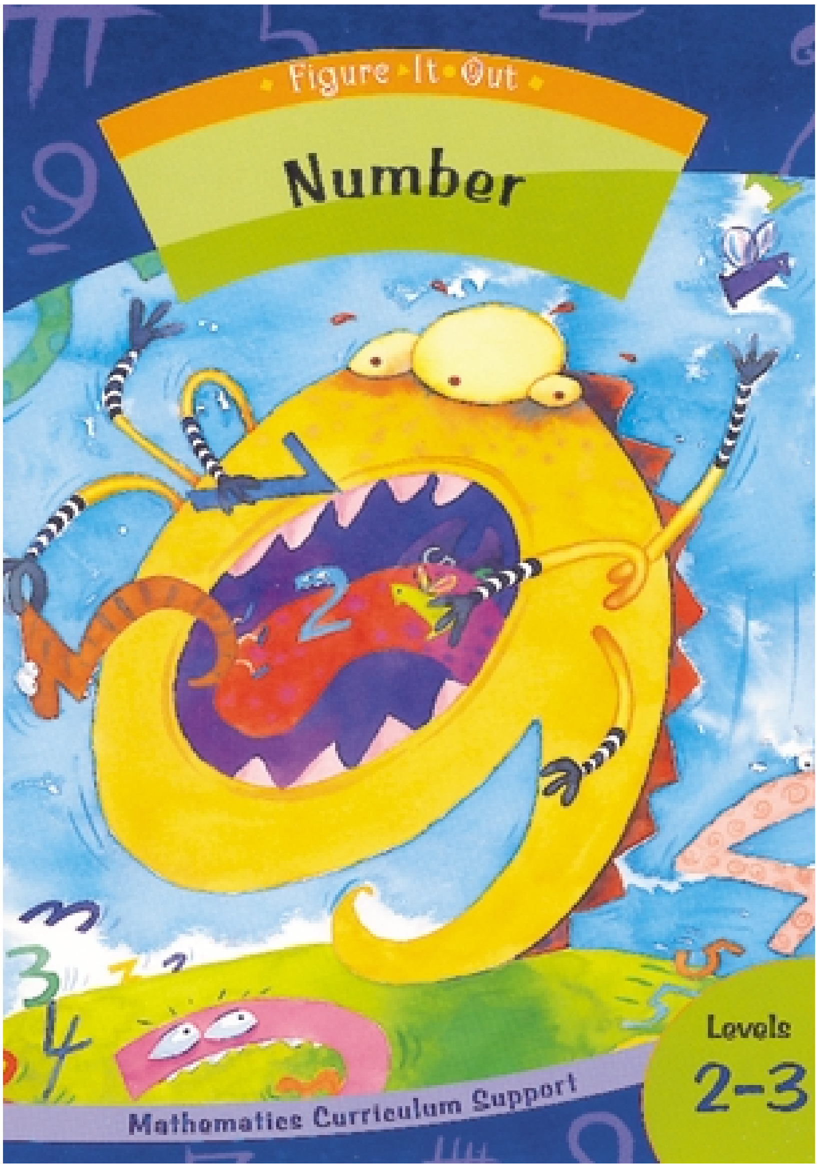
Answers and Teachers' Notes



MINISTRY OF EDUCATION
Te Tāhuhu o te Mātauranga

Contents

Introduction

The Figure It Out series is designed to support *Mathematics in the New Zealand Curriculum*. The booklets have been developed and trialled by classroom teachers and mathematics educators. The series builds on the strengths of a previous series of mathematics booklets published by the Ministry of Education, the School Mathematics supplementary booklets.

Figure It Out is intended to supplement existing school mathematics programmes and can be used in various ways. It provides activities and investigations that students can work on independently or co-operatively in pairs or groups. Teachers can select particular activities that provide extension to work done in the regular classroom programme. Alternatively, teachers may wish to use all or most of the activities in combination with other activities to create a classroom programme. The booklets can be used for homework activities, and the relevant section in the teachers' notes could be copied for parents. These notes may also provide useful information that could be given as hints to students.

There are eight booklets for levels 2–3: one booklet for each content strand, one on problem solving, one on basic facts, and a theme booklet. Each booklet has its own *Answers and Teachers' Notes*. The notes include relevant achievement objectives, suggested teaching approaches, and suggested ways to extend the activities. The booklets in this set (levels 2–3) are suitable for most students in year 4. However, teachers can decide whether to use the booklets with older or younger students who are also working at levels 2–3.

The booklets have been written in such a way that students should be able to work on the material independently, either alone or in groups. Where applicable, each page starts with a list of equipment that the students will need in order to do the activities. Students should be encouraged 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 a problem. Teachers could encourage students to write down as much as they can about how they did investigations or found solutions, including drawing diagrams. Where possible, suggestions have been made to encourage discussion and oral presentation of answers, and teachers 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. Successful ways of solving problems should be acknowledged, and where more effective or efficient processes can be used, students can be encouraged to consider other ways of solving the problem.

Figure It Out

Number

Answers

Page 1: Happy Hundreds

Activity One

1. 45
2. Possible answers:
   - They are all divisible by 9.
   - The digits all add to 9.
   - The difference between each number is 9.

Activity Two

1.

24	25	26	27	28
34	35	36	37	38
44	45			48
54	55	56	57	58

2.

46	47

3. Answers will vary.

Activity Three

1. Answers will vary, for example, vertical lines, multiples of two.

   Note: Check the calculators the students are using to make sure this procedure works. The activity may need to be modified for different calculators.
2. Answers will vary.
3. 17, 24, 31, 38, 45, 52, 59
   On some calculators: 17, 27, 37, 47, 57

Page 2: Putting Numbers to Work

Activity One

1. **a.** 18 **b.** 10 **c.** 18
2. **a.** Yes

   b. Answers will vary, for example, out of 100, Millie sold 54, which is more than one half.

Activity Two

1. 53
2. **a.** 25 **b.** 87 **c.** 71
3. Answers will vary, for example, subtract from 100.

Page 3: What's My Number?

Activity One

1. Any number out of: 21, 30, 31, 32, 40, 41, 42, 43, 50, 51, 52, 53, 54, 60, 61, 62, 63, 70, 71, 72, 80, 81
2. 112

Activity Two

Answers will vary.

Page 4: Now and Then

Activity One

1. 14: tekau mā whā

   25: rua tekau mā rima

   31: toru tekau mā tahi

   40: whā tekau

   50: rima tekau
2. Answers will vary.

3. 5s: rima, tekau, tekau mā rima, rua tekau, rua tekau mā rima, toru tekau, toru tekau mā rima, whā tekau, whā tekau mā rima, rima tekau, rima tekau mā rima, ono tekau, ono tekau mā rima, whitu tekau, whitu tekau mā rima, waru tekau, waru tekau mā rima, iwa tekau, iwa tekau mā rima, rau

   7s: whitu, tekau mā whā, rua tekau mā tahi, rua tekau mā waru, toru tekau mā rima, whā tekau mā rua, whā tekau mā iwa, rima tekau mā ono, ono tekau mā toru, whitu tekau, whitu tekau mā whitu, waru tekau mā whā, iwa tekau mā tahi, iwa tekau mā waru

   10s: tekau, rua tekau, toru tekau, whā tekau, rima tekau, ono tekau, whitu tekau, waru tekau, iwa tekau, rau

Activity Two

1. Take away one.
2. Add one.
3. Answers will vary.

Page 5: Digit Time

Activity One

859, 854, 879, 874, 839,

359, 354, 379, 374, 339, 334

If the students use zero, they may also get:

804, 870, 830, 850, 809,

304, 370, 330, 350, 309

Activity Two

1. 742 = 700 + 40 + 2
2. 999 = 900 + 90 + 9
3. 508 = 500 + 8
4. 444 = 400 + 40 + 4
5. 630 = 600 + 30

Activity Three

1. One way to do this is to subtract 70.
2. Subtract 500.
3. Subtract 4.
4. Subtract 10.
5. Subtract 200 and then 90 or subtract 290.

Page 6: Important Places

Activity One

1. **a.** 60 **b.** 43 **c.** 510
2. Answers will vary. Students could count in tens. The fastest way to work out the area of the more complicated shapes (**b** and **c**) is to divide the building into regular block shapes and work out the area for each set. For example, with the building in **c**, work out the area (length, height, and width) for three sets of cubes, multiply each set (10 x 11 x 4, 10 x 6 x 1, 10 x 1 x 1), and then add the three totals together (440 + 60 + 10 = 510).

Activity Two

1. Other numbers: 4, 13, 103, 22, 112, 202, 31, 211, 301, 40, 130, 220, 310, 400
2. Answers will vary. Students will need to use a system like this, which will make sure they have covered all the possibilities:

4	22	31	40
13	112	121	130
103	202	211	220
		301	310
			400

Page 7: On the Cards

Activity One

1. Two-digit numbers: maximum of 12
Three-digit numbers: maximum of 24
The two- and three-digit numbers will vary, depending on the cards the student has dealt.
2. Answers will vary, depending on the cards the student has dealt.

Activity Two

Answers will vary.

Page 8: Going Up

Game One

Skyscrapers game

Game Two

Hit a Hundred game

Page 9: Going Down

Game One

Calculator game

Game Two

Pyramid game

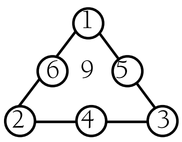
Page 10: Maps and Magic

Activity One

1. 922 space units
2. Tu
3. 1197 space units (including returning to Home Planet)
4. Tu and Vi

Activity Two

a.



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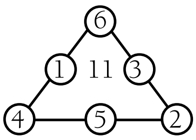
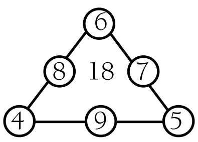
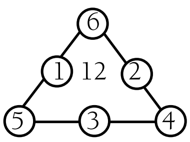


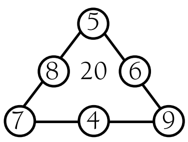
c.



d.



e.



Page 11: Alien Addition

Activity

1. **a.** 492 **b.** 289 **c.** 1459
   d. 29 **e.** 349 **f.** 2762
2. 95 and 62
3. 212 + 210 = 422
4. Answers will vary.
5. 3140
6. The aliens not working would add up to 870. One option would be aliens with the numbers 652, 212, and 6 on their tummies.

Page 12: Knocking over Subtraction

Activity

1. 77
2. Answers will vary.

Game

The Nasty Game

Page 13: Stockpot Power

Activity One

The winner is Julie. She can get four equations right.

Activity Two

1. Yes, 6 x 2 = 12; 12 carrots cut in half gives 24 half carrots. (Julie will be eating as well.)
2. Put them in the cauldron three times:

   first time 3 x 2 = 6

   second time 6 x 2 = 12

   third time 12 x 2 = 24

Page 14: High Flyers

Activity

1. 20 seats
2. Answers will vary.
3. Answers will vary.

Page 15: Wheel and Deal

Activity One

36 cats would get 1 tin each.

18 cats would get 2 tins each.

12 cats would get 3 tins each.

9 cats would get 4 tins each.

6 cats would get 6 tins each.

4 cats would get 9 tins each.

3 cats would get 12 tins each.

2 cats would get 18 tins each.

Activity Two

1. Answers will vary. If at least one of each toy is made, four possible answers are:
   - 2 scooters, 2 tricycles, 4 pushchairs, 1 car with trailer, and 2 trucks
   - 3 scooters, 2 tricycles, 2 pushchairs, 2 cars with trailers, and 2 trucks
   - 1 scooter, 2 tricycles, 3 pushchairs, 2 cars with trailers, and 2 trucks
   - 2 scooters, 2 tricycles, 1 pushchair, 3 cars with trailers, and 2 trucks

   If the 48 wheels were used to make only one type of toy, the factory could make 24 scooters, 16 tricycles, 12 pushchairs, 8 cars with trailers, or 6 trucks.

2.

Pushchairs	**Cars with trailers**
0	8
3	6
6	4
9	2
12	0

3. Answers will vary.

Page 16: Stepping Out

Activity

1. Yes.
2. 5 x 12 = 60. The twelfth jump, from stone 55, would take Kangaroo to land.
3. Hoppy the Frog: 30 Larry Longlegs: 20
   Flit the Flea: 15
4. Hoppy the Frog: 45 Kangaroo: 18
   Larry Longlegs: 30 Flit the Flea: 23

Page 17: Circle Segments

Activity One

Answers will vary.

Activity Two

Answers will vary. The teacher will need to check that the fractions are correct.

Page 18: Fabulous Folding

Activity

1. – 3. Teacher to check

4. triangle: $^1/_3$, $^2/_3$

square: $^1/_4$, $^2/_4$, $^3/_4$

octagon: $^1/_8$, $^2/_8$, $^3/_8$, $^4/_8$, $^5/_8$, $^6/_8$, $^7/_8$

hexagon: $^1/_6$, $^2/_6$, $^3/_6$, $^4/_6$, $^5/_6$

pentagon: $^1/_5$, $^2/_6$, $^3/_6$, $^4/_6$

5. – 6. Teacher to check

7. The bigger the number on the bottom, the more pieces the number line is divided into, and so the smaller each piece will be.

Page 19: Getting in Shape

Activity

1. It eats three-quarters of everything.
2. Answers will vary. The shapes could be the same but three times as big.

Page 20: How Many?

Activity One

Touch rugby: 8

T-ball: 4

Irish dancing: 8

Netball: 12

Activity Two

1. **a.** 15 **b.** 15 **c.** 20 **d.** 10
2. No

Activity Three

1. **a.** $^{12}/_{24}$ or $^{1}/_{2}$ **b.** $^{4}/_{24}$ or $^{1}/_{6}$ **c.** $^{8}/_{24}$ or $^{1}/_{3}$
2. **a.** $^{10}/_{20}$ or $^{1}/_{2}$ **b.** $^{1}/_{20}$ **c.** $^{5}/_{20}$ or $^{1}/_{4}$

Page 21: Flitting with Fractions

Activity

1. $^{5}/_{30}$ or $^{1}/_{6}$
2. $^{6}/_{30}$ or $^{1}/_{5}$
3. $^{1}/_{3}$
4. $^{3}/_{30}$ or $^{1}/_{10}$
5. $^{15}/_{30}$ or $^{1}/_{2}$

Page 22: Dividing Dough

Activity

1. 100 cm^3 salt

   300 cm^3 flour
2. 2 cups of salt
3.

	Cooking	Resting
a.	15 minutes	15 minutes
b.	20 minutes	20 minutes
c.	10 minutes	10 minutes

Page 23: Don't Ditch the Boat

Activity

1. 200 mL
2. 100 g
3. 2
4. 250 mL of water, 125 g of survival slab, and 2 pills each day or 2 pills one day and 3 pills the other day.

Page 24: Job Sharing

Activity

1. **a.** 50c each

   b. $1 each

   c. 60c each

   d. 65c each and 5c left over
2. Group **d** (Raj, Scott, and Ismael) couldn't share their money equally.
3. Answers will vary.
4. The actual coins drawn could vary, but the amount must equal those drawn here:

   a. (50)

   b. ($1) **or** (50) (50)

   c. (20) (20) (20) or (50) (10)

   d. (50) (10) (5) and (5) left over

   or (20) (20) (20) (5) and (5) left over

Figure It Out

Number

Teachers' Notes

Overview: Number

Title	Content	Page in students' book	Page in teachers' notes
Happy Hundreds	Reading, writing, and ordering numbers to 99	1	9
Putting Numbers to Work	Applying place values with two-digit whole numbers	2	10
What's My Number?	Naming whole numbers	3	12
Now and Then	Exploring number systems	4	13
Digit Time	Understanding the meaning of digits in three-digit whole numbers	5	14
Important Places	Understanding the meaning of whole numbers	6	15
On the Cards	Understanding the meaning of two- and three-digit whole numbers	7	16
Going Up	Understanding the meaning of two- and three-digit whole numbers	8	17
Going Down	Number operations: subtraction	9	18
Maps and Magic	Number operations: addition	10	19
Alien Addition	Number operations: addition	11	21
Knocking over Subtraction	Number operations: subtraction	12	22
Stockpot Power	Number operations: multiplication	13	22
High Flyers	Multiplication with two-digit answers	14	23
Wheel and Deal	Dividing two-digit numbers by single-digit numbers	15	24
Stepping Out	Dividing two-digit numbers	16	25
Circle Segments	Finding fractions of a circle	17	26
Fabulous Folding	Finding fractions of length	18	28
Getting in Shape	Recognising fractions in shapes	19	30
How Many?	Parts of sets	20	31
Flitting with Fractions	Story problems using fractions	21	32
Dividing Dough	Measuring capacity and time	22	33
Don't Ditch the Boat	Finding fractions of mass, volume, and capacity	23	34
Job Sharing	Linking fractions with decimals	24	35

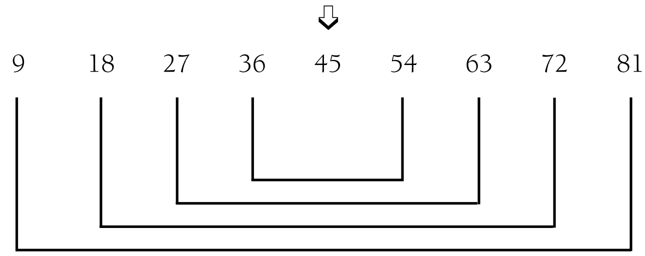
Page 1: Happy Hundreds

Achievement Objectives

- explain the meaning of the digits in 2- or 3-digit whole numbers (Number, level 2)
- order any set of three or more whole numbers (up to 99) (Number, level 2)

Activity One

Some students may need to re-enact what Jodi did and write the numerals on a set of cards. Most are likely to write list of numbers and find the middle number, as below.



Some students will recognise that the numbers are answers to the nine times table (multiples of nine). These numbers also have a digital sum of nine, for example, 2 + 7 = 9 in the case of 27. Other students may observe that the numbers form a diagonal path on the hundreds board. (A copymaster for a hundreds board is provided at the back of this booklet.)

Students should be encouraged to perform the same task with other sets of numbers, for example, multiples of five: 0, 5, 10, 15, 20, 25, …

Activity Two

Some students may need to see a complete hundreds board. Useful prompts for students might be:

"What patterns can you see in the numbers?"

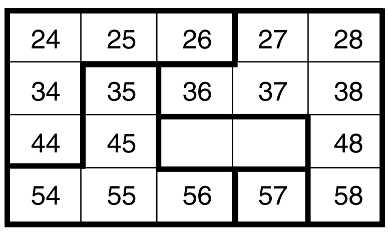
"Which number is smallest/largest?"

"Which numbers are likely to be in the middle of the jigsaw?"

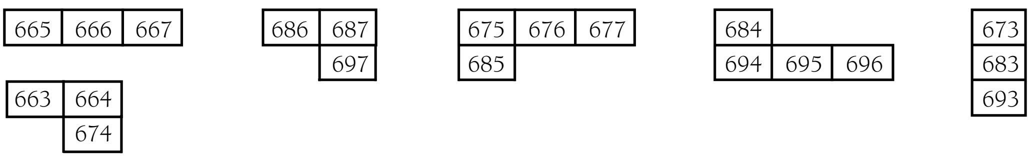
Students could make models of the pieces out of squared paper and manipulate them to find the solution.

Rather that providing students with copies of hundreds boards to work with, encourage them to make their own jigsaws and write in the numbers.

One method of drawing a jigsaw is illustrated here:



As an extension, a jigsaw could be made from pieces in a 601–700 board. For example,



Activity Three

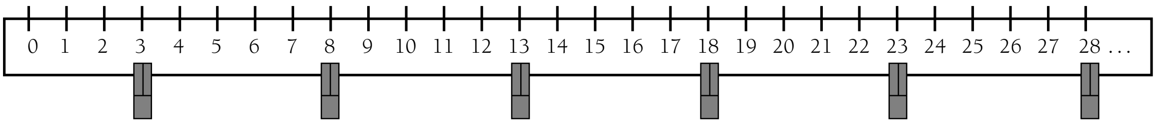
For this activity, you will need to check the kinds of calculators students are using. Simple calculators seem to work as indicated in the activity, but others need two + + to achieve the desired result (that is, 2 + + = = =). Some scientific calculators will not be able to be used for this activity.

In question **3**, you will need to check whether the students' calculators add seven, as in the illustration, or ten, which would need a different target.

The constant capability of a four-function calculator is activated whenever an operation is keyed in followed by the = button. From that point on until the on/c button is pressed, the same operation will be performed on the window number each time = is pressed. For example, + 2 = = = = = … generates the multiples of two. These form a pattern of columns on a hundreds board.

You should ask students to explain why that occurs. Since each row of ten is divisible evenly by two, each row will have the same sequence of counters. With + 3 = = = = …, which generates the multiples of three, the pattern is diagonal. This is because each row is divisible by three with a remainder of one, which means the sequence is one to the left (one advanced) compared with that on the previous row.

Question **3** encourages students to apply skip counting. Many students will find pegs on a number line a useful visual model of the process. For example, starting with 3 + 5 … and pressing = until 28 is in the window could be modelled as:



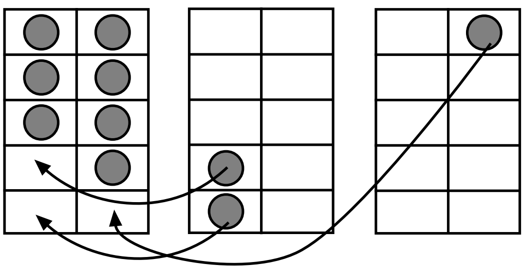
Page 2: Putting Numbers to Work

Achievement Objectives

- mentally perform calculations involving addition and subtraction (Number, level 2)
- write and solve story problems which involve halves, quarters, thirds, and fifths (Number, level 2)

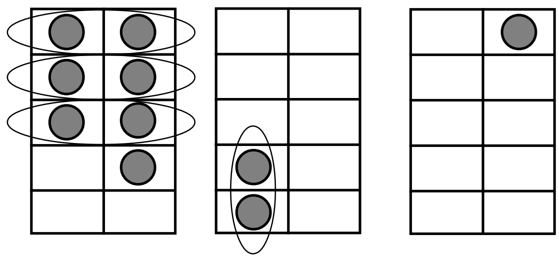
Activity One

The aim of this activity is for students to recognise and use visual patterns in tens frames. For example, students may find many ways to work out how many green containers are left:



An "up to ten" strategy

(that is, 7 + 2 + 1 = 10)

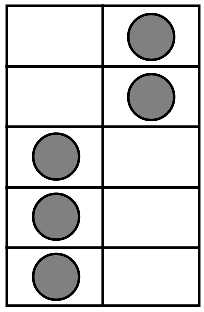


A doubles strategy

(2 + 2 + 2 + 1 + 2 + 1 = 10)

These strategies may be carried out in a tactile way with counters or more powerfully as mental images. Encourage students to communicate their strategies by drawing pictures in the air to show where counters are moved. Students at this level should have a good understanding of part-whole relationships, particularly with the number 10. This might be shown by them realising that there are 7, 2, and 1 green containers. Since 7 + 2 + 1 and 7 + 3 are names for ten, the total number of bottles is 10.

The arrangement of the blue containers may encourage students to use columns of five. For example, they may see the part-whole relationship of five in:

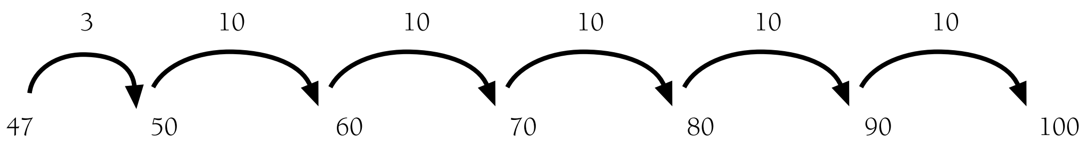


Students will demonstrate their understanding of place value by recognising that there are “10 10s” (a total of 100) places for containers and realising that less than 50 containers left will mean that over half the containers were sold.

Activity Two

Number lines or hundreds boards are useful aids for some students when solving this problem. The number of steps left for Herbie to climb might be found by subtraction, though “counting on” is likely to be the most natural method for students to use.

Encourage them to record their methods. Some may use the empty number line method.



This is a powerful method for solving some types of difference problems.

The activity also aims to reinforce students’ understanding of 100 as a unit, that is, its part-whole relationships.

Page 3: What's My Number?

Achievement Objectives

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

Activity One

A copy of a hundreds board helps students eliminate possibilities. For question **2**, the array could be extended to include the numbers 101–119.

Students need to approach the clues systematically. For example, in question **1**:

i. "I am less than 90."

0, 1, 2, 3, 4, … 86, 87, 88, 89

ii. "If you add my digits, the total is less than 10."

10, 11, 12, 13, 14, 15, 16, 17, 18

20, 21, 22, … , 27

30, 31, … 36

40, 41, … 45

50, 51, … 54

…

80, 81

iii. "I am greater than 20."

21, 22, … 27

30, 31, …

iv. "My tens digit is greater than my ones digit."

21

30, 31, 32

40, 41, 42, 43

50, 51, 52, 53, 54

etc.

Activity Two

With this activity, discuss how students might develop similar problems. Suggest that a set of clues that leave only one solution is ideal. Discuss possible clues, such as:

"greater than", "less than", "even number", "odd number", "multiple of five", "digits add to", "difference of digits is"

Tell students that crossing out the numbers on a hundreds board that are affected by each new clue is a useful strategy.

Page 4: Now and Then

Achievement Objectives

- read any 3-digit whole number (Number, level 2)
- explain the meaning of the digits in 2- or 3-digit whole numbers (Number, level 2)

Activity One

Investigating the number systems of different cultures can help students to recognise the vagaries of the English language. It also raises students' awareness of a major culture in New Zealand and encourages them to appreciate and value the various cultures in New Zealand.

Many languages, such as Māori and Japanese, have spoken words for numbers that reveal the place value structure of the numbers. For example, "tekau mā rua" translates to "ten and two". This is clearer than the word "twelve", which gives little clue as to the structure of the number it represents.

For many students, making a poster of the numbers to twenty and decades thereafter will be enlightening. (A decade is a set of 10 or a period of 10 years.)

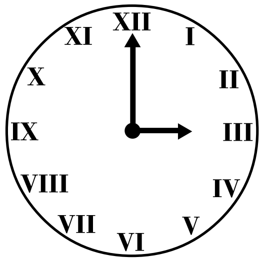
Number	Māori	Translation	English
1	tahi	one	one
2	rua	two	two
…	…	…	…
10	tekau	ten	ten
11	tekau mā tahi	ten and one	eleven
12	tekau mā rua	ten and two	twelve
13	tekau mā toru	ten and three	thirteen
…	…	…	…
20	rua tekau	two tens	twenty
21	rua tekau mā tahi	two tens and one	twenty-one
…	…	…	…
50	rima tekau	five tens	fifty
…	…	…	…

Students may realise that the suffix "teen" is equivalent to "ten and" and that the suffix "ty" is equivalent to "tens".

Activity Two

The Roman numerals worked on an additive system and did not use place value. Sixteen is written as XVI, which translates to 10 (X) plus five (V) plus one (I), and 116 was written as CXVI, which means 100 (C) plus 10 (X) plus five (V) plus one (I).

The Roman numerals on clocks are very common (for example, on Big Ben in London). Note that IX means one before 10 (nine), and IV means one before five (four). Students may wish to explore how the Romans wrote larger numbers using this system.



Page 5: Digit Time

Achievement Objectives

- read any 3-digit whole number (Number, level 2)
- explain the meaning of the digits in 2- or 3-digit whole numbers (Number, level 2)

Activity One

Compact numeral cards help students understand the way multidigit numbers are composed. They reinforce the idea of zero as a place holder. However, the ability to use compact numeral cards correctly is not a sufficient indicator of place value understanding.

You can develop students' familiarity with reading and writing a three-digit number by having them collectively try to find all the numbers that Caleb could make. This might be further expanded with problems such as:

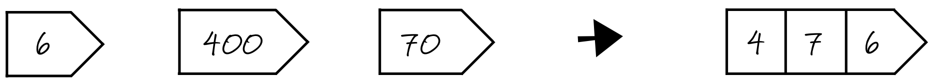
"Which number is the smallest/greatest? How do you know?"

"Which number is closest to 600?"

"Can Caleb make the number that is 110 less than 469?"

Activity Two

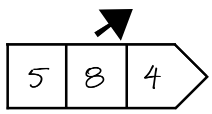
Converting compact numerals to expanded numerals is made much easier by using the cards. This should be a temporary aid only as students should perform this renaming task mentally. Expanding numerals is excellent preparation for performing operations on multidigit whole numbers. As an additional exercise, provide tasks where students are required to write the compact numeral for an expanded set of cards. For example:



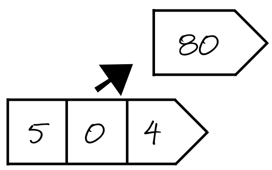
Activity Three

Zapping the digits is a difficult application of place value. Students who are familiar with compact numeral cards may see a connection between zapping a digit and removing a compact numeral card. For example:

Zap the 8 in 584. is modelled as …



Subtract 80 504. can be thought of as …



A more difficult application of this idea is to suggest that the calculator "change its …".

For example, students might put 762. in the window and be told to change the display to 642., using the smallest number of key presses. Pressing on/c is not permitted.

Page 6: Important Places

Achievement Objective

- explain the meaning of the digits in 2- or 3-digit whole numbers (Number, level 2)

Activity One

This activity could be used to help students discover the structure of place value blocks by making buildings in the most efficient way possible. There are a number of ways to make each building, but using the largest unit for each section (flat, long, or single cube) is less time-consuming. Encourage students to use efficient strategies to count the number of small cubes required. For example, building **b** can be made using four longs (10 cubes) and three single cubes. Students may explain their counting as:

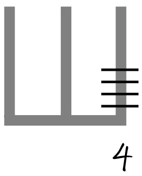
"That's 10 plus 10 plus 10 plus 10 plus three … that's 43," or more efficiently, "Four 10s, that's 40, plus three is 43."

As an independent activity, you can ask students to make their own place value block building, draw it on isometric dot paper, and present it to a classmate. The classmate can build the model and work out the number of unit cubes it needs.

Activity Two

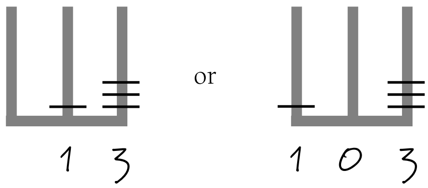
Students need to use a systematic strategy to find all the three-digit numbers that can be modelled with four counters. They may choose to draw the abacus pictures or record the numerals, knowing that the sum of the digits must always be four. A systematic strategy might proceed as follows:

Start with four counters in the ones column:

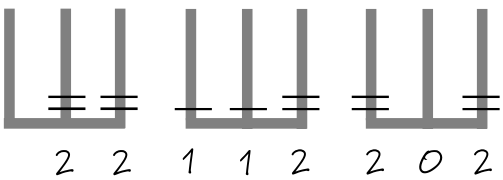


Only 4 is possible.

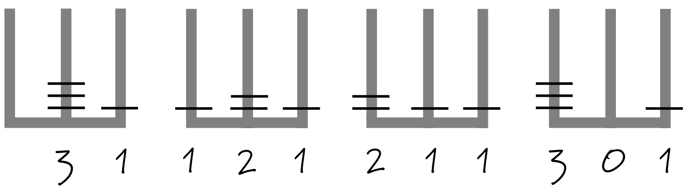
Move to possibilities with three counters in the ones column:



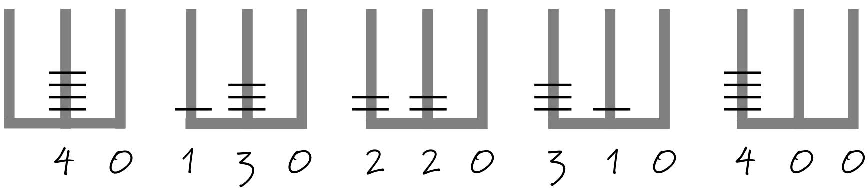
Then try possibilities with two counters in the ones column:



Then try possibilities with one counter in the ones column:



Finally, try possibilities with no counters in the ones column:



As an extension, you could ask students to find all the five-counter numbers, or you could simplify the problem by using only three counters.

Page 7: On the Cards

Achievement Objectives

- explain the meaning of the digits in 2- or 3-digit whole numbers (Number, level 2)
- order any set of three or more whole numbers (up to 99) (Number, level 2)
- use the mathematical symbols =, <, > for the relationships "is equal to", "is less than", and "is greater than" (Algebra, level 2)

Digit cards can easily be made from file cards or offcuts. They have a variety of uses, either independently or in conjunction with other equipment.

Activity One

Encourage students to use a systematic approach to finding all the possible numbers. This may involve using a tree diagram or writing an organised list. For the digits shown in this activity, one strategy might be:

13	31	51	81
15	35	53	83
18	38	58	85

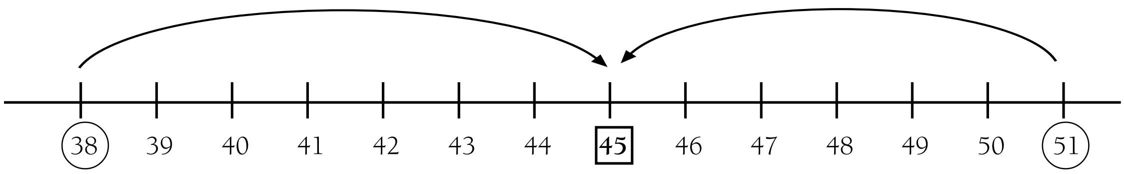
all possible two-digit numbers

135	315	513	813
138	318	518	815
153	351	531	831
158	358	538	835
183	381	581	851
185	385	583	853

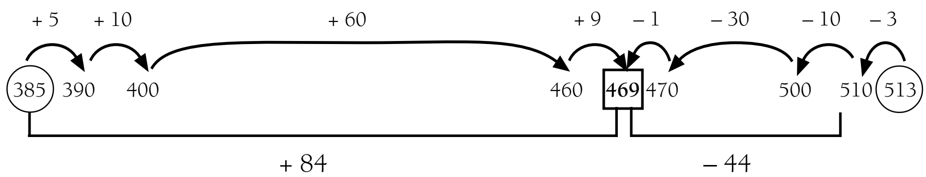
all possible three-digit numbers

For less able students, the problem can be limited to two-digit numbers. You could place the numbers on a number line in relative position and ask questions like "Which number is closest to 45?"

Distance on a number line is a nice model for solving "closest to" problems:



Students will need more advanced strategies for solving "closest to" problems with three-digit numbers. For example: "Which number is closest to 469?"



Activity Two

Students will need to apply place value knowledge and realise that the digit with the highest place value in each number is considered first when determining "greater than" or "less than" relationships. For example, to determine which is greater, 79 or 81, the digits in the tens place have the greatest total value and must be compared first. This can become complex when numbers with three or more digits are involved, for example, 619 and 641. The hundreds digits are compared first (the same value) and then the tens (40 is greater than 10).

Page 8: Going Up

Achievement Objectives

- explain the meaning of the digits in 2- or 3-digit whole numbers (Number, level 2)
- order any set of three or more whole numbers (up to 99) (Number, level 2)

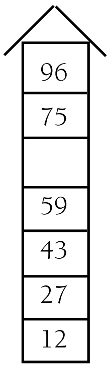
Game One

Skyscrapers is designed to develop students' ability to order two-digit whole numbers. (The copymaster for Skyscrapers is provided at the back of this booklet.) After the students have played the game several times, discuss tactics with them. Look for students to suggest that for any number selected, it is important to match the rung it is placed on with its related position in the numbers 0–99. For example, if the number 48 were selected, it would be wise to place it near the middle, but if 11 were selected, then the bottom rung might be best.

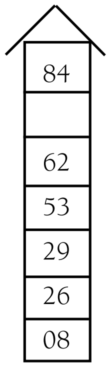
The game can be made more difficult by forming a three-digit number for each turn and getting students to start their skyscrapers floor plan at floor 100.

You can develop your students' understanding of probability by giving them hypothetical game situations. For example:

"If player one's floor plan looks like this:



and player two's floor plan looks like this:



which player do you think is more likely to win?"

Game Two

The game of Hit a Hundred requires students to make choices about where to put digits.
A productive strategy is to allocate the first few throws to "tens" in order to build the total as close to 100 as possible and then choose "ones" or "tens" on the remaining throws.

Totals are allowed to exceed 100. This can create rounding issues about which score is closest. For example, is 97 or 104 closest? A number line, which provides a visual representation of the distance between numbers, can help solve such problems.

Page 9: Going Down

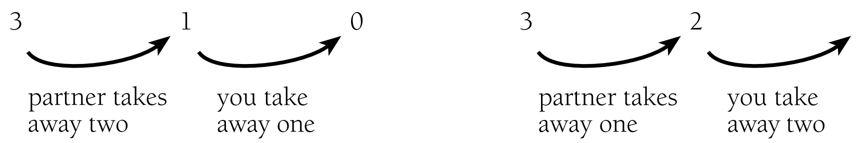
Achievement Objectives

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

Game One

This is a calculator version of the game Num, which is played with counters. Students are likely to play the game without a strategy to start with. They may realise that if they can finish their turn with the window showing three, they can win, no matter what move their opponent makes.

For example:

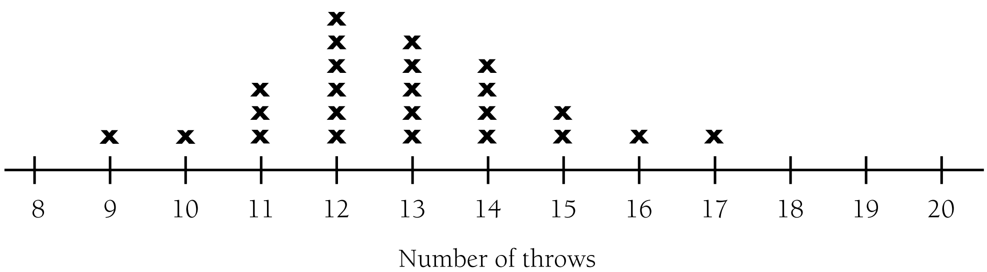


Similarly, if they can finish a turn on six, they can bring the total to three in their next turn and go on to win the game (no matter what their opponent does). If they finish a turn on nine, they can bring the total to six, and so on.

The game can be adapted by allowing each player to subtract one, two, or three when it is their turn. This will require a winning strategy that aims at multiples of four instead of three.

Game Two

This is a game of chance that requires students to subtract single-digit numbers. Students should perform these calculations mentally. As an extension, data could be gathered about how many throws it usually takes to reach the bottom row. This data could be gathered on a dot plot as students play the game in groups:



The distribution could be explained by looking at the difference between the numbers on the bottom row and the top number, 50. The issue would then become, "How many throws do you need to take away about 40?" Note that the dice average is 3.5, so $40 \div 3.5 \approx 11$ is a good indication of the median number of throws needed.

Page 10: Maps and Magic

Achievement Objectives

- 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 One

Students will need to recognise that the space map is not to scale. They will need to identify the numbers to be added in each problem and discard irrelevant information. Encourage them to use sensible estimation strategies rather than relying on lengthy calculations. For example, question **2** can be solved by realising that Ma is too far away, Vi is too close, and only a return trip to Tu (175 x 2 space units) can produce an answer anywhere near 350 space units.

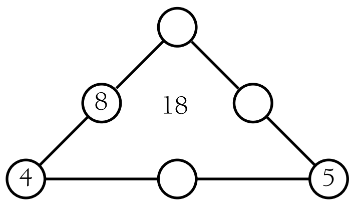
Question **4** requires students to look for connected distances with a total of 587 space units. One effective strategy is to look at ones-digit totals. A journey to Vi and Ma and home again would result in a ones-digit total of 6 + 4 + 2 = 12, which eliminates this as the possible route taken.

Students may enjoy creating their own space map problems for others or looking at distance maps for New Zealand roads, which are available from the Automobile Association and most petrol stations.

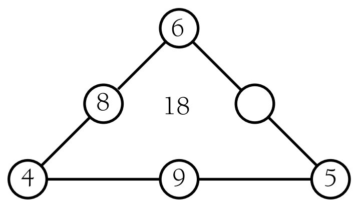
Activity Two

A systematic strategy is useful for solving magic number problems. Listing the numbers 1–9 will help students keep track of the digits that have been used.

For example, consider problem **c**:

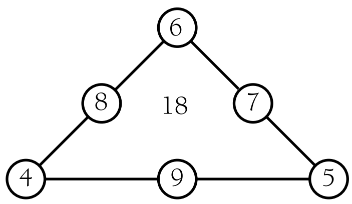


1 2 3 ~~4~~ ~~5~~ 6 7 ~~8~~ 9



1 2 3 ~~4~~ ~~5~~ ~~6~~ 7 ~~8~~ ~~9~~

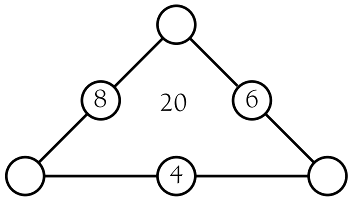
because 4 + 8 + [6] = 18
and 4 + [9] + 5 = 18



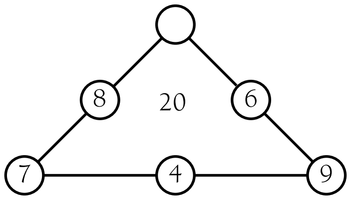
1 2 3 ~~4~~ ~~5~~ ~~6~~ ~~7~~ ~~8~~ ~~9~~

because 6 + [7] + 5 = 18

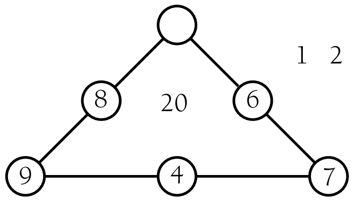
Problem **e** is quite difficult. It can be solved by trial and error, but reasoning can save a lot of effort.



Looking at the numbers that could go in the corners of the side with 4 on it, we realise that they must add to 16 for the whole side to total 20. Only two numbers, 7 and 9, are left to make this possible, so the triangle becomes:



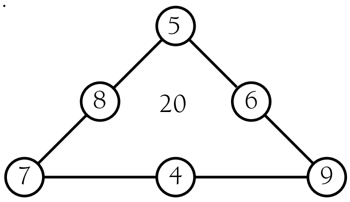
or



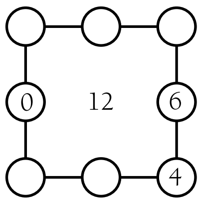
1 2 3 ~~4~~ 5 ~~6~~ ~~7~~ ~~8~~ ~~9~~

The right-hand option does not work because no digit can fit in the remaining circle to make the other two side totals equal.

The solution must be:



Students might enjoy creating similar square puzzles, such as:



Once again, they would select digits between 0–9 to fill in the circles and make each side total equal to 12.

Page 11: Alien Addition

Achievement Objectives

- 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 provide students with practice adding single-, two-, and three-digit whole numbers. Students should try to do the calculations mentally or on paper. Calculators may be used to check calculations.

Some students will need help to interpret the problems, particularly with vocabulary such as "total", "two-digit", and "double". Encourage students to identify the relevant information in each task. For example, the important information in question **2** is "two aliens" and "the numbers … add up to 157". Other contextual information needs to be discarded.

Help students develop estimation strategies involving sensible rounding by discussing the different methods they have used. For example, you could ask students to estimate the answer to question **1b**: 210 + 332 + 95 + 62. By rounding, the problem solution might be estimated by 210 + 330 + 100 + 60 = 700.

Page 12: Knocking over Subtraction

Achievement Objectives

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

Activity

The scorecard is set up for students to apply place value because each triangle has 10 skittles and there are "10 times 10" skittles in total. Students might use two different strategies to solve this problem:

- Count the white skittles. (This is relatively time-consuming.)
- Count the black skittles and subtract the total from 100.

Encourage students to look for useful groupings. For example, one frame has seven black skittles and another has three, so this gives a group of 10.

Answers will vary for question **2**. Encourage students to use place value to reach their solutions.

Game

In the Nasty Game, students use a strategy based on place value. They will realise that creating the smallest difference possible in their hundreds column is desirable while trying to get the differences in their classmates' hundreds columns as large as possible. The game also encourages students to consider the probability of events.

For example, consider the situation where Tina draws a "2" card in this game:

Frank

	9		4
–	2		3

Tina

	8	7	
–		3	

Lena

	9	5	6
–		2	

She could give it to herself in the bottom of the hundreds column. This would mean that she has beaten Frank, but also there would be other digits that Lena could get to beat her. The Nasty Game can also be played with three-digit addition, and players strive to get the highest total.

Page 13: Stockpot Power

Achievement Objective

- demonstrate the ability to use the multiplication facts (Number, level 2)

Activity One

In this activity, students need to recognise that some equations (using whole numbers only) cannot be solved. For example, two cannot be multiplied by a whole number to equal 15.

Activity Two

Teachers may need to remind students that Julie is included in the total at the dinner party. They also need to focus on using only the two times table to reach the required solutions.

Page 14: High Flyers

Achievement Objective

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

Activity

Students may see the array in question **1** in several ways:

2 + 2 + 2 + 2 + 2 + 2 + 2 + 2 + 2 + 2 or 10 x 2

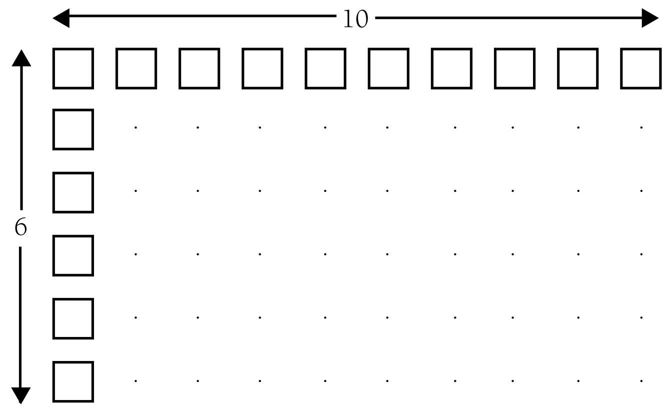
10 + 10 or 2 x 10

This shows that multiplication and repeated addition are related and that the order of the numbers being multiplied (factors) does not affect the answer (product). This is called the commutative property, and it also applies to addition, for example, 4 + 5 = 5 + 4.

For question **2**, teachers may need to point out that the arrays of seats are rectangular. Students may not see this problem as an application of multiplication and division and instead may arrange 60 tiles or multilink cubes. They should be encouraged to record their results. Square grid paper is useful for organising this recording.

A systematic strategy involving multiplication might look like this:

Using a table:



Width		Length		Total	
1	x	60	=	60	
2	x	30	=	60	} These options might be the best for aeroplane design.
3	x	20	=	60	
4	x	15	=	60	
5	x	12	=	60	
6	x	10	=	60	

No other numbers between 6 and 10 will work.

To check whether students have generalised the process, you can change the conditions in the problem. For example:

"The aeroplane has 48 seats."

"The aeroplane makers want a seat pattern that is twice as long as it is wide. They want 32 seats. How wide is the pattern?"

Page 15: Wheel and Deal

Achievement Objective

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

Activity One

Students will need to investigate which numbers of cats will work to give an even share with no cans left over. This can be acted out with the students playing the cunning cats and multilink cubes representing the tins of cat food.

Encourage students to apply their knowledge about multiplication and division to the problem. For example:

"Six sixes are 36, so there could be six cunning cats getting six cans each."

Organise the results students come up with in a table so that students can notice patterns:

Number of cunning cats	Number of cans each	Total
2	18	36
3	12	36
4	9	36
6	6	36
9	4	36
12	3	36
18	2	36
36	1	36

In this way, students may see that finding two factors of 36 gives two solutions (the commutative property). Changing the number of cans in the problem to 42 provides another opportunity to assess whether students can apply what they have learned.

Activity Two

Question **1** involves dividing the number 48. Some students will need access to counters (to use as wheels) to model the problem. Encourage these students to predict how many of a given type of vehicle they will be able to make. Other students will see the connection with multiplication and division. Ask them to record their solutions, using equations such as:

$3 \times 16 = 48$ or $48 \div 3 = 16$

For less able students, this problem can be simplified by reducing the number of vehicles made and the total number of wheels available.

Question **2** involves investigating the possible vehicles in an organised way. For example, a student might know that eight cars with trailers can be made because $8 \times 6 = 48$. From that, they may realise that reducing the number of cars with trailers to six frees up 12 wheels (2×6), so three pushchairs can be made. The pattern continues with four cars with trailers and six pushchairs or two cars with trailers and nine pushchairs being made.

Page 16: Stepping Out

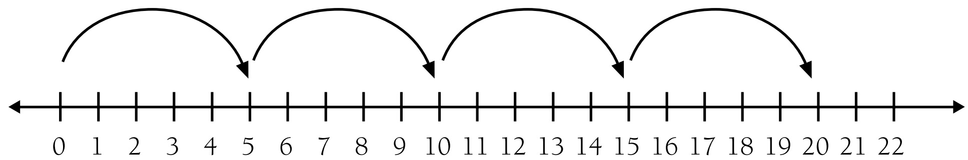
Achievement Objectives

- 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)

Activity

Many students will need a number line to solve the problem, though others may be able to use skip counting in combination with systematic recording.

For example, Kangaroo's trip might be modelled as:



Clip-on pegs might be used on a number line to record which stepping stones Kangaroo landed on. The solution might be recorded as:

5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60 12 numbers, 12 jumps

More powerful reasoning might be $5 \times 12 = 60$, which is greater than 58, and therefore Kangaroo's statement is correct. Division might be used to work out the number of jumps needed by the other animals.

58 divided by 2 = 29. Hoppy takes 30 jumps because one more is needed to get across.

58 divided by 3 = 19 remainder 1, so Larry will need 20 jumps to get right across to the other side.

The problem can be simplified by reducing the number of animals and the number of stepping stones. The problem for 88 stepping stones is difficult, but it can be solved using similar reasoning.

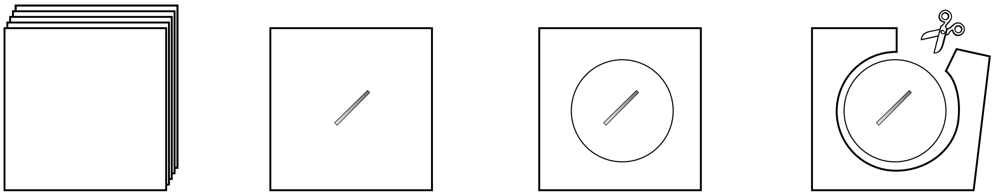
Page 17: Circle Segments

Achievement Objective

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

Activity One

A number of paper circles can be cut out efficiently in the following way:



Put several pieces of paper in a pile.

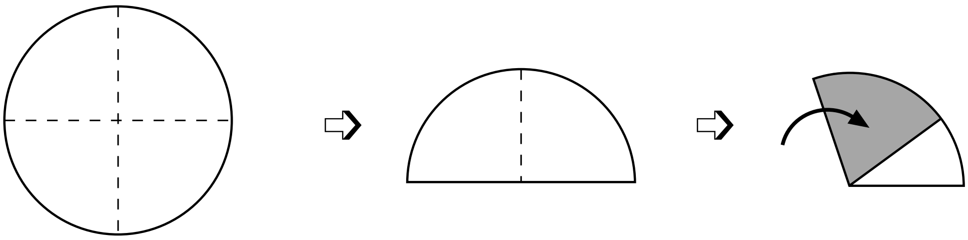
Staple through the pile.

Draw around the staple, using a circular plate.

Cut out the circles and then undo the staple.

Note: You will still need to hold the edges of all your pieces of paper as you cut around your circle shape to stop the bottom pieces slipping out of line.

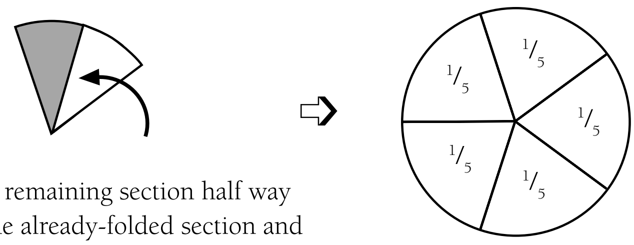
Folding the circles into quarters is straightforward, but students will have to estimate their folds for thirds and also for fifths, if you wish to extend the activity to include fifths. For example, for fifths:



Find the centre by folding quarters.

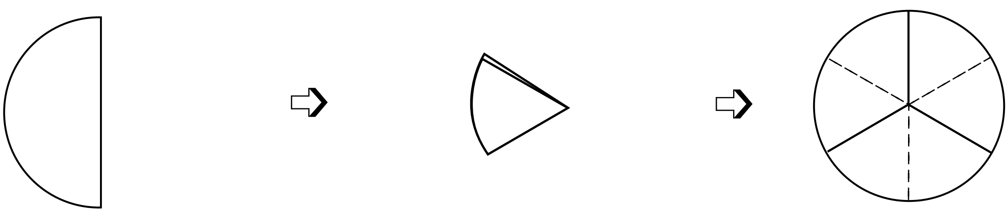
Fold in half.

Starting at the centre, fold so that the section being folded over is twice the size of the remaining section and crease firmly.



Fold the remaining section half way across the already-folded section and crease firmly.

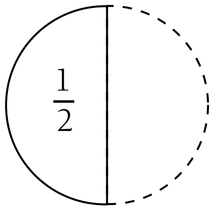
Thirds can be folded as follows:



Fold the circle in half.

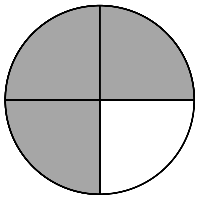
Fold the half in thirds by bringing the outside edges into the centre to form a cone shape. Flatten the cone and crease.

Students will be able to find many relationships with their labelled fraction pieces. It is important that these are recorded. Discuss the way fractions are written.



"One-half is written as $\frac{1}{2}$ ($^1/_2$). The bottom line (denominator) indicates how many equally sized parts the whole has been divided into. The top number (numerator) gives the number of these parts that is used."

It is important that fractions with numerators greater than one are discussed.



Three parts are used.
The whole is divided into four equal parts.

The fraction sentences students might find include:

Joining (addition), for example, $^1/_3 + ^1/_3 + ^1/_3 = 1$

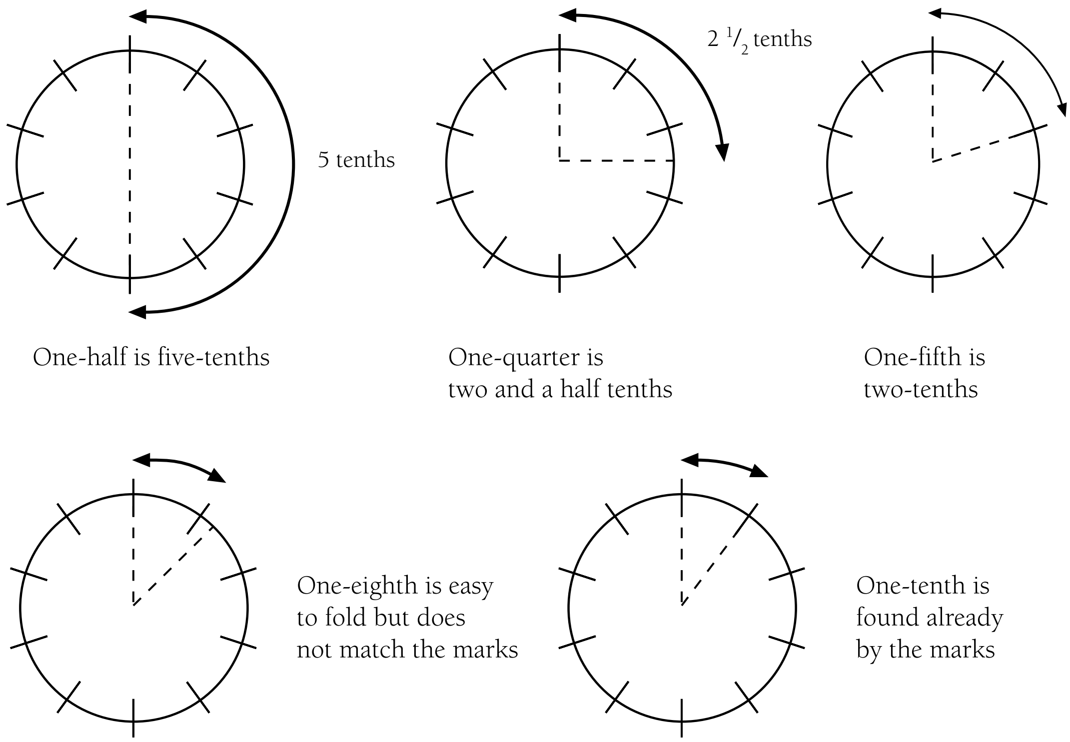
Differences (subtraction), for example, $^1/_2 - ^1/_4 = ^1/_4$

Inequalities, for example, $^2/_4 < ^3/_4$ (why?)

Multiplication, for example, $2 \times ^1/_4 = ^1/_2$

Activity Two

This activity is aimed at developing some readiness for early work with tenths in decimal form. Give the students circles so that they can investigate the problem by cutting out and folding.



The "untidy" fractions, such as the quarters and eighths, could be further investigated using a circle divided into hundredths (see Number, level 3 in *Mathematics in the New Zealand Curriculum*). Ensure that fractions with numerators greater than one are discussed, for example,

"How would you cut three-fifths of Pieta's pizza?"

Page 18: Fabulous Folding

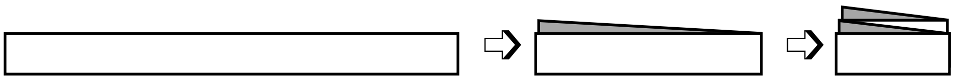
Achievement Objective

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

Activity

Leave students to attempt these problems with minimal direction. Discuss their efforts with them after they have been trying for a suitable period. It is important that the students have created polygons with sides of equal length (called regular polygons). The relationship between the folded strips and fractions is that in order to form a triangle, the strip needs to be folded in thirds and that to form a pentagon, it must be folded in fifths, etc.

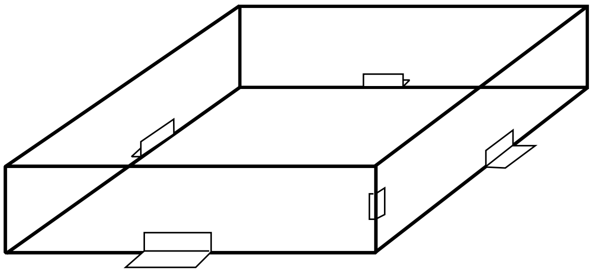
The square is the easiest polygon to form:



Fold the strip in half

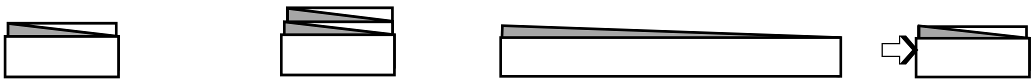
and in half again and press to crease.

This produces quarters. Once the creases are made, they can be used to form the corners for the square.



Note that the corners will need to be right angles. The edge of a book could be used to check this.

Some of the other fractions are harder to fold.



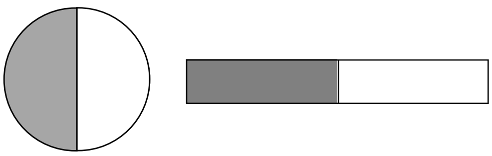
Thirds: trial and improvement by overlapping

Fifths: as with thirds but with five pieces

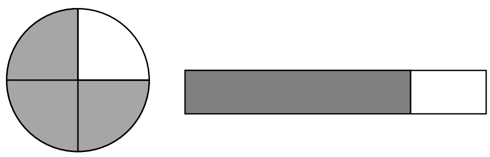
Sixths: in half and then use the thirds technique

Some students might use ruler measurements to create the equal parts. If the strips of paper are cut to 30 centimetres long (about the length of A4 paper), this will help students to make their folds equal.

Encourage students to link what happened with circular regions on page 17 to the folding activities on this page. For example:

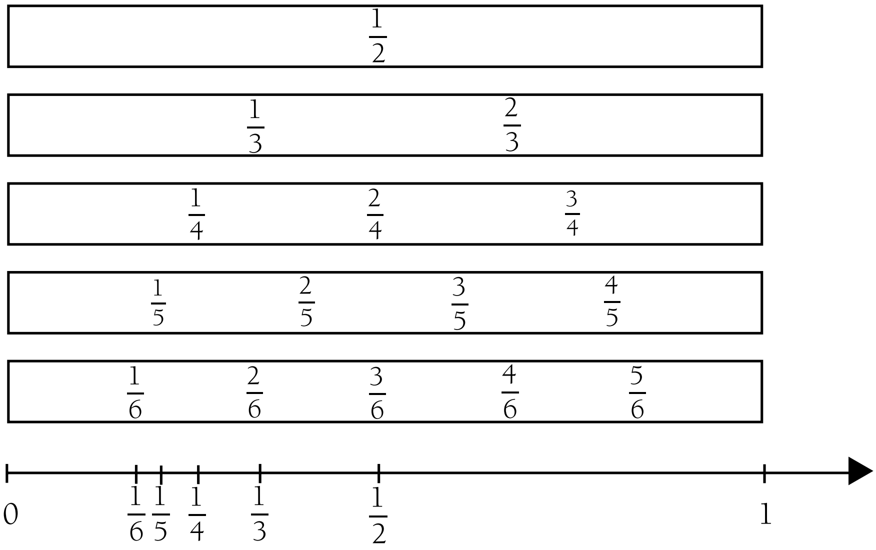


Why are these both called one-half?
Why are they both written as $^{1}/_{2}$?



Why are these both called three-quarters and written as $^{3}/_{4}$?

Create the number line with unit fractions (the one on the top line) first. You can expand on this later. Students will need to recognise that "1" is the length of one whole strip, "2" would be the length of two strips, etc.



This activity has many possible avenues of investigation, such as:

"What other names for one-half can you see?"

"Why do the lengths get shorter as the bottom number (denominator) gets bigger?"

"Will the length of a piece ever get to zero? What fraction would that be?"

"Where on the number line would $1^1/_4$ ($^5/_4$) go? What does $^5/_4$ mean?"

"Why are $^4/_6$ and $^2/_3$ the same length?"

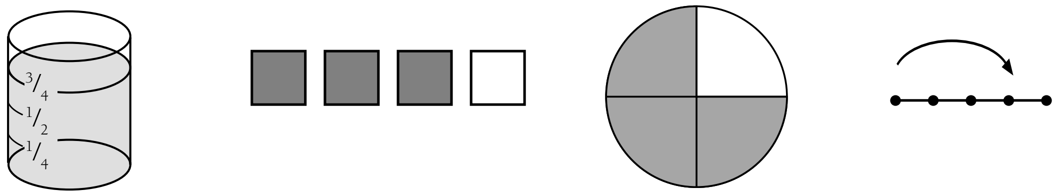
Page 19: Getting in Shape

Achievement Objective

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

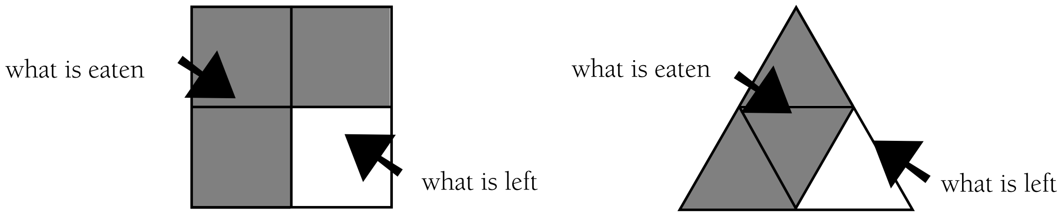
Activity

You may need to remind students, in various ways, what "three-quarters" means. This might involve creating a poster with representations such as:



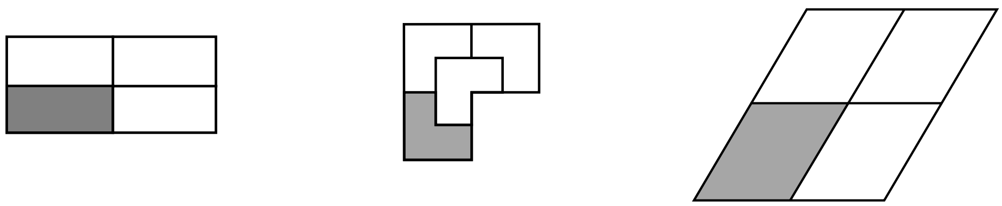
The three-quarter bug problems will each have a number of solutions. Students should be encouraged to find as many answers as possible.

To help them realise why it is called the three-quarter bug, the original shape and what is left behind could be modelled with pattern blocks.



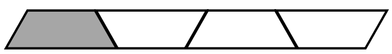
"How could we write how much of the whole square/triangle the bug ate?"

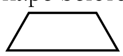
An interesting connection is that for each quarter shape, the original shape could have been an enlargement of the quarter.



Shapes like this are sometimes called reptiles.

Students must justify their solutions. For example:



"The parallelogram was this shape before the bug ate it because it is made up of four  ."

Page 20: How Many?

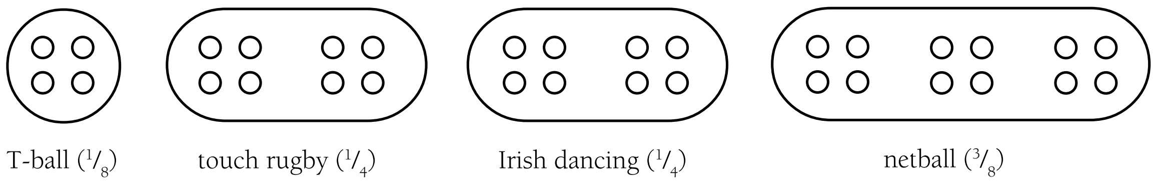
Achievement Objective

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

This page focuses on students finding fractions of a set. Sets are an important model for fractions, particularly seeing they occur in many practical contexts, as shown with the three activities given here.

Activity One

The problem could be solved by using counters as models for the children in the class. Having counted out 32 counters, the students will need to find one-eighth of the set by dividing the counters into eight equal subsets. They may then assign these subsets to each activity.



Understanding how fractional numerals are written is critical. One-quarter suggests that the set has been divided into four equal subsets (parts) and that one of those subsets is chosen. Encourage students to see the connection between fraction notation and division, for example, $^1/_4$ is equivalent to $1 \div 4$, and $^3/_8$ is equivalent to $3 \div 8$.

This can allow a numerical approach rather than relying on equipment. In this activity, $32 \div 8 = 4$ gives the number of children in each eighth, and $2 \times 4 = 8$ gives the number who play touch rugby because $^1/_4$ is $2 \times {}^1/_8$.

Activity Two

Although question **1** can be solved by modelling with counters or similar apparatus, it is much more efficient to work out the problem numerically:

a. $^1/_4$ of 60 is 60 divided by 4 = 15 taro

b. $^1/_4$ of 60 is 60 divided by 4 = 15 kūmara

c. $^1/_3$ of 60 is 60 divided by 3 = 20 yams

d. $^1/_6$ of 60 is 60 divided by 6 = 10 breadfruit

In question **2**, the number of each vegetable is doubled if the recipe is doubled. Students will need to recognise that the ratios (fractions) remain constant although the numbers of vegetables change.

Activity Three

The aim of this activity is for students to recognise how to record fractions seen in the context of sets and to recognise equivalent fractions (fractions with the same value) in this context. In each case for question **1 a**, **b**, and **c**, students may make statements such as, “Twelve of the children are wearing blue togs.”

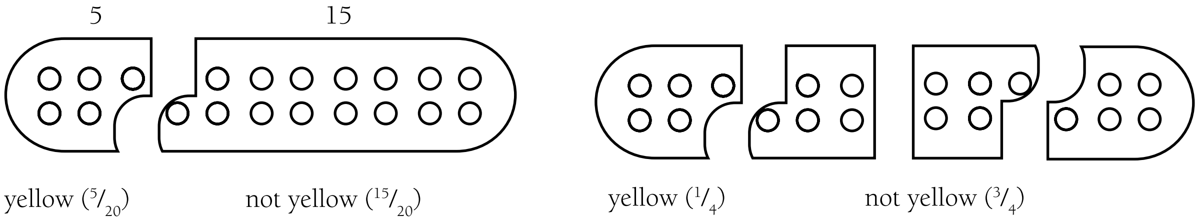
Prompt a move towards fraction symbols with questions such as:

“How many children are swimming at the pool altogether?” (24)

“So 12 out of 24 children are wearing blue togs. How could we write that down using fractions?” ($^{12}/_{24}$)

“Is there an easier way to describe this fraction?” ($^1/_2$)

If students' responses to the last question are unclear, you could prompt them by making models of the colour of children's togs, using counters and dividing the counters into blue and non-blue subsets. This will also allow question **2** to be modelled by removing two blue and three yellow counters and adding one green counter. Subsets can be separated out to answer each question. For example, for question **c**:



Page 21: Flitting with Fractions

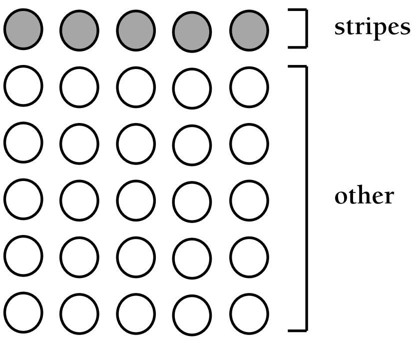
Achievement Objective

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

Activity

These problems are similar to those on page 20 because they involve a sets model of fractions. Students will need to count systematically and organise their data carefully.

A useful teaching point is the reduction of a fraction to its simplest form. For example, in question **1**, five of the 30 butterflies have stripes. This could be modelled as:

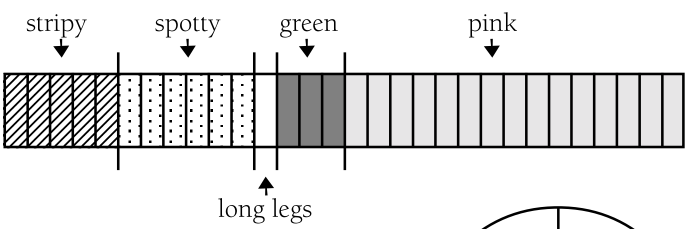


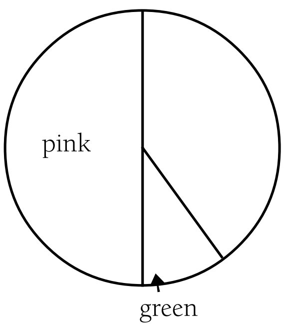
This model suggests $^1/_6$ is an equivalent fraction for $^5/_{30}$.

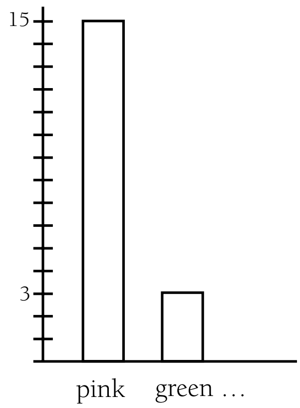
Numerically this can be recorded as

$$\overset{\div 5}{\underset{\div 5}{^5/_{30} = {}^1/_6}} \quad \text{or} \quad \overset{\times 5}{\underset{\times 5}{^1/_6 = {}^5/_{30}}}$$

Students may graph the characteristics of the butterflies using bar, strip, or pie graphs. This will provide a useful connection between fractions and data handling (statistics).







Page 22: Dividing Dough

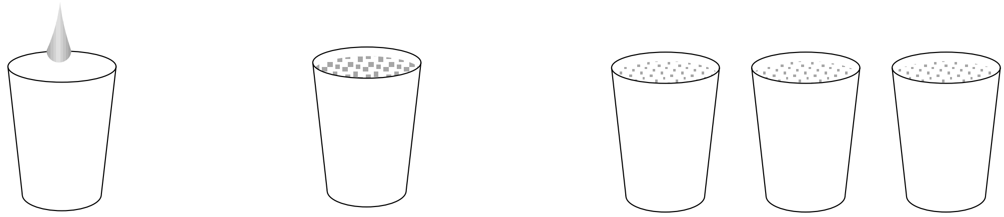
Achievement Objective

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

Activity

Students will need to understand that the term "parts" refers to equal amounts. In the first question, the amounts are measured by volume or capacity, that is, 100 mL of water must be mixed with the same volume of salt and three times that volume of flour.

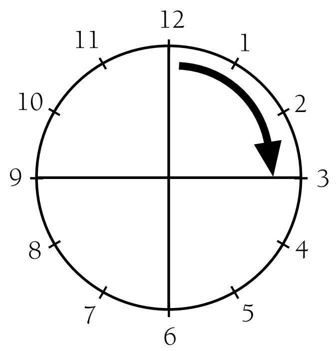
Note that 1 mL equals 1 cm^3, often written as 1 cc. Students will need access to flour, salt, and water. Ensure that they organise the correct amounts before they are mixed.



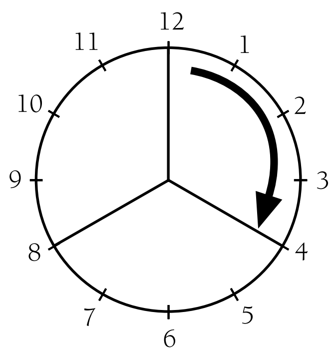
The above diagram is also useful for students attempting question **2**.

Since Jessie has doubled the amount of flour, she must also double the amount of salt, that is, 2 parts salt : 6 parts flour.

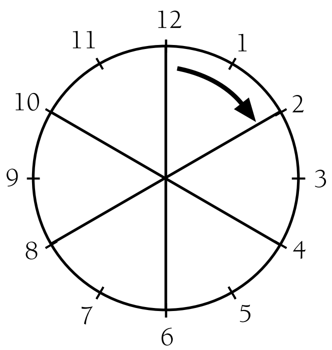
Question **3** asks students to relate fractions to turns of the minute hand of a clock face. Previous experience with folding paper circles is very useful here (see the activities on page 17).



One-quarter of an hour is 15 minutes because 60 divided by 4 = 15



One-third of an hour is 20 minutes because 60 divided by 3 = 20



One-sixth of an hour is 10 minutes because 60 divided by 6 = 10

Students will need to know that 15:00 on a microwave indicates a cooking period of 15 minutes.

Page 23: Don't Ditch the Boat

Achievement Objectives

- write and solve story problems which involve halves, quarters, thirds, and fifths (Number, level 2)
- write and solve story problems which require a choice of any combination of the four arithmetic operations (Number, level 2)

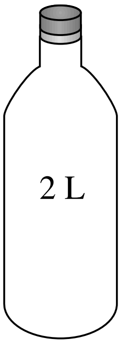
Activity

Providing students with a physical model of the problem, that is, a full 2 litre bottle of water, 1 kilogram of Plasticine or play dough, and a jar of 20 counters, will help them to work through the problem by identifying the important information.

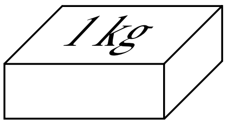
For five sailors, 2 litres of water, 1 kilogram of survival slab, and 20 pills must last for 2 days.

Suggest that students consider each of the rations separately. A logical path to the solution might be:

Five people for 2 days requires 10 equal parts (tenths).



2 litres is 2000 millilitres.
2000 ÷ 10 = 200 mL
per person per day



One kilogram is 1000 grams.
1000 ÷ 10 = 100 g
per person per day

20 ÷ 10 = two pills per person per day

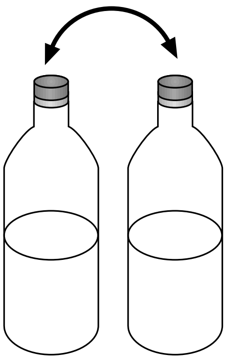
Some students may divide the ratios in half to get a daily amount and then divide this amount into fifths. Similar reasoning can be applied to the situation in question **4**, where there are four people in the boat.

2000 mL ÷ 8 = 250 mL per person per day (water)

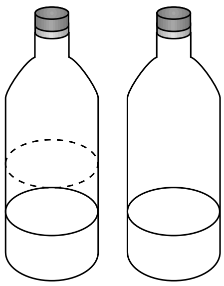
1000 g ÷ 8 = 125 g per person per day (survival slab)

20 ÷ 8 = $2\frac{1}{2}$ pills per person per day (vitamins)

Students who are not familiar with metric units are likely to use innovative ways to divide the amounts. For example, eighths of a 2 litre bottle can be found by:



first pouring the contents of a full 2 litre bottle into an empty 2 litre bottle until the amounts equate, and then



pouring the contents of a half-full 2 litre bottle into an empty 2 litre bottle until the amounts equate.

Repeat the pouring with quarters of a bottle to get eighths.

Page 24: Job Sharing

Achievement Objectives

- write and solve story problems which involve halves, quarters, thirds, and fifths (Number, level 2)
- write and solve story problems which require a choice of any combination of the four arithmetic operations (Number, level 2)

Activity

This activity prepares students for decimals and builds on the circle activities from page 17.

Students may solve the sharing problems in a variety of ways. Encourage them to reason efficiently. In question **1a**, a student might use 100 counters and divide these into equal subsets to find how much each child receives. Although this is effective in getting the solution, it is cumbersome. Another method might be to find equal amounts that add to the total amount. For example, Rob and Sue will get 50 cents each because 50 + 50 = 100. The most efficient method is to use division, for example, 100 ÷ 2 = 50.

In question **1d**, when three people share $2, students should realise that 65 cents is the closest possible solution. This will leave 5 cents over.

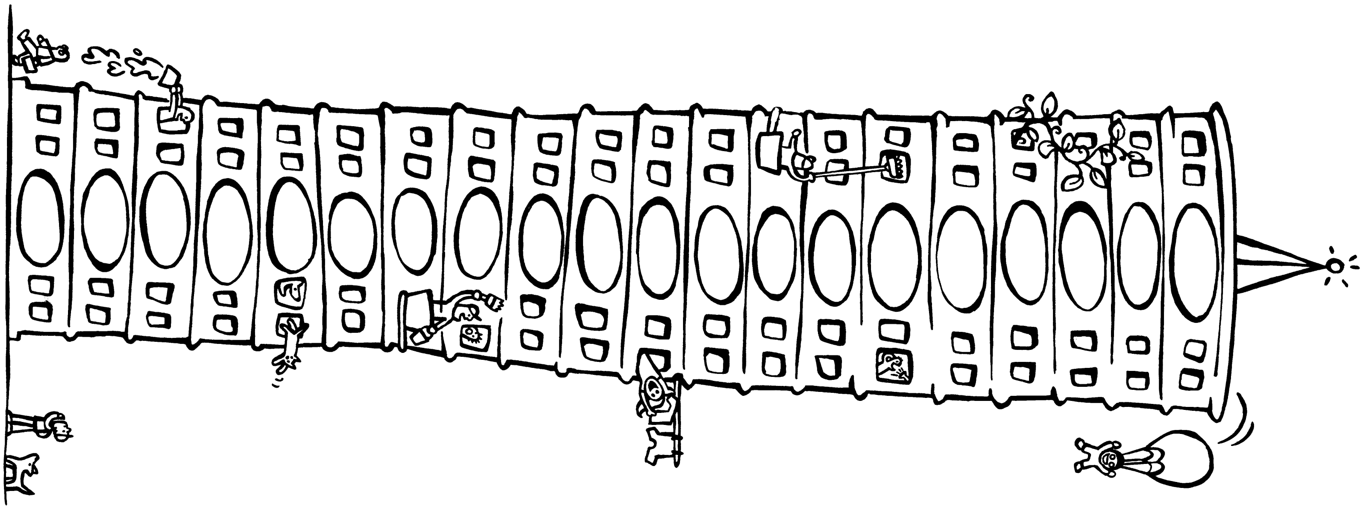
Writing the amounts in money form is useful preparation for decimals. For example, one half of a dollar is 50 cents, which can be written as $0.50.

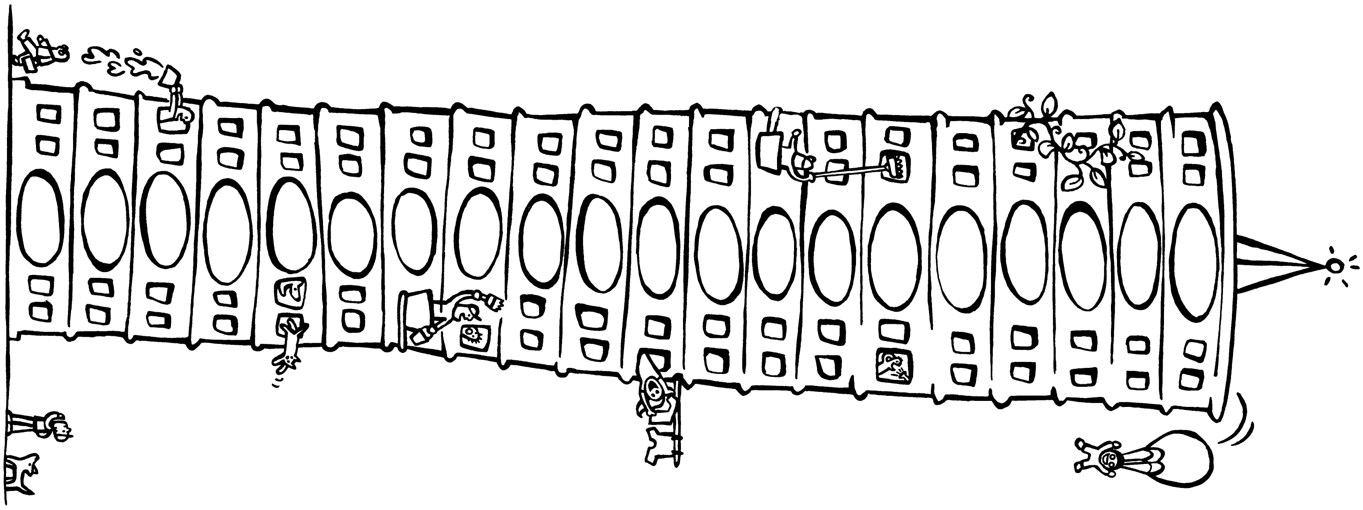
Copymaster: **Happy Hundreds**

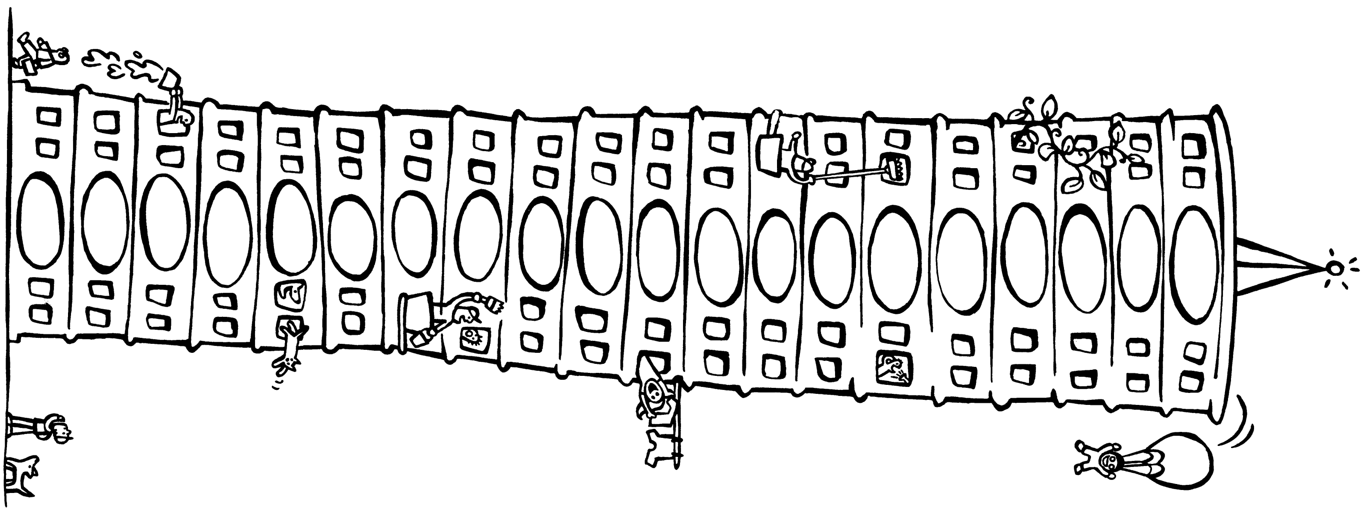
1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

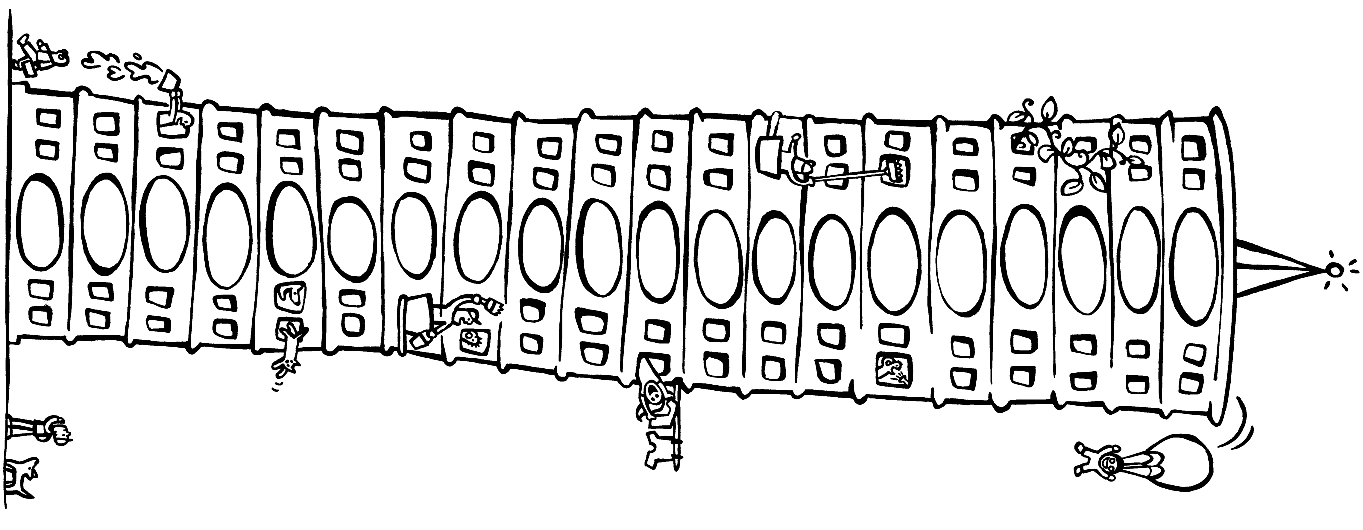
1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

Copymaster: Going Up









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