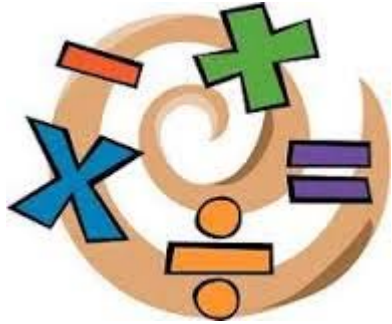


Problem Solving

Aims of the Workshop

- The purpose of problem solving
- The curriculum and problem solving
- Problem solving skills
- Problem solving skills in action



Thinking is at the heart of Mathematics and therefore should be at the heart of mathematical teaching and learning.

The Maths Curriculum

Children should:

- Become **fluent** in the fundamentals of mathematics, including through varied and frequent practice with increasingly complex problems over time, so that pupils develop conceptual understanding and the ability to recall and apply knowledge rapidly and accurately.
- Reason mathematically by following a line of enquiry, conjecturing relationships and generalisations and developing an argument, justification or proof using mathematical language.
- Solve problems by applying their mathematics to a variety of problems with increasing sophistication, including breaking down problems into a series of simpler steps and persevering in seeking solutions.

What kinds of problems are there?

- Word problems
- A Real world problem
- An investigative problem
- A puzzle or logic problem
- A problem in symbolic form e.g. algebra $a - b$

Problem solving skills

- Trial and improvement- trying something out
- Working systematically- working in an organised and efficient way
- Pattern spotting
- Working backwards
- Reasoning logically
- Visualising- picturing what is happening
- Conjecturing- Asking what if questions

Why teach problem solving skills?

- To help children deal with problems effectively
- To develop thinking skills
- To develop, reinforce, enhance and extend mathematical skills and concepts in children
- To develop a sense of enquiry
- To help children engage with imaginative and creative work

Where does problem solving fit into the Early Years Curriculum?

Statutory Framework for the Early Year's Foundation Stage Mathematics

Numbers: children count reliably with numbers from 1 to 20, place them in order and say which number is one more or one less than a given number. **Using quantities and objects**, they add and subtract two single-digit numbers and count on or back to find the answer. **They solve problems, including doubling, halving and sharing.**

Shape, space and measures: **children use everyday language to talk about size, weight, capacity, position, distance, time and money to compare quantities and objects and to solve problems. They recognise, create and describe patterns.**

The key characteristics for teaching maths in the Early Years are by:

- playing and exploring
- active learning
- creating and thinking critically

Where does problem solving fit into the maths curriculum?

Progression

Addition and Subtraction

Y1- I can solve **one- step problems** that involve addition and subtraction using concrete objects, pictorial representations and missing number problems $7 = ? - 9$

Y2- I can solve problems with addition and subtraction using concrete objects and pictorial representations including quantities and measures.

I can solve problems with addition and subtraction applying my knowledge of mental and written methods.

Y3- I can solve problems, including missing number problems, using number facts, place value, and more complex addition and subtraction

Where does problem solving fit into the maths curriculum?

Addition and Subtraction

Y4- I can solve addition and subtraction **two-step problems** in contexts, deciding which operations and methods to use.

Y5- I can solve addition and subtraction **multi-step problems** in contexts, deciding which operations and methods to use and why

Y6- I can **use formal methods** to solve multi- step problems.

I can use estimation to check answer to calculations and determine, in the context of the problem, an appropriate degree of accuracy.

Problem solving strategies





Recalling Facts



- It is important that children recognise number bonds and are able to apply these with fluency, constantly making links. E.g. $8+2=10$ $80+20=100$
 $800+200=1000$

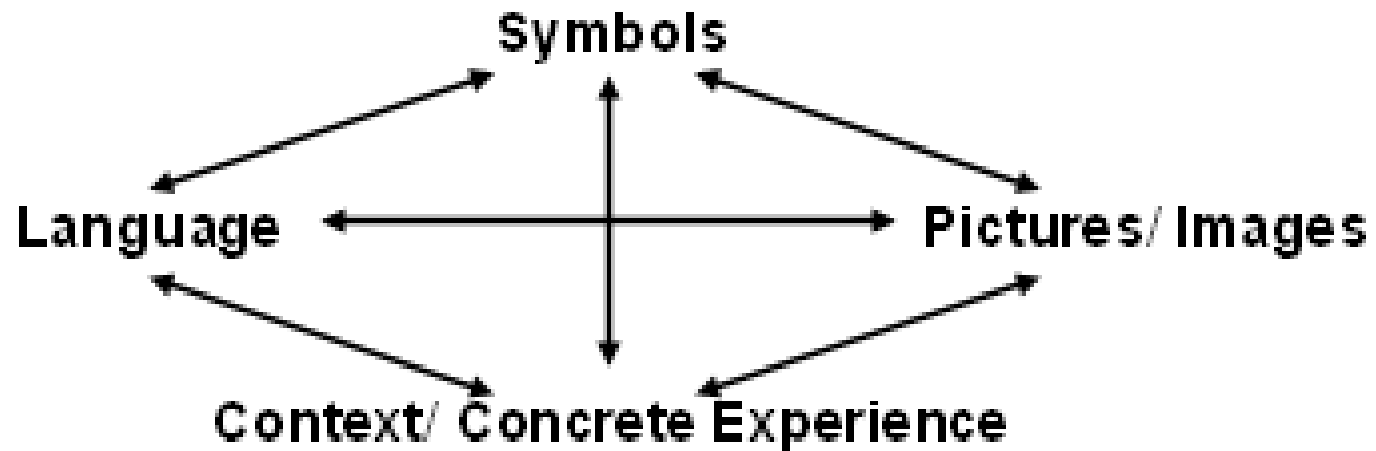


Times Tables

- By the end of year 4 children need to be able to recall and use multiplication and division facts up to 12×12 .

Making Connections

They need to be able to make connections.



Children must have concrete experiences to help them create visual images.

Making Connections

The inverse $3 \times 7 = 21$ $7 \times 3 = 21$

$$21 \div 3 = 7 \quad 21 \div 7 = 3$$

Know the link between \times and \div and repeated addition and subtraction

e.g. $7+7+7 = 21$

$$21-3 = 18 \quad -3 = 15-3 = 12-3 = 9-3 = 6-3 = 3-3 = 0$$

Making Connections

Being able to use and discuss arrays.

x x x x x x x

x x x x x x x

x x x x x x x

$$3 \times 7 = 21$$

Being able to apply the above calculations in a word problem. E.g. 7 children each have 3 biscuits. How many biscuits are there altogether?

How can parents help their child?

Parents can help by offering tips and suggestions e.g.

- Helping them to read the question carefully
- Underline the key facts
- Talk about the mathematical vocabulary
- Use objects or pictures to support
- Encourage them to act out the problem
- Make sure the answer makes sense