Saint Joseph & Saint Teresa
CATHOLIC PRIMARY SCHOOL

'Together we live, learn, love'

St Joseph and St Teresa Catholic Primary School Policy for Mathematical Problem Solving

Rational and Aims

Solving problems is one of the core purposes of the study of mathematics. The national curriculum aims to ensure that all pupils can solve problems by applying their mathematics to a variety of routine and non-routine problems. As well as including problem solving in all of our mathematics lessons, we explicitly teach how to solve problems using a variety of strategies. As children become more experienced, they then learn to select a skill to solve a particular problem. We want to give children a chance to believe in themselves as mathematicians and develop the power of resilience and perseverance when faced with mathematical challenges both in school and in everyday life.

What is problem solving and how do we teach it?

Problem solving can be defined as involving these core principles:

- analysing the components of a problem: identifying what is known and what needs to be found and making links between them
- exploring patterns or relationships
- formulating conjectures and testing them/developing a line of enquiry making references and deductions, for example, 'If I know this, then that could or must be true'
- finding proofs and reasoning
- seeking solutions
- presenting, recording and communicating

In mathematics, teachers plan regular opportunities (2 dedicated lessons per half term) to practise these problem solving principles. Children are taught strategies for effective problem solving with the aim that they will understand how and when to use them in order to support them to become an efficient problem solver. When teaching problem solving, the teacher links problems to real life contexts, models how to use an appropriate problem solving strategy, gives children opportunities to solve problems with opportunities to review and evaluate.

Different types of problems and problem solving strategies

Children are taught the different types of problems with a whole school focus per half term

Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Finding all the possibilities	Visual puzzles	Word Problems	Finding rules and patterns	Logic puzzles	Review of different problems

Alongside the type of problem, it is important to consider the skill that the children will be developing. Selecting a skill and then offering opportunities for it to be modelled can help children to realise there are many different ways to solve a problem. Children then learn to select a skill to use as they become more experienced at problems.

Working on a problem will involve using one or several problem solving skills as listed below:

- Acting it out/ making a model
- Trial and improvement
- Working systemically (there will be more than one way of doing this: not just the one that is obvious to you)
- Pattern spotting
- Working backwards
- Reasoning logically
- Simplify the problem
- Conjecturing

The strategies and skills listed above will be taught progressively from Reception to Year 6.

Reception/ Year 1	Year 2	Year 3
Acting it out/ making a model: use various resources and equipment to act out the problem and aid the solution **Pattern spotting**: identify things that happen again, repeating patterns or sequences **Trial and improvement**: a systematic approach: First estimate the starting point then refine the answer	**Acting it out/ making a model**: use various resources and equipment to act out the problem and aid the solution **Pattern spotting**: identify things that happen again, repeating patterns or sequences **Trial and improvement**: a systematic approach: First estimate the starting point then refine the answer **Simplify the problem**: break a problem down into smaller parts **Working systematically**: working in a methodical and efficient way which could clearly show others that we are using a pattern or system (this could involve making a list or table)	**Acting it out/ making a model**: use various resources and equipment to act out the problem and aid the solution **Pattern spotting**: identify things that happen again, repeating patterns or sequences **Trial and improvement**: a systematic approach: First estimate the starting point then refine the answer **Simplify the problem**: break a problem down into smaller parts **Working backwards**: use inverse operations to solve a problem **Working systematically**: working in a methodical and efficient way which could clearly show others that we are using a pattern or system (this could involve making a list or table)

Year 4	Year 5	Year 6
Acting it out/ making a model: use various resources and equipment to act out the problem and aid the solution	**Acting it out/ making a model**: use various resources and equipment to act out the problem and aid the solution	**Acting it out/ making a model**: use various resources and equipment to act out the problem and aid the solution
Pattern spotting: identify things that happen again, repeating patterns or sequences	**Pattern spotting**: identify things that happen again, repeating patterns or sequences	**Pattern spotting**: identify things that happen again, repeating patterns or sequences
Trial and improvement: a systematic approach: First estimate the starting point then refine the answer	**Trial and improvement**: a systematic approach: First estimate the starting point then refine the answer	**Trial and improvement**: a systematic approach: First estimate the starting point then refine the answer
Simplify the problem: break a problem down into smaller parts	**Simplify the problem**: break a problem down into smaller parts	**Simplify the problem**: break a problem down into smaller parts
Working backwards: use inverse operations to solve a problem	**Working backwards**: use inverse operations to solve a problem	**Working backwards**: use inverse operations to solve a problem
Working systematically: working in a methodical and efficient way which could clearly show others that we are using a pattern or system (this could involve making a list or table)	**Working systematically**: working in a methodical and efficient way which could clearly show others that we are using a pattern or system (this could involve making a list or table)	**Working systematically**: working in a methodical and efficient way which could clearly show others that we are using a pattern or system (this could involve making a list or table)
Reasoning logically: thinking through mathematical problems logically in order to arrive at solutions. Being able to identify what is important and unimportant in solving a problem and to explain or justify a solution	**Reasoning logically**: thinking through mathematical problems logically in order to arrive at solutions. Being able to identify what is important and unimportant in solving a problem and to explain or justify a solution	**Reasoning logically**: thinking through mathematical problems logically in order to arrive at solutions. Being able to identify what is important and unimportant in solving a problem and to explain or justify a solution
	Conjecturing: making a conclusion or a proposition that is offered on an uncertain basis without proof	**Conjecturing**: making a conclusion or a proposition that is offered on an uncertain basis without proof