

Helping your child to solve problems in mathematics at home

What is problem solving?

Problem solving is cognitive processing directed at achieving a goal when no solution is obvious to the problem solver. Problem solving is related to other skills such as thinking, reasoning, decision making, critical thinking, and creative thinking.

If pupils know that all four-sided figures are quadrilaterals and that all squares have four sides, then by using deduction they can conclude that all squares are quadrilaterals. Decision making refers to problem solving with a specific task in which the goal is to choose one of two or more alternatives based on some criteria. For example, a decision making task is to decide whether someone would rather have £100 for sure or a 1% chance of getting £100,000. Thus, both reasoning and decision-making are kinds of problem solving that are characterised by specific kinds of tasks.

According to Mayer and Wittrock (2006), pupils need to have four kinds of knowledge in order to be successful problem solvers:

Knowledge of facts, such as “there are 100 pennies in a pound”;

Knowledge of concepts, such as knowing what place value means in arithmetic;

Knowledge of strategies, such as how to break a problem into parts or how to find a related problem;

Knowledge of procedures, such as how to carry out short division..

How do I get my child to think reason and explain?

Open questions provide a greater challenge to your child but will also allow them to answer it at their own level. The following type of questions will help your child to think and explain about the process rather than just achieving the answer.

How can we get started on this problem?

What other way could you start this calculation/investigation?

What do you already know that will help you?

What patterns can you see? What reason might there be for these patterns?

Which of your methods were best? Why?

Can you explain what is happening when...?

Is there a rule?

What could we look at next?

What strategies have we learned for next time?

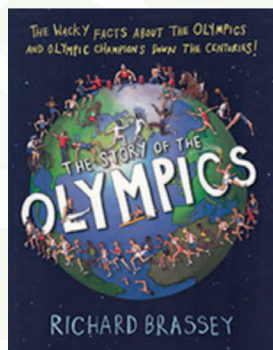
If you were doing this investigation again what would you do?

Activities and ideas to help your child with problem solving at home

Sporting events, daily life, stories or favourite films allow opportunities for problem solving using knowledge of measure including money, area, perimeter, distance, speed and time. Where possible it is always best to deliver problem solving through your child's interest, rather than through a dry uninspiring text book.

Problem solving in Stories

When reading with your child look for opportunities to practise problem solving.



The following activities link to the book: **The Story of the Olympics** by Richard Brassey

Create a timeline of events. Work out the roman numerals. The Marathon on p14, calculate how long the

marathon is in metres, kilometres and miles. Compare the times of athletics and compare. When will the next Olympics be? How many weeks, days, minutes and or seconds? What is the length of an Olympic swimming pool? If it is a race is 800m long, how many lengths of the pool does a swimmer need to do? Beijing p27. Look at the statistics for Michael Phelps, Measure your arm-span, feet size and other body parts. How many times longer is his torso and limbs compared to your own? Michael eats 10,000 calories a day, look at the calorie content of different foods and work out what he can eat in one day. How many people participate in the Olympics? How many countries participate and what are their rankings? If a coach holds 80 people, how many coaches would it take to transport 17,320 athletes? If an average size coach 14.5m, how long would the length of the coaches be?

Daily life opportunities

In the kitchen

Look at the packaging and convert from metric to imperial.

Find a recipe for 4 people and rewrite it for 8 people, e.g.

4 people

125g flour
50g butter

8 people

250g flour
100g butter

For further information visit www.bexleyeis.co.uk

75g sugar

30ml treacle

1 teaspoon ginger

150g sugar

60ml treacle

2 teaspoons ginger

Can you rewrite it for 3 people? Or 5 people? If I have 100g of sugar, how many people will I be able to make it for?

In the bathroom

Estimate how much water a bath holds.

Estimate and then measure how many buckets or jugs of water it takes to fill the bath.

Calculate the volume of the bath. If the shower uses 10litres a minute, how many litres do you use in a shower?

In the garden

Find the area and perimeter of your garden, grass area, patio and path. Explore the ratio of pots to hanging baskets. If a pot takes 2.5 litres of compost and a hanging basket takes 1.25 litres of compost what is the ratio of pot to hanging basket. How much compost would I need to fill 5 pots and hanging baskets?

In the supermarket

- The supermarket sells a 500ml bottle of squash for 69p and a 1.5 litre bottle for £1.99. Which is better value for money? How do you decide?
- On your next supermarket trip get your child to compare 2 products and decide which product is better value for money.

Games:

Crash!

1. Each person draws a 10 × 10 grid, with 'spaceships' at 6 different intersections.
2. Players take turns to guess the grid references at which their opponent's spaceships are stationed.
3. A correct guess 'crashes' the opponent's spaceship and the opponent must cross out that spaceship. The first to lose all their spaceships loses the game. **Battleships**



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