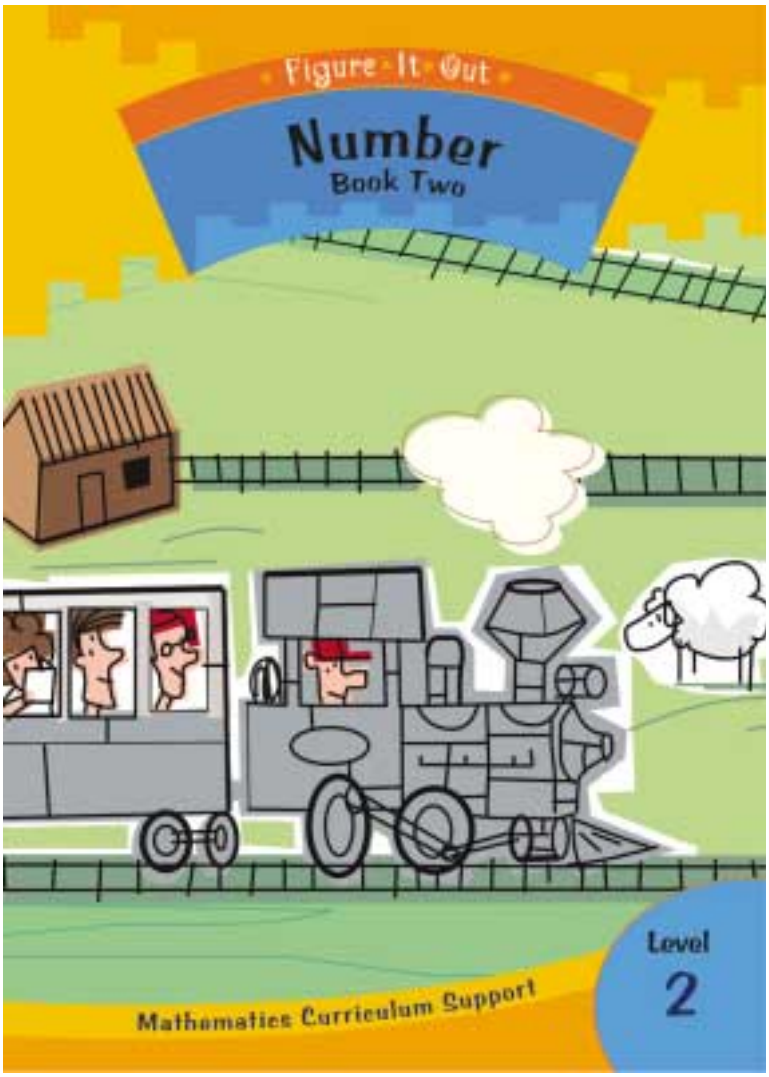
Answers and Teachers' Notes



MINISTRY OF EDUCATION
Te Tāhuhu o te Mātauranga

Contents

Introduction

The books for level 2 in the Figure It Out series are issued by the Ministry of Education to provide support material for use in New Zealand classrooms. The books have been developed to support teachers who have completed the Early Numeracy Project professional development. These books are most suitable for students in year 3. However, teachers should use their judgment as to whether to use the booklets with older or younger children who are also working at level 2.

Student books

The activities in the student books are set in meaningful contexts, including real-life and imaginary scenarios. The books have been written for New Zealand students, and the contexts reflect their ethnic and cultural diversity and the life experiences that are meaningful to students in year 3.

The activities can be used as the focus for teacher-led lessons, for students working in groups, or for independent activities. Also, the activities can be used to fill knowledge gaps (hotspots), to reinforce knowledge that has just been taught, to help students develop mental strategies, or to provide further opportunities for students moving between strategy stages of the Number Framework.

Answers and Teachers' Notes

The Answers section of the *Answers and Teachers' Notes* that accompany each of the student books includes full answers and explanatory notes. Students can use them for self-marking, or you can use them for teacher-directed marking. The teachers' notes for each activity, game, or investigation include relevant achievement objectives, comments on mathematical ideas, processes, and principles, and suggestions on teaching approaches. The *Answers and Teachers' Notes* are also available on Te Kete Ipurangi (TKI) at www.tki.org.nz/r/maths/curriculum/figure/index_e.php

Using Figure It Out in the classroom

Where applicable, each page starts with a list of equipment that the students will need in order to do the activities. Encourage the students to be responsible for collecting the equipment they need and returning it at the end of the session.

Many of the activities suggest different ways of recording the solution to the problem. Encourage your students to write down as much as they can about how they did investigations or found solutions, including drawing diagrams. Discussion and oral presentation of answers is encouraged in many activities, and you may wish to ask the students to do this even where the suggested instruction is to write down the answer.

> The ability to communicate findings and explanations, and the ability to work satisfactorily in team projects, have also been highlighted as important outcomes for education. Mathematics education provides many opportunities for students to develop communication skills and to participate in collaborative problem-solving situations.
>
> *Mathematics in the New Zealand Curriculum*, page 7

Students will have various ways of solving problems or presenting the process they have used and the solution. You should acknowledge successful ways of solving questions or problems, and where more effective or efficient processes can be used, encourage the students to consider other ways of solving a particular problem.

Figure It Out

Number

Answers

Page 1: Rolling Along

Activity One

1. Between 60 and 70
2. Two faster ways are:
   - skip-counting in 2s, 3s, 4s, and so on.
   - dividing the tray into fractions, for example, quarters, counting the number of marbles in that quarter, and then multiplying it by 4.

Activity Two

Practical activity

Page 2: Fan-tastic Numbers

Activity One

1. a. Any of the numbers 61, 62, 63, 64, 65, 67, 68, 69
   b. Any of the numbers 123, 124, 125, 126, 127, 128, 129
   c. Any of the numbers 168, 169, 170, 172, 173, 174, 175, 176
   d. Any of the numbers 76, 78, 79, 80, 81, 82, 83, 84
2. a. 46
   b. 90
   c. 79
   d. 140
3. a. 34
   b. 12
   c. 156
   d. 197
4. a. 6
   b. 8
   c. 10
   d. 12
5. a. 26
   b. 12
   c. 40
   d. 64
6. a. 34
   b. 86
   c. 102
   d. 48

Activity Two

Practical activity

Page 3: All That Glitters

Activity

1. a. 2
   b. 3
   c. 1
   d. 3
   e. 1
   f. 2
2. 390
3. 3 days

Page 4: Hitting 100

Activity

1. a. 26 + □ = 100?
   26 + □ = 30, that's 4
   30 + 70 = 100, so there are 4 + 70 = 74 beads

b. 29 + □ = 100?
29 + □ = 30, that's 1
30 + 70 = 100, so there are 1 + 70 = 71 beads

c. 49 + □ = 100?
49 + □ = 50, that's 1
50 + 50 = 100, so there are 1 + 50 = 51 beads

d. 65 + □ = 100?
65 + □ = 70, that's 5
70 + 30 = 100, so there are 5 + 30 = 35 beads

e. 79 + □ = 100?
79 + □ = 80, that's 1
80 + 20 = 100, so there are 1 + 20 = 21 beads

2. Practical activity

Page 5: Hide-and-seek Numbers

Activity One

a.

4	5	6
14	15	16
24	25	26

b.

24	25	26
34	35	36
44	45	46

c.

7	8	9
17	18	19
27	28	29

d.

76	77	78
86	87	88
96	97	98

e.

53	54	55
63	64	65
73	74	75

f.

5	6	7
15	16	17

(6 is in the top row of the hundreds board.)

g.

81	82	83
91	92	93

(92 is in the bottom row.)

h.

39	40
49	50
59	60

(50 is in the outside column.)

Activity Two

Practical activity

Page 6: It's a Magic Mishmash

Activity

1. Skip-counting in 100s or adding 100 to the previous number

2. **a.** 113, 213, 313

b. 127, 227, 327

c. 145, 245, 345

3. Skip-counting in 2s or adding 2 to the previous number

4. **a.** 214, 216, 218, 220, 222

b. 443, 445, 447, 449, 451

c. 704, 706, 708, 710, 712

d. 599, 601, 603, 605, 607

Page 7: Hunting the Taniwha

Game

A game of addition and subtraction

Pages 8–9: Flexible Fingers

Activity

1. They put the two fives together to make 10 and then add the other fingers.

2. **a.** 14: (5 + 5) + 4

b. 15: (5 + 5) + (3 + 2)

c. 16: (5 + 5) + (2 + 4)

d. 14: (5 + 5) + (3 + 1)

e. 13: (5 + 5) + (1 + 2)

f. 17: (5 + 5) + (4 + 3)

Game

A game using addition

Page 10: Counting Counts

Activity

1. **a.** 16. Examples of methods are:
- (9 + 1) + 6 = 16

- (5 + 5) + (4 + 2) = 16
- (7 + 7) + 2 = 16
- 9 ... 10, 11, 12, 13, 14, 15, 16

b. 12. Examples of methods are:
- (6 + 4) + 2 = 12
- (5 + 5) + (1 + 1) = 12
- 6 + 6 = 12
- 6 ... 7, 8, 9, 10, 11, 12

c. 13. Examples of methods are:
- (8 + 2) + 3 = 13
- (5 + 5) + 3 = 13
- 8 ... 9, 10, 11, 12, 13

d. 15. Examples of methods are:
- (8 + 2) + 5 = 15
- (5 + 5) + (3 + 2) = 15
- (7 + 7) + 1 = 15
- 8 ... 9, 10, 11, 12, 13, 14, 15

e. 13. Examples of methods are:
- (9 + 1) + 3 = 13
- 5 + (4 + 4) = 13
- (4 + 4 + 4) + 1 = 13
- 9 ... 10, 11, 12, 13

2. Answers will vary.

Page 11: On Target

Activity

1. Three ways to make 12 are:
4 + 4 + 2 + 2 = 12
4 + 4 + 4 = 12
3 lots of 4 are 12.
There are other ways to make 12.

2. Five more ways to make 15 are:
5 + 10 = 15
12 + 3 = 15
6 x 2 = 12 ⇨ 12 + 3 = 15
3 x 5 = 15
17 – 2 = 15
There are many other ways to make 15.

3. **a.** Five ways to make 14 are:
5 + 5 + 4 = 14
2 x 5 = 10 ⇨ 10 + 4 = 14
10 + 1 + 1 + 1 + 1 = 14
6 + 6 + 2 = 14
3 + 3 + 3 + 3 + 2 = 14
There are many other ways to make 14.

b. Five ways to make 17 are:
5 + 5 + 5 + 2 = 17
20 – 1 – 1 – 1 = 17
20 – 5 + 2 = 17
5 x 3 = 15 ⇨ 15 + 2 = 17
8 + 8 + 1 = 17
There are many other ways to make 17.

c. Five ways to make 11 are:
5 + 5 + 1 = 11
3 x 3 = 9 ⇨ 9 + 1 + 1 = 11
3 x 4 = 12 ⇨ 12 –1 = 11
6 + 6 – 1 = 11
8 + 2 + 1 = 11
There are many other ways to make 11.

Pages 12–13: Leapfrog

Activity One

1. 2

2. **a.** 3

b. 3

c. 6

d. 4

e. 7

f. 8

Activity Two

1. 20

2. **a.** 30 (3 tens)

b. 50 (5 tens)

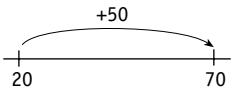
c. 30 (3 tens)

d. 20 (2 tens)

e. 30 (3 tens)

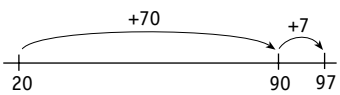
Activity Three

1. **a.**



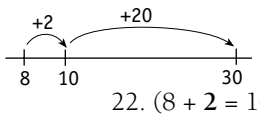
50. (20 + **50** = 70)

b.



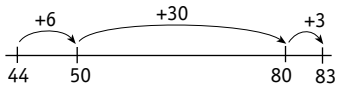
77. (20 + **70** = 90, and 90 + **7** = 97, so 20 + **77** = 97)

c.



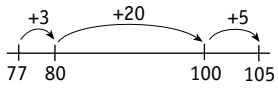
22. (8 + **2** = 10, and 10 + **20** = 30, and 8 + **22** = 30)

d.



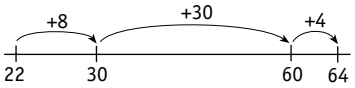
39. (44 + **6** = 50, and 50 + **30** = 80, and 80 + **3** = 83, so 44 + **39** = 83)

e.



28. (77 + **3** = 80, and 80 + **20** = 100, and 100 + **5** = 105, so 77 + **28** = 105)

f.



42. (22 + **8** = 30, and 30 + **30** = 60, and 60 + **4** = 64, so 22 + **42** = 64)

2. Practical activity

Page 14: On and off the Train

Activity

1. 18

2. 26

3. 9

4. 9

Page 15: It's Not Fair!

Activity

1. 1

2. **a.** 14 + 12 = 13 + 13

b. 19 + 21 = 20 + 20

c. 10 + 4 = 7 + 7

d. 28 + 18 = 23 + 23

3. **a.** 19 + 13 = 16 + 16

b. 7 + 13 = 10 + 10

c. 20 + 14 = 17 + 17

Pages 16–17: To Market, to Market

Activity One

1. 48. Methods will vary. Teacher to check

2. 36. Methods will vary. Teacher to check

3. 5. Methods will vary. Teacher to check

4. 8. Methods will vary. Teacher to check

Activity Two

a. 1 row of 15 ***************

3 rows of 5
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5 rows of 3
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15 rows of 1
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b. 1 row of 12 ************

2 rows of 6
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3 rows of 4
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4 rows of 3
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6 rows of 2
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12 rows of 1

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c. 1 row of 36

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2 rows of 18

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3 rows of 12

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4 rows of 9

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6 rows of 6

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9 rows of 4

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12 rows of 3

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18 rows of 2

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36 rows of 1

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d. 1 row of 27

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3 rows of 9

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9 rows of 3

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27 rows of 1

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e. 1 row of 32

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2 rows of 16

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4 rows of 8

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8 rows of 4

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16 rows of 2

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32 rows of 1

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Page 18: Double Trouble

Activity

1. **a.** 14. (2 x 5) + (2 x 2)

b. 28. 14 x 2 (double the answer for 2 lots of 7) or (4 x 5) + (4 x 2)

c. 56. 28 x 2 (double the answer for 4 lots of 7) or (8 x 5) + (8 x 2)

2. **a.** 2 x 10 = 20
4 x 10 = 40 or 2 x 20 = 40
8 x 10 = 80 or 2 x 40 = 80

b. 2 x 9 = 18
4 x 9 = 36 or 2 x 18 = 36
8 x 9 = 72 or 2 x 36 = 72

c. 2 x 8 = 16
4 x 8 = 32 or 2 x 16 = 32
8 x 8 = 64 or 2 x 32 = 64

Page 19: The Dinosaur Dig

Activity One

1. **a.** 25

b. 16

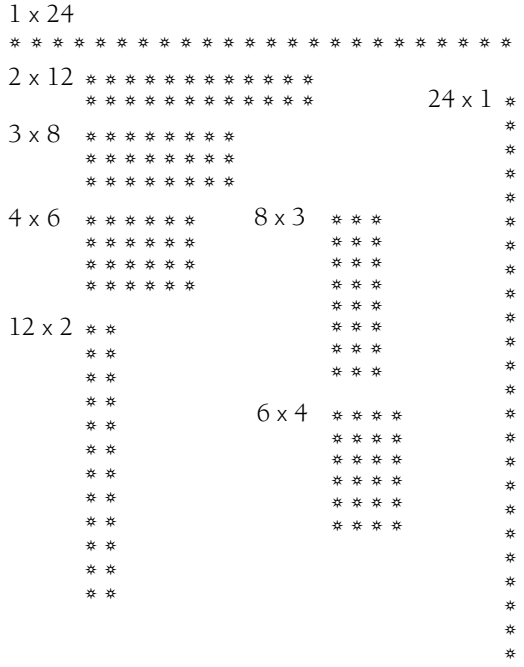
2. 6

3. 3

4. 6 rows with 6 in each row

Activity Two

1. 1 x 24



2. 1 x 36
2 x 18
3 x 12
4 x 9
6 x 6
9 x 4
12 x 3
18 x 2
36 x 1

Page 20: Tummyache

Activity

1. **a.** 24

b. Bruno: $^{12}/_{24}$ or $^{1}/_{2}$
Greg: $^{6}/_{24}$ or $^{1}/_{4}$
Jan: $^{6}/_{24}$ or $^{1}/_{4}$
Kate: 0

c. No, because they don't all get the same number of lollies.

2. **a.** 6

b. $^{6}/_{24}$ or $^{1}/_{4}$

3. The 24 and the 28 packets because they can be divided evenly by 4

Page 21: Hot Stuff!

Activity One

1. One whole pizza and three pieces

2. Paolo knows that 6 sixths make a whole pizza. There is one piece left over, which is 1 sixth, so he has sold $1^{1}/_{6}$ pizzas.

Activity Two

1. **a.** 2

b. $^{7}/_{8}$

c. $1^{3}/_{8}$

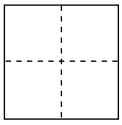
d. $1^{1}/_{8}$

2. 7 whole cakes

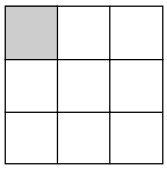
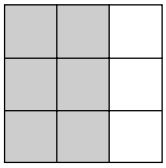
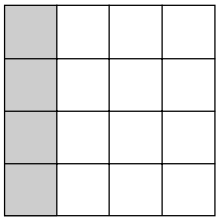
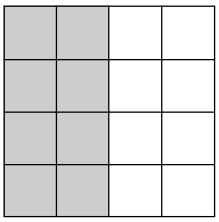
3. 8 pieces

Pages 22-23: Fun Folding

Activity One

1. Practical activity
2. a. 
   b. Practical activity
3. a. 2
   b. 4
   c. 8
4. a. 8
   b. Practical activity
5. a. 4
   b. 6
   c. 12
6. a. 16
   b. Practical activity
7. a. 8
   b. 4
   c. 2

Activity Two

1. a. $^{4}/_{6}$, $^{2}/_{3}$
   b. $^{3}/_{9}$, $^{1}/_{3}$
   c. $^{12}/_{16}$, $^{6}/_{8}$, $^{3}/_{4}$
2. a. 
   b. 
   c. 
   d. 

Page 24: Finding Fractions

Game

A game of identifying equivalent fractions

Figure It Out

Number

Teachers' Notes

Overview of Number: Book Two

Title	Content	Page in students' book	Page in teachers' book
Rolling Along	Estimating	1	14
Fan-tastic Numbers	Working with number sequences and number operations	2	14
All That Glitters	Rounding and adding numbers	3	15
Hitting 100	Exploring compatible numbers to 100	4	17
Hide-and-seek Numbers	Sequencing using a hundreds board	5	18
It's a Magic Mishmash	Skip-counting	6	18
Hunting the Taniwha	Adding and subtracting multiples of 10	7	19
Flexible Fingers	Adding using five-based strategies for addition	8–9	19
Counting Counts	Adding numbers using various strategies	10	20
On Target	Renaming numbers	11	21
Leapfrog	Making jumps in ones and tens	12–13	21
On and off the Train	Adding and subtracting	14	22
It's Not Fair!	Rewriting number sentences	15	23
To Market, to Market	Multiplying using arrays	16–17	24
Double Trouble	Using doubling as a multiplication strategy	18	25
The Dinosaur Dig	Dividing using arrays	19	25
Tummyache	Finding fractions of sets	20	26
Hot Stuff!	Working with fractions	21	27
Fun Folding	Exploring equivalent fractions	22–23	27
Finding Fractions	Representing fractions	24	28

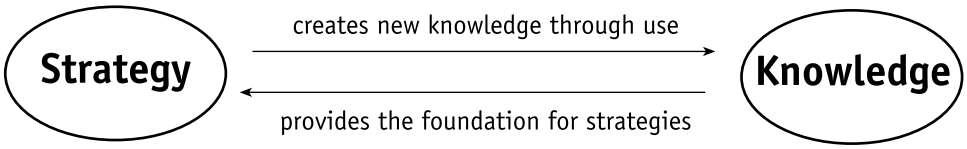
Introduction to Number

There is a remarkable commonality in the way many countries around the world are now teaching arithmetic. Changes in the approaches reflect the evolving demands of everyday life, a greater volume of classroom-based research about how students learn, and a desire to improve general levels of numeracy.

In the past, arithmetic teaching has focused on preparing students to be reliable human calculators. The prevalence of machines in society that calculate everything from supermarket bills to bank balances has meant that students now require a wider range of skills so that they can solve problems flexibly and creatively.

The Figure It Out series aims to reflect these trends in modern mathematics education. A range of books is provided at different levels to develop both number skills and number sense. The *Number* books are aimed at developing students' understanding of the number system and their ability to apply efficient methods of calculation.

The development of the Figure It Out series has occurred against the backdrop of a strong drive for improved standards of numeracy among primary-aged students. A key element of this drive has been the creation of the Number Framework as part of the Numeracy Strategy. The framework highlights this significant connection between students' ability to apply mental strategies to solving number problems and the knowledge they acquire.



Learning activities in the series are aimed at both the development of efficient and effective mental strategies and increasing the students' knowledge base.

Links to the Number Framework
There are strong links in the level 2 *Number* books to the stages of development in the Number Framework. The knowledge- and strategy-based activities in these books are all at the advanced counting to early additive part-whole stages of the Number Framework.

Information about the Number Framework and the Numeracy Project is available on the NZMaths website (www.nzmaths.co.nz/Numeracy/Index.htm). Teachers may wish to visit this website and refer to *The Number Framework* for details of these stages. The material masters mentioned in these notes can also be downloaded from this website. A planning guide will be available on the NZMaths website in 2003. The guide will make links to this booklet.

Terms
Teachers who are not familiar with the Numeracy Project may find the following explanations of terms useful.

The Number Framework – This is a framework showing the way students acquire concepts about number. It comprises eight stages of strategy and knowledge development.

Knowledge – These are the key items of knowledge that students need to learn. Knowledge is divided into five categories: number identification, number sequence and order, grouping and place value, basic facts, and written recording.

Strategies – Strategies are the mental processes that students use to estimate answers and solve operational problems with numbers. The strategies are identified in the eight stages of the Number Framework.

Counting strategies – Students using counting strategies will solve problems by counting. They may count in ones, or they may skip-count in other units such as fives or tens. They may count

forwards or backwards.

Part-whole thinking or part-whole strategies – Part-whole thinking is thinking of numbers as abstract units that can be treated as wholes or can be partitioned and recombined. Part-whole strategies are mental strategies that use this thinking.

Partitioning – Partitioning is dividing a number into parts to make calculation easier. For example, 43 can be partitioned into 40 and 3, or 19 could be partitioned into 10 and 9 or thought of as 20 minus 1.

The advanced counting stage – Students who are at this stage understand that the end number in a counting sequence measures the whole set. They can relate the addition or subtraction of objects to the forward and backward number sequences by ones, tens, and so on. For example, instead of counting all objects to solve 6 + 5, the student recognises that "6" represents all six objects and counts on from there: "7 , 8 , 9, 10, 11." Students at this stage are also able to skip-count, for example, "10, 20, 30, 40, 50," to get $50 in $10 notes. This is the beginning of grouping to solve multiplication and division problems.

The early additive part-whole stage – At this stage, students have begun to recognise that numbers are abstract units that can be treated simultaneously as wholes or can be partitioned and recombined. This is called part-whole thinking.

A characteristic of this stage is the derivation of results from related known facts, such as finding addition answers by using doubles or "teen" numbers. For example, students at this stage might solve 7 + 8 by recalling that 7 + 7 = 14, so 7 + 8 = 15. They might solve 9 + 6 by knowing that 10 + 6 = 16, so 9 + 6 = 15. They might solve 43 + 35 as (40 + 30) + (3 + 5), which is 70 + 8 = 78.

Links to Beginning School Mathematics (BSM)
Many of the activities in the level 2 *Number* books can be supported by BSM activities that deal with similar concepts. BSM activities that link to the pages of the students' books have been identified in the teachers' notes for those pages.

Further BSM activities that link to the advanced counting and early additive part-whole stages of the Number Framework have been outlined in *Enriching the Number Framework with Beginning School Mathematics*, which is available from your Numeracy Project facilitator or can be downloaded from the NZMaths website (www.nzmaths.co.nz/Numeracy/project_material.htm).

Page 1: Rolling Along

Achievement Objectives

- make sensible estimates and check the reasonableness of answers (Number, level 2)
- mentally perform calculations involving addition and subtraction (Number, level 2)

The activities on this page are designed to get students to identify small groups of objects within a whole collection and to use these groups to count more efficiently. The students will be developing and using their ability to skip-count and/or partition to help them estimate accurately.

Most people can see objects in groups of one, two, three, or four. The ability to see larger groups, such as five, six, or seven, is rare, but those people who can see groups of this size are able to count objects much more quickly than most people. Recent Australian research (Sue Willis, "Strengthening Numeracy: Reducing Risk", ACER Research Conference 2000) has suggested that children from indigenous cultures may be able to see groups of larger sizes.

Activity One

If you don't have marbles, the students could use beans or multilink cubes. Encourage the students to discuss and share their ideas about ways to count the marbles. Once they have suggested counting in twos, threes, or fours, you may need to reinforce skip-counting patterns using a hundreds board.

You could circle the marbles in groups of 2 or 3 or 4 on some enlarged photocopies of Hēmi's marbles. You could also mark off the marbles into quarters to show how you could count a smaller section and multiply by 4.

Activity Two

The students may like to use a table to record their estimates, for example:

Name	Estimate	How worked out	Actual number
Erin	10	Counted in 2s	9

If the students continue to make unrealistic guesses, you could set up some trays containing 10, 50, or 100 marbles to serve as a guide.

As an extension, you could make connections to measurement. For example, you could ask: "If one cup contained 20 marbles, how many cups would be in a bottle that contained 120 marbles?"

Page 2: Fan-tastic Numbers

Achievement Objectives

- read any 3-digit whole number (Number, level 2)
- order any set of three or more whole numbers (up to 99) (Number, level 2)
- write and solve story problems which involve halves, quarters, thirds, and fifths (Number, level 2)

The activities on this page use students' knowledge of number sequence and order. It is a good idea to model the way you want the students to make and show their numbers. Ensure that they have the fans facing towards themselves when they make the number and that they then turn the fan to face their partner. This ensures that the digits are in the correct order; 24 can easily be made as 42 if the student is not correctly oriented to the fan.

Number fans are a useful warm-up tool to use at the beginning of your maths lesson. Your students can all be engaged in the activity, and you can quickly assess the students' number knowledge by checking the answers on their fans. Fans can be downloaded from the NZMaths website (www.nzmaths.co.nz/numeracy/project_material.htm, material master 4-10).

A variety of number fans is also available commercially, so it is important to check the exact range of digits printed on them.

Activity One

If the students are having difficulty with this activity, you could use a hundreds board or a thousands book (available on www.nzmaths.co.nz/numeracy/project_material.htm, material masters 4-4 and 4-7 respectively) to find the given number and, from there, follow the instruction, for example, 10 more. This will help to make the links for the students as they work with larger, less familiar numbers. Counting together as a class in 10s and 100s from numbers such as 34 or 289 will also help the students with this activity.

Activity Two

Initially, the students could follow the format of **Activity One** to design their questions. Ensure that their range of numbers extends to 999 and includes 10 more, 10 less, 100 more, and 100 less.

As an extension, the students could use number fans to show their answers to strategy questions as well as knowledge questions. They could do this by exploring how to find other fractions of numbers. For example, you could tell the students to make the number that is $\frac{1}{4}$ of 8 , $\frac{1}{3}$ of 24, and so on.

They could write word problems in a context relating to themselves, their interests, or the class theme or topic. For example: Room 12 had 36 students. Half the students own a dog. How many students in Room 12 own a dog?

BSM activities relevant to this page are:
11-1-4 Peg them in
11-1-45 It's a goal
11-1-46 Here's a clue

Page 3: All That Glitters

Achievement Objectives

- make sensible estimates and check the reasonableness of answers (Number, level 2)
- recall the basic addition and subtraction facts (Number, level 2)
- mentally perform calculations involving addition and subtraction (Number, level 2)
- write and solve story problems which involve whole numbers, using addition, subtraction, multiplication, or division (Number, level 2)

Activity

In this activity, students use their knowledge of the basic facts that add up to 10 to make rounded or tidy numbers to work with. They then use their knowledge of place value and addition strategies.

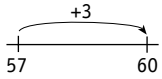
The students need to have the opportunity to explore the situations in these activities on their own and to discuss the answers. You could then discuss and model with them a variety of strategies they could use to solve the problems in the activities.

You could use a variety of modelling materials to make this activity practical. For example:

- $1 coins in toy money (if you have enough);
- sets of place value equipment, such as loose nursery sticks, bundles of 10 nursery sticks, and bags of 10 bundles;
- loose beans (commercially made or from the supermarket), film canisters or small plastic bags of 10 beans, and a box for 10 canisters/bags to show 100 beans;
- Unifix blocks, loose, in sticks of 10, and in boxes of 100.

The students could model 18 pieces of gold and add to the model to get to the nearest tidy number. They could record their answers as 18 + 2 = 20 and make links to their basic facts, for example, 8 + 2 = 10, so 18 + 2 = 20 and 28 + 2 = 30.

More able students may be able to use an empty number line to make their rounded or tidy numbers.



The students could also use a hundreds board (www.nzmaths.co.nz/numeracy/project_material.htm, material master 4-4) to make their rounded or tidy numbers and to help them add.

In question **2**, the students will have the amounts 20, 70, 50, 60, 90, and 100. It is very important that they have place value equipment (as in question **1**) available to help them to solve this problem.

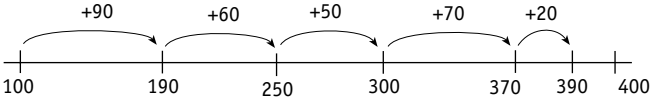
There is already one bag of 100 pieces, so you could ask the students to join the remaining bags to the 100-piece bag. Starting with the largest number is a useful strategy for those students whose addition strategy is to count on: 100 + 90 would be 100, 110, 120, 130, 140, 150, 160, 170, 180, 190. As the students count, they should physically move the place value sets of 10 so that they don't lose track. As they make each new set of 100, they should start another set of 100 so that they can see their total at a glance.

The students could use a thousands book (www.nzmaths.co.nz/numeracy/project_material.htm, material master 4-7) to help them to recognise the number sequence beyond 100.

Students with more advanced addition strategies may be able to add together pairs of numbers:
100 + 90 = 190, 60 + 50 = 110, 70 + 20 = 90
so 110 + 90 = 200 and 200 + 190 = 390

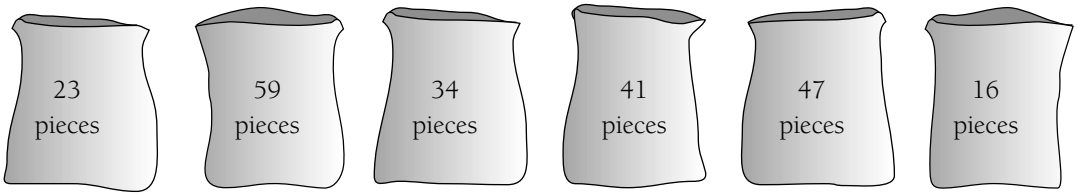
Encourage the students to discuss which pairs of numbers they added and why. For example, "I chose 50 + 60 = 110 because I know 50 + 50 = 100, so it's just 10 more."

The students may also be able to use a 400-number line, marked in decades, to solve the addition problem.



Question **3** involves grouping the bags so that they do not exceed 150. The students should investigate this on their own and then share their results. If they come up with two bags each day for 3 days, for example, 100 + 50, 90 + 60, and 20 + 70, you could ask if they can find a way to bank three bags on 1 day. Does this reduce the number of days needed to bank the gold?

As an extension, you could ask the students this question:
"The next time Supple-Jack is ashore, he has these bags to bank:



He has no more gold pieces, but he wants to bank all the gold. What can he do?"

This will encourage the students to find compatible numbers that add up to 100. To answer the question, they need to be secure in their knowledge of basic facts and have the ability to add by using part-whole strategies. For example, 23 + 47 = 70 because 20 + 40 = 60 and 3 + 7 = 10, so 60 + 10 = 70.

BSM activities relevant to this page are:
12-1-6 Programmes for the show
12-1-46 Up or down?

Page 4: Hitting 100

Achievement Objectives

- recall the basic addition and subtraction facts (Number, level 2)
- mentally perform calculations involving addition and subtraction (Number, level 2)

Activity

This activity is designed to develop the students' ability to visualise 100 represented on a bead frame and to know what numbers can be joined to make 100 (that is, compatible numbers).

Make sure that they understand the structure of the bead frame. Let them discover that there are 100 beads in 10 rows of 10 and that each row is split into two sets of 5. There are 25 beads of each colour, so each quadrant of the frame has 25 in it. Spend some time counting with the frame while all the beads are visible. Firstly reinforce groupings such as 20 + 80, 40 + 60, then move on to groupings such as 35 + 65, 25 + 75, and finally move to groupings such as 23 + 77 and 38 + 62. Encourage the students to verbalise the different strategies they are using to work out how many more they need to make 100.

Students who use counting on and skip-counting as their strategy for adding will solve these problems by counting on in ones to make the next decade and then skip-counting in tens to reach 100. For example, for question **1**:
"26 ... 27, 28, 29, 30 (that's 4)
30 ... 40, 50, 60, 70, 80, 90, 100 (that's 70)
so 70 + 4 = 74
26 + 74 = 100"

Students who can use part-whole strategies will solve these problems by partitioning the tens and ones to form 100. They are also more likely to use their knowledge of basic facts and apply it to larger numbers. For example, they would approach question **1a** in this way:
"Start with 26: 6 + 4 = 10, so 26 + 4 = 30
3 + 7 = 10, so 30 + 70 = 100
so 70 + 4 = 74
26 + 74 = 100"

For question **2**, the students need to know the answers themselves before they ask their classmates. It's a good idea to have them design the question and record their answer and strategy for solving it before they pose the problem to their classmates. The classmates can then solve the problem and record their answer and strategy, and then each pair can compare their answers and strategies together.

BSM activities relevant to this page are:
12-1-1 Looking at a hundred
12-1-2 Looking at patterns to one hundred
12-1-41 Patterns of one hundred
12-1-82 Make it a hundred

Page 5: Hide-and-seek Numbers

Achievement Objective

- order any set of three or more whole numbers (up to 99) (Number, level 2)

In these knowledge-based activities, students are encouraged to think about how numbers on a hundreds board relate to each other. Spend some time exploring the hundreds board with all the numbers visible before you mask the numbers. Let the students discover the number patterns as numbers go up a row (– 10) and down a row (+ 10) and horizontally to the left (– 1) and to the right (+ 1). Encourage the students to skip-count in tens for numbers other than 10, for example, 12, 16, or 13, both forwards and backwards.

Explore the charts in your thousands book (www.nzmaths.co.nz/numeracy/project_material.htm, material master 4-7) as an extension and let the students discover that the patterns are the same as for hundreds.

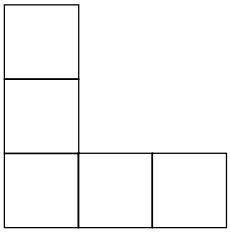
Activity One

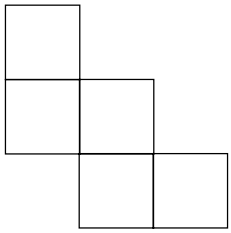
The students will probably be able to name the number to the right (+1) most easily, so start with that one, followed by the number to the left (–1), then down (+10), and finally up (–10).

Activity Two

This activity can also be done on smaller individual hundreds charts and extended to any chart in the thousands book so that the students are working with numbers up to 1 000.

As an extension, give the students other cardboard shapes to cover the hundreds board, for example:





Page 6: It's a Magic Mishmash

Achievement Objectives

- read any 3-digit whole number (Number, level 2)
- order any set of three or more whole numbers (up to 99) (Number, level 2)

Activity

This knowledge-based activity is designed to help students to recognise the skip-counting patterns in a range of numbers and apply the rule to their own set of numbers.

Prior knowledge and experience with skip-counting is necessary. For number sequences beyond 100, use a thousands book (www.nzmaths.co.nz/numeracy/project_material.htm, material master 4-7) to show the effect of skip-counting in increments of 100.

As an extension, ask the students to make up their own magic number machine and write the rules for what will happen in each tube as the numbers pass through. See whether their classmate can guess what the rules are. Encourage the students to record their thinking and the number sequence to help them identify a pattern.

As another extension, you could give the students this problem:
"Irwin and Xanthe found some other magic number machines. They put 248 into each machine. Here are the first three numbers that came out of each machine:
Machine 1: 298 348 398 (skip-counting in 50s)
Machine 2: 238 228 218 (subtracting 10 each time)
Machine 3: 448 648 848 (skip-counting in 200s)

What is each machine doing to the number?"

BSM activities relevant to this page are:
10-1-4 Turn them over and pattern them
10-1-43 Jump for your heart 10-1-44 In a circle

Page 7: Hunting the Taniwha

Achievement Objectives

- mentally perform calculations involving addition and subtraction (Number, level 2)
- recall the basic addition and subtraction facts (Number, level 2)

Game

This game is designed to have students add in multiples of 10 and apply their knowledge of basic facts to do this. For example, 5 + 2 = 7, so 50 + 20 = 70.

The most important teaching point is to ensure that the students perform the addition **before** they move their counter. If they are on 120 and roll a 50, they must do the calculation first rather than simply moving their counter along and counting 10, 20, 30, 40, 50 to get to 170.

One way of encouraging the students to use addition is to ask them to record each move in a table.

Starting number	Number rolled	Where I landed
0	40	40
40	20	60
60	50	110

Other ideas to consider:
- You could use an ordinary dice and make 6 the "lost paddle", 1 = 10, 2 = 20, and so on.
- The students don't have to reach exactly 200 to win.

Pages 8–9: Flexible Fingers

Achievement Objectives

- recall the basic addition and subtraction facts (Number, level 2)
- mentally perform calculations involving addition and subtraction (Number, level 2)

Activity

This activity is designed to give students a visual and kinaesthetic model of numbers up to 10 that can be partitioned into 5 and a remainder. For example, 8 is 5 and 3. When the students make numbers on their hands in pairs and face each other, they can put together their two fives to make 10 and then add the remaining parts of their two numbers. Make sure that they are sitting knee to knee and making the five part of their numbers so that their two fives are directly opposite. This makes it easier to join the two fives to make 10: they simply touch hands.

The quinary tens frames (www.nzmaths.co.nz/numeracy/project_material.htm, material master 4-6) can be used to help make the connection, with the fives down one side. This also makes it easy for the students to see the two fives that make the 10.

You may like to work through Helping Hands on page 3 of *Number: Book One*, Figure It Out, level 2, with the students before doing this page.

Spend time modelling examples with the students and recording each stage of the addition so that they make the link between the practical activity and the written recording.

9 + 6: 9 = 5 + 4 and 6 = 5 + 1
: (5 + 5) + (4 + 1)
: 10 + 5
: 15

Game

Ensure that you play this game with the students to really reinforce the five-based strategy. It would be easy for the students to revert to counting on as the strategy to add the two numbers. One way of encouraging them to use the five-based strategy is to get them to record their addition in a table, showing the partitioning.

Numbers rolled	Five and ? split	Answer
6 + 9	(5 + 1) + (5 + 4)	10 + 5 = 15
7 + 8	(5 + 2) + (5 + 3)	10 + 5 = 15

Page 10: Counting Counts

Achievement Objectives

- mentally perform calculations involving addition and subtraction (Number, level 2)
- recall the basic addition and subtraction facts (Number, level 2)

Activity

This activity is designed to move students on from counting strategies to part-whole strategies. Of the four possible strategies shown on the page, three are part-whole and one is counting. The important prior knowledge that students need to use a part-whole strategy is:

- doubles up to 20, for example, 6 + 6 = 12
- addition facts that make 10, for example, 9 + 1 = 10
- addition facts that are 10 and more, for example, 10 + 6 = 16.

Representing the numbers on tens frames is critical for the students to be able to develop their own mental images of how the numbers are being partitioned and regrouped.

If your students are having difficulty with the concept of regrouping, get them to physically move counters around on tens frames. For example, for 8 + 6, have eight blue counters on one tens frame and six red counters on another tens frame. Ask the students to make a ten by moving two red counters from the 6 to the 8. This clearly shows the regrouping and confirms that no counters have been added or removed; they have simply been regrouped. Now 10 are on one frame and 4 are on the other, and the students will know the answer to this as a basic fact (10 + 4 = 14). It's very important that the students see the benefit in the regrouping and can see this strategy as a faster, easier, and more efficient way to add numbers together.

In this activity, the students initially need to be able to choose their own recording methods for question **1**. For example, some students will represent their strategies graphically, possibly by drawing the tens frames and circling parts or by using arrows. Then through discussion, sharing, and teacher modelling, they can gradually refine their recording to a simple numerical representation.

The students' discussion in question **2** about which strategy they chose and why they found it easy is important for when they deal with larger numbers later on. For example, 6 + 6 encourages using doubles facts rather than making a 10: (6 + 4) + 2. Later on, problems such as 25 + 26 would most easily be solved by using doubles: (25 + 25) + 1 rather than making a 10: (25 + 5) + 21. Ultimately, the students should have a range of strategies they can choose from to solve problems in the most efficient way possible.

As an extension, you could pose problems such as 28 + 6 or 47 + 7 to see if the students can transfer the strategy beyond 20.

Page 11: On Target

Achievement Objective

- mentally perform calculations involving addition and subtraction (Number, level 2)
- demonstrate the ability to use the multiplication facts (Number, level 2)

Activity

This activity is designed to encourage students to find more than one way to solve problems. It focuses on the students sharing and verbalising their strategies, which helps them to clarify their findings and discover more patterns in numbers. The activity also makes splitting or partitioning numbers a natural action and cements the idea that the same number can be split up in different ways.

Some students who find this activity difficult may need to build up patterns of numbers, for example, 12 can be 12 + 0, 11 + 1, 10 + 2, 9 + 3, and so on. You may also need to point out to the students that they can use subtraction to make the target number. For example, to make 17 for question **3b**, the students could start at 20 (a bit above the target number) and put down one finger at a time until they reach 17.

You could extend this activity by using it as an introduction to multiplication because the way to multiplication is through skip-counting and repeated addition. Ask the students to skip-count in twos, threes, and so on to see if they will land on their target number. Then you could ask the students to see whether they can add the same number repeatedly to reach their target, for example: "Can you use twos to reach 12? Can you use threes or fours or fives or sixes?"

BSM activities relevant to this page are:
11-1-47 The last of the special squares
11-1-48 Four names for twenty
11-1-82 How many for twenty?

Pages 12–13: Leapfrog

Achievement Objectives

- recall the basic addition and subtraction facts (Number, level 2)
- mentally perform calculations involving addition and subtraction (Number, level 2)
- demonstrate the ability to use the multiplication facts (Number, level 2)
- write and solve story problems which involve whole numbers, using addition, subtraction, multiplication, or division (Number, level 2)

These activities are designed to move students on from making simple, single-digit jumps to jumps in tens and multiples of 10 and then to any two-digit jump. Modelling these on a large number line is very important. (There is a large number line at www.nzmaths.co.nz/numeracy/project_material.htm, material master 4-8.)

Activity One

The important point in this warm-up activity is to ensure that the students are moving the peg along the line as they count the jumps. Some students start by "jumping" on the starting number, and their answer is always out by one because of the extra jump. For example, for 2 to 6, they jump on 2, 3, 4, 5, and 6 and the answer is 5 jumps, not 4. Encourage your students to use their knowledge of basic facts to predict the number of jumps and then to check it by jumping.

Activity Two

Making the link between the linear representation of a number line and the hundreds board is important. Some students have difficulty moving between the two representations and orienting themselves to each one. Have one student moving up two tens on the hundreds board and another moving up two tens on the number line at the same time. Ask these two students to compare how they've moved. You may need to use place value sets to model that two tens is 20.

Activity Three

In this activity, the students are combining jumps in multiples of 10 with single-digit jumps. When Farlap the Frog starts at 8, the first jump is a jump of 2 to get Farlap to a "tidy" or rounded number. Then there are larger jumps in multiples of 10 and sometimes a single-digit jump to finish.

Discuss why Farlap has started with a jump of two spaces from 8 to 10. Encourage your students to use the tidy numbers to make it easier to find out how far Farlap has jumped.

On the large class number line, ask the students how they would jump from 36 to 73 and mark each stop along the way with a peg. Discuss their reasoning. Modelling the recording of each jump is important so that the students can keep track of the jumps they are adding. (See the diagrams and recording of jumps in the Answers section.)

When the students make their own number lines, it may be a good idea to start with all the numbers on the line that they are using before introducing empty number lines.

BSM activities relevant to this page are:
10-1-4 Turn them over and pattern them
10-1-43 Jump for your heart
10-1-44 In a circle

Page 14: On and off the Train

Achievement Objectives

- recall the basic addition and subtraction facts (Number, level 2)
- mentally perform calculations involving addition and subtraction (Number, level 2)
- write and solve story problems which involve whole numbers, using addition, subtraction, multiplication, or division (Number, level 2)

Activity

This activity is designed to have students add and subtract by making up to 10 and working back through 10.

As an alternative to using empty tens frames and counters for the people, you could use egg cartons chopped down to 10 sections and plastic teddy bears for people.

Using the equipment to model the people getting on and off the train helps the students to see the tens frames filling and emptying. In question **1**, the students have to work out 24 – 6. Ask them to look at the train and tell you how many are in the last carriage (four). Ask them how many more they need to take off so that six people have left the train. If they take off two more, how many will that leave in the second carriage? They can repeat this process for questions **2** to **4**.

Encouraging the students to imagine what will happen helps them to develop images of the tens frames. When you think they are ready, try similar problems where you model with the equipment and then mask one or all of the carriages. Can the students visualise going back through 10 and making up to 10?

As an extension, you could ask the students this question:
"Another train started with 28 people on board. The same number of people got on or off at Palmerston North, Ōtaki, and Paraparaumu stations as in the students' booklet. After Paekakariki station, there were 18 people onboard. Use tens frames to work out how many people will be on the train at each station." Ask the students to solve this problem and discuss their solutions.

Page 15: It's Not Fair!

Achievement Objectives

- write and solve comparison problems (Number, level 2)
- mentally perform calculations involving addition and subtraction (Number, level 2)

Activity

This activity is designed to have students regroup two numbers as equal amounts. Initially they can do this by making collections and balancing them by progressively moving counters from the larger number to the smaller number.

Use equipment to model question **1** and role-play what the students think they could do to make it fair. When the number of shells is balanced, ask the students which total is bigger or whether they are the same: 7 + 9 or 8 + 8? It's important that the students see that the total has remained the same.

Modelling using a balance is another effective way to show that the two quantities are equal. Once you have modelled with a real balance scale, you could draw balances and ask the students to write on them.

In question **3**, the students are asked to balance the numbers without using counters, and so they need a strategy to do this. If you model question **3a**, the students will see that three lollipops need to be moved from 19 to 13 so that both children have 16. You could explain to the students that 19 is 3 more than 16, and 13 is 3 less than 16. "The difference between 19 and 13 is 6. Half this difference is 3. If we then subtract half from the larger number and add half to the smaller number, we will get 16 and 16, which is balanced."

This strategy can be applied to other questions, for example, question **3b**:
7 and 13: The difference is 6.
Half the difference is 3.
7 + 3 = 10 and 13 – 3 = 10
10 + 10

Pages 16–17: To Market, to Market

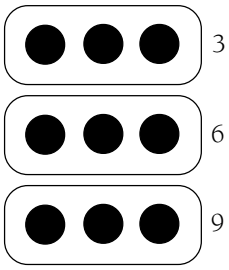
Achievement Objectives

- demonstrate the ability to use the multiplication facts (Number, level 2)
- write and solve story problems which involve whole numbers, using addition, subtraction, multiplication, or division (Number, level 2)

These activities are designed to make students familiar with arrays and encourage them to use arrays to develop their multiplication strategies.

The students need to be able to skip-count in multiples of 2, 5, and 10 and to use doubling to solve multiplication problems. Lots of class or group practice with skip-counting games is a good warm-up for this activity.

Another useful warm-up is to give the students worksheets of arrays to count and ask them to circle the multiples they counted in. Ask them to discuss how they counted their arrays. They could also record the numbers beside each circle.



Activity One

Use a bead frame abacus to model the four rows of six kūmara in the example in this activity. Discuss the different strategies each person used and model what they did on the bead frame. Move the beads and count in sixes and fours, show doubles, and count on in ones from 6.

Make up some other simple problems and encourage the students to use a particular strategy, for example, 5 rows of 3, 7 rows of 2, or 4 rows of 4.

Discuss the strategies that the students used and ask them to explain why the strategy they ticked was the fastest for them. They may need to draw the arrays for questions **3** and **4**.

Activity Two

You will need to model this activity first and give the students plenty of opportunity to make different arrays to represent the same number. You could give the students a blank grid and counters to help them to stay organised with their arrays. Once they have experimented, they could draw their arrays for the activity and write the corresponding multiplication facts beside their drawings.

BSM activities relevant to this page are:

11-3-12 Pooling our material
11-3-13 Making up the teams
11-3-54 Fill the bags
11-3-55 Who has the longest track?
11-3-85 Tick-tock heart

Page 18: Double Trouble

Achievement Objectives

- mentally perform calculations involving addition and subtraction (Number, level 2)
- demonstrate the ability to use the multiplication facts (Number, level 2)

Activity

Like the activities on pages **16–17**, this activity is designed to make students familiar with arrays and to use them to help develop their multiplication strategies. The strategies on this page focus on doubling and using fives, so the students need some prior knowledge of these processes.

Model two lots of 7 on a bead frame or use an overhead projector with an overhead transparency of a bead frame and coloured transparencies of different bead combinations. The students may know that 7 + 7 = 14. Ask them to look at how they could use the groups of fives to work it out another way. There are two fives and four more. The differentiated colours on the bead frame make this very clear for the students. You could record this as: two lots of 7 is 7 + 7 = 14 and (2 x 5) + (2 x 2) = 14.

As an extension, you could ask the students what other times tables they could work out from knowing that 8 x 6 = 48. Discuss how to adjust the answer 48 to give the answers to 7 x 6 and 9 x 6. Model eight lots of 6 on the bead frame and add or remove one more group of 6.

A BSM activity relevant to this page is:
12-3-13 Lots of groups the same

Page 19: The Dinosaur Dig

Achievement Objectives

- demonstrate the ability to use the multiplication facts (Number, level 2)
- write and solve story problems which involve whole numbers using addition, subtraction, multiplication, or division (Number, level 2)

This page builds on the arrays used in the previous three pages but this time uses them to investigate division. The students need prior knowledge of arrays and skip-counting for these activities.

Give the students a total number of objects and a number of rows and ask them to find out how many objects there will be in each row. Using counters to represent dinosaurs and a blank grid to keep arrays organised is a good idea. Emphasise that to divide in this context means to equally share the total number between a predetermined number of rows. Use everyday language such as "split between" or "shared between" to help develop their understanding, for example:
"There are 12 dinosaurs sharing two waterholes. How many dinosaurs at each waterhole?"
"There are 12 dinosaurs sheltering under three trees. How many under each tree?"
"If there were six zoos and 12 crocodiles, how many crocodiles would each zoo get?"

Activity One

After the students have done question **1**, discuss with them the counting strategies they used and record their responses on a chart or board. Accept all counting strategies and discuss which ones are the most efficient. Some students may count in fives and others group two sets of five as 10. Ask the students "Is 5, 10, 15, 20, 25 more efficient than 10, 20, 25?"

Ensure that the students understand what is being asked in questions **2** to **4**. Modelling or drawing the array will help them to clarify their thinking. You could also ask the students to write number sentences for the arrays once they are completed, that is, 18 ÷ 6 = 3 or, in words, "18 dinosaurs shared between six watering holes means three dinosaurs at each watering hole".

Activity Two

Encourage the students to share their results and discuss systematic ways to find all the solutions.

As an extension, the students could explore square numbers further. Ask them: "If there were 49 pebbles, how many rows would there be?" "What other numbers of pebbles could be put into perfect squares?"

Page 20: Tummyache

Achievement Objectives

- write and solve story problems which involve whole numbers, using addition, subtraction, multiplication, or division (Number, level 2)
- write and solve story problems which involve halves, quarters, thirds, and fifths (Number, level 2)

Activity

This activity provides a context for finding fractions of whole-number amounts.

The students will need to model and explore sharing quantities before they attempt this activity.

Asking the students to divide their class or group into categories would be a good introduction. For example, divide the group into those with blue eyes, green eyes, and brown eyes. "How many of us are there altogether? What fraction or part of the class or group has brown eyes?" Modelling ways of recording is also important at this stage, for example, $^{12}/_{24}$ have brown eyes, $^{8}/_{24}$ have blue eyes, and $^{4}/_{24}$ have green eyes.

The students could model question **1** by getting into groups of four and evenly sharing counters that represent the lollies in the book, or students working on their own could fold a piece of paper into four, open it up, and then divide the counters among the four sections of paper.

For question **2**, the students could adjust their groups from question **1** to make them all have an equal share.

Allow the students to investigate this and then discuss their findings for question **3**. You could use the hundreds board to discover all the multiples of 4 up to 100 that would work.

As an extension, the students could set their own problem for a friend to solve.

BSM activities relevant to this page are:

12-3-7 Half, quarter, or a third?
12-3-49 Follow the trail
12-3-50 Make it up
12-3-51 Two of a kind
12-3-83 Have you got this part?
12-3-84 Which attribute for this fraction?

Page 21: Hot Stuff!

Achievement Objective

- write and solve story problems which involve halves, quarters, thirds, and fifths (Number, level 2)

These activities provide a context for finding fractions of a whole and also introduce the idea of fractions greater than one. The prior knowledge that the students need for this activity is recognition of fractions and an understanding of how the symbols for fractions work. For example, $^{3}/_{4}$ means there are four equal parts and three parts have been selected. Ensure that the students have been exposed to all fractions from halves to tenths. Learning to recognise fractions can be fun if they are learned through games such as bingo. Displaying fractions in your classroom would also help to make fractions more easily recognised symbols.

Activity One

Modelling what nine pieces of pizza looks like, using commercially available fraction kits or the circular fractions copymaster at the end of these notes, would be a good introduction to this activity. Ask the students to form one whole pizza and see how much is left over. Discuss ways to record this amount as $^{9}/_{6}$, 1 and $^{3}/_{6}$, $1\,^{3}/_{6}$, or $1\,^{1}/_{2}$.

Establish the fact that six pieces makes one whole ($^{6}/_{6} = 1$), and so $^{7}/_{6}$ is 1 and $^{1}/_{6}$ or $1\,^{1}/_{6}$.

Activity Two

This activity asks students to add whole numbers and fractions. The students can model the cake slices using fraction sets or the circular fractions copymaster. It may be necessary to break this activity into smaller parts. Try making a model of Monday's 1 and $^{5}/_{8}$ cakes and Tuesday's 2 and joining the two models together to make 3 and $^{5}/_{8}$ cakes. Then gradually add on each day's cakes after that.

Pages 22-23: Fun Folding

Achievement Objective

- write and solve story problems which involve halves, quarters, thirds, and fifths (Number, level 2)

These activities are a practical way of exploring equivalent fractions of a region and fractions that are greater than one.

You could ask the students questions such as "What is happening to your paper each time you fold it?" and "What happens to the number of squares?" You could also use supermarket register tape instead of squares of paper and always fold it in the same direction.

Activity One

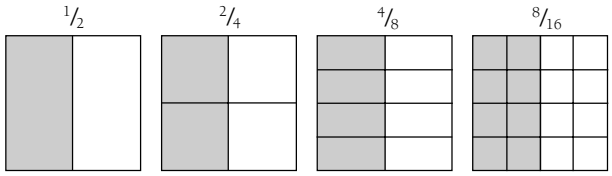
This is a useful activity to work through together with your group. Make sure that each student has their own piece of paper so that they get as much hands-on experience as possible. Record all the symbols for fractions as you go to reinforce their understanding of what the denominator and numerator represent. Highlight the equivalent fractions you discover as you are working. Have them predict what will be next: $^{1}/_{2}$, $^{2}/_{4}$, $^{4}/_{8}$, … Can they use this pattern to help them predict what will come next in the sequence: $^{3}/_{4}$, $^{6}/_{8}$, …?

For question **3c**, have the students work with a partner to discover how many quarters there are in two pieces of paper and brainstorm how they might record this. Repeat this process for question **5c**.

If each student has a piece of paper, there is an opportunity to extend this even further. For example, you could ask, "How many quarters are there in two pieces of paper … four pieces of paper … 10 pieces of paper?" and so on.

To introduce the students to the ideas they will encounter in the next activity, you could record equivalent fractions for the students as you go and ask them what is happening in the sequence. The students could make up a display of a series of squares of paper showing halves, with the half shaded on the first square, $^{2}/_{4}$ on the second square, and then $^{4}/_{8}$, and so on, to show that it's an equivalent area of paper that's shaded.

Shade half of each square and write the correct fraction above each: $^{1}/_{2}$, $^{2}/_{4}$, $^{4}/_{8}$, and $^{8}/_{16}$.



Activity Two

Start by identifying the fraction, using the total number of squares as the denominator and the total number of shaded squares as the numerator. Discuss with the students fractions that are equivalent to the one given, for example, $^{4}/_{6}$ and $^{2}/_{3}$.

BSM activities relevant to this page are:
11-2-18 Make a whole
11-2-59 Spin a whole
12-2-15 How many makes a whole?

Page 24: Finding Fractions

Achievement Objective

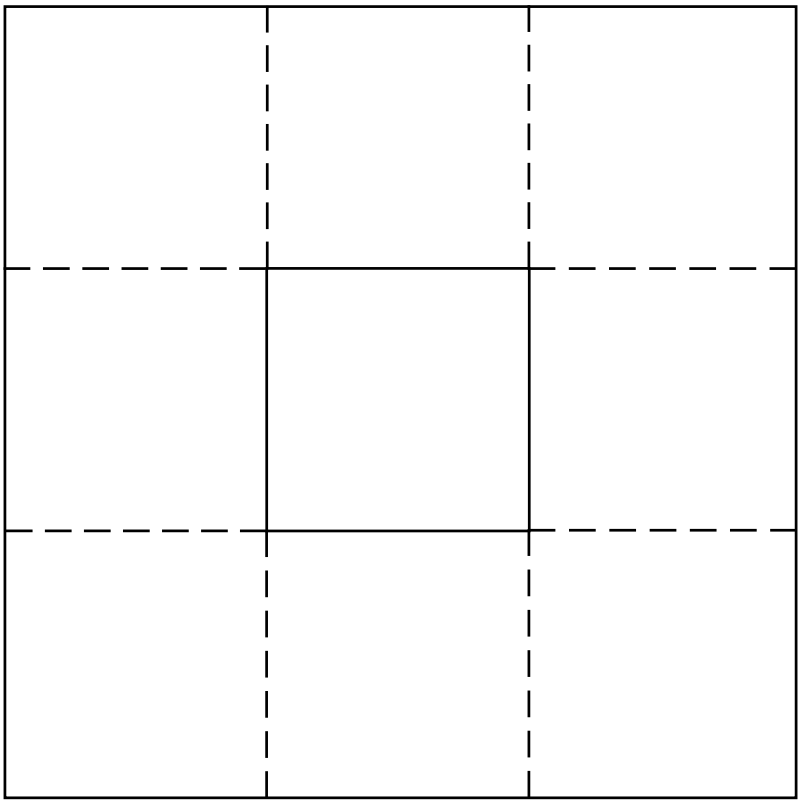
- write and solve story problems which involve halves, quarters, thirds, and fifths (Number, level 2)

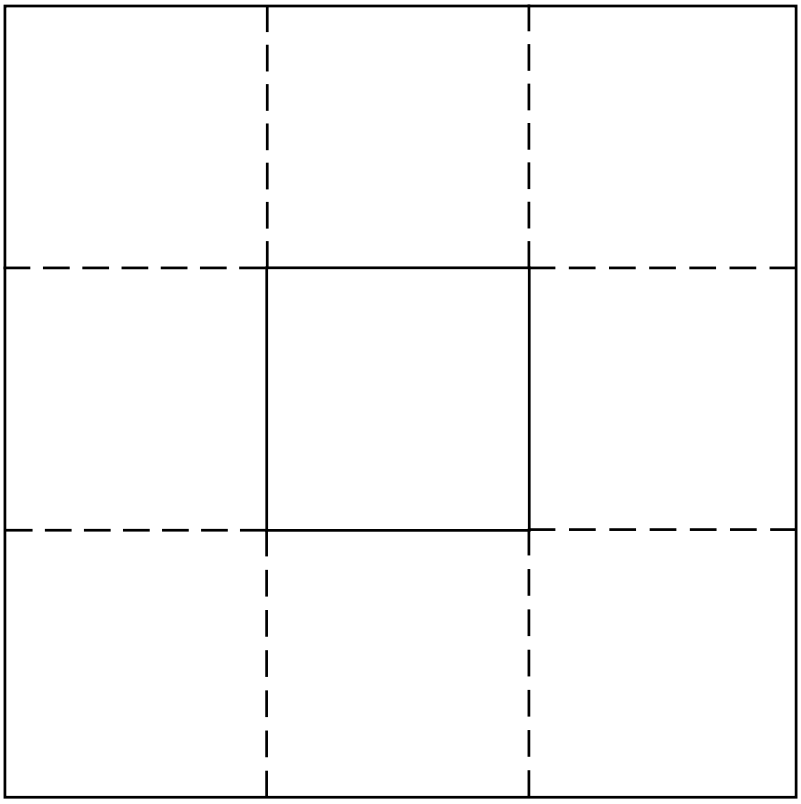
Game

This game is designed as a fun way of identifying the fractions $^{1}/_{2}$, $^{1}/_{3}$, $^{1}/_{4}$, $^{1}/_{5}$, and $^{1}/_{6}$.

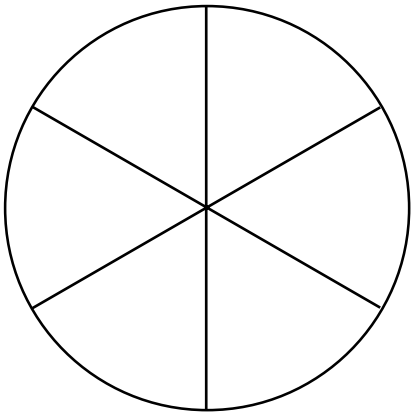
To play this game, the students need to understand that the same fraction can be represented in different ways, for example, as a symbol, words, fractions of a region, and fractions of a set. Ensure that the students realise that the numerator of the fraction is shown on the game board by the shaded area or object.

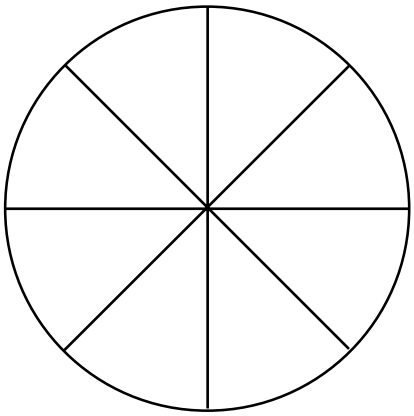
Copymaster: Square Screens

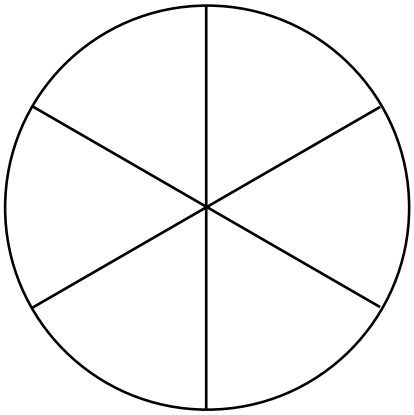


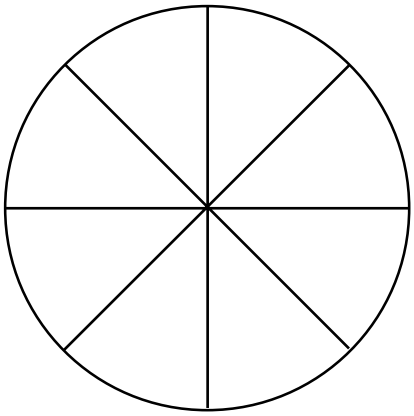


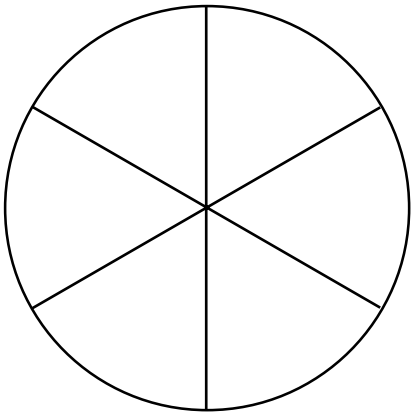
Copymaster: Circular Fractions

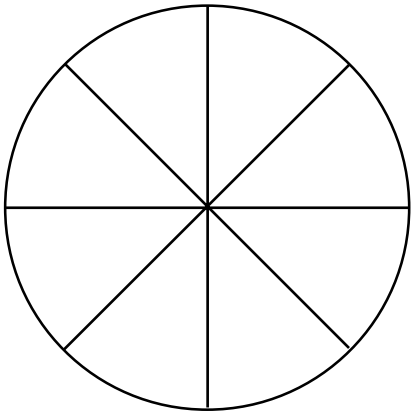












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