

(KS 2/3) For Ages 11 - 12

Everyday Maths Book 3

**Mathematics problems
set in a real world
context.**

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Teachers' Notes

The idea of problem solving activities often conjures up images of numbers and objects that have no direct meaning for students other than teaching the basic problem solving strategies. The activities in this book are designed to present real-life problems in a realistic context so as to provide children with situations in which everyday problem solving and comprehension skills are required.

The activities are based around recurring characters who find themselves exposed to a range of problems that need to be solved; the sort of problems that students may one day encounter.

Most Sheets include a challenge activity, usually an extension of the main problem, which will further consolidate comprehension skills. Included throughout the book are brainteaser Sheets which focus on a particular problem solving strategy, highlighted at the foot of the Page. These brainteasers can be photocopied and individually glued on to card so as to create a set. Students might like to think up their own brainteasers to add to the set.

Problem Solving Strategies

There are many strategies for solving everyday maths problems. Some of the main problem solving strategies have been explained below. In some cases examples of problems are given where the particular strategy can be applied.

Guess and check:

Probably the first strategy children might try and definitely the easiest. By making a guess and checking their answer, children have a point of reference on which to base all other guesses.

An example:

I am thinking of two consecutive numbers that when multiplied give 82. A guess might be to try 14×15 which would give 210. Obviously the next guess would try lower numbers.

Act it out:

Students quite often need to visualise the problem, especially where people or objects are concerned. Counters, coins and students can be used to help solve the problem.

Examples:

There are 48 players in the darts championships. Each player stays in the competition until they lose a game. How many games must be played to find the club champion?

A caterpillar crawls 2 m up a tree every day. Every night it slips back 50 cm. The tree trunk is 10.5 m tall. How long will it take for the caterpillar to reach the top of the trunk?

Make a model:

When problems cannot be acted out the next best thing is to make a model using cubes, matches and so on.

Make a drawing, diagram or graph:

Graphs and diagrams are particularly useful for trying different combinations or clarifying information.

An example:

Jack has a rectangular field that has an area of 360 m. What are the possible dimensions of the rectangle?

Look for a pattern:

This strategy can be used in many number and space activities to help simplify the problem.

Number patterns: It takes three matches to make a triangle, 5 matches to make 2 triangles. How many matches are needed to make 3 triangles?

Spatial Patterns: How many squares are there on a checker board?

Construct a table:

By organising data in a more meaningful way children can better see relationships, patterns and possibly missing information. This strategy is best used where different information is given about each person or object in the problem. A table can include all the information and eliminate irrelevant information.

An example:

Tim, Peter, Max, Jane, Tannie and Kelly each play sport over the weekend. They all play a different sport. Match the person to their sport based on the following:

Tim doesn't like swimming but enjoys cricket;

Peter likes tennis more than swimming;

Kelly enjoys netball;

Max won't play hockey;

Jane doesn't like cricket or diving;

Tannie plays the sport that Max doesn't like.

	Swimming	Tennis	Netball	Hockey	Cricket	Diving
Tim	X				✓	
Peter	X	✓				
Kelly						
Max				X		
Tannie				✓		
Jane					X	X

The solution can be found through the process of elimination.

Make a list:

All possibilities can be listed when using this strategy and again the process of elimination can be used.

An example:

You have three T-shirts: red, blue and yellow; and four pairs of jeans: green, black, navy and light blue. How many different combinations can you wear?

Restate the problem:

This is best used to make sure students fully comprehend the problem and know what they need to do to find the solution.

An example:

At the supermarket Sarah bought some groceries. All the items she bought were the same price and she bought as many things as the total number of pence she was charged for each item. If her bill was £6.25 how many things did she buy?

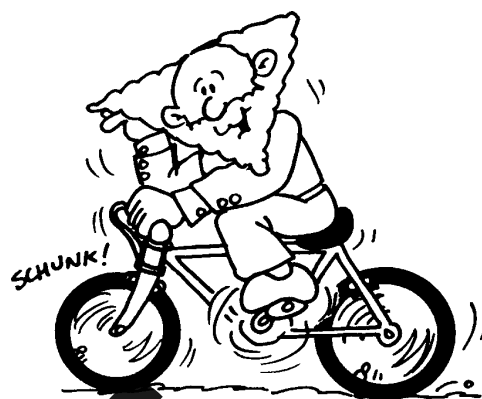
This could then be rephrased as: How many things can be bought with £6.25 where they all cost the same amount?

Life in the Wheel World

Pythagoras has been cycling around the lake. His bike is fairly old and one brake pad has worn away on the front wheel. A certain part of the wheel always touches the brake pad making a short grinding noise. It only does this once every revolution.

Pythagoras has been meaning to buy an odometer for his bike so he can measure the distance around the lake. However he has decided to use his brain instead. He knows that he has 48 cm diameter tyres on his bike and thinks he can work out the circumference. He has placed the wheel so that it will grind immediately and is going to count the noises he hears.

Remember: Circumference of a circle = pi (π) x diameter (D). $C = \pi \times D$
 π is approximately equal to 3.14



Pythagoras counted 250 grinding noises when he rode once around the lake.

1. Approximately how far in metres is the distance around the lake?

How many grinding noises should Pythagoras expect to hear if he rides:

2. Three times around the lake?

3. Five times around the lake?

4. Exactly half way around the lake?

5. If he rides for exactly four and a half kilometres?

6. If he rides at twice the speed around the lake once?



Challenge:

A tree doubled its height each year until it reached its maximum height of 9.6 metres. It took ten years to reach this height. How many years did it take for the tree to reach half its maximum height?

Name

ARCHIMEDES IN THE POOL

Archimedes has a pool in his garden. It has been raining all day and the pool is full to the brim. The rectangular pool measures 4 m long and 2.5 m wide. It is 3.75 m deep in all areas of the pool because Archimedes once dived in the shallow end and created a huge hole! Since then it has been levelled out to 3.75 m.

1. What is the total capacity of the pool?

Volume, Capacity and Mass are related. Look at the table below:

Capacity (millilitres)	Volume (cubic centimetres)	Mass (grams)
1 mL	1 cm ³	1 g
10 mL	10 cm ³	10 g
100 mL	100 cm ³	100 g
200 mL	200 cm ³	200 g
500 mL	500 cm ³	500 g
1 L	1000 cm ³	1 kg

2. Archimedes needs to chlorinate the pool every week. He uses a litre of chlorine for every 15 cubic metres of water. How much chlorine does Archimedes need each week?

.....

Archimedes has seen the following specials in Galleo's Gazette:



3. How much chlorine does Archimedes need for one year?
4. Which offer should Archimedes take if he puts the same amount of chlorine in his pool all year round?
5. Will he have any chlorine left over?

Challenge:

If three hours ago it was as long after one o'clock in the morning as it was before one o'clock in the afternoon, what time would it be now?




Name



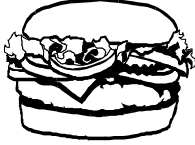
HAMBURGER HEADACHE

Every Sunday Galileo and his family eat hamburgers for dinner. Mrs Galileo gets confused as everybody likes different things in their hamburger, so she now phones through an order to the hamburger shop before she gets there.

She knows that: Everyone in the family likes meat, lettuce and tomato;
She likes gherkin but doesn't like beetroot or cheese;
Galileo likes cheese but not gherkin or egg;
Gary Galileo does not like egg or beetroot but loves gherkin;
Gina Galileo does not like beetroot or gherkin but likes cheese.

Mrs Galileo phoned through her order and was given two extra burgers for making things easier. Here is the order she gave:

					
egg	cheese	egg	cheese	egg	cheese
✓	✓		✓		✓
beetroot	gherkin	beetroot	gherkin	beetroot	gherkin
		✓		✓	

					
egg	cheese	egg	cheese	egg	cheese
✓					✓
beetroot	gherkin	beetroot	gherkin	beetroot	gherkin
	✓	✓			✓

1. Which burger is for which person? Write their names beside their burgers.
2. Who is most likely to eat the leftover burgers? Write their names beside the burgers.

Hint: It may help you to draw up a table to solve the problem.

A regular hamburger with meat, lettuce and tomato costs £3.50 with extras costing:

Egg: 50p
Beetroot: 60p
Cheese: 35p
Gherkin: 45p



3. What would the total cost of the order be?

Challenge:

How many times can you subtract the number 6 from 36?

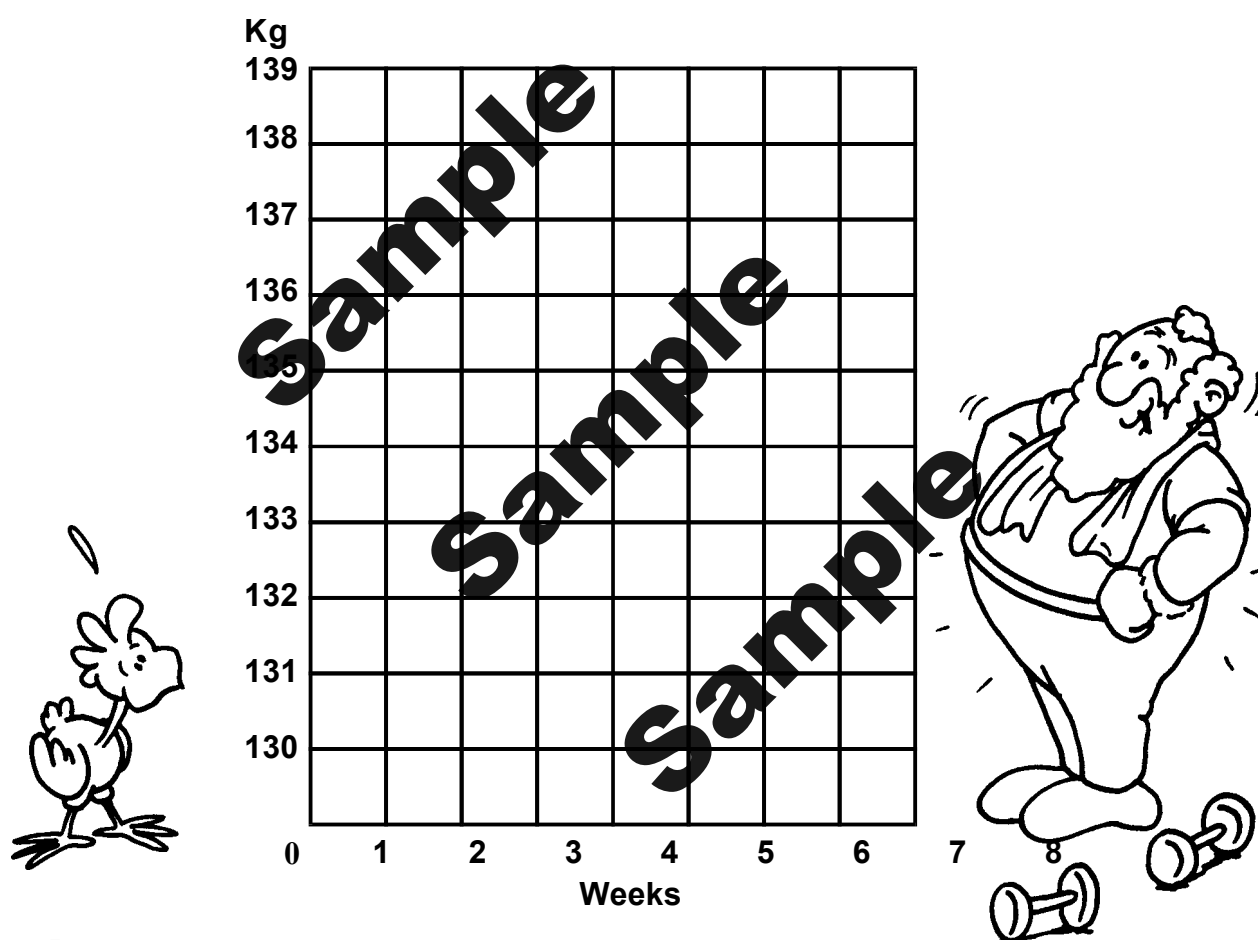
ARCHIMEDES' DIET 1

Archimedes has been on his diet for eight weeks now and has recorded his progress in his notebook.

Weight at the end of each week:

Week 1	138 kg	Week 5	132.5 kg
Week 2	136 kg	Week 6	131 kg
Week 3	136.5 kg	Week 7	132.5 kg
Week 4	134 kg	Week 8	130 kg

Draw a graph showing Archimedes' weight loss below:



How?

It looks like Archimedes lost eight kgs in the eight weeks as $138 - 130$ equals 8. In fact Archimedes lost more than eight kgs. Explain how he did this.

1. What is the *total* weight loss for the 8 week period?
2. In which week did Archimedes lose the most amount of weight?
3. On average how much weight has Archimedes been losing each week?
4. If Archimedes continues at this rate how long will it be before he reaches his target weight of 75 kg?