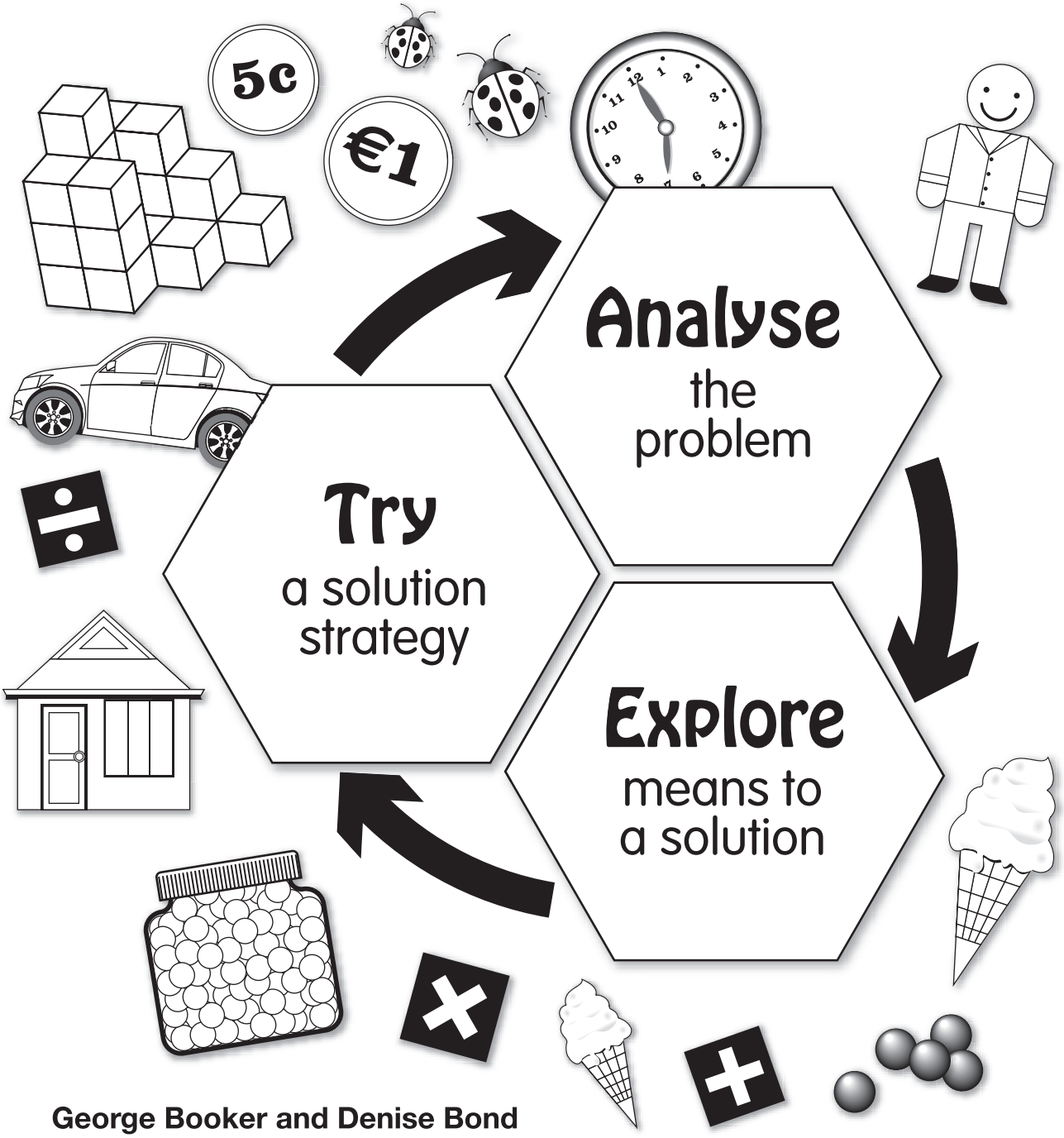
PRIMARY

BOOK A
(Ages 5–6)

CURRICULUM LINKED

Problem-solving in mathematics



George Booker and Denise Bond

6030IRE

SAMPLE - NOT FOR SALE

CONTENTS

Foreword ..... iii – v
Contents vi
Introduction ..... vii – xix
Teacher notes 2
Block time 3
Block patterns 4
More blocks 5
Teacher notes 6
Block Street 7
Teacher notes 8
How many? 1 9
How many? 2 10
Animal pets 11
Teacher notes 12
Animal antics 13
Sorting clothes 14
Clown hats 15
Teacher notes 16
What's my number? 17
Teacher notes 18
Missing numbers 19
Number sense 20
Number stories 21
Teacher notes 22
Number problems 1 23
Number problems 2 24
Number problems 3 25
Teacher notes 26
Toy animals 27
Teacher notes 28
Patterns 29
Ordinal patterns 30
Car race 31
Teacher notes 32
Making sandwiches 33
Sandwich choices 34
More choices 35
Teacher notes 36
At the toyshop 37
Teacher notes 38
Ice-creams 1 39
Ice-creams 2 40
Chocolates 41
Teacher notes 42
Hanging out the washing 43
Washing day 44
Dry-cleaning 45
Teacher notes 46
Using squares 47
Using 5 squares 48
Growing shapes 49
Teacher notes 50
How long? 51
Solutions 52–54
Tangram resource page 55
10 mm x 10 mm grid resource page 56
15 mm x 15 mm grid resource page 57
Triangular grid resource page 58
Triangular isometric resource page 59
Square isometric resource page 60
4-digit number expander resource page (x 5) 61

SAMPLE - NOT FOR SALE

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

Curriculum links
Senior Infants
Skills
- Select and apply appropriate strategies for completing a task or solving a problem
- Record the results of mathematical activities using pictures

Algebra
- Identify and extend patterns in colour

Materials
Blocks such as Unifix™ cubes, counters, teddies or plastic animals in different colours

Focus
To explore making patterns, changing patterns and using patterns and numbers. To have pupils analyse what makes a pattern and make predictions based on their experiences.

Discussion
Page 3
The blocks can be lined up in six ways. For example, a pupil might put the same block first and then find two ways by swapping the other two blocks. Then the pupil changes the colour of the first block and swaps the other two colours again. This can be done a third time and gives the following six arrangements:

blue red yellow	red blue yellow	yellow blue red
blue yellow red	red yellow blue	yellow red blue

The next activity involves taking four blocks in different colours and lining them up in different groups of two. 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

Page 4
The six different arrangements now need to be continued to form a pattern using more blocks in the same repeating order. The pupils are not told how many blocks to get and some may not have enough blocks to make a pattern and may need to get more to complete their pattern. This requires pupils to problem-solve how to make a pattern and what to do if they don't have enough blocks.

Page 5
Pattern-making and numbers are combined in these activities. When lining up their blocks in groups of two and three, some pupils will have blocks left over. This encourages discussion about who can line up their blocks with none left over and who have some left over. The last question involves pupils looking at their blocks to see if they can make a pattern. They should have enough blocks to make some sort of pattern.

Possible difficulties
- Indiscriminately moving blocks around
- Inability to keep track of what they are trying
- Difficulty in repeating a consistent pattern
- Content to find only one or two possibilities

Extension
- Pupils can be encouraged to make and describe more complex patterns of their own.

SAMPLE - NOT FOR SALE

BLOCK TIME

Take 3 blocks, each a different colour.

How many ways can you line them up? _____

Draw a picture of all the ways they can be lined up.

Take 4 blocks, each a different colour.

How many ways can you line them up in groups of two? _____

Draw the different groups of two you made.

How many different groups can you make? _____

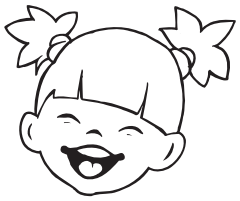
SAMPLE - NOT FOR SALE

BLOCK PATTERNS

Choose some blocks in 3 different colours and make a pattern.

Draw your pattern.

Did you have enough to make a pattern or did you have to get some more blocks?



_____

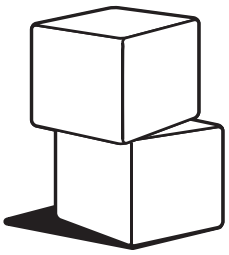
Think about other patterns you can make using the same blocks. Draw the different patterns.

How many different patterns can you make using the blocks?

_____

SAMPLE - NOT FOR SALE

MORE BLOCKS



How many blocks can you hold in one hand?

Guess and then count them. _____

How many blocks can you hold in two hands?

Guess and then count them. _____

Can you line up your blocks in groups of 2? _____

How many groups did you make? _____

Can you line them up in groups of 3? _____

How many groups did you make? _____

Look at your blocks and see if they make a pattern.

Draw your pattern below.

SAMPLE - NOT FOR SALE

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

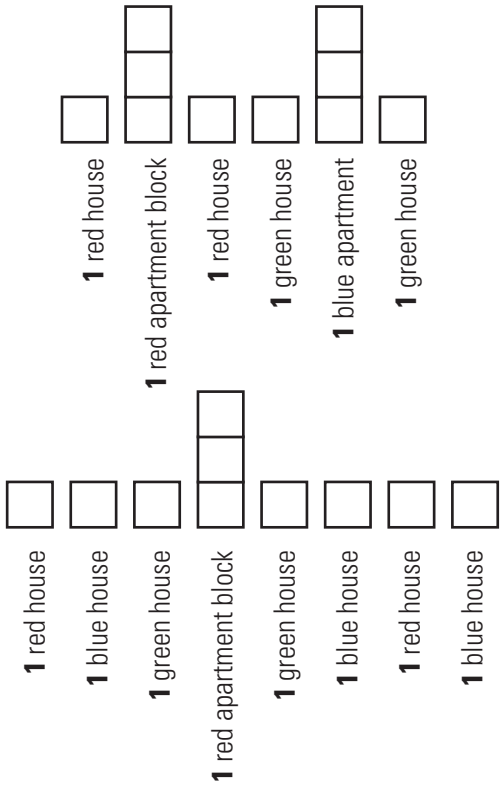
Curriculum links
Senior Infants
Skills
- Select and apply appropriate strategies for completing a task or solving a problem
- Record the results of mathematical activities using pictures

Algebra
- Identify and extend patterns in colour

Materials
Blocks such as Unifix™ cubes, Multilink™ cubes or other counters (For each group, 10 in total: 5 red, 3 blue and 2 green.)

Focus
To analyse problems with a three-dimensional aspect. This extends the previous work with coloured blocks on page 3. There are a number of 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 10 blocks and arrange them on their street according to the street map. For example, the five red people could either be five houses or one apartment block and two houses, while the green people can be only houses. Possible arrangements could include:



Possible difficulties
- Only making houses
- Mixing the colours in the apartments
- Not realising that a different order gives a different solution

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

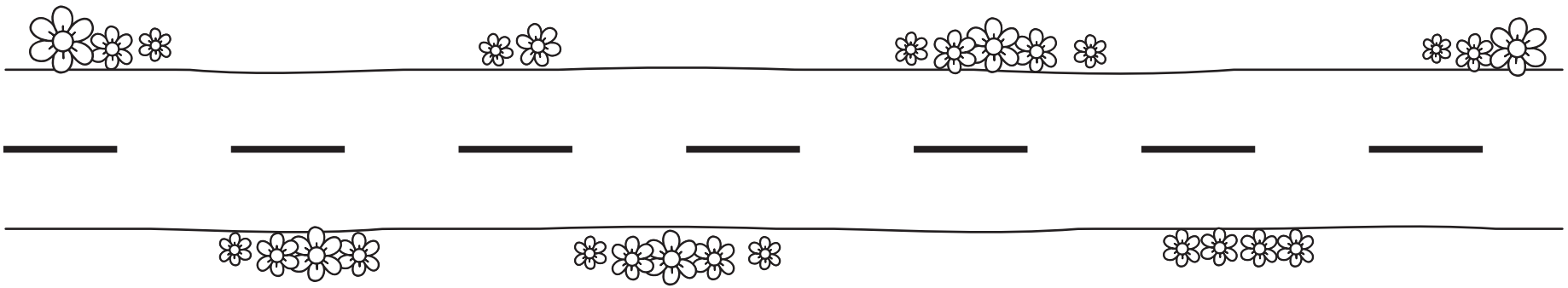
SAMPLE - NOT FOR SALE

BLOCK STREET

Put blocks on the street to show:

house = **1** block apartment = **3** blocks of the same colour

10 people live on Block Street:
5 red people, **3** blue people and **2** green people.
Make your street with houses and apartments to show where the people live.



Use the same blocks to make a different-looking street.

SAMPLE - NOT FOR SALE

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

Curriculum links
Senior Infants
Skills
- Select and apply appropriate strategies for completing a task or solving a problem
- Record the results of mathematical activities using diagrams

Early mathematical activities
- Compare sets without counting

Focus
These pages explore the reading and interpretation of information to solve problems involving numeration. No addition or subtraction is needed. Pupils analyse the problem to locate the required information, decide what information is not needed and then use comparison, rather than addition or subtraction, to obtain solutions.

Discussion
Page 9
These problems state information that has to be analysed in order to answer a series of questions. The first problems involve reading and identifying the information needed. The next problem requires several comparisons among the number of marbles the children have.

The last problem is about the red cars, with the blue cars included only as additional information. Although Ashley counted the largest number of cars, she, in fact, counted more blue cars than red cars, so Rob counted the largest number of red cars.

Page 10
Analysis of the first problem reveals that Kim skipped more times than Josh, because she skipped as many times as he did and then a further six times.

The second problem involves the two types of insects being counted by Dillon. The questions ask the pupils to sort out on what day of the week a certain number of bugs were counted and when a number of beetles were counted and to understand that at no time are the numbers of bugs and beetles combined.

Page 11
The information in the graph is analysed to sort out which of the entries on the graph belong to which animal. Understanding comparison enables pupils to work out which label goes with the largest number (dogs) and smallest number (fish). The statement that the number of cats added to the number of fish is the same as the number of dogs is not needed, but it does show if the columns have been labelled correctly. This leaves only guinea pigs and budgies. There must be seven guinea pigs and six budgies to match the criteria of there being one less budgie than guinea pigs.

Possible difficulties
- An inability to compare numbers
- Combining all numbers present, rather than seeing that some information is not needed
- Using the cue 'more' to find an answer by adding rather than comparing
- Combining the information about bugs and beetles
- Not determining which information to use first when graphing

Extension
- In pairs, have the pupils use the problem structure on page 9 to write problems of their own to give to other pupils to solve.

SAMPLE - NOT FOR SALE

HOW MANY? 1

Mary ate 9 grapes.

Peter ate 5 grapes.

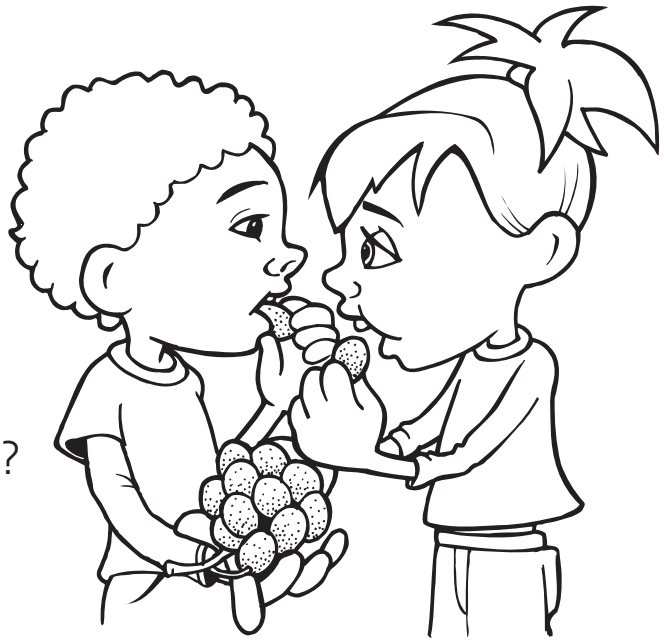
Danny ate 7 grapes.

Who ate the most grapes?

_____

How many grapes did Peter eat?

_____



Wendy has 9 marbles.

Adam has 16 marbles.

Simon has 7 marbles.

Who has the most marbles?

_____

Who has more?
Wendy or Simon?

_____

Lucy counted 7 red cars.

Ashley counted 6 red cars and 10 blue cars.

Rob counted 9 red cars.

Who counted the most red cars? _____

How many red cars did Ashley count? _____

SAMPLE - NOT FOR SALE

HOW MANY? 2

Josh and Kim were skipping.

Josh skipped **9** times.

Kim skipped **6** more times.

Who skipped the most?

_____

How many times did Josh skip?

_____

On Monday, Dillon counted **24** bugs and **4** beetles.

On Tuesday, he counted **16** bugs and **9** beetles.

The next day, he counted **19** bugs and **7** beetles.

On which day did he count the most bugs? _____

How many beetles did he count on Wednesday? _____

On which day did he count the most beetles? _____

SAMPLE - NOT FOR SALE

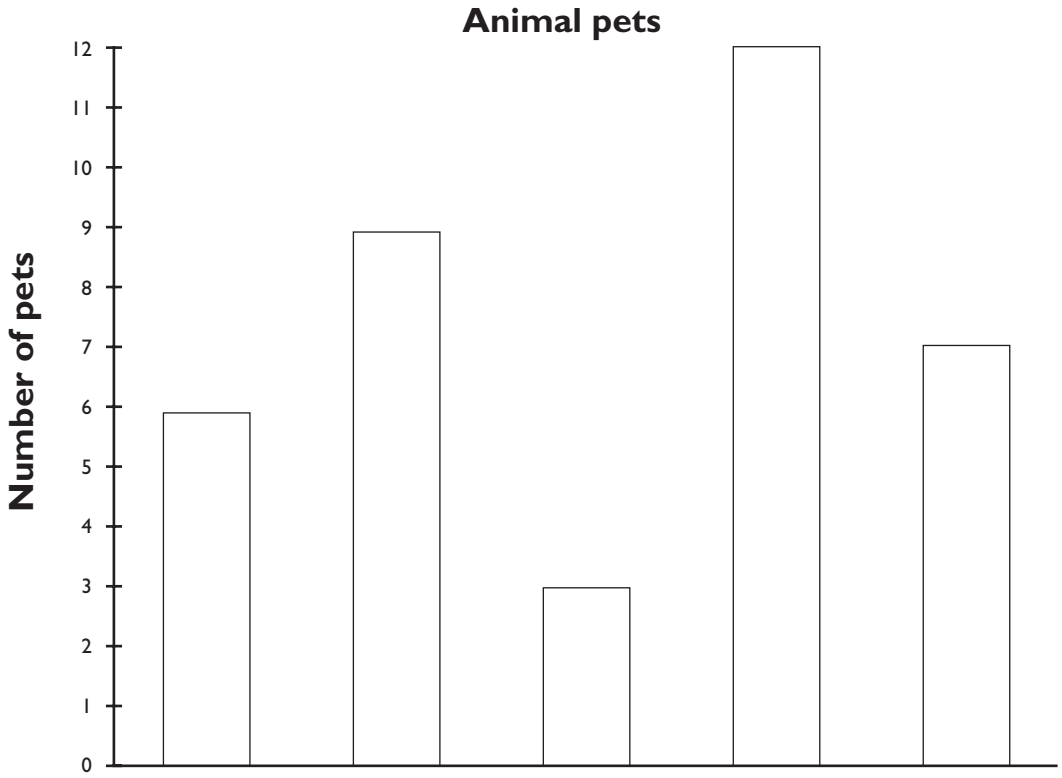
ANIMAL PETS

Sonia's class has collected information about pets.

Class members keep five different kinds of animals as pets. Below is a graph showing how many there are of each pet.

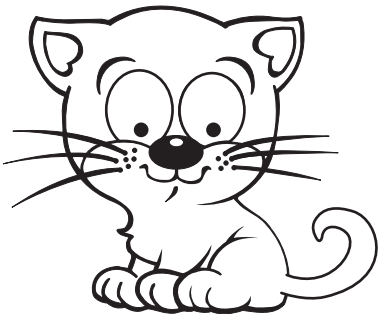
The names of the types of animals have not been put on the graph.

Cut out the animals' names and glue them onto the graph. Use the information below to help you.



Clues:

- *There are 3 fewer cats than dogs.*
- *The smallest number of pets kept are fish.*
- *The number of cats added to the number of fish is the same as the number of dogs.*
- *Most pupils have dogs as pets.*
- *There is one fewer budgie than guinea pigs.*



cats	fish	budgies	guinea pigs	dogs

SAMPLE - NOT FOR SALE