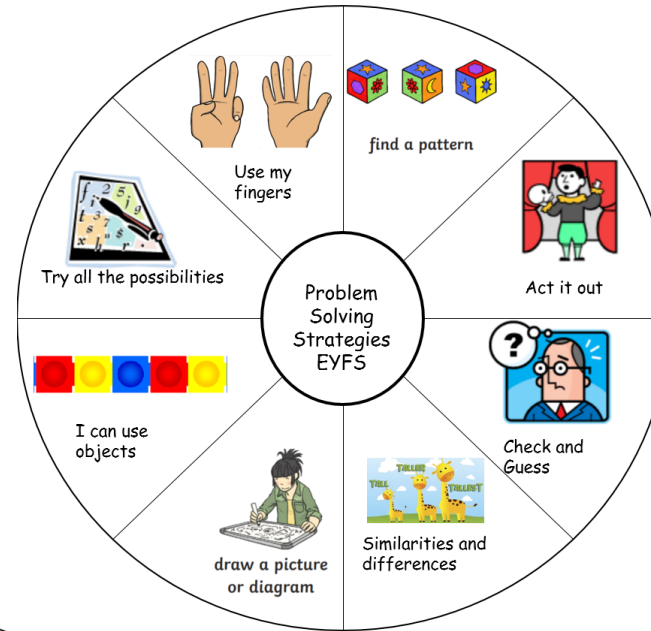
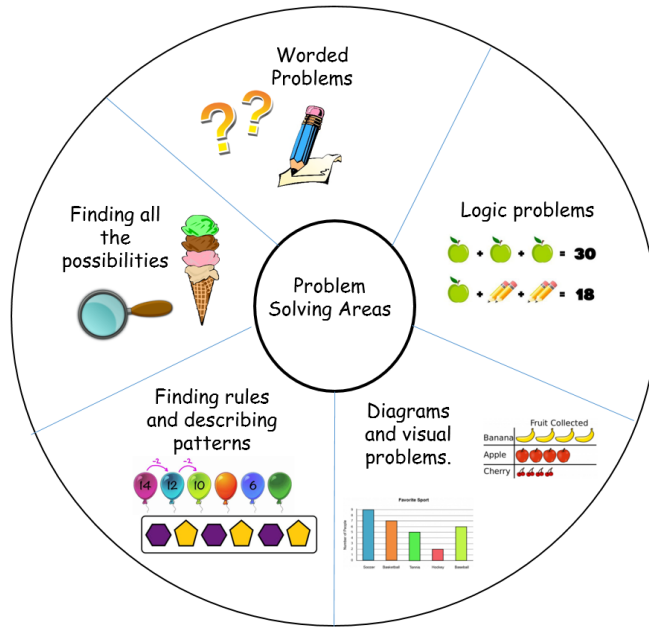
National curriculum aims to ensure that children ' can solve problems by applying their mathematics to a variety of routine and non-routine problems with increasing sophistication, including breaking down problems into a series of simpler steps and preserving in seeking solutions'(DfE 2013)

Representing is part of the problem solving process and children will be encouraged to use and develop the skill as the progress through school. Time will be given for children to practice this. Children need to learn the different ways they can do this and get to see it in a different context or using different numbers before they look for a solution.

These are the strategies that they will practice:

- Using logical reasoning
- Working backwards
- Drawing a diagram
- Drawing a table
- Creating an organised list
- Looking for a pattern
- Acting it out
- Guessing and checking
- Language is also representation and it is important that children have a good understanding of the mathematical language involved. Class discussion is important and cartoon concepts, which supports and helps them, make sense of the language involved.
- This progression map is written to help teachers promote mathematical problem solving in children.
- The progression map presents four different types of mathematical types of problems, although these can be linked and overlap. However, teachers can see the progression in each types of problem.

Problem Solving Skills Wheels



Problem Solving Progression

	Reception	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Word problems	Use developing mathematical, ideas and methods to solve practical problems.	Solve problems involving counting, adding, subtracting, doubling or halving in the context of numbers, measures or money, for example to 'pay' and 'give change'.	Solve problems involving addition, subtraction, multiplication or division in contexts of numbers, measures or pounds and pence.	Solve one-step and two-step problems involving numbers, money or measures, including time, choosing and carrying out appropriate calculations.	Solve one-step and two-step problems involving numbers, money or measures, including time; choose and carry out appropriate calculations, using calculator methods where appropriate.	Solve one-step and two-step problems involving whole numbers and decimals and all four operations, choosing and using appropriate calculation strategies, including calculator use.	Solve multistep problems, and problems involving fractions, decimals and percentages; choose and use appropriate calculation strategies at each stage, including calculator use.
Logic problems/ puzzles	Match sets of objects to numerals that represent the number of objects.	Describe a puzzle or problem using numbers, practical materials and diagrams; use these to solve the problem and set the solution in the original context.	Identify and record the information or calculation needed to solve a puzzle or problem; carry out the steps or calculations and check the solution in the context of the problem.	Represent the information in a puzzle or problem using numbers, images or diagrams; use these to find a solution and present it in context, where appropriate using £.p notation or units of measure.	Represent a puzzle or problem using number sentences, statements or diagrams; use these to solve the problem; present and interpret the solution in the context of the problem.	Represent a puzzle or problem by identifying and recording the information or calculations needed to solve it; find possible solutions and confirm them in the context of the problem.	Tabulate systematically the information in a puzzle or problem; identify and record the steps or calculations needed to solve it, using symbols where appropriate; interpret solutions in the original context and check their

							accuracy.
Finding all the possibilities	- Recognise similarities and differences; - Sort objects, using a number of criteria; - Explain what they are thinking and doing.	- Know that there is sometimes more than one answer to a problem - Work with objects, numbers and pictures in a systematic way to solve finding all possibilities problems. - Use simple lists and practical resources to organize answers. - Spot and describe simple patterns. - Explain how different answers or solutions are different'	- Organise the recording of possibilities in an ordered list or table. - Know when all the possibilities have been found. - Check for repeats of solutions. - Use lists or tables to find answers to other questions - Spot simple patterns and make predictions.	- Begin to make decisions about how best to organise solutions. - Describe how I know I have found all the possible solutions. - Check that my solutions meet all the criteria of the problem. - Begin to suggest extensions by asking 'what if...?'	- Develop my own systems for solving finding all possibilities problems, e.g. start with the smallest number. - List answers in a systematic way and explain why I chose to solve the problem the way I did. - Check solutions against given criteria - Recognise patterns and relationships between solutions and begin to generalise.	- Solve finding all possibilities problems by organising solutions into lists or tables. - Decide on the best way to solve a problem involving finding all possibilities. - Explain my thinking when I solve a finding all possibilities problems and begin to decide whether it was effective.	- work systematically, using my knowledge of number facts and the relationship between operations to solve problems efficiently and I can explain and justify my conclusions in words and symbols
Patterns, Sequences and Rules	Talk about, recognise and recreate simple patterns	Use familiar objects and common shapes to create and recreate patterns and build models	Continue simple patterns and involving numbers or shapes and explain why.	Describe patterns and relationships involving numbers or shapes, make predictions and test these with examples	Solve problems by Identifying patterns and relationships involving numbers or shapes.	Complete sequences by following simple rules and investigate statements by identifying and using patterns, relationships and properties of numbers or shapes.	Represent and interpret sequences, patterns and relationships in different ways, including using simple expressions and formulae in words then symbols

Test Base Progression

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Number and place value		2N6 use place value and number facts to solve problems	3N6 solve number problems and practical problems involving 3N1 - 3N4 3N6 - Reasoning	4N6 solve number and practical problems that involve 4N1 - 4N5 and with increasingly large positive numbers	5N6 solve number problems and practical problems that involve 5N1 - 5N5 5N6 - Reasoning	6N6 solve number problems and practical problems that involve 6N2 - 6N5 6N6 - Reasoning
Addition and Subtraction	1C4 solve one-step problems that involve addition and subtraction, using concrete objects and pictorial representations, and missing number problems such as $7 = ? - 9$ 1C4 - Reasoning	2C4 solve problems with addition and subtraction: - using concrete objects and pictorial representations, including those involving numbers, quantities and measures - applying their increasing knowledge of mental and written methods 2C4 - Reasoning 2M9 solve simple problems in a practical context involving addition and subtraction of money of the same unit, including giving change (from measures) 2M9a - Reasoning	3C4 solve problems, including missing number problems, using number facts, place value, and more complex addition and subtraction 3C4 - Reasoning 3M9b add and subtract lengths (m / cm / mm) (from measures) 3M9b - Reasoning	4C4 solve addition and subtraction two-step problems in contexts, deciding which operations and methods to use and why 4C4 - Reasoning	5C4 solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why 5C4 - Arithmetic & Reasoning 5C4 - Reasoning	6C4 solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why 6C4 - Reasoning 6C8 solve problems involving addition, subtraction, multiplication and division 6C8 - Reasoning

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Multiplication and division	1C8 solve one-step problems involving multiplication and division, by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher 1C8 - Reasoning	2C8 solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts 2C8 - Reasoning	3C8 solve problems including missing number problems, involving multiplication and division, including integer scaling problems and correspondence problems in which n objects are connected to m objects	4C8 solve problems involving multiplying and adding, including using the distributive law to multiply two-digit numbers by one digit, integer scaling problems and harder correspondence problems such as n objects are connected to m objects	5C8a solve problems involving multiplication and division including using their knowledge of factors and multiples, squares and cubes	6C8 solve problems involving addition, subtraction, multiplication and division
					5C8b solve problems involving addition and subtraction, multiplication and division and a combination of these, including understanding the meaning of the equals sign	
					5C8c solve problems involving multiplication and division including scaling by simple fractions and problems involving simple rates	6R3 solve problems involving similar shapes where the scale factor is known or can be found (from ratio and proportion) 6R3 - Reasoning

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Fractions, decimals and percentages			3F10 solve problems that involve 3F1-3F4	4F10a solve problems involving increasingly harder fractions to calculate quantities and fractions to divide quantities, including non-unit fractions where the answer is a whole number 4F10a - Reasoning	5F10 solve problems involving numbers up to three decimal places 5F10 - Reasoning	
				4F10b solve simple measure and money problems involving fractions and decimals to two decimal places 4F10b - Reasoning	5F12 solve problems that require knowing percentage and decimal equivalents of $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{5}$, $\frac{2}{5}$, $\frac{4}{5}$ and those with a denominator of a multiple of 10 or 25 5F12 - Reasoning	
Statistics			4F10b solve simple measure and money problems involving fractions and decimals to two decimal places 4F10b - Reasoning	5F12 solve problems that require knowing percentage and decimal equivalents of $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{5}$, $\frac{2}{5}$, $\frac{4}{5}$ and those with a denominator of a multiple of 10 or 25 5F12 - Reasoning	4F10b solve simple measure and money problems involving fractions and decimals to two decimal places 4F10b - Reasoning	5F12 solve problems that require knowing percentage and decimal equivalents of $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{5}$, $\frac{2}{5}$, $\frac{4}{5}$ and those with a denominator of a multiple of 10 or 25 5F12 - Reasoning

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Money	1M3 recognise and know the value of different denominations of coins and notes	2M3a recognise and use symbols for pounds (£) and pence (p); combine amounts to make a particular value 2M3ab - Reasoning 2M3b find different combinations of coins that equal the same amounts of money 2M9 solve simple problems in a practical context involving addition and subtraction of money of the same unit, including giving change 2M9 - Reasoning	3M9a add and subtract amounts of money to give change, using both pounds (£) and pence (p) in practical contexts 3M9a - Reasoning			
Measuring					5M9a-d use all four operations to solve problems involving measure [e.g. length, mass, volume, money] using decimal notation, including scaling 5M9ad - Reasoning	6M9 solve problems involving the calculation and conversion of units of measure, using decimal notation up to three decimal places where appropriate 6M9 - Reasoning

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Converting				4M5 convert between different units of measurement [e.g. km to m; hour to minute] 4M5 - Reasoning	5M5 convert between different units of metric measure [e.g. km and m; cm and m; cm and mm; g and kg; l and ml] 5M5 - Reasoning	6M5 use, read, write and convert between standard units, converting measurements of length, mass, volume and time from a smaller unit of measure to a larger unit, and visa versa, using decimal notation of up to three decimal places 6M5 - Reasoning
Time			3M4e know the number of seconds in a minute and the number of days in each month, year and leap year 3M4e - Reasoning 3M4d estimate and read time with increasing accuracy to the nearest minute; record and compare time in terms of seconds, minutes and hours; use vocabulary such as o'clock / am / pm, morning, afternoon, noon and midnight 3M4d - Reasoning	4M4c solve problems involving converting from hours to minutes; minutes to seconds; years to months; weeks to days 4M4c - Reasoning 4M4c solve problems involving converting from hours to minutes; minutes to seconds; years to months; weeks to days	5M4 solve problems involving converting between units of time 5M4 - Reasoning 5M4 solve problems involving converting between units of time	6M9 solve problems involving the calculation and conversion of units of measure, using decimal notation up to three decimal places where appropriate 6M9 - Reasoning

3M4f compare durations of events [e.g. to calculate the time taken by particular events or tasks

[3M4f - Reasoning](#)

3M4d estimate and read time with increasing accuracy to the nearest minute; record and compare time in terms of seconds, minutes and hours; use vocabulary such as o'clock / am / pm, morning, afternoon, noon and midnight

[3M4d - Reasoning](#)