

Subject: Mathematics

Golden Concept: Problem Solving

Purpose of Problem Solving:

The English National Curriculum for Mathematics emphasises problem-solving skills across all key stages. It integrates problem-solving into various strands, encouraging students to apply mathematical concepts in real-life scenarios, reason, and develop strategies to solve problems. Students are taught problem-solving techniques, logical thinking, and ways to approach and tackle mathematical challenges. These skills are woven into different areas such as number, algebra, geometry, and statistics, enabling students to build a solid foundation in problem-solving throughout their mathematical education.

Assessment:

Teachers observe students during class activities, noting their approach to solving problems, their strategies, and how they tackle challenges in different subjects. This method is more common in early years and primary education.

Students complete tasks or projects that require problem-solving. These tasks can be open-ended, allowing for multiple solutions, and are assessed based on the process as well as the outcome.

Problem-solving questions can be included in exams across subjects, where students apply their knowledge to solve problems presented in various formats. These questions assess their ability to analyse, reason, and apply concepts.

Cross curriculum:

Science: Students engage in experiments and investigations where they analyse data, draw conclusions, and solve scientific problems. This involves critical thinking and applying scientific principles to find solutions.

Design and Technology: Problem-solving is inherent in designing and creating solutions to real-world problems. Students learn to identify needs, brainstorm ideas, and develop prototypes while solving design challenges.

History and Geography: Analysing historical or geographical data often involves problem-solving, such as interpreting maps, understanding cause-and-effect relationships, and making connections between events.

Art and Design: Problem-solving is inherent in creating art. Students face challenges related to composition, technique, and expressing ideas visually. They solve problems related to colour theory, perspective, and artistic expression.

PE: In sports and physical activities, students encounter problem-solving situations, such as strategizing during team sports, analysing opponents' movements, or adapting their tactics to overcome challenges.

PSHE: Problem-solving skills are crucial in navigating personal and social challenges, decision-making, and understanding the impact of choices on health and well-being.

Key Stage or stage breakdown:

Stages 1 and 2: Students start by exploring basic mathematical concepts through practical activities, games, and puzzles. They learn to solve simple problems involving addition, subtraction, multiplication, and division. Emphasis is on using concrete objects to understand mathematical ideas.

Stages 3-6: Problem-solving becomes more structured. Students engage in a wider range of mathematical problems involving more complex calculations, logical reasoning, and applying mathematical concepts to real-life situations. They start exploring topics like fractions, decimals, geometry, and statistics, often solving problems that involve multiple steps.

Stages 7-9: Students delve deeper into mathematical problem-solving. They work on more intricate problems that require higher-order thinking skills. Emphasis is placed on developing fluency in mathematical techniques, logical reasoning, and applying problem-solving strategies across various mathematical areas, preparing them for more advanced studies.

Throughout these stages, problem-solving is embedded within the curriculum to help students develop resilience, creativity, and confidence in applying mathematical principles to solve problems in everyday life and in more abstract mathematical contexts.