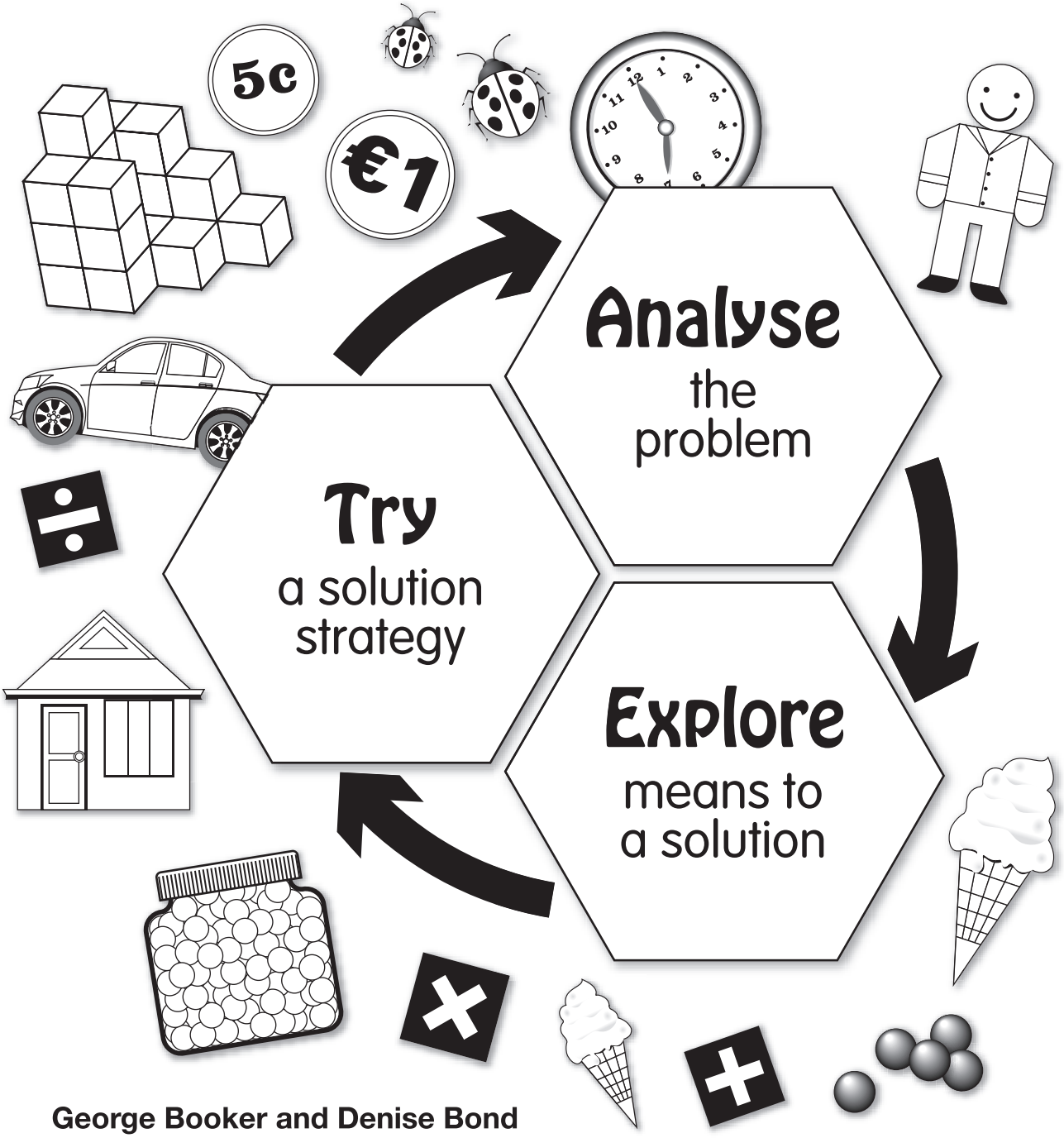
PRIMARY

BOOK B
(Ages 6–7)

CURRICULUM LINKED

Problem-solving in mathematics



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SAMPLE - NOT FOR SALE

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Problem-solving
To reason logically and to identify, create and describe patterns.

Curriculum links
First Class
Skills
- Select and apply appropriate strategies for completing a task or solving a problem
- Discuss and record the results of mathematical activities using diagrams and pictures

Algebra
- Recognise pattern

Materials
Blocks such as Unifix™ cubes or counters (for example, teddies or plastic animals) in four different colours

Focus
These pages explore making patterns, changing patterns and using patterns and numbers. Pupils analyse what makes a pattern and make predictions based on their experiences.

Discussion
Page 3
The first activity involves taking four blocks (of different colours) and lining them up in different groups of two. It is important to explain to pupils that there can be two groups with the same two colours but they have to be lined up in a different order. The possible arrangements are:

blue	red	red	blue	yellow	blue	green	blue
blue	yellow	red	yellow	yellow	red	green	red
blue	green	red	green	yellow	green	green	yellow

The same concept is extended in the next activity, where pupils now line up the blocks in groups of three. For example, a pupil might keep the same colour first and then change the next two colours or he/she might change the first colour and then swap the following two colours. Encourage pupils to explore different ways and arrangements. The possible arrangements are:

red	blue	green	red	yellow	blue	blue	red	green
red	blue	yellow	red	yellow	green	blue	red	yellow
red	green	yellow	blue	green	red	blue	yellow	green
red	green	blue	blue	green	yellow	blue	yellow	red
green	blue	red	green	yellow	red	yellow	blue	green
green	blue	yellow	green	yellow	blue	yellow	blue	red
green	red	blue	yellow	red	blue	yellow	green	red
green	red	yellow	yellow	red	green	yellow	green	blue

Page 4
This activity builds on the previous experience of lining up the blocks and interchanging the colours to make the pattern. The grid can be organised in a number of ways; however, each different way will always have the same diagonal with three blocks of the same colour. Two grids are provided to enable pupils to explore and try different possible arrangements.

Page 5
This activity builds on and extends the previous experience of the three-by-three grid by extending the grid to four-by-four with an additional colour. Again, the grid can be organised in a number of ways and this time it is possible for both diagonals to have four blocks of the same colour. Two grids are provided to enable pupils to explore and try different possible arrangements.

Possible difficulties
- Indiscriminately moving blocks around
- Unable to keep track of what has already been tried
- Content to find only one possibility
- Unable to consider both rows and columns

Extension
- Pupils can be encouraged to make and describe more complex patterns of their own.
- Extend the grid to five-by-five, using five different colours.

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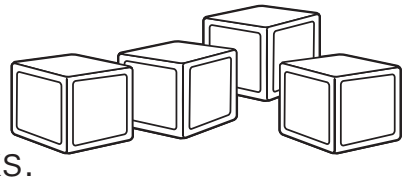
BLOCKS

Take 4 blocks, each a different colour;
for example: red, blue, green and yellow.



1. Line up and draw different groups of 2 blocks.

2. How many different groups can you make? _____

3. Now, line up and draw different groups of 3 blocks.

4. How many can you make? _____

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GRID FUN

Make 3 groups of 3 blocks (9 blocks), with each group a different colour.

Place the blocks on the grid, making sure that no row or column has the same colour in it more than once.

What do you notice about the diagonals? _____

_____

Try doing it a different way.

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MORE BLOCKS

Make 4 groups of 4 blocks (16 blocks), with each group a different colour.

Place the blocks on the grid, making sure that no row or column has the same colour in it more than once.

What pattern do you notice? _____

_____

Try doing it a different way.

SAMPLE - NOT FOR SALE

Problem-solving
To reason logically and to use patterns to represent and solve problems.

Curriculum links
First Class
Skills
- Select and apply appropriate strategies for completing a task or solving a problem
- Discuss and record the results of mathematical activities using diagrams and pictures

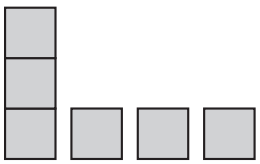
Algebra
- Recognise pattern

Materials
Blocks such as Unifix™ cubes or counters (For each group, 16 in total: 6 red, 3 blue, 5 green and 2 yellow.)

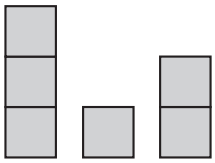
Focus
These pages explore analysing problems with a three-dimensional aspect. They build on and extend the previous work with coloured blocks on page 3. There are various solutions to this problem and pupils should be encouraged to explore and try a number of different possibilities.

Discussion
Page 7
Individually or in pairs, pupils use the 16 blocks and place them on their street according to the street map; for example: the 6 red people could be 1 apartment block and 3 houses; 1 apartment block, 1 house and 1 townhouse; or 2 apartment blocks. However, the yellow blocks can only be 2 houses or 1 townhouse. Possible arrangements (using the red blocks) could be:

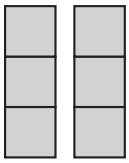
RED PEOPLE



1 apartment block, **3** houses



1 apartment block, **1** house, **1** townhouse



2 apartment blocks

Possible difficulties
- Pupils are making houses only
- When making apartments, colours are mixed
- Not realising that organising the blocks in a different order gives a different solution

Extension
- Using the 'Block Street' copymaster, make up other criteria for pupils to make streets.
- Take a digital photo of each Block Street and have the pairs write about their street, listing how many houses there are.

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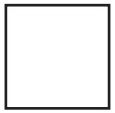
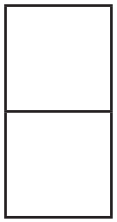
BLOCK STREET

Place blocks on the street to show:

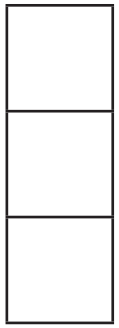
house = **1** block



townhouse = **2** blocks of the same colour

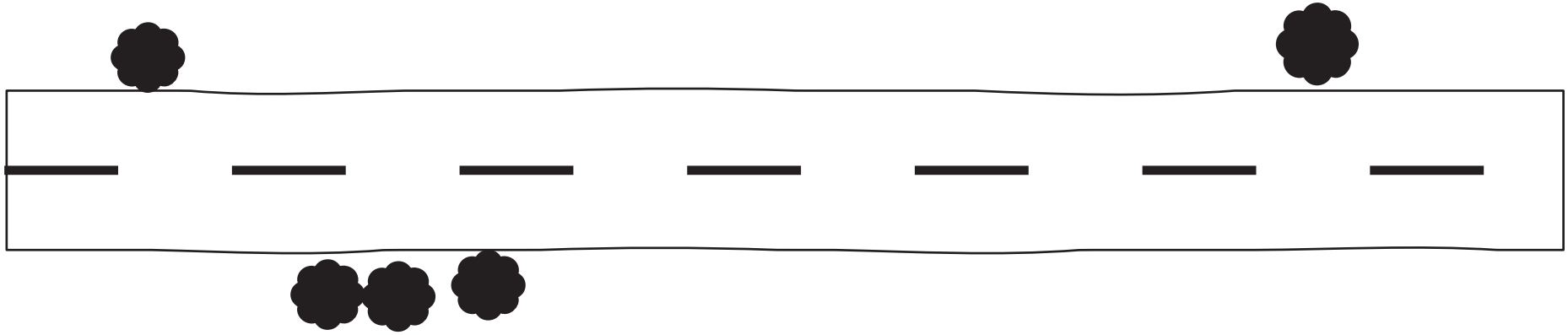


apartment = **3** blocks of the same colour



16 people live in Block Street:
6 red people, **3** blue people, **5** green people and **2** yellow people.

1. Make your street, placing houses, townhouses and apartments to show where the people live.



2. Using the same blocks, make a different-looking street.

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Problem-solving
To identify and use information in a problem.

Curriculum links
First Class
Skills
- Select and apply appropriate strategies for completing a task or solving a problem
- Discuss and record the results of mathematical activities using diagrams and pictures

Number
- Compare equivalent and non-equivalent sets

Focus
These pages explore the reading and interpreting of information to solve problems involving numeration (no addition or subtraction is needed to solve them). Pupils analyse the problem to locate the required information, decide which information is not needed and then use comparison rather than addition or subtraction to obtain solutions.

Discussion
Page 9
Anne skipped 10 more times than Maree, who skipped 42 times. In the next problem, pupils need to read what happened on Saturday and the next day to infer that the next day was Sunday. The last problem is about jelly beans, with the additional information (about marshmallows) not required. Although Aaron has the largest number, these are marshmallows and not jelly beans. Jane has the largest number of jelly beans.

Page 10
In the first problem, Julie has no (or zero) swap cards, so technically, she has the smallest number of cards. This can lead to a discussion about whether the problem means the smallest actual number or should include only the people who actually have cards. The next problem introduces the idea of organising information in a table to help find a solution. The question does not specify how many cards John lost or how many Carla won. The information in the table will show that John has the least number of cards and Carla the most. As John loses some cards, he still has the least number, while Carla winning some means she still has the most.

Page 11
This page introduces the concept of magic squares. Simple three-by-three magic squares have been used to enable pupils to come to terms with the idea that each row, column and diagonal adds to the magic number.

Possible difficulties
Pupils are unable to interpret the information in the problems, including:
- thinking that Maree skipped 42 times and Anna skipped only 10 times
- not being able to work out that the next day is Sunday
- not realising that having no cards means 0 (zero)
- not seeing that having the least number of cards and then losing more will always mean you will have the least cards, while having the most cards and winning more will mean you always have the most.

Inadequate numeration understanding
- Not understanding that zero, as a number, shows none of something.
- Counting or adding to find 10 more rather than using place value.
- Using comparison to determine least and greatest tens place value is not developed.

Extension
- Use a table to record information for the other problems and discuss how this helps in solving them.
- Investigate other magic squares.

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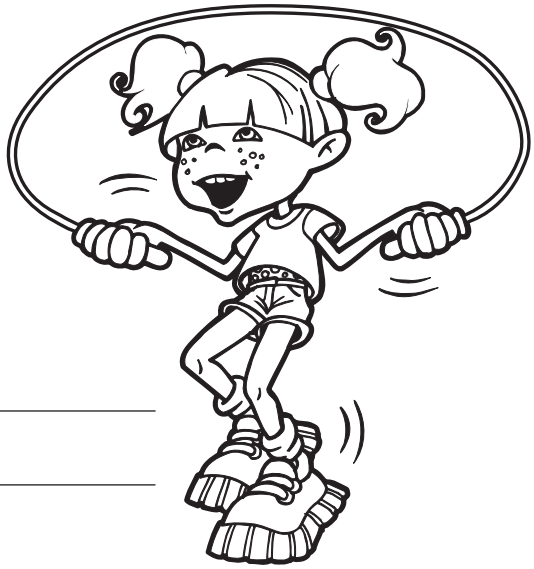
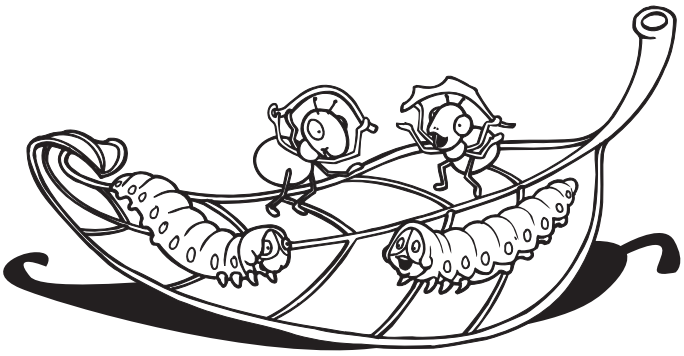
HOW MANY? 1



Maree and Anne were skipping.
Maree skipped 42 times.
Anne skipped 10 more times.

1. Who skipped the most? _____
2. How many times did Maree skip? _____



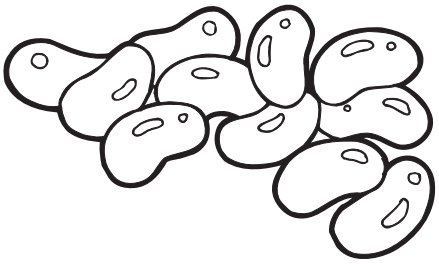
On Saturday, Lee counted 46 ants and 23 caterpillars. The next day he counted 58 ants and 25 caterpillars.

3. How many ants did Lee count on Sunday?

   _____

4. On which day did he count the most caterpillars?

   _____



Jane had 32 jelly beans.
Aaron had 48 marshmallows.
Scott had 29 jelly beans.

5. Who had the most jelly beans? _____

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SWAP CARDS

Kerry has 42 swap cards.
Julie has no swap cards.
Valda has 35 swap cards.

1. Who has the smallest number of cards? _____

Mark has 53 swap cards.
John has 10 less than Mark.
Carla has 72 swap cards.

2. Use the table to record how many cards each person has.

Mark	John	Carla

The next day, John lost some cards and Carla won some cards.

3. Who has the most cards? _____

4. Who has the least cards? _____

SAMPLE - NOT FOR SALE

MAGIC SQUARE

In a magic square, every row, column and diagonal adds to the same number.

2	7	6
9	5	1
4	3	8

In this magic square all the rows, columns and diagonals add to **15**. Its magic number is **15**.

Look at the magic squares below. Remember, each row, column and diagonal must to add to the same number.

1. Figure out what the magic number of each square is.
2. Fill in the missing numbers in each square.

6		8
7	5	3
	9	

	1	6
3		7
		2

(a) Magic number: _____ (b) Magic number: _____

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