

Mathematics Class 6

Term 1



Teacher's Guide

Ministry of Education, Youth & Sports
Bikenibeu, Tarawa, Republic of Kiribati

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UNIT 1: PLACE VALUE

Lesson 1: Introducing the Denary/Decimal System

Outcome

Identify and explain the concept of the denary/decimal system.

Teaching Aids

Teaching for Understanding

Allow children to sit in front and count using the denary system.

Count in 2's, 3's, 5's and 10's from 0 to 50 or 100.

Then let them count using the denary/decimal system, including decimals in tenths and hundredths from 0 to 10.

0.1, 0.2, 0.3, 0.4, 0.5, 0.6, 0.7, 0.8, 0.9, 1.0, 1.1, 1.2,

0.2, 0.4, 0.6, 0.8, 1.0, 1.2, 1.4, 1.6, 1.8, 2.0, 2.2,

0.5, 1.0, 1.5, 2.0, 2.5, 3.0, 3.5, 4.0, 4.5, 5.0, 5.5, 6.0,

0.05, 0.10, 0.15, 0.20, 0.25, 0.30, 0.35, 0.40,

When a number is written in the denary/decimal system, it uses base ten. The values of the places to the left of the decimal point increase by a factor of 10 as in units, tens, hundreds and so on. The number value to the right of the decimal point decreases by a factor of 10 as in tenths, hundredths, etc.

For example: 9803.8, read as nine thousand, eight hundred and three point eight, is equivalent to:

$$(9 \times 1000) + (8 \times 100) + (0 \times 10) + (1 \times 3) + (8 \times \frac{1}{10})$$

↓ ↓ ↓ ↓ ↓
9 8 0 3 • 8

Thousands	hundreds	tens	units	tenths
-----------	----------	------	-------	--------

Group Work

Group 1: Complete the following

- a) 1.01, 1.03, 1.05, **1.07, 1.09, 1.11, 1.13, 1.15**
- b) 2.02, 2.04, **2.06, 2.08**, 2.10, **2.12, 2.14, 2.16**

What is the value of 5 in these numbers?

- a) 254.06 **tens**
- b) 537.14 **hundreds**
- c) 3642.35 **hundredths**
- d) 7261.52 **tenths**

Group 2: Complete the following:

- a) 3.31, 3.33, 3.35, **3.37, 3.39, 3.41, 3.43, 3.45, 3.47**
- b) 5.52, 5.54, **5.56, 5.59, 5.60, 5.62, 5.64, 5.68, 5.70**

What is the value of 3 in these numbers?

- a) 304.5 **hundreds**
- b) 643.64 **tens**
- c) 2456.73 **hundredths**
- d) 7241.35 **tenths**

Group 3: Complete the following:

- a) 11.1, 11.3, **11.5, 11.7, 11.9, 12.1, 12.3, 12.5, 12.7**
- b) 20.92, 20.94, **20.96, 20.98, 21.00, 21.02, 21.04, 21.06, 21.08**

What number is equivalent to the following?

- a) $(3 \times 100) + (4 \times 10) + (6 \times 1) + (2 \times \frac{1}{10}) + (8 \times \frac{1}{100})$ **346.28**
- b) $(7 \times 1000) + (2 \times 100) + (0 \times 10) + (3 \times 1) + (7 \times \frac{1}{10})$ **7203.7**

Individual Application

Write these numbers in another form.

- 1. 40.35 **$(4 \times 10) + (0 \times 1) + (3 \times \frac{1}{10}) + (5 \times \frac{1}{100})$**
- 2. 143.8 **$(1 \times 100) + (4 \times 10) + (3 \times 1) + (8 \times \frac{1}{10})$**
- 3. 2431.05 **$(2 \times 1000) + (4 \times 100) + (3 \times 10) + (1 \times 1) + (0 \times \frac{1}{10}) + (5 \times \frac{1}{100})$**
- 4. 92,534.718 **$(9 \times 10000) + (2 \times 1000) + (5 \times 100) + (3 \times 10) + (4 \times 1) + (7 \times \frac{1}{10}) + (1 \times \frac{1}{100}) + (8 \times \frac{1}{1000})$**

Additional Exercise

- 1. Write the place value of the digit underlined.

- a) 4.57 **7 hundredths**
- b) 1.14.09 **1 tenths**
- c) 918.42 **9 hundreds**
- d) 2156.62 **2 hundredths**
- e) 723.35 **3 tenths**
- f) 29845.67 **2 thousands**

Lesson 2: Reading and Writing Numbers Shown on the Abacus

Outcome

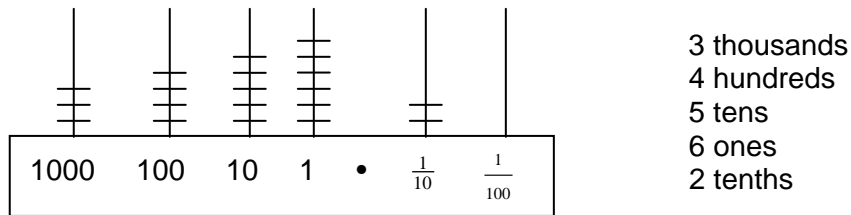
Read, write and identify numbers on the abacus.

Teaching Aids

Abacus with beads used for counting

Teaching for Understanding

Show the number 3456.2 on the abacus. A child gives the value of each digit.



Ask a child to show 5 2 1 . 3 on the abacus.

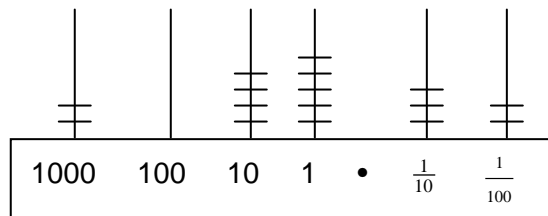
Ask five more children to show these numbers on the abacus.

3604.24, 215.24, 605.05, 5210.37 and 567.64

Group Work

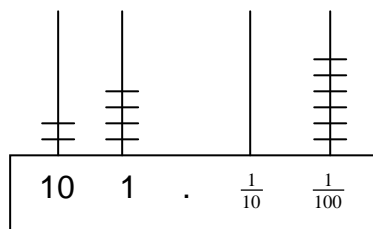
In groups of five, children do the following activities.

1. What is the number shown on the abacus? **2045.32**

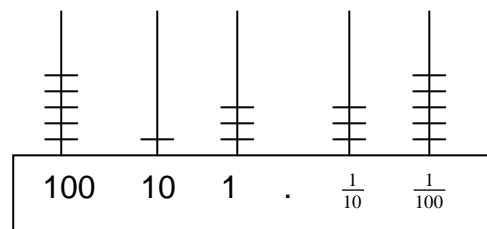


2. Show these numbers on the abacus.

(a) 24.06



(b) 513.35



3. What is the value of each digit in these numbers?

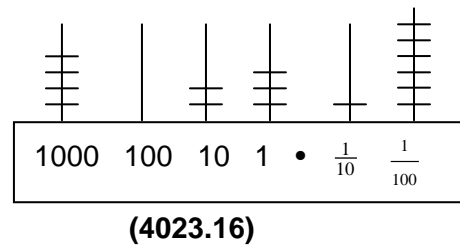
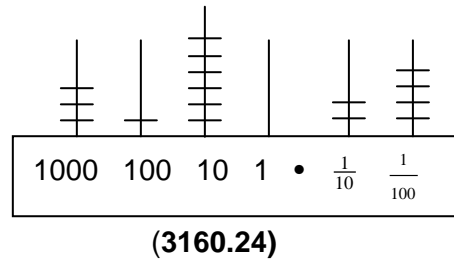
e.g. 25.6 → 2 tens, 5 ones and 6 tenths

a) 243.5 **2 hundreds, 4 tens, 3 ones and 5 tenths**

b) 6472.38 **6 thousands, 4 hundreds, 7 tens, 2 ones, 3 tenths and 8 hundredths**

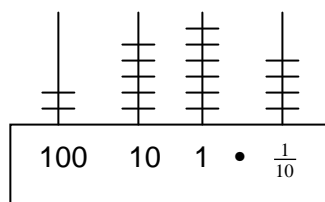
Individual Application

1. What are the numbers shown on the abacus?

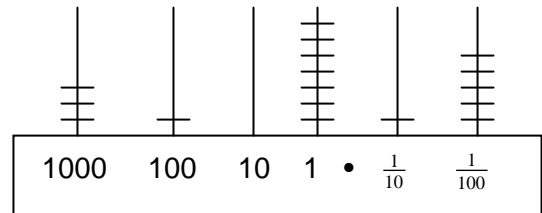


2. Show these numbers on the abacus.

- a) 256.4



- b) 3107.15



3. What are the values of the digits in these numbers?

- | | | |
|----|---------|---|
| a) | 82.73 | 8 tens, 2 ones, 7 tenths and 3 hundredths |
| b) | 423.5 | 4 hundreds, 2 tens, 3 ones and 5 tenths |
| c) | 5317.06 | 5 thousands, 3 hundreds, 1 tens, 7 ones and 6 hundredths |

Additional Exercise

1. What is the value of the digit underlined in each of the following numbers?

- | | | |
|----|------------------|---------------------|
| a) | 4 <u>3</u> 6.2 | 3 tens |
| b) | 3751. <u>6</u> 2 | 2 hundredths |
| c) | <u>6</u> 257.34 | 6 thousands |
| d) | 203 <u>5</u> .7 | 5 ones |

2. Write these numbers in figures.

- | | | |
|----|---|---------------|
| a) | 3 hundreds, 4 tens and one tenth | 340.1 |
| b) | 5 hundreds, 6 ones, 3 tenths and 4 hundredths | 506.34 |

Lesson 3: Reading and Writing Numbers Including Decimals to Three Decimal Places

Outcome

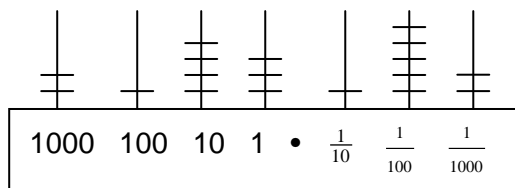
Read and write numbers to three decimal places.

Teaching Aids

Abacus with counters, number cards

Teaching for Understanding

Gather children in the front of the classroom and show them the abacus with counters.



The number shown on the abacus is **2143.152**.

The value of each digit shown is equivalent to:

$$(2 \times 1000) + (1 \times 100) + (4 \times 10) + (3 \times 1) + (1 \times \frac{1}{10}) + (5 \times \frac{1}{100}) + (2 \times \frac{1}{1000})$$

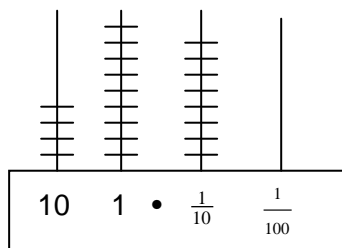
$$\rightarrow 2000 + 100 + 40 + 3 + .1 + .05 + .002$$

$$\rightarrow 2143.152$$

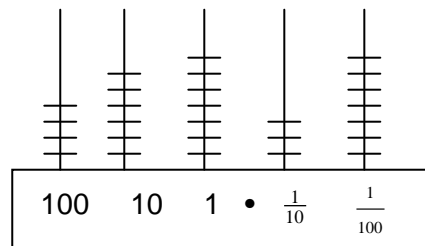
Group Work

Working in groups of six, children show the following numbers on the abacus.

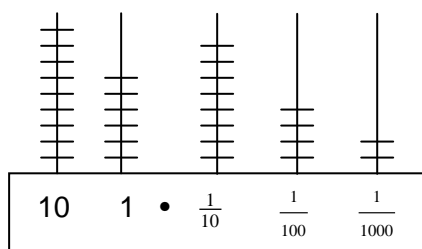
1. 49.8



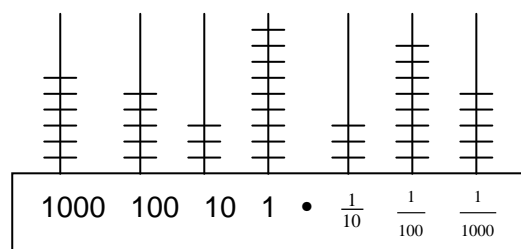
2. 467.37



3. 96.842



4. 6539.385



Individual Application

1. What is the value of each digit in these figures?

a) 352.34 $(3 \times 100) + (5 \times 10) + (2 \times 1) + (3 \times \frac{1}{10}) + (4 \times \frac{1}{100})$

b) 4258.43 $(4 \times 1000) + (2 \times 100) + (5 \times 10) + (8 \times 1) + (4 \times \frac{1}{10}) + (3 \times \frac{1}{100})$

c) 5364.247 $(5 \times 1000) + (3 \times 100) + (6 \times 10) + (4 \times 1) + (2 \times \frac{1}{10}) + (4 \times \frac{1}{100}) + (7 \times \frac{1}{1000})$

d) 8293.563 $(8 \times 1000) + (2 \times 100) + (9 \times 10) + (3 \times 1) + (5 \times \frac{1}{10}) + (6 \times \frac{1}{100}) + (3 \times \frac{1}{1000})$

2. What are the numbers shown on the chart?

Thousands	Hundreds	Tens	Ones	Tenths	Hundredths	Thousandths	Number
	3	6	4	3	0	1	364.301
2	0	5	6	2	7		2056.27
5	4	6	0	0	5	3	5460.053
7	5	2	3	0	6		7523.06
3	9	0	8	4	2	6	3908.426

Additional Exercise

1. What is the number shown on the abacus? **3524.067**

thousands	hundreds	tens	ones	tenths	hundredths	thousandths

2. Write these numbers in another form.

eg. 245.63 $\rightarrow (2 \times 100) + (4 \times 10) + (5 \times 1) + (6 \times \frac{1}{10}) + (3 \times \frac{1}{100})$
 $\rightarrow 200 + 40 + 5 + .6 + .03$

a) 523.45 $(5 \times 100) + (2 \times 10) + (3 \times 1) + (4 \times \frac{1}{10}) + (5 \times \frac{1}{100})$

b) 3614.37 $(3 \times 1000) + (6 \times 100) + (1 \times 10) + (4 \times 1) + (3 \times \frac{1}{10}) + (7 \times \frac{1}{100})$

c) 7258.639 $(7 \times 1000) + (2 \times 100) + (5 \times 10) + (8 \times 1) + (6 \times \frac{1}{10}) + (3 \times \frac{1}{100}) + (9 \times \frac{1}{1000})$

Lesson 4: Reading and Writing Numbers to One Million

Outcome

Read, count and write numbers to one million.

Identify numbers in hundreds of thousands to one million.

Teaching Aids

Number chart in thousands up to one million

Teaching for Understanding

Let children sit in the front of the classroom and count in thousands, ten thousands and hundred thousands to one million in ascending and descending order. Write on the blackboard, 11,000, 12,000, ____, 14,000. Ask, What is the missing number? You have to identify the pattern first, which is that you add 1000 to 11,000 to get 12,000. So the pattern is to add 1,000 to get the next number.

Group Work

Divide children into three or four groups. Let them sit in lines. Children who sit in the front now will stand and face the back. Once you bang on the board, they will turn back and call out the number you point to. The first one to say the number correctly will get a point for his/her group.

Individual Application

1. Write numbers that come between these numbers.
 - a) 12,000, **13,000**, **14,000**, **15,000**, **16,000**, 17,000
 - b) 20,250, 20,500, **20,750**, **21,000**, **21,250**, **21,500**, 21,750
 - c) 200,000, 400,000, **600, 000**, **800,000**, **1,000,000**, 1,200,000.
2. Circle any number which is greater than 19,000.
13,000 17,000 19,500 2500 21,00
3. Underline the number that comes before 910,000.
280,000 980,000 810,000 920,000 750,000

Additional Exercise

Study the pattern, then find the missing number.

1. 10,000, 12,000, 14,000, **16,000**, **18,000**, **20,000**, 22,000
2. 61,000, 63,000, **65,000**, **67,000**, 69,000, **71,000**
3. 550,000, **570,000**, 590,000, **610,000**, 630,000
4. 920,000, **940,000**, 960,000, **980,000**, **1,000,000**.

Lesson 5: Writing Numbers in Expanded Form

Outcome

Write numbers in expanded form.

Teaching for Understanding

Invite the children to sit in the front of the classroom. Let them count in hundred thousands up to one million. Write 141,258 on the board and let the children read it aloud. Briefly explain how to write that figure in expanded form.

$$141,258 = (1 \times 100,000) + (4 \times 10,000) + (1 \times 1,000) + (2 \times 100) + (5 \times 10) + (8 \times 1) \\ 100,000 + 40,000 + 1,000 + 200 + 50 + 8$$

To confirm the answer, they have to add all the numbers. They will get the same figure. Do several examples.

Group Work

Put the class into three groups. Each member of the group must do his/her work in his/her exercise book after working out the answers together.

Write these numbers in expanded form.

1. 290,450 **$(2 \times 100,000) + (9 \times 10,000) + (4 \times 100) + (5 \times 10)$**
 $200,000 + 90,000 + 400 + 50$
2. 910,568 **$(9 \times 100,000) + (1 \times 10,000) + (5 \times 100) + (6 \times 10) + (8 \times 1)$**
 $900,000 + 10,000 + 500 + 60 + 8$
3. 398,674 **$(3 \times 100,000) + (9 \times 10,000) + (8 \times 1,000) + (6 \times 100)$**
 $+ (7 \times 10) + (4 \times 1)$
 $300,000 + 90,000 + 8,000 + 600 + 70 + 4$

Individual Application

Find the missing numbers.

1. 698,343 = 600,000 + **90,000** + 8,000 + **300** + 40 + **3**
2. 999,898 = 900,000 + 90,000 + **9,00** + 800 + **90** + 8
3. 16,453 = 10,000 + **6,000** + 400 + **50** + 3
4. 87,354 = **80,000** + 7,000 + **300** + 50 + **4**.

Lesson 6: Writing Numbers including Decimals in Expanded Form

Outcome

Write numbers including decimals in expanded form.

Teaching for Understanding

Invite children to sit in the front of the classroom. Write 16,235.825 on the board. Allow the children to say the number correctly. Then show them how to write the figure in expanded form.

eg. 16,235.825

$$10,000 + 6000 + 200 + 30 + 5 + 0.8 + 0.02 + 0.005$$

To check their answers, they should write all the numbers of the expanded form in columns and add them.

$$\begin{array}{r} \text{eg. } 10,000 \\ 6,000 \\ 200 \\ 30 \\ 5 \\ 0.8 \\ 0.02 \\ + 0.005 \\ \hline 16,235.825 \end{array}$$

If their answer is the standard, non-expanded number with which they started (16,235.825), the work has been done correctly.

Group Work

In groups of five or six, children work together to write the numbers below in expanded form.

1. 7634.936 **(7000 + 600 + 30 + 4 + 0.9 + 0.03 + 0.006)**
2. 98534.05 **(90,000 + 8000 + 500 + 30 + 4 + 0.05)**
3. 1863453.714 **(1,000,000 + 800,000 + 60,000 + 3,000 + 400 + 50 + 3 + 0.7 + 0.01 + 0.004)**

Individual Application

Write the numbers in expanded form:

1. 2581.809 **(2000 + 500 + 80 + 1 + 0.8 + 0.009)**
2. 17394.85 **(17,000 + 300 + 90 + 4 + 0.8 + 0.05)**
3. 423689.937 **(423,000 + 600 + 80 + 9 + 0.9 + .03 + 0.007)**
4. 846257.643 **(846,000 + 200 + 50 + 7 + 0.6 + 0.04 + 0.003)**

Additional Exercise

Find the missing numbers:

1. 4321.35 = 4000 + **300** + 20 + **1** + 0.3 + **0.5**
2. 634957.08 = **600,000** + 30,000 + 4,000 + **900** + 50 + 7 + **0.8**
3. **5321.83** = 5000 + 300 + 20 + 1 + 0.8 + 0.03
4. **759423.9** = 700,000 + 50,000 + 9000 + 400 + 200 + 30 + 0.9

Lesson 7: Rounding Down Numbers Including Decimals

Outcome

Round down numbers including decimals.

Teaching for Understanding

Gather all the children in the front of the classroom. Show them the rule for rounding down numbers including decimals.

Write this figure 241.434 on the board. To round down the figure to two decimal places follow this rule.

1. Look at the number in the third decimal place.
2. If is less than 5, do not change the number in the second decimal place.

To round down the figure to one decimal place, follow the same procedure as above. Then look at the number in the second decimal place. If it is less than 5, do not change it.

Example:

241.434
↓
241.43 → 2 decimal places

241.434
↓
241.4 → 1 decimal place

Group Work

Let the children work in four or five groups.
They round down the following to one decimal place.

1. 26.342 **26.3**
2. 9894.63 **9894.6**
3. 100.62 **100.6**
4. 63.94 **63.9**

Individual Application

Round down these numbers to two decimal places.

1. 26.043 **26.04**
2. 123.1221 **123.12**
3. 64391.321 **64391.32**
4. 904321.243 **904321.24**

Lesson 8: Rounding Up Numbers Including Decimals

Outcome

Round up numbers if the digit to the right of the number is 5 or more than 5.

Teaching for Understanding

Briefly review the idea of rounding down numbers. Then show them the rule to round up the numbers, that is, if the number to the right is 5 or more than 5, then increase the number.

Examples:

1. Round up to the nearest 100

468 → 500
580 → 600

2. Round up the number to 2 decimal places.

Look at the third decimal place
3.227
= 3.23

Group Work

In groups of five or six, children work out numbers 1 to 4. Group members work together but record the answers individually.

Walk around to assess each group's work.

Round up to the nearest 1000.

- | | | |
|----|------|-------------|
| 1. | 3536 | 4000 |
| 2. | 8900 | 9000 |
| 3. | 1549 | 2000 |
| 4. | 7830 | 8000 |

Individual Application

Round off these numbers to the nearest unit.

- | | | |
|----|----------|---------------|
| 1. | 8.9 | 9 |
| 2. | 12.7 | 13 |
| 3. | 19.5 | 20 |
| 4. | 102.7 | 103 |
| 5. | 4083.6 | 4084 |
| 6. | 984326.8 | 984327 |

Lesson 9: Rounding Off Numbers Including Decimals

Outcome

Apply the rules of rounding as follows :

- If the digit to the right of the number is 5, 6, 7, 8 or 9, round up.
- If the digit to the right of the number is 0, 1, 2, 3 or 4, round down.

Teaching for Understanding

Briefly review the idea of rounding down and rounding up on the board. Write several numbers on the board and ask children to work out which numbers are to be rounded up and which are to be rounded down.

eg: 1.5 215
 13.4 493
 649 29.05
 19 100

Group Work

In groups of five, children work out numbers 1 to 5 together. Individuals record the answers in their exercise books.

- | | | | |
|----|---------|-----------------------------------|---------------|
| 1. | 6900 | round off to the nearest thousand | 7000 |
| 2. | 17.045 | round off to 2 decimal places | 17.05 |
| 3. | 125 | round off to the nearest ten | 130 |
| 4. | 60.4334 | round off to 3 decimal places | 60.433 |
| 5. | 2.37 | round off to 1 decimal place | 2.4 |

Lesson 10: Assessment

Group Work

Put children in groups of four or five to work out the following :

- | | | |
|----|---|--------------------------|
| 1. | What is the value of 4 in the number 4,000,000? | 4 million |
| 2. | What is the value of 0 in the number 498,032? | 0 hundreds |
| 3. | What is the value of 9 in the number of 18.09? | 9 hundredths |
| 4. | What is the value of 3 in the number of 6.9003? | 3 ten thousandths |

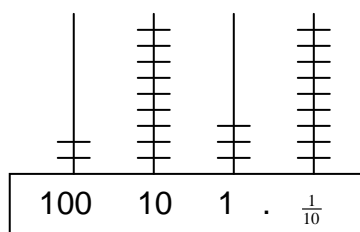
Individual Application

Write these numbers using expanded notation:

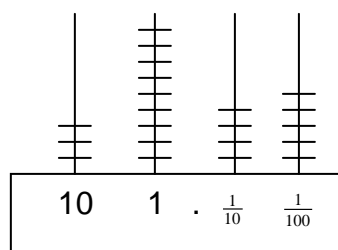
- | | | |
|----|------------|---|
| 1. | 19394.39 | (10,000 + 9,000 + 300 + 90 + 4 + $\frac{3}{10}$ + $\frac{9}{100}$) |
| 2. | 293456.004 | (200,000 + 90,000 + 3,000 + 400 + 50 + 6 + $\frac{4}{1000}$) |
| 3. | 639.58 | (600 + 30 + 9 + $\frac{5}{10}$ + $\frac{8}{100}$) |
| 4. | 173.25 | (100 + 70 + 3 + $\frac{2}{10}$ + $\frac{5}{100}$) |

Draw these numbers on the abacus.

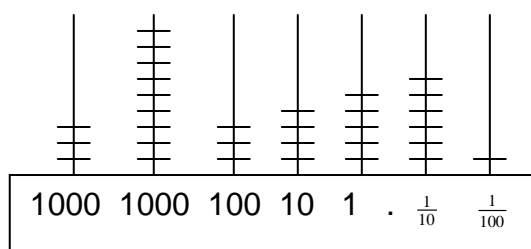
1. 293.9



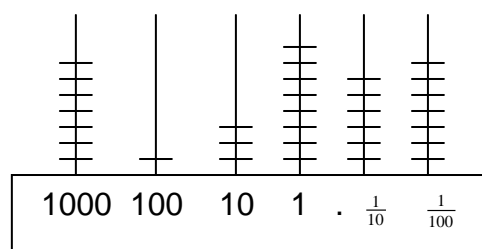
2. 39.45



3. 39345.61



4. 7138.67



Round off these numbers to the nearest unit.

- | | | | | | |
|----|--------|-------------|----|----------|---------------|
| 1. | 9.5 | 10 | 4. | 3.8 | 4 |
| 2. | 13.6 | 14 | 5. | 1.4 | 1 |
| 3. | 2005.7 | 2006 | 6. | 305934.3 | 305934 |

UNIT 2: WHOLE NUMBERS

Lesson 1: Introducing Whole Numbers in Kiribati

Outcome

Give Kiribati names for counting numbers.

Use Kiribati names for counting numbers correctly

Teaching Aids

A chart of Kiribati names for counting numbers, as below:

Counting in ones	teeu, uouu, teeniu, aau, nimau, oonou, itiu, waaniu, ruuai, tebwi teuana, uoua, teniua, aua, nimau, onoua, itiua, waniua, ruaiua, tebwina
Counting in twos	tiki toun tara bwati tati teera uua teen aanga niima tetaangana, uataanga, tentaanga, ataanga, nimataanga, onotaanga, ititaanga, wantaanga, ruataanga, tengaun tekirina, uakiri, tenikiri, akiri, nimakiri, onokiri, itikiri, wanikiri, ruakiri, tengaun tebwebwena, uabwebwe, tenibwebwe, abwebwe, nimabwebwe, onobwebwe, itibwebwe, wanibwebwe, ruabwebwe, tengaun
Counting in tens	tebwina, uabwi, tenibwi, abwi, nimabwi, onobwi, itibwi, wanibwi, ruabwi tebubua tengaun, uangaun, teningaun, angaun, nimangaun, onongaun, itingaun, waningaun, ruangaun, tebubua
Counting in spans	terakana, uaraka, tenraka, araka, nimaraka, onoraka, itiraka, wanraka, ruaraka, tengaun.
Counting in paces	terangatana, uarangata, tenrangata, arangata, nimarangata, onorangata, itirangata, wanrangata, ruarangata, tengaun

Counting in fathoms	tengaana, uangaa, teningaa, angaa, nimangaa, onongaa, itingaa, waningaa, ruangaa, tengaun
Counting in pieces	temwakorona, uamwakoro, tenimwakoro, amwakoro, nimamwakoro, onomwakoro, itimwakoro, wanimwakoro, ruamwakoro, tengaun
Counting in fractions	temwanangina/ te iterana, kauamwakoro, katenimwakoro, kamwakoro, kanimamwakoro, kaonomwakoro, kaitimwakoro, kawanimwakoro, karuamwakoro
Counting in bundles	tebabatina, uababati, tenibabati, ababati, nimababati, onobabati, itibabati, wanibabati, ruababati, tengaun teamwiina, uaamwi, tennamwi, amwi, nimaamwi, onomwi, itimwi, wanimwi, ruamwi, tengaun teritorona, uaritoro, tenritoro, aritoro, nimaritoro, onoritoro, itiritoro, wanritora, ruaritora, tengaun tebwatikuna, uabwatiku, tenibwatiku, abwatiku, nimabwatiku, onobwatiku, itibwatiku, wanibwatiku, ruabwatiku, tengaun teungina, uaung, teniung, aung, nimaung, onoung, itiung, waniung, ruaung, tengaun

Teaching for Understanding

Children read from the counting chart above. Explain the chart and give an example of each form of counting to the children. Choose the Kiribati counting names for stones, couples, coconuts, string and pieces of bread and count each from 1 to 20. Point out that the counting of coconuts is done in a different way : tebwina, uabwi, tenibwi, abwi, nimabwi, onobwi, itibwi, wanibwi, ruabwi, tebubua again means hundreds.

Group Work

Divide children into six groups. Each group will complete the table:

Group 1:

No. of people numerals	Married couples	Twins
2	Tetaangana	Tebwebwena
4	Uataanga	Uabwebwe
16	Wantaanga	Wanibwebwe
38	Tengaun ma ruataanga	Tengaun ma ruabwebwe

Group 2:

Numbers	Kiribati Words
1	tengaana
3	teninga
12	tengaun ma uanga
99	ruangaun ma ruanga
20	uangaun ma te ngaa

Group 3:

Numbers	In Words
97 te raka	ruangaa ma itiraka
16 terangata	tengaun ma onorangata
65 teraka	onongaun ma nimaraka
12 te rangata	tengaun ma uarangata
58 te raka	nimagaun ma wanraka
41 terangata	angaun ma te rangatana

Group 4:

Numbers	Kiribati Words
10 coconuts	tebwina
12 coconuts	tebwi ma uoua
100 coconuts	tengaun
30 coconuts	tenibwi
500 coconuts	nimangaun

Group 5:

Numbers	In Words
1 teiri	teirina
11 te ung	tengaun ma teungina
35 te iri	teningaun ma nimairi
47 te ung	angaun ma itiung
12 te iri	tengaun ma uairi

Group 6:

Numbers	In Words
7 te babati	itibabati
18 te amwi	tengaun ma wannamwi
69 te babati	onongaun ma ruababati
42 te amwii	angaun ma uamwi
16 te babati	tengaun ma onobabati

Individual Application

Write in Kiribati words:

- | | | | |
|----|--------------------------------|---|---------------------------------------|
| 1. | $2\frac{1}{2}$ loaves of bread | = | uaai ao te makorona |
| 2. | 2,698 | = | uoua te nga, onobubua ruabwi ma wanua |
| 3. | 20 fathoms of string | = | uangaun te kora |
| 4. | 53 spans | = | nimangaun ma tenraka |
| 5. | 40 coconuts | = | abwi te ben |
| 6. | 3 couples | = | ten taanga |

Additional Exercise

- Name 2 common objects counted in ones **te ben, te raurau etc.**
- Write 2 ways of counting twins. **te bwebwena**
- Write these numbers in Kiribati words.
 - 400 coconuts = **abubua te ben**
 - 12 375 = **tebwi ma uoua tenga, tenibubua itibwi ma nimaua**
 - $\frac{3}{4}$ = **tenua ni kamakoro**

Lesson 2: Read and Write Kiribati Numbers

Outcome

Read and write numbers in Kiribati.
Use the Kiribati names for numbers correctly.

Teaching Aids

A chart prepared with drawings as follows:



Teaching for Understanding

Let the children find the correct Kiribati counting name for each object in the picture above and count from 1 to 15 using that Kiribati name with your help.

For example: counting pandanus fruits → teirina, uairi, teniri
counting pencils → teaina, uaai, tenai

Group Work

Put children in their groups.

They name things that can be counted using the following Kiribati counting names.

- | | | |
|----|-----------|-------------------|
| 1. | teaina | te ba |
| 2. | tekorana | te kaue |
| 3. | teamwiina | te moimoto |
| 4. | temanna | te ika |

Individual Application

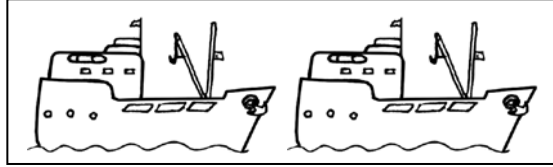
Write up to 15 :

- | | | |
|----|----------|---|
| 1. | teirina | teirina, uairi, teniri, aairi, nimairi, onoiri, itiiri, waniiri, ruairi, tengaun, tengaun ma te irina, tengaun ma uairi, tengaun ma teniiri, tengaun ma aairi, te ngaun ma nimairi. |
| 2. | tekorana | tekorana, uakora, tenikora, akora, nimakora, onokora, itikora, wanikora, ruakora, tengaun, tengaun ma tekorana, tengaun ma uakora, tengaun ma tenikora, tengaun ma akora, tengaun ma nimakora. |
| 3. | tekuona | tekuona, uakuo, tenikuo, akuo, nimakuo, onokuo, itikuo, wanikuo, ruakuo, tengaun, tengaun ma tekuona, tengaun ma uakuo, tengaun ma akuo, tengaun ma nimakuo |
| 4. | tewaana | tewaana, uowaa, teniwaa, awaa, nimawaa, onowaa, itiwaa, waniwaa, ruawaa, tengaun, tengaun ma tewana, tengaun ma uowaa, tengaun ma teniwaa, tengaun ma awaa, tengaun ma nimawaa |
| 5. | tebaana | tebaana, uobaa, tenibaa, abaa, nimabaa, onobaa, itibaa, wanibaa, ruabaa, tengaun, tengaun ma tebaana, tengaun ma uobaa, tengaun ma tenibaa, tengaun ma abaa, tengaun ma nimabaa |
| 6. | tekaina | tekaina, uakai, tenikai, akai, nimakai, onokai, itikai, wanikai, ruakai, tengaun, tengaun ma tekaina, tengaun ma uakai, tengaun ma tenikai, tengaun ma akai, tengaun ma nimakai |

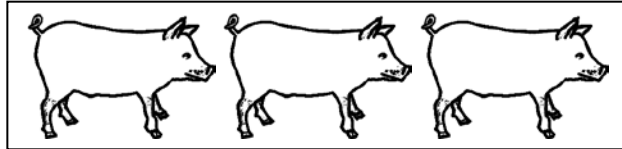
Additional Exercise

Write in words.

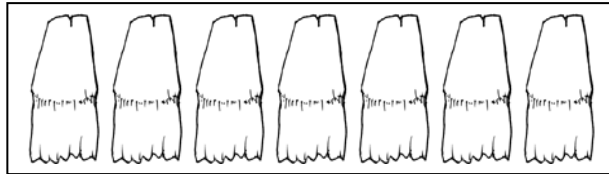
1.



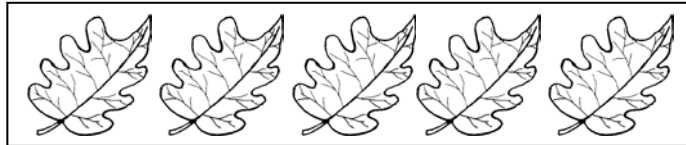
2.



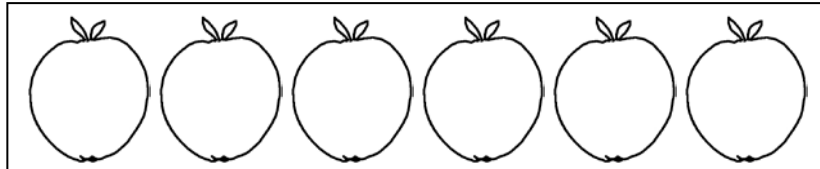
3.



4.



5.



Lesson 3: Even and Odd Numbers

Outcome

List even and odd numbers.

Identify which number is even and which is odd.

Teaching Aids

Counting numbers 1 to 100 written on a chart.

Teaching for Understanding

Children read the counting numbers on the chart. Explain that a number divisible by 2 without a remainder is an even number and a number divisible by 2 with a remainder is an odd number. Children read out the first 25 even numbers and you draw a circle round each of them. Children read out the first 25 odd numbers and you draw a square round each of them.

Group Work

Divide children into groups of four and give each group a chart and marker pen. Each group works out the other 25 even numbers and puts them in a big circle and works out the other 25 odd numbers and puts them in a big square. Each group will present its work when completed.

Individual Application

1. Here is a set of numbers:
5, 18, 36, 109, 42, 27, 56, 2003, 1901
Which of these are even numbers and which are odd numbers ?
2. Show your working out to find whether 2097 is even or odd.

Additional Exercise

1. List the even and odd numbers between 14 and 94.
2. Which of the following is true?
 - a) Even number = odd number + 1
 - b) Even number = odd number – 1
 - c) Odd number = even number + 1

Lesson 4: Prime Numbers

Outcome

Identify prime numbers.
Work out and find prime numbers.

Teaching Aids

Definition of Prime Numbers written on a chart as shown below :

Numbers which are only divisible by themselves and one are called Prime Numbers or Primes.

Teaching for Understanding

Explain the definition of Prime Numbers written on the chart.
Write the numbers 1 to 20 on the blackboard and ask a volunteer to come up and cross out 2 and the multiples of 2, a second volunteer to cross out 3 and the multiples of 3, and a third volunteer to cross out 5 and the multiples of 5.
Tell the children that the remaining numbers are Prime Numbers (Primes). A set of prime numbers is (2, 3, 5, 7, 11,)

Group Work

Divide the children into teams.
Write the numbers 41 to 60 on the blackboard and tell the groups to cross out multiples of 2, 3, 5 and 7.
A team will gain 20 marks when they get all the remaining prime numbers correct.

Individual Application

Copy and complete this table, showing the primes in each group of 10 numbers.

Group	Primes
0 - 9	2, 3, 5, 7
10 - 19	11, 13, 17, 19
20 - 29	23, 29
30 - 39	31, 37
40 - 49	41, 43, 47
50 - 59	51, 53, 57, 59
60 - 69	61, 67

Additional Exercise

Which of these numbers are primes?

113 121 123 133 209 211 143 13570

113, 123, 133, 209, 211

Lesson 5: Triangle Numbers

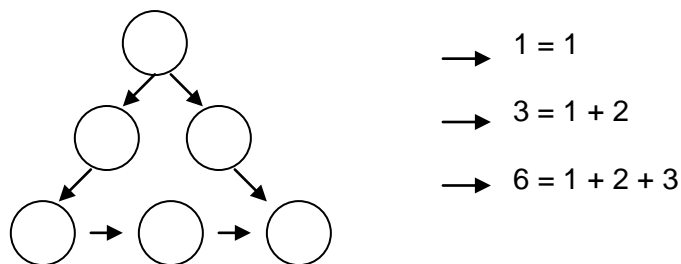
Outcome

Identify numbers and solve puzzles.

Form magic triangles.

Teaching Aids

Magic triangle drawn on blackboard or chart

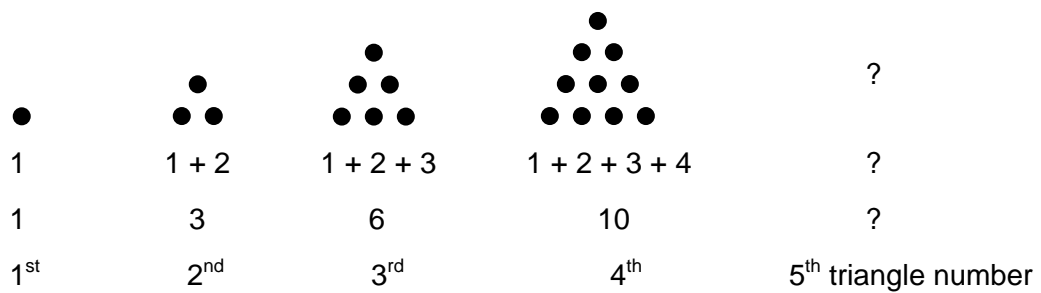


Teaching for Understanding

Show the magic triangle on the blackboard/chart to children.

Let them study the triangle pattern and the numbers which form the pattern.

Below are triangles with a similar pattern to the magic triangle shown.

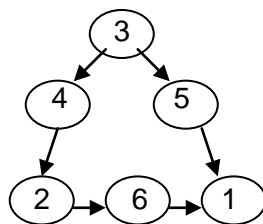


The numbers 1, 3, 6 and 10 can form triangular patterns of dots/circles. Such numbers are known as triangle numbers. Can the children complete the fifth triangle ?

Group Work

Put children in their teams.

- Each team draws triangular patterns for the 5th and 6th triangle numbers.
- Children in their teams draw a magic triangle using numbers 1, 2, 3, 4, 5 and 6 to fill in the six circles.



The total of the three numbers along the sides equals 9.

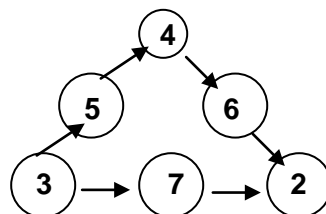
Each number is used once.

Three circles have been filled. Fill in the other three.

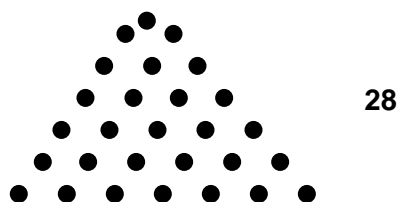
- Draw another magic triangle and fill in the six numbers to get the total 12 instead of 9.

Individual Application

- Fill in the circles with the numbers 2, 3, 4, 5, 6 and 7. The total along the each side equals 12.



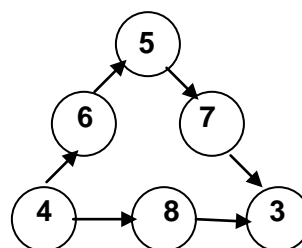
- Draw a triangular pattern to find the 7th triangle number.



3. Find the 8th triangle number. **36**

Additional Exercise

1. Draw a magic triangle using the numbers 3, 4, 5, 6, 7 and 8. The total along the three sides must equal 15.



2. Find the 10th triangle number. **55**

Lesson 6: Square Numbers

Outcome

Find and identify square numbers.

Teaching Aids

Prepare square patterns on the blackboard or chart, as in the following example.

Magic square

8	3	4
1	5	9
6	7	2

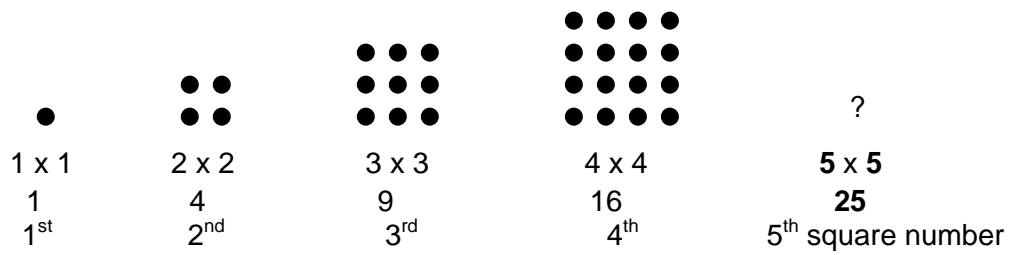
Teaching for Understanding

Ask the children to look at the magic square on the blackboard (above). Do not write in the numbers in bold type.

The numbers to be used to fill in the square are 1, 2, 3, 4, 5, 6, 7, 8, 9. You should use each number only once. The total of the three numbers along the sides and diagonally are equal. **(15)**

Work with the children to fill in the magic square using the numbers and rules given.

Then ask the children to study the square patterns below and find the 5th square number pattern.



Group Work

Put the children into groups of five.

Each group discusses and completes the magic squares.

1.

4	9	2
3	5	7
8	1	6

2	7	6
9	5	1
4	3	8

2	9	4
7	5	3
6	1	8

Individual Application

1. Complete these magic squares.

a)

8	1	6
3	5	7
4	9	2

b)

4	9	2
3	5	7
8	1	6

2. Complete the square pattern below.

$$\begin{array}{rcl}
 1 & = & 1 \\
 1 + 3 & = & 4 \\
 1 + 3 + 5 & = & 9 \\
 1 + 3 + 5 + 7 & = & 16 \\
 1 + 3 + 5 + 7 + 9 & = & 25
 \end{array}$$

Additional Exercise

1. Complete the magic square.

6	1	8
7	5	3
2	9	4

2. Complete the square pattern.

$$\begin{array}{rcl}
 & 1 + 2 + 1 & 4 \\
 1 + & 2 + 3 + 2 + 1 & 9 \\
 1 + 2 + & 3 + 4 + 3 + 2 + 1 & 16
 \end{array}$$

Lesson 7: Writing Numbers in Words

Outcome

Write the numbers in words correctly.

Teaching Aids

Counting chart :

Counting Numbers							
1	one	11	eleven	10	ten	100	hundred
2	two	12	twelve	20	twenty	1,000	thousand
3	three	13	thirteen	30	thirty	10,000	ten thousand
4	four	14	fourteen	40	forty	100,000	hundred thousand
5	five	15	fifteen	50	fifty	1,000,000	million
6	six	16	sixteen	60	sixty		
7	seven	17	seventeen	70	seventy		
8	eight	18	eighteen	80	eighty		
9	nine	19	nineteen	90	ninety		

Teaching for Understanding

Let children read the numbers from the chart. Help the children to write:

- 13,259 → **thirteen thousand, two hundred and fifty nine**
- 2,456,807 → **two million, four hundred and fifty six thousand, eight hundred and seventy**
- 731,416 → **seven hundred and thirty one thousand, four hundred and sixteen**

Group Work

Divide children into groups of five.

Each group will write these numbers in words.

- 28,012 → **twenty eight thousand and twelve**
- 1,321,649 → **one million, three hundreds and twenty-one thousand six hundreds and forty-nine**

- | | | | |
|----|------------|---|--|
| 3. | 4,603,360 | → | four million, six hundreds and three thousand, three hundreds and sixty |
| 4. | 25,050,008 | → | twenty five million fifty thousand and eight |

Individual Application

Write these numbers in words.

Example: 10,294,050 → ten million, two hundred and ninety four thousand and fifty.

- | | | | |
|----|-----------|---|--|
| 1. | 621,493 | → | six hundred and twenty one thousand, four hundred and ninety three |
| 2. | 4,609 | → | four thousand six hundred and ninety |
| 3. | 560,714 | → | five hundred and sixty thousand, seven hundred and fourteen |
| 4. | 4,219,104 | → | four million, two hundred and nineteen thousand, one hundred and four |

Additional Exercise

Write these numbers in words:

- | | | | |
|----|------------|---|---|
| 1. | 12,605 | → | twelve thousand, six hundred and five |
| 2. | 1,470,050 | → | one million, four hundred and seventy thousand and fifty |
| 3. | 403,127 | → | four hundred and three thousand, one hundred and twenty seven |
| 4. | 70,060,453 | → | seventy million, sixty thousand, four hundreds and fifty three |

Lesson 8: Writing Numbers in Figures

Outcome

Write the numbers in figures correctly.

Teaching Aids

Chart prepared for Lesson 7

Teaching for Understanding

Let children read the counting numbers from the chart. Help children to write:

- | | | |
|----|---|--------------------|
| 1. | nine hundred and thirteen thousand and forty | 913,040 |
| 2. | five hundred and seventy three million, sixty six thousand, one hundred and nine in numbers on the blackboard | 573,060,109 |
| 3. | twelve million, eight hundred and four thousand, two hundred and thirty one. | 12,804,231 |

Group Work

Put children in groups of six.

Each group writes these words in figures.

1. six thousand, five hundred and thirty two **6532**
2. one hundred and forty million, three hundred and eighteen thousand and seven **140,318,007**
3. five hundred and one million, seven thousand and sixteen. **501,007,016**

Check, assist and mark each group's work.

Individual Application

Write these numbers in figures.

Example: three thousand, six hundred and ninety four = 3,694

1. three thousand and twenty **3,020**
2. nine thousand, four hundred and sixty **9,460**
3. two million, four hundred and eleven thousand, eight hundred and five **2,411,805**
4. twenty million, ten thousand, seven hundred, and two **20,010,702**
5. eight hundred and sixty five million, one hundred and twelve thousand and forty. **865,112,040**

Additional Exercise

Write these numbers in figures.

1. nine million, twelve thousand and ten **9,012,010**
2. ninety million, fifty thousand, two hundred and one **90,050,201**
3. twenty seven million, four hundred and one thousand and eight **27,401,008**
4. three hundred and six million five hundred and thirty one **306,000,531**

Lesson 9: Rounding Numbers

Outcome

Round off numbers.

Teaching Aids

4 work cards (see group work)

Teaching for Understanding

Remind children how to round off numbers, by working through the following examples with them.

Example 1:

Round off 268 to the nearest 10:

➡ 8 in the unit place is bigger than 5. It is closer to the next number = 268 so the answer should be 270.

2. Round off 247 to the nearest 100:

➡ 7, which is the unit, is bigger than 5 so it is closer to the 5 than the 4. The answer is 240. 5, which is the tens, is equal to 5 so carry one to the next

number = 300.

The answer should be 300.

3. Round off 652 and 138 to the nearest 10 and then add them.
➡ 2 which is the unit is less than 5 so there is no carrying to the next number = 50. Answer 650.
➡ 8 is more than 5, so 138 becomes 140.
The answer is $650 + 140 = 790$.
4. Round off 27 and 31 to the nearest 10 and then multiply.
➡ 7, which is the unit, is bigger than 5, so carry one to the next number = 30.
➡ 1, which is the unit, is less than 5 so there is no carrying to the next number = 30.
➡ $30 \times 30 = 900$

Group Work

Put children in groups of four. Each group will do the activity on each card. Give out a card to each group. At the end of 5 minutes the groups exchange their working cards. You will be the timekeeper.

Card 1

Round off these numbers to the nearest ten.

1. 51 **50**
2. 2,436 **2440**

Card 2

Round off these numbers to the nearest hundred.

1. 2,837 **2800**
2. 5,946 **5900**

Card 3

Round off these numbers to the nearest ten and then add.

1. $483 + 269$ **$480 + 270 = 750$**

Card 4

Round off these numbers to the nearest ten and then multiply.

1. 51×47 **$50 \times 50 = 2500$**

Individual Application

Round off these numbers to the nearest ten, then multiply.

- | | | | | | |
|----|----------------|--|----|-----------------|--|
| 1. | 14×86 | $10 \times 90 = 900$ | 4. | 47×13 | $50 \times 10 = 500$ |
| 2. | 21×17 | $20 \times 20 = 400$ | 5. | 248×42 | $250 \times 40 = 10,000$ |
| 3. | 35×23 | $40 \times 20 = 800$ | 6. | 319×24 | $320 \times 20 = 6,400$ |

Round off these numbers to the nearest hundred, then add.

1. $392 + 859$ **$400 + 900 = 1,300$** 4. $1,439 + 256$ **$1400 + 300 = 1,700$**

- | | | | | | |
|----|-------------|-------------------|----|---------------|-----------------------|
| 2. | $139 + 261$ | $100 + 300 = 400$ | 5. | $648 + 4,357$ | $600 + 4,400 = 5,000$ |
| 3. | $529 + 153$ | $500 + 200 = 700$ | 6. | $3,446 + 943$ | $3400 + 900 = 4,300$ |

Additional Exercise

Round off these numbers to the nearest ten, then add


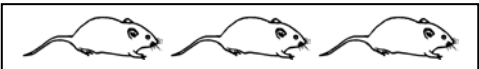

- | | | | | | |
|----|------------|------------------------------------|----|------------|------------------------------------|
| 1. | $21 + 78$ | $20 + 80 = 100$ | 4. | $62 + 93$ | $60 + 90 = 150$ |
| 2. | $39 + 95$ | $40 + 100 = 140$ | 5. | $253 + 46$ | $250 + 50 = 300$ |
| 3. | $86 + 143$ | $90 + 140 = 230$ | | | |

Lesson 10: Assessment

Group Work

Divide children into groups, to complete the work assigned below. They present it to the other groups.

Group 1: Write these in Kiribati number names.

1.  =
2.  =
3.  =

Group 2: Say which of the numbers in this set are odd and which are even. (15, 104, 32, 2001, 47, 62, 310, 53). Explain why they are odd and even.

Odd: 15, 200, 47, 53 (cannot be paired)

Even: 104, 32, 62, 310 (can be paired)

Group 3: Explain what a Prime Number is and write the Prime Numbers between 0 and 30.

(A prime number can be divided only by itself and one.

2, 3, 5, 7, 11, 13, 17, 19, 23, 29).

Group 4: Explain what a Square Number is.

(the product of a number multiplied by itself)

Show your working out to find the 11th and 23rd square number.

(11 x 11 = 121)

(23 x 23 = 529)

Group 5: Write these number in words.

a) 1,211

one thousand, two hundred and eleven

- b) 102,419,310 **one hundred and two million four hundred and nineteen thousand, three hundred and ten**

Group 6: Explain what a triangle number is, then list the triangle numbers between 10 and 50.

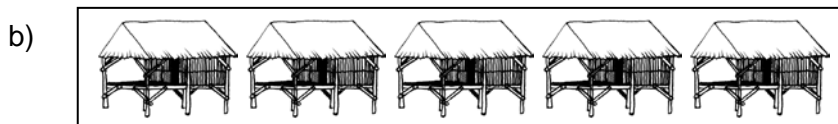
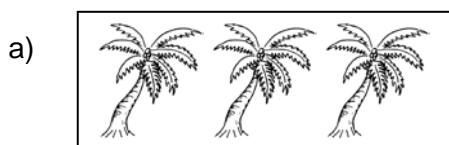
**(numbers that can be arranged to form a triangle:
10, 15, 21, 28, 36, 45)**

Group 7: Round off these numbers to the nearest ten and the nearest hundreds.

	Numbers	Nearest Ten	Nearest Hundred
1.	1,452	1450	1500
2.	5,947	5950	5950
3.	8,675	8680	8700

Individual Application

1. Add the objects and write the number in Kiribati.



2. Write the odd and even numbers between 0 and 50.

Odd: 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31, 33, 35, 37, 39, 41, 43, 45, 47, 49

Even: 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 48, 50

3. Write the prime numbers between 69 and 100.

71, 73, 79, 83, 87, 89, 97

4. Work out the square numbers for:

- a) 22nd square number pattern **484**
 b) 23rd square number pattern **529**
 c) 24th square number pattern **576**

5. Write these numbers in figures.

- a) twenty nine thousand, four hundred and thirty **29,430**

b) two million, one hundred and one thousand and nineteen
2,101,019

6. List the triangle numbers between 50 and 100. **55, 66, 78, 91**

7. Round off these numbers to the nearest ten and to the nearest hundred.

	Numbers	Nearest Ten	Nearest Hundred
a)	3,947	3950	3900
b)	7,452	7450	7500

UNIT 3: OPERATIONS WITH WHOLE NUMBERS

Lesson 1: Addition of whole numbers up to four digits

Outcome

Add numbers of up to four digits.

Teaching Aids

Abacus, blackboard

Teaching for Understanding

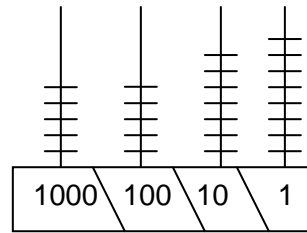
Sit children where they can see the blackboard.

a) Write these sums on the blackboard.

Why	How	Step	How	Why
$\begin{array}{r} 4258 \\ + 1325 \\ \hline \end{array}$	$\begin{array}{r} 4258 \\ + 1325 \\ \hline 13 \end{array}$	1 Add the ones	$\begin{array}{r} 4258 \\ + 1325 \\ \hline 3 \end{array}$	
$\begin{array}{r} 4258 \\ + 1325 \\ \hline 13 \\ 70 \end{array}$		2 Add the tens	$\begin{array}{r} 4258 \\ + 1325 \\ \hline 83 \end{array}$	
$\begin{array}{r} 4258 \\ + 1325 \\ \hline 13 \\ 70 \\ 500 \end{array}$		3 Add the hundreds	$\begin{array}{r} 4258 \\ + 1325 \\ \hline 583 \end{array}$	
$\begin{array}{r} 4258 \\ + 1325 \\ \hline 13 \\ 70 \\ 500 \\ 5000 \\ 5583 \end{array}$		4 Add the thousands	$\begin{array}{r} 4258 \\ + 1325 \\ \hline 5583 \end{array}$	

- b) Draw the numbers on the abacus.

$$\begin{array}{r} 4253 \\ + 1325 \\ \hline \end{array}$$



Place 3 counters in the unit bar
 5 counters in the tens bar
 2 counters in the hundreds bar
 4 counters in the thousands bar

Then add by putting

5 in the unit bar
 2 in the tens bar
 3 in the hundreds bar
 1 in the thousands bar

What is the total number displayed?

$$\begin{array}{rcl} 13 \text{ for the units} & = & 13 \\ 7 \text{ for the tens} & = & 70 \\ 5 \text{ for the hundreds} & = & 500 \\ 5 \text{ for the thousands} & = & + 5,000 \\ & & \hline & & 5,583 \end{array}$$

Group Work

Children work in pairs.
 Draw an abacus. Find the sums using the abacus.

- | | | |
|----|-------------|-------------|
| 1. | 1804 + 49 | 1853 |
| 2. | 1789 + 721 | 2510 |
| 3. | 1345 + 123 | 1468 |
| 4. | 2063 + 1325 | 3388 |
| 5. | 5431 + 2038 | 7469 |

Individual Application

1. Add these in steps:

a)
$$\begin{array}{r} 945 \\ + 600 \\ \hline 1545 \end{array}$$

e) $3728 + 2015$ **5743**

b)
$$\begin{array}{r} 4983 \\ + 3264 \\ \hline 8247 \end{array}$$

f) $2959 + 728$ **3687**

c)
$$\begin{array}{r} 1694 \\ + 1352 \\ \hline 3046 \end{array}$$

g) $3312 + 2601$ **5913**

d) $5015 + 3572$ **8587**

2. Use an abacus to add these:

$$\begin{array}{r} \text{a)} \quad 5504 \\ + 1124 \\ \hline 6628 \end{array}$$

$$\begin{array}{r} \text{b)} \quad 6346 \\ + 573 \\ \hline 6919 \end{array}$$

$$\begin{array}{r} \text{c)} \quad 958 \\ + 361 \\ \hline 1319 \end{array}$$

Additional Exercise

1. Add these on an abacus.

$$\begin{array}{r} \text{a)} \quad 6174 \\ + 3251 \\ \hline 9425 \end{array}$$

$$\begin{array}{r} \text{b)} \quad 8345 \\ + 653 \\ \hline 8998 \end{array}$$

$$\begin{array}{r} \text{c)} \quad 1658 \\ + 324 \\ \hline 1982 \end{array}$$

2. Work these out using the why and how steps.

$$\begin{array}{r} \text{a)} \quad 9018 \\ + 516 \\ \hline 9534 \end{array}$$

$$\begin{array}{r} \text{b)} \quad 1893 \\ + 375 \\ \hline 2268 \end{array}$$

$$\begin{array}{r} \text{c)} \quad 7522 \\ + 1353 \\ \hline 8875 \end{array}$$

Lesson 2: Addition Using Expanded and Short Form

Outcome

Add using the expanded and the short forms.

Teaching Aids

Blackboard

Teaching for Understanding

Sit children in the front.

Demonstrate:

$$\begin{array}{r} \text{a)} \quad 453 \\ + 621 \\ \hline 1074 \end{array}$$

Think

Add the ones

Add the tens

Add the hundreds

	Expanded Form	Short Form
$\begin{array}{r} \text{b)} \quad 7523 \\ + 2467 \\ \hline \end{array}$	$\begin{array}{l} 7000 + 500 + 20 + 3 \\ + 2000 + 400 + 60 + 7 \\ \hline 9000 + 900 + 80 + 10 \end{array}$	$\begin{array}{r} 7523 \\ + 2467 \\ \hline 9990 \end{array}$

Group Work

Put the children in four groups to do the following:

1. Use the expanded form to add the following:

$$\begin{array}{r} \text{a)} \quad 5453 \\ + 4502 \\ \hline 9955 \end{array}$$

$$\begin{array}{r} \text{b)} \quad 2795 \\ + 207 \\ \hline 3002 \end{array}$$

2. Use the short form to add the following:

- a)
$$\begin{array}{r} 5826 \\ + 3698 \\ \hline 9524 \end{array}$$
- b)
$$\begin{array}{r} 1038 \\ + 541 \\ \hline 1579 \end{array}$$
- c)
$$\begin{array}{r} 2564 \\ + 1213 \\ \hline 3777 \end{array}$$

Individual Application

Copy the following then complete.

1.
$$\begin{array}{r} 7209 \\ + 6588 \\ \hline 13797 \end{array}$$
2.
$$\begin{array}{r} 3794 \\ + 1585 \\ \hline 5379 \end{array}$$
3.
$$\begin{array}{r} 1867 \\ + 969 \\ \hline 2836 \end{array}$$
4.
$$\begin{array}{r} 5492 \\ + 1217 \\ \hline 6709 \end{array}$$

Additional Exercise

1. Use the expanded and the short forms to find the sums.

- a)
$$\begin{array}{r} 8046 \\ + 253 \\ \hline 8299 \end{array}$$
- b)
$$\begin{array}{r} 5816 \\ + 2375 \\ \hline 8191 \end{array}$$

2. Use an abacus to add these numbers.

- a)
$$\begin{array}{r} 552 \\ + 243 \\ \hline 795 \end{array}$$
- b) $8504 + 42 = 8546$

Lesson 3: Subtraction of Whole Numbers

Outcome

Subtract numbers of up to four digits.
Subtract without borrowing.

Teaching for Understanding

1. Write on the blackboard or on a chart:
I went shopping. I bought 39 candies. I gave 24 to Ruru. How many were left?
Ask, What is the answer? **(15)**. What operation do you use?
(- subtraction). Let one child come forward to the blackboard and do the sum.
- $$\begin{array}{r} 39 \\ - 24 \\ \hline 15 \end{array}$$

Now let us subtract these numbers.

$$\begin{array}{r} 1349 \\ - 1024 \\ \hline 0325 \end{array}$$



(a)

Think

subtract the ones 9

$$\begin{array}{r} -4 \\ 5 \end{array}$$

Contracted (Short)

So 1349

$$\begin{array}{r} -1024 \\ \hline 325 \end{array}$$

(b)

subtract the tens 4

$$\begin{array}{r} -2 \\ 2 \end{array}$$

(c)

subtract the hundreds 3

$$\begin{array}{r} -3 \\ 0 \end{array}$$

(d)

subtract the thousands 1

$$\begin{array}{r} -1 \\ 0 \end{array}$$

3. Now let us subtract using the contracted form.

$$\begin{array}{r} 2849 \\ - 1627 \\ \hline 1222 \end{array}$$

Group Work

Put the children in groups of four.

1. Teere collects 1540 coconuts. On his way home he drops 300 coconuts. How many coconuts does he bring home?
2. Use the contracted form to subtract :

- | | | |
|----|-------------|-------------|
| a) | 8375 – 6342 | 2033 |
| b) | 9864 – 5463 | 4401 |
| c) | 9783 – 5471 | 4312 |
| d) | 6875 – 1432 | 5443 |

Individual Application

Work out the answers:

$$\begin{array}{r} 1. \quad 946 \\ - 214 \\ \hline 732 \end{array}$$

$$\begin{array}{r} 2. \quad 7642 \\ - 4401 \\ \hline 3241 \end{array}$$

$$\begin{array}{r} 3. \quad 5637 \\ - 2415 \\ \hline 3222 \end{array}$$

$$4. \quad 658 - 107 \quad \mathbf{551}$$

$$5. \quad 7386 - 4054 \quad \mathbf{3332}$$

Additional Exercise

Find the answer to these subtraction questions.

$$\begin{array}{r} 1. \quad 5278 \\ - 1275 \\ \hline 4003 \end{array}$$

$$4. \quad 4867 - 1566 \quad \mathbf{3301}$$

$$\begin{array}{r} 2. \quad 9865 \\ - 1432 \\ \hline 8433 \end{array}$$

$$5. \quad 8396 - 7234 \quad \mathbf{1162}$$

$$\begin{array}{r} 3. \quad 1579 \\ - 478 \\ \hline 1101 \end{array}$$

6. Bwao's weight is 9,789 grams. Mango's weight is 7,642 grams.

- a) How much more does Bwao weigh than Mango? **2147**
 b) How much less does Mango weigh than Bwao? **2147**

Lesson 4: Subtraction of Multi-Digit Numbers

Outcome

Subtract multi-digit numbers.
 Subtract using borrowing.

Teaching Aids

Chart

Teaching for Understanding

Explain subtraction by decomposition (borrowing).

Example 1:

Subtract $594 - 378 = ?$

$$\begin{array}{r} 594 \\ - 378 \\ \hline \end{array}$$

Start at the right

Subtract the ones

You can't subtract 8 from 4

$$\begin{array}{r} 594 \\ - 378 \\ \hline \end{array}$$

Borrow one ten from the 9 tens

Leaving 8 tens and 14 units

$$\begin{array}{r} 814 \\ - 378 \\ \hline \end{array}$$

Subtract the ones

$$14 - 8 = 6$$

$$\begin{array}{r} 814 \\ - 378 \\ \hline 16 \end{array}$$

Subtract the hundreds

$$8 - 7 = 1$$

$$\begin{array}{r} 814 \\ - 378 \\ \hline 216 \end{array}$$

Subtract the hundreds

$$5 - 3 = 2$$

Example 2:

905

What do you do in a case like this?

- 466

There are no tens to borrow from!

905

9 hundred is the same as 90 tens.

- 466

Borrow one of these hundreds to become 10 tens.
And borrow one of the new tens to add to the units
to become 15 units.

905

- 466

Now subtract.

439

You can do the same with thousand.. Remember, one thousand is 10 hundreds
or 100 tens or a thousand units.

You should now do the following example using thousands, hundreds, tens and
units: 2004 – 765.

Individual Application

1. Copy and complete:

a)
$$\begin{array}{r} 7849 \\ - 2453 \\ \hline 5396 \end{array}$$

c)
$$\begin{array}{r} 3405 \\ - 1146 \\ \hline 2259 \end{array}$$

b)
$$\begin{array}{r} 518 \\ - 69 \\ \hline 349 \end{array}$$

d)
$$\begin{array}{r} 2417 \\ - 1405 \\ \hline 1012 \end{array}$$

2.

a) $5846 - 803 = 5043$

b) $2896 - 2594 = 302$

c)
$$\begin{array}{r} 2266 \\ - 1075 \\ \hline 1191 \end{array}$$

d)
$$\begin{array}{r} 7598 \\ - 1458 \\ \hline 6140 \end{array}$$

e)
$$\begin{array}{r} 7362 \\ - 6998 \\ \hline 364 \end{array}$$

Additional Exercise

1. Complete this table:

-	6 2 1 5	4 5 2 1	3 7 4 6
1 6 5 9	4 5 5 6	2 9 6 2	2 0 8 7
2 3 8 7	3 8 2 8	2 1 3 4	1 4 5 9
1 9 2 0	4 2 9 5	2 6 0 1	1 8 2 6

2. In Tom's class there are 46 pupils. 30 of them are girls. How many
boys are there in Tom's class? **16**

3. Rutema had \$2500 in her safe. She used \$1,355 for building her house. How much had she left in her safe? **\$1145**

Lesson 5: Multiplication of Whole Numbers

Outcome

Multiply numbers using expanded notation.
Multiply numbers up to four digits.

Teaching Aids

Chart, blackboard

Teaching for Understanding

Allow children to sit in the front of the classroom.

1. Read the following with the children :

Definition – **Multiplication is Repeated Addition**

This means that $125 \times 3 = 125 + 125 + 125$, or that 3 sets of 125 are added together.

$$125 \times 3 = 375$$

2. Say, We are going to multiply a two-digit number by a two-digit number in two ways:
a) Expanded Notation
b) Contracted Form

Multiplication

$$48 \times 12 \rightarrow$$

Expanded form

$$\begin{aligned} 48 \times 12 &= 48 (10 + 2) \\ &= (48 \times 10) + (48 \times 2) \\ &= 480 + 96 \\ &= 576 \end{aligned}$$

Contracted form

$$\begin{array}{r} 48 \times 12 = 48 \\ \times 12 \\ \hline 96 \rightarrow \\ + 480 \rightarrow \\ \hline 576 \rightarrow \end{array}$$

Group Work

The children sit in four groups to do the following:

1. Multiply using the two methods.

a) 28×25
700

b) 46×32
1472

c) 50×26
1300

2. Estimate each product. Then multiply.

a) 58
 $\times 37$
2146

b) 67
 $\times 35$
2345

c) 25
 $\times 17$
425

Individual Application

1. Multiply using expanded notation.

$$\begin{array}{r} \text{a)} \quad 96 \\ \times 15 \\ \hline 1440 \end{array}$$

$$\begin{array}{r} \text{c)} \quad 35 \\ \times 41 \\ \hline 1435 \end{array}$$

$$\begin{array}{r} \text{b)} \quad 65 \\ \times 22 \\ \hline 1430 \end{array}$$

$$\begin{array}{r} \text{d)} \quad 81 \\ \times 62 \\ \hline 5022 \end{array}$$

2. Using the contracted form, multiply the following :

$$\text{a)} \quad 65 \times 28 \quad \mathbf{1820}$$

$$\text{d)} \quad 83 \times 62 \quad \mathbf{5146}$$

$$\text{b)} \quad 83 \times 62 \quad \mathbf{5146}$$

$$\text{e)} \quad 49 \times 53 \quad \mathbf{2597}$$

$$\text{c)} \quad 59 \times 18 \quad \mathbf{1062}$$

Additional Exercise

Solve these problems.

- Aoni bought 25 bags of rice. The cost of 1 bag was \$21. What was the total cost? **\$525.00**
- Marieta travelled 24 km. every day for 12 days. How far did she travel altogether? **288 km**
- Use the expanded then the contracted form of multiplication.

a) 24×22 528	d) 95×80 7600
b) 38×16 608	e) 47×25 1175
c) 56×34 1904	

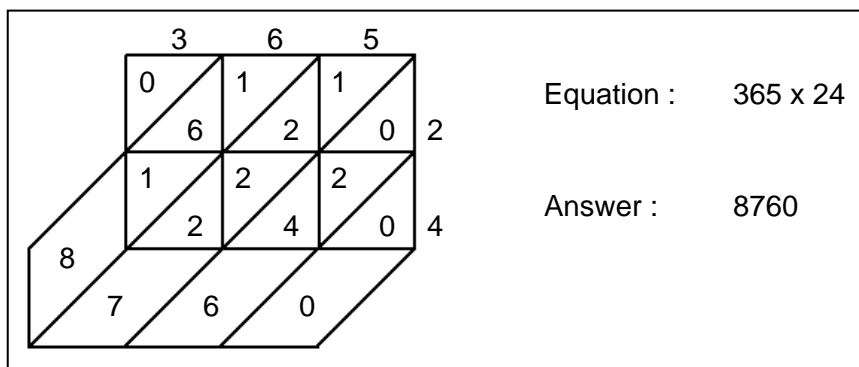
Lesson 6: More Work on Multiplication of Whole Numbers Up to Four Digits

Outcome

Use number squares to multiply.

Teaching Aids

Chart



Teaching for Understanding

- Show children the chart, which demonstrates how to use a number square to work out an equation.

Across the top of the number square is written 365. Down the side is written 24. Each digit of the first number is multiplied by the first digit of

the second number (2). The answers are entered in the upper row of boxes. Then each digit of the first number is multiplied by the second digit of the second number (4). The answers are entered in the lower row of boxes. Then those numbers are added as in the diagram above to get the answer.

2. Write the following problem on the blackboard, then show the children how to solve it:

Problem Teau and Aoni collected 45 bundles of paper.

Tell → Each bundle weighed 35 kilograms.
What was the total weight?

Show → $45 \text{ bundles} \times 35 \text{ kilograms} = 45 \times 35 = n$

Solve →
$$\begin{array}{r} 45 \\ \times 35 \\ \hline 225 \\ 1350 \\ \hline 1575 \end{array}$$

Answer = They collected 1,575 kilograms of paper.

Group Work

1. Multiply:

a) 225×25 5625	b) 125×18 2250	c) 187×15 2805
-----------------------------------	-----------------------------------	-----------------------------------
2. Use the contracted form to work out the following multiplication problems.

a) 321×34 10914	c) 720×20 14400
b) 72×45 3240	d) 542×16 8672

Individual Application

1. Use expanded notation to answer the following :

a) 98×26 2548	b) 127×42 5334
-------------------------------	--------------------------------
2. Multiply:

a) 390×52 20280	c) 575×22 12650
b) 605×33 19965	d) 835×45 37575
3. Solve these problems :
 - a) A farmer planted 270 tomatoes a day for 12 days.
How many tomatoes did he plant altogether? **3,240 tomato plants**
 - b) Reiti bought 28 boxes of oranges. Each box contained 48 oranges. How many oranges were there altogether? **1,344**

Additional Exercise

1. Multiply:

a) 236×34 8024	c) 309×59 18231
b) 373×44 16412	d) 582×68 39576
2. Use the contracted form to work out the answers to the following:

a) 485×32	b) 633×55	c) 75×48
--------------------	--------------------	-------------------

15520

34815

3600

3. Use the expanded form to work out the answers to the following :

a) 464×36
 16704

b) 89×38
 3382

c) 875×45
 39375

Lesson 7: Division of Whole Numbers Up to Four Digits

Outcome

Name parts of a division example.

Use steps to find quotients.

Teaching Aids

Write the following division example on the blackboard.

$$17 \div 5 = \begin{array}{r} 3 \\ 5 \overline{) 17} \\ \underline{-15} \\ 2 \end{array}$$

17 \rightarrow dividend

5 \rightarrow divisor

3 \rightarrow quotient

2 remainder.

Show the children how to divide by following steps:

Think

$$3 \overline{) 4761} \text{ Is } 3 < 4$$

How many 3s in 4?

$$3 \times 1 = 3$$

Subtract

Step 1:

$$3 \overline{) 4761} \begin{array}{r} 1 \\ \underline{-3} \end{array}$$

Step 2:

Bring down 7

How many 3s in 17?

$$3 \times 5 = 15$$

Subtract

$$3 \overline{) 4761} \begin{array}{r} 15 \\ \underline{-3} \\ 17 \\ \underline{-15} \\ 2 \end{array}$$

Step 3:

Bring down 6

How many 3s in 26?

$$3 \times 8 = 24$$

Subtract

$$3 \overline{) 4761} \begin{array}{r} 158 \\ \underline{-3} \\ 17 \\ \underline{-15} \\ 26 \\ \underline{-24} \\ 2 \end{array}$$

Step 4:

Bring down 1

How many 3s in 21?

$$3 \times 7 = 21$$

$$3 \overline{) 4761} \begin{array}{r} 1587 \\ \underline{-3} \end{array}$$

Subtract
There is no remainder

$$\begin{array}{r} 17 \\ - 15 \\ \hline 26 \\ \\ \\ 00 \end{array}$$

$$\begin{array}{r} - 24 \\ 21 \\ \hline 21 \end{array}$$

Group Work

Put the children into two groups.

They follow the steps taught above to find the quotients.

1. $5895 \div 5$ **(1179)** 2. $9876 \div 8$ **(1235)**

3.
$$\begin{array}{r} 214 \\ 12 \overline{) 2568} \end{array}$$
 4.
$$\begin{array}{r} 2716 \\ 20 \overline{) 54320} \end{array}$$

5.
$$\begin{array}{r} 216 \\ 17 \overline{) 3678} \end{array}$$

Individual Application

1. Name the parts of each division sum.

a)
$$\begin{array}{r} 71 \\ 54 \overline{) 3838} \\ - 378 \\ \hline 58 \\ - 54 \\ \hline 4 \end{array}$$
 b) $927 \div 3 = 309$

2. Use steps to find the following quotients.

a) $1658 \div 4$ **415**

b) $88540 \div 10$ **8854**

c)
$$\begin{array}{r} \\ 81 \overline{) 8865} \end{array}$$
 109

d)
$$\begin{array}{r} \\ 35 \overline{) 69725} \end{array}$$
 1992

e)
$$\begin{array}{r} \\ 5 \overline{) 9435} \end{array}$$
 1887

Additional Exercise

1. Complete these division sums.

$$\begin{array}{r} \text{a)} \quad \quad \quad \mathbf{90} \\ 32 \overline{) 2891} \\ \underline{- 288} \\ 11 \\ \underline{00} \\ 11 \end{array}$$

$$\begin{array}{r} \text{b)} \quad \quad \quad \mathbf{186} \\ 26 \overline{) 4836} \\ \underline{- 26} \\ 223 \\ \underline{- 208} \\ 156 \\ \underline{- 156} \\ 00 \end{array}$$

2. Follow steps to find the quotients.

$$\begin{array}{r} \text{a)} \quad \quad \quad \mathbf{1343 + 47r} \\ 51 \overline{) 68540} \\ \underline{- 51} \\ 175 \\ \underline{- 153} \\ 224 \\ \underline{- 204} \\ 200 \\ \underline{- 153} \\ 47r \end{array}$$

$$\text{d)} \quad 7688 \div 43 \quad \mathbf{178 + 34r}$$

$$\begin{array}{r} \text{b)} \quad \quad \quad \mathbf{2822 + 14r} \\ 34 \overline{) 95962} \\ \underline{- 68} \\ 279 \\ \underline{- 272} \\ 76 \\ \underline{- 68} \\ 82 \\ \underline{- 68} \\ 14r \end{array}$$

$$\text{e)} \quad 5163 \div 11 \quad \mathbf{469 + 4r}$$

$$\begin{array}{r} \text{c)} \quad \quad \quad \mathbf{174 + 12r} \\ 14 \overline{) 2448} \\ \underline{- 14} \\ 104 \\ \underline{- 98} \\ 68 \\ \underline{- 56} \\ 12r \end{array}$$

Lesson 8: More About Division of Whole Numbers

Outcome

Use the long and short forms of division.
Divide using carrying numerals.
Solve word problems.

Teaching Aids

Blackboard, chart

Teaching for Understanding

(Refer to Class 6, Term 1, Unit 3: Operations with Whole Numbers, for earlier lessons about division.)

Children sit in the front of the classroom.

Put up a chart showing of ways of dividing numbers.

Example 1:

	Long form	Short form
a)	158	b) 1587
	$\begin{array}{r} 3 \overline{) 4761} \\ \underline{- 3} \\ 17 \\ \underline{- 15} \\ 26 \\ \underline{- 24} \\ 21 \\ \underline{- 21} \\ 00 \end{array}$	$\begin{array}{r} 3 \overline{) 4761} \end{array}$

Example 2: Solving problems

Rutema drove her car 17,532 kilometres in one year. About how many kilometres did she travel every month, if she travelled the same distance each month?

a) Say: Travelled 17,532 km per year.
12 months in year.
About how many km. travelled in a month

b) Show: $17532 \div 12 = n$

c) Solve:

$$\begin{array}{r} 1461 \\ 12 \overline{) 17532} \\ \underline{- 12} \\ 55 \\ \underline{- 48} \\ 73 \\ \underline{- 72} \\ 12 \end{array}$$

d) Answer: 1461 : She drove about 1 461 km. each month.

Group Work

Put children in groups of three to do the following.

1. Find the quotients. Use the short form of calculation.

- a) $40872 \div 52$ **786**
 b) $1472 \div 32$ **46**
 c) $1638 \div 7$ **234**

2. Use the long form to find the following quotients.

- a)
$$\begin{array}{r} \text{116 + 17r} \\ 21 \overline{) 2453} \end{array}$$
 b)
$$\begin{array}{r} \text{210 + 28r} \\ 70 \overline{) 14728} \end{array}$$
 c)
$$\begin{array}{r} \text{245} \\ 15 \overline{) 3675} \end{array}$$

Individual Application

1. Use the Say, Show, Solve and Answer steps to find the quotient:

Mr Tebau made 2,464 doughnuts for his 32 friends. How many doughnuts did each friend get? **77 doughnuts**

2. Use the long form of calculation to divide:

- a)
$$\begin{array}{r} \text{1059 + 2r} \\ 4 \overline{) 4238} \end{array}$$
 b)
$$\begin{array}{r} \text{712} \\ 8 \overline{) 5696} \end{array}$$
 c)
$$\begin{array}{r} \text{127 + 11r} \\ 25 \overline{) 3186} \end{array}$$

3. Use the short form to divide:

- a)
$$\begin{array}{r} \text{921 + 1r} \\ 8 \overline{) 7369} \end{array}$$
 b)
$$\begin{array}{r} \text{139 + 10r} \\ 12 \overline{) 1678} \end{array}$$
 c)
$$\begin{array}{r} \text{183} \\ 25 \overline{) 4575} \end{array}$$

Additional Exercise

1. Use long and short forms to find the following quotients:

- a) $1620 \div 36$ **45**
 b) $1999 \div 19$ **105 + 4r**
 c) $65024 \div 64$ **1016**
 d)
$$\begin{array}{r} \text{103 + 7r} \\ 52 \overline{) 5363} \end{array}$$

 e)
$$\begin{array}{r} \text{102} \\ 41 \overline{) 4182} \end{array}$$

Lesson 9: Order of Operations

Outcome

Use the order of operations to evaluate expressions.
Use rules to avoid confusion.

Teaching Aids

Chart showing the rules for the order of operations (see below)

Teaching for Understanding

Show the chart to class.

Allow children to read the equation first

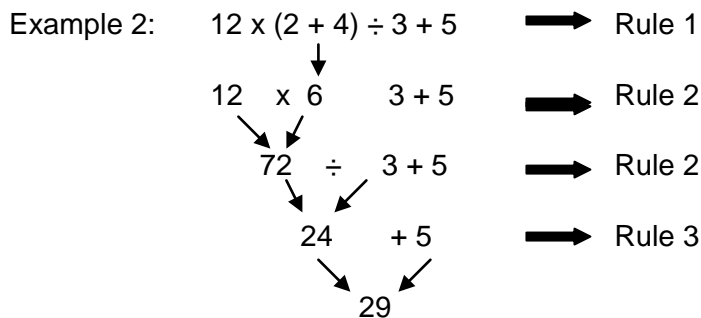
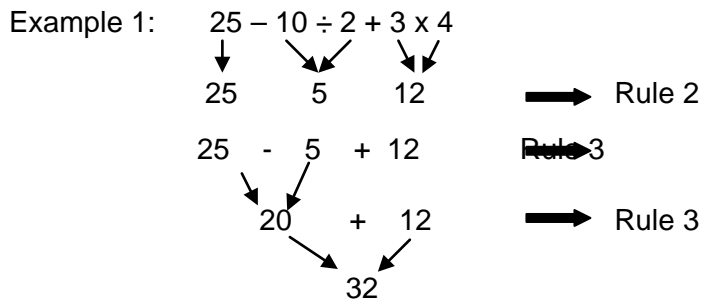
$$25 - 10 \div 2 + 3 \times 4$$

Then they read the rules :

Rules: Follow the order

1. Do all **operations in parenthesis** first.
2. **Multiply and divide** in order from left to right.
3. **Add and subtract** in order from left to right.

Now let us evaluate this equation following the order



Group Work

In groups of four, children evaluate the following:

- | | | |
|----|--------------------------------------|------------|
| 1. | $3 + 5 - 7$ | 1 |
| 2. | $16 \div 2 + 4 \times 3$ | 20 |
| 3. | $12 + 2 \times (3 + 4) \times 2$ | 84 |
| 4. | $56 \div 7 + 10 - 2$ | 16 |
| 5. | $120 \div 4 \times 5 + (2 + 8) - 20$ | 140 |

Individual Application

Simplify the following:

- | | | |
|----|----------------------------------|-----------|
| 1. | $210 \div 7 + (11 - 4) \times 5$ | 65 |
|----|----------------------------------|-----------|

- | | | |
|----|---------------------------------|------------|
| 2. | $(18 + 4) \times 3 - 20 \div 5$ | 62 |
| 3. | $3 + 5 - 10 \div 2$ | 3 |
| 4. | $210 - 20 \times 4 + 16$ | 146 |
| 5. | $10 \times 3 + 20 \div 5 - 21$ | 13 |
| 6. | $8 \times 16 + 10 \div 5 - 20$ | 110 |

Additional Exercise

Evaluate the following:

- | | | |
|----|--|------------|
| 1. | $124 + (68 - 42) \div 4 \times 6$ | 163 |
| 2. | $35 \div 7 - 3 + 8$ | 10 |
| 3. | $12 \times 3 + 5 \div 5$ | 37 |
| 4. | $205 \div 5 + 4 - 25$ | 20 |
| 5. | $(3 \times 9) - (4 \times 2) + 28 - 5$ | 42 |

Lesson 10: Assessment

Group Work

In group of five, children work out the following:

1. Use an abacus to find the sum:

a)

$$\begin{array}{r} 5783 \\ + 1205 \\ \hline 6988 \end{array}$$

b)

$$\begin{array}{r} 3001 \\ + 986 \\ \hline 3987 \end{array}$$

2. Use expanded and contracted form to find the difference:

a)

$$\begin{array}{r} 3596 \\ - 1453 \\ \hline 2143 \end{array}$$

d)

$$\begin{array}{r} 6729 \\ - 4567 \\ \hline 2162 \end{array}$$

b)

$$\begin{array}{r} 5109 \\ - 982 \\ \hline 4127 \end{array}$$

e)

$$\begin{array}{r} 1593 \\ - 341 \\ \hline 1252 \end{array}$$

c)

$$\begin{array}{r} 3468 \\ - 1782 \\ \hline 1686 \end{array}$$

3. Find the products:

a) 125×20 **2500**
 b) 139×55 **7645**

c) 99×99 **9801**
 d) 5831×15 **87465**

4. Find the quotient. Use the long form of calculation.

a)	$9354 \div 12$	779 + 6r
b)	$34582 \div 25$	1383 + 7r
c)	$36 \overline{) 75892}$	2108 + 4r
d)	$12 \overline{) 53490}$	4457 + 6r

Individual Application

1. Solve the following:

a) $24 \times 3 + 30$ **102**

b) $4 \times 14 + 20 \div 5$ **60**

c) Rutema went shopping. She bought 24 cartons of orange juice. There were 48 cans of orange juice in each carton. How many cans were there altogether? **1152 cans**

d) Mangonikua made rock buns. She could make 320 buns in one day. How many rock buns could she make in 5 days? **1600 buns**

e) The head teacher planned to have a trip to Bikeman for 1,550 students. The boat she planned to use could take only 50 passengers. How many trips would be needed to transport all the students to Bikeman? **31 trips**

f) Tetu collected coconuts for copra. On the first day he collected 250, on the second day he collected 568 and on the third day he collected 365. How many coconuts were there altogether? **1185 coconuts**

g) Aonny sold 2,500 candies each day. On her way to the market some of her friends took 39 candies. How many candies were left? **2461 candies**

2. Evaluate:

a) $112 + 45 - 4(4 \times 10)$ **117**

b) $33 \times 24 + 8 \div 5$ **793.6**

c) $4569 - 189$ **4380**

d) $25 \times 3 \div 10$ **7.5**

e) How many pens are there in 100 packets if one packet contains 12 pens? **1200 pens**

f) In Class 6 there are 42 pupils. Sixteen are boys. How many are girls? **26 girls**

UNIT 4: FRACTIONS

Lesson 1: To Review Ideas of Fractions : Improper Fractions, Mixed Number Fractions in their Simplest Form and Equivalent Fractions

Outcome

Find and identify mixed numbers, improper fractions and equivalent fractions.
Simplify fractions to their lowest terms.

Teaching Aids

Teaching for Understanding

Write the following on the board and discuss them with the children.

1. Fraction

$\frac{2}{4}$
 2 ← Numerator - How many of these pieces we are considering?
 — Fraction Bar
 4 ← Denominator - How many equivalent parts is the whole separated into?

2. **Mixed Fraction/Number** - $3\frac{1}{2} = 3 + \frac{1}{2}$
 whole number fraction fraction

3. **Improper Fraction** - $\frac{7}{2}$ Numerator is greater than denominator
 $\frac{7}{2} = 3\frac{1}{2}$
 improper denominator

4. **Fractions in their lowest terms** - $\frac{6}{18} = \frac{3}{9} = \frac{1}{3}$ is the lowest term

5. **Equivalent Fractions** - $\frac{1}{2} = \frac{2}{4} = \frac{3}{6} = \frac{4}{8} = \frac{5}{10} = \frac{10}{20}$ etc.
 $\frac{2}{3} = \frac{4}{6} = \frac{6}{9} = \frac{8}{12}$ etc.

Group Work

Let children sit in groups of five. Each group is to find answers to the following:

1. Change these mixed fractions to improper fractions:

a) $3\frac{4}{5}$ $(\frac{19}{5})$ c) $8\frac{1}{2}$ $(\frac{17}{2})$
 b) $7\frac{2}{3}$ $(\frac{23}{3})$ d) $10\frac{3}{8}$ $(\frac{83}{8})$

2. Change to mixed fractions:

a) $\frac{22}{5}$ $(4\frac{2}{5})$ b) $\frac{35}{6}$ $(5\frac{5}{6})$

3. Complete the following equivalent fractions:

$$\frac{1}{2} = \frac{\boxed{4}}{8} = \frac{\boxed{6}}{12} = \frac{7}{\boxed{14}} = \frac{10}{\boxed{20}}$$

Individual Application

1. Simplify to their lowest terms:

a) $\frac{6}{15}$ $(\frac{2}{5})$
 b) $\frac{16}{24}$ $(\frac{2}{3})$

c) $\frac{42}{63}$ $(\frac{2}{3})$

2. Change to improper fractions:

a) $3\frac{4}{7}$ $(\frac{25}{7})$

b) $6\frac{5}{8}$ $(\frac{53}{8})$

c) $9\frac{3}{5}$ $(\frac{48}{5})$

3. Change to mixed numbers:

a) $\frac{14}{8}$ $(1\frac{6}{8})$

b) $\frac{24}{9}$ $(2\frac{6}{9})$

c) $\frac{20}{6}$ $(3\frac{2}{6})$

4. Complete these equivalent fractions:

a) $\frac{2}{3} = \frac{6}{\boxed{9}}$

b) $\frac{3}{5} = \frac{21}{\boxed{35}}$

c) $\frac{5}{7} = \frac{15}{\boxed{21}}$

Additional Exercise

1. Write in their simplest form:

a) $\frac{9}{15}$ $(\frac{3}{5})$

b) $\frac{14}{21}$ $(\frac{2}{3})$

c) $\frac{26}{42}$ $(\frac{13}{21})$

2. Change to improper fractions:

a) $3\frac{3}{7}$ $(\frac{24}{7})$

b) $7\frac{4}{9}$ $(\frac{67}{9})$

c) $11\frac{4}{5}$ $(\frac{59}{5})$

3. Change to mixed numbers:

a) $\frac{42}{20}$ $(2\frac{2}{20} = 2\frac{1}{10})$

b) $\frac{65}{26}$ $(2\frac{13}{26} = 2\frac{1}{2})$

c) $\frac{48}{32}$ $(1\frac{16}{32} = 1\frac{1}{2})$

4. Complete the following by filling in the boxes:

a) $2\frac{3}{4} = \frac{\boxed{11}}{4} = \frac{\boxed{33}}{12}$

b) $3\frac{3}{5} = \frac{\boxed{18}}{5} = \frac{\boxed{72}}{20}$

Lesson 2:

Addition Using Equivalent Fractions

Outcome

Add fractions using equivalent fractions.

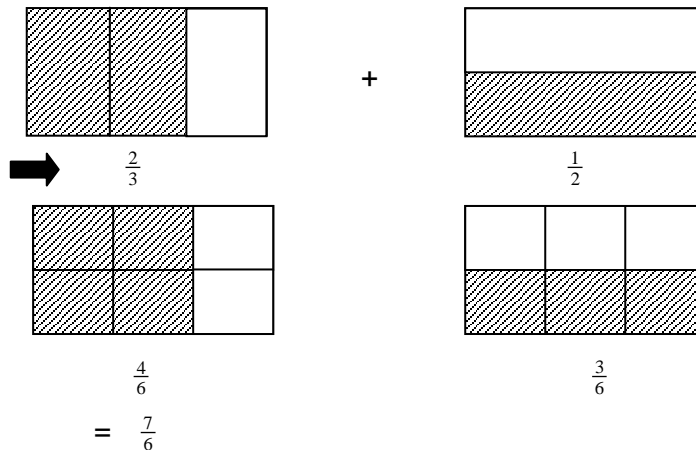
Teaching Aids

Chart of equivalent fractions, fraction number strips

Teaching for Understanding

1. Add fractions with different denominators.

Example:



To add fractions with different denominators, first change the fractions to equivalent fractions with the lowest common denominator as in:

$$\begin{aligned}\frac{1}{2} &= \frac{2}{4} = \frac{3}{6} = \frac{4}{8} = \frac{5}{10} = \frac{6}{12} \\ \frac{2}{3} &= \frac{4}{6} = \frac{6}{9} = \frac{8}{12} \\ \frac{1}{2} + \frac{2}{3} &= \frac{3}{6} + \frac{4}{6} \\ &= \frac{7}{6} \\ &= 1\frac{1}{6}\end{aligned}$$

2. To add mixed numbers (fractions), numbers must be added first then fractions. Example:

$$\begin{aligned}2\frac{1}{4} + 1\frac{1}{2} \\ &= 3\frac{1}{4} + \frac{1}{2} \\ &= 3\frac{1}{4} + \frac{2}{4} \\ &= 3\frac{3}{4}\end{aligned}$$

Group Work

Divide children into groups of five.

Give each group fraction number strips. Let them work out the following.

- a) $\frac{3}{8} + \frac{1}{4}$ $(\frac{5}{8})$
- b) $\frac{1}{2} + \frac{3}{10}$ $(\frac{8}{10})$
- c) $2\frac{4}{5} + 3\frac{1}{2}$ $(6\frac{3}{10})$
- d) $4\frac{1}{2} + 1\frac{3}{8}$ $(5\frac{7}{8})$

Individual Application

Solve these problems. Question 1 is done as an example.

1. The boys took $2\frac{1}{4}$ hours to cut the grass of their playground. After the boys had finished, the girls swept it taking $1\frac{1}{2}$ hours. How long did the boys and girls together take to clean up their playground?

To solve the problem : add:

$$\begin{aligned}
 &= 2\frac{1}{4} + 1\frac{1}{2} \\
 &= (2 + 1) + \frac{1}{4} + \frac{1}{2} \\
 &= 3 + \frac{1}{4} + \frac{1}{2} \\
 &= 3 \times \frac{1}{4} + \frac{2}{4} \\
 &= 3\frac{3}{4}
 \end{aligned}$$

2. Add these fractions:

$$\begin{array}{ll}
 \text{a)} & 1\frac{1}{5} + 2\frac{1}{2} \quad \quad \quad (3\frac{7}{10}) \\
 \text{b)} & 2\frac{3}{4} + 1\frac{1}{8} \quad \quad \quad (3\frac{7}{8}) \\
 \text{c)} & 3\frac{2}{3} + 2\frac{1}{6} \quad \quad \quad (5\frac{5}{6})
 \end{array}$$

3. Father works $3\frac{1}{4}$ hours in his plantation during the morning and only $1\frac{1}{2}$ hours in the afternoon. How long does father spend in his plantation altogether? **$4\frac{3}{4}$ hours**
4. I take $4\frac{1}{2}$ loaves of bread for my class on Monday and $1\frac{1}{4}$ loaves the next day. How much does the class eat altogether? **$5\frac{3}{4}$ loaves**

Additional Exercise

1. Work out these fractions:

$$\begin{array}{ll}
 \text{a)} & \frac{7}{35} + \frac{3}{5} \quad \quad \quad (\frac{4}{5}) \\
 \text{b)} & 5\frac{4}{7} + 2\frac{4}{21} \quad \quad \quad (7\frac{16}{21})
 \end{array}$$

2. Solve the problem:

The boys spent $4\frac{1}{2}$ days working on a new hut for their teacher in the first week. They spent another $5\frac{1}{4}$ days in the second week. How long did they spend altogether making the new hut? **$(9\frac{3}{4}$ days)**

Lesson 3: To Add and Subtract Fractions with Denominators in the Range of 2 to 12

Outcome

Add and subtract fractions with denominators in the range of 2 to 12.

Teaching Aids

Wooden blocks with fractions written on the faces:

$$\begin{array}{ll}
 \text{Block 1:} & \frac{1}{2}, \frac{2}{3}, \frac{3}{4}, \frac{4}{5}, \frac{5}{6}, \frac{5}{7} \\
 \text{Block 2:} & \frac{1}{3}, \frac{1}{4}, \frac{2}{5}, \frac{1}{6}, \frac{3}{7}, \frac{3}{8}
 \end{array}$$

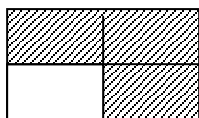
Teaching for Understanding

1. Hold up a sheet of paper and then fold it in half. Ask the class how many parts the sheet is divided into (2 parts). Ask the class what one of the two parts can be called (half).



Now fold it again so that it has 4 equal parts (quarters). Ask the class how many equal parts the sheet has been folded into (4 equal parts).

Shade 3 of the 4 parts and ask someone to write the fraction represented by the shaded part on the blackboard.



2. Demonstrate and discuss with the children how to solve:

$$\begin{aligned} & \frac{2}{3} + \frac{3}{4} \\ = & \frac{2 \times 4}{3 \times 4} + \frac{3 \times 3}{4 \times 3} \\ = & \frac{8}{12} + \frac{9}{12} \\ = & \frac{17}{12} \\ = & 1 \frac{5}{12} \end{aligned}$$

and
and

$$\begin{aligned} & \frac{3}{5} - \frac{1}{3} \\ = & \frac{3 \times 3}{5 \times 3} - \frac{1 \times 5}{3 \times 5} \\ = & \frac{9}{15} - \frac{5}{15} \\ = & \frac{4}{15} \end{aligned}$$

Group Work

Put children in groups of five or six and give each group a pair of blocks with fractions written on them to find the answers.

1. The leader rolls the two blocks. When they stop rolling the group adds the two fractions facing up. The one who calls the right answer first will have a turn to roll the blocks.
2. The leader rolls the blocks again. When they stop rolling the group subtracts the fraction on block 2 from the fraction on block 1.

Example: **block 1 – block 2**

$$\begin{aligned} & \frac{1}{2} - \frac{2}{5} \\ = & \frac{5}{10} - \frac{4}{10} \\ = & \frac{1}{10} \end{aligned}$$

Use the same rule as in (1).

Individual Application

1. Change the following into mixed fractions:

$$\begin{aligned} \text{a)} & \frac{27}{4} \\ \text{b)} & \frac{16}{3} \\ \text{c)} & \frac{14}{4} \end{aligned}$$

$$\begin{aligned} & (6 \frac{3}{4}) \\ & (5 \frac{1}{3}) \\ & (3 \frac{2}{4}) \end{aligned}$$

$$\begin{aligned} \text{d)} & \frac{17}{6} & (2 \frac{5}{6}) \\ \text{e)} & \frac{29}{12} & (2 \frac{5}{12}) \end{aligned}$$

2. Solve the following:

$$\begin{array}{ll}
 \text{a)} & \frac{3}{8} + \frac{3}{4} & (1\frac{1}{8}) \\
 \text{b)} & \frac{7}{8} - \frac{5}{6} & (\frac{1}{24}) \\
 \text{c)} & \frac{2}{3} + \frac{3}{5} & (1\frac{4}{15}) \\
 \text{d)} & \frac{5}{6} - \frac{2}{3} & (\frac{1}{6})
 \end{array}$$

Additional Exercise

1. Write these fractions in their lowest terms:

$$\begin{array}{ll}
 \text{a)} & \frac{6}{9} & (\frac{2}{3}) \\
 \text{b)} & \frac{12}{36} & (\frac{1}{3}) \\
 \text{c)} & \frac{8}{48} & (\frac{1}{6}) \\
 \text{d)} & \frac{9}{61} \frac{3}{4} & (\frac{9}{61})
 \end{array}$$

2. Solve the following:

$$\begin{array}{ll}
 \text{a)} & \frac{11}{12} + \frac{3}{5} & (1\frac{31}{60}) \\
 \text{b)} & \frac{2}{3} - \frac{3}{5} & (\frac{1}{15}) \\
 \text{c)} & \frac{1}{6} + \frac{7}{12} & (\frac{3}{4}) \\
 \text{d)} & \frac{6}{7} + \frac{2}{3} & (1\frac{11}{21})
 \end{array}$$

Lesson 4: Add and Subtract Mixed Fractions (mixed numbers)

Outcome

Add and subtract mixed fractions as mixed numbers.

Teaching Aids

Flash cards with mixed fractions on them and answers on the other side.

$$\begin{array}{ll}
 \text{a)} & 3\frac{1}{2} + 4\frac{2}{3} \\
 \text{b)} & 5\frac{3}{5} - 2\frac{2}{3} \\
 \text{c)} & 6\frac{3}{7} + 2\frac{12}{2} \\
 \text{d)} & 7\frac{1}{6} - 3\frac{2}{5}
 \end{array}$$

Teaching for Understanding

Let children sit in the front of the classroom. Demonstrate on the blackboard and discuss how to add the fractions:

$$\begin{array}{ll}
 1. & 3\frac{1}{3} + 1\frac{3}{4} \\
 2. & 2\frac{1}{3} + 1\frac{1}{2} \\
 \text{a)} & \frac{1}{3} + 1\frac{3}{4} \longrightarrow \begin{array}{l} \text{add the two sets altogether} \\ \text{add whole numbers first (4)} \\ \text{change the two fractions into the same} \\ \text{denomination} \end{array} \\
 & = 3 + 1 + \frac{1}{3} + \frac{3}{4} \\
 & = 4 + \frac{1}{3} + \frac{3}{4} \\
 & = 4 + (\frac{1}{3} \times \frac{4}{4}) + (\frac{3}{4} \times \frac{3}{3}) \\
 & = 4 + \frac{4}{12} + \frac{9}{12} \\
 & = 4 + \frac{13}{12} \\
 & = 4 + 1\frac{1}{12} \\
 & = 5\frac{1}{12} \\
 & \text{Replacing } \frac{13}{12} \text{ by 1 whole} + \frac{1}{12}, \text{ we have } 1\frac{1}{12}. \\
 & \text{Add the whole number from above (4) to find the} \\
 & \text{answer (5}\frac{1}{12}\text{)} \\
 \text{b)} & = 2\frac{1}{3} - 1\frac{1}{2} \\
 & = 1\frac{1}{3} - \frac{1}{2} \\
 & \text{subtract whole numbers first (1)} \\
 & \text{change fractions into the same denomination}
 \end{array}$$

$$\begin{aligned}
 &= 1 \left(\frac{1}{3} \times \frac{2}{2} \right) - \left(\frac{1}{2} \times \frac{3}{3} \right) \\
 &= 1 \frac{2}{6} - \frac{3}{6} \\
 &= \frac{8}{6} - \frac{3}{6} \\
 &= \frac{5}{6}
 \end{aligned}
 \qquad
 \begin{aligned}
 1 \frac{2}{6} &= 1 + \frac{2}{6} = \frac{6}{6} + \frac{2}{6} = \frac{8}{6} \\
 \text{Answer} &= \frac{5}{6}
 \end{aligned}$$

Group Work

Put the children in groups of five or six. Give them flashcards (see teaching aids). Let them discuss these sums and work out the answers. They can then check their answers with those on the backs of the cards.

1. $3 \frac{1}{2} + 4 \frac{2}{3}$ **$(8 \frac{1}{6})$**
2. $5 \frac{3}{5} + 2 \frac{2}{3}$ **$(8 \frac{4}{15})$**
3. $6 \frac{3}{7} + 2 \frac{1}{2}$ **$(8 \frac{13}{14})$**
4. $7 \frac{1}{6} + 3 \frac{2}{5}$ **$(10 \frac{17}{30})$**

Individual Application

1. Solve the following:

- a) $2 \frac{3}{4} + \frac{2}{5}$ **$(3 \frac{3}{20})$**
- b) $4 \frac{2}{3} + 3 \frac{5}{6}$ **$(8 \frac{1}{2})$**
- c) $9 \frac{3}{8} + 4 \frac{3}{6}$ **$(14 \frac{1}{4})$**

2. Work out these sums:

- a) $4 \frac{1}{3} - 2 \frac{2}{5}$ **$(1 \frac{14}{15})$**
- b) $7 \frac{2}{7} - 3 \frac{5}{6}$ **$(3 \frac{19}{42})$**
- c) $9 \frac{7}{9} - 4 \frac{5}{6}$ **$(4 \frac{17}{18})$**

Additional Exercise

1. Write these fractions in their simplest form:

- a) $\frac{8}{12}$ **$(\frac{2}{3})$**
- b) $\frac{9}{21}$ **$(\frac{3}{7})$**
- c) $\frac{12}{36}$ **$(\frac{1}{3})$**
- d) $\frac{15}{35}$ **$(\frac{3}{7})$**

2. Calculate the answers:

- a) $2 \frac{3}{5} + 3 \frac{5}{6}$ **$(6 \frac{13}{30})$**
- b) $5 \frac{1}{4} + 7 \frac{7}{12}$ **$(12 \frac{5}{6})$**
- c) $6 \frac{2}{3} - 2 \frac{2}{5}$ **$(4 \frac{4}{15})$**
- d) $8 \frac{3}{8} - 4 \frac{3}{4}$ **$(3 \frac{5}{8})$**

Lesson 5: Solving Problems Involving Fractions

Outcome

Solve problems involving fractions.

Teaching Aids

Flash cards, prepare as many as possible for group work.

eg:

$$\frac{1}{2} + \boxed{\frac{1}{2}} \quad \frac{1}{4} + \boxed{\frac{1}{8}} \quad \frac{2}{8} - \boxed{\frac{3}{6}}$$

Teaching for Understanding

Write this problem on the board.

$\frac{2}{3}$ of my father's plantation is planted with coconuts. $\frac{1}{4}$ is planted with bananas and the rest is planted with bwabwai. What fraction of the plantation is covered with coconuts and bananas? What fraction is covered with bwabwai?

Discuss the problem with the class.

Let them suggest each step of setting out.

Fraction taken by coconuts = $\frac{2}{3}$

Fraction taken by bananas = $\frac{1}{4}$

Total fraction taken by coconuts and bananas = $\frac{2}{3} + \frac{1}{4} = ?$

$$\begin{aligned} &= \frac{\frac{2}{3}}{\frac{2}{3}} + \frac{\frac{1}{4}}{\frac{1}{4}} \\ &= \frac{2}{3} \times \frac{4}{4} \text{ (one)} + \frac{1}{4} \times \frac{3}{3} \text{ (one)} \\ &= \frac{8}{12} + \frac{3}{12} \\ &= \frac{11}{12} \end{aligned}$$

Fraction taken by bwabwai is the rest of the plantation which is $\frac{1}{12}$ since $\frac{11}{12} + \frac{1}{12}$
 $= \frac{12}{12} = 1$

(1 stands for one whole plantation).

$$\begin{aligned} \text{Therefore } 1 - \frac{11}{12} \\ &= \frac{12}{12} - \frac{11}{12} \\ &= \frac{1}{12} \end{aligned}$$

Group Work

Put the children into three groups. Select the most able child to be the leader.

Prepare as many cards as possible:

eg: $\boxed{\frac{1}{12} + \frac{1}{12}}$ $\boxed{2\frac{1}{12} + 1\frac{1}{12}}$ $\boxed{\frac{1}{12} - \frac{1}{12}}$ $\boxed{3\frac{1}{12} - 1\frac{1}{12}}$ etc.

The leader holds up a flash card where that all the members of the group can see it.

The first one to give the correct answer to the expression on the card wins the card. The player with the most cards at the end wins the game and becomes the leader of the next game.

Individual Application

Solve these problems. Show your working out in full.

1. Tom gave $\frac{1}{3}$ of the cake to his father, $\frac{1}{8}$ to his mother and the rest to his sisters and brothers. What part of his cake did his father and mother eat? $(\frac{11}{24})$
2. The tank was $\frac{3}{4}$ full of water. After 3 days it was $\frac{1}{2}$ full. What fraction of the tank did the villagers use during those three days? $(\frac{1}{4})$
3. Tione did $\frac{5}{12}$ of the work. Toromon did $\frac{1}{5}$ of it. What part of the work still needs to be done? $(\frac{23}{60})$

Additional Exercise

1. Solve these problems:

a) $3\frac{5}{8} + 4\frac{5}{12}$ $(8\frac{1}{24})$
 b) $21\frac{5}{6} + 12\frac{7}{15}$ (35)

2. Solve this problem

Meere usually spends $\frac{2}{5}$ of her money on food, $\frac{1}{6}$ on school material and the rest on clothes. What part of her money is usually spent on food and school materials? What fraction is spent on clothes? $(\frac{17}{30})$

Lesson 6: Multiplication of Fractions Using Rectangular Diagrams and Algorithms

Outcome

Multiply fractions using rectangular regions and algorithms.

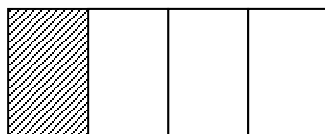
Teaching Aids

Diagrams, paper or cards, crayons

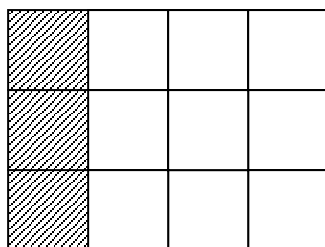
Teaching for Understanding

Write this on the board: $\frac{2}{3} \times \frac{1}{4}$

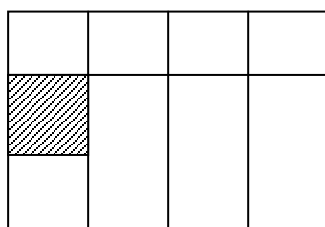
Ask a child to draw a rectangular diagram divided into quarters and to shade $\frac{1}{4}$.



Now ask another child to divide the same diagram again into thirds.



$\frac{1}{4}$ is already shaded. Now ask that child to shade, using a different coloured chalk, $\frac{2}{3}$ of that $\frac{1}{4}$.



$\frac{2}{3}$ of $\frac{1}{4}$



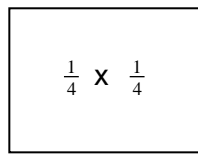
Pick one child to work it out on the board using an algorithm without the diagram.

eg: $\frac{2}{3} \times \frac{1}{4} = \frac{2 \times 1}{3 \times 4}$
 $= \frac{2}{12}$

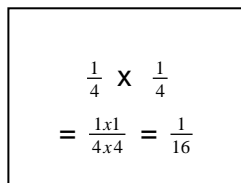
Provide more examples using the same steps (as shown above).

Group Work

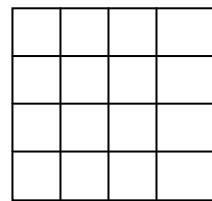
Put the children into five groups. Give each group a work card like the one below. (The second and fourth diagrams show the card after the children have used it.)



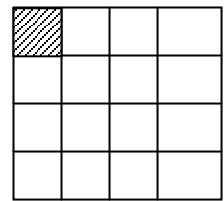
front before use



front after use



back before use



back after use

1. Give them the sum only and let them draw diagrams on the back of card. After that let them solve the problem on the front of the card, using an algorithm.
2. Draw diagrams to find the answer.
 - a) $\frac{1}{3} \times \frac{3}{4}$ $\left(\frac{3}{12}\right)$
 - b) $\frac{1}{2} \times \frac{3}{5}$ $\left(\frac{3}{10}\right)$

Individual Application

1. Draw diagrams to find the answer.
 - a) $\frac{3}{5} \times \frac{1}{2}$ $\left(\frac{3}{10}\right)$
 - b) $\frac{2}{5} \times \frac{1}{5}$ $\left(\frac{2}{25}\right)$
2. Solve these without using diagrams.
 - a) $\frac{3}{4} \times \frac{1}{5}$ $\left(\frac{3}{20}\right)$
 - b) $\frac{2}{3} \times \frac{3}{8}$ $\left(\frac{6}{24}\right)$
 - c) $\frac{4}{5} \times \frac{1}{8}$ $\left(\frac{4}{40}\right)$
 - d) $\frac{5}{6} \times \frac{2}{3}$ $\left(\frac{10}{18}\right)$

Additional Exercise

1. Draw diagrams to find the answer.
 - a) $\frac{2}{3} \times \frac{5}{4}$ $\left(\frac{10}{12}\right)$
 - b) $\frac{5}{6} \times \frac{11}{4}$ $\left(\frac{55}{24}\right)$
2. Solve these using algorithms.
 - a) $\frac{3}{4} \times \frac{3}{5}$ $\left(\frac{9}{20}\right)$
 - b) $\frac{2}{7} \times \frac{2}{3}$ $\left(\frac{4}{21}\right)$

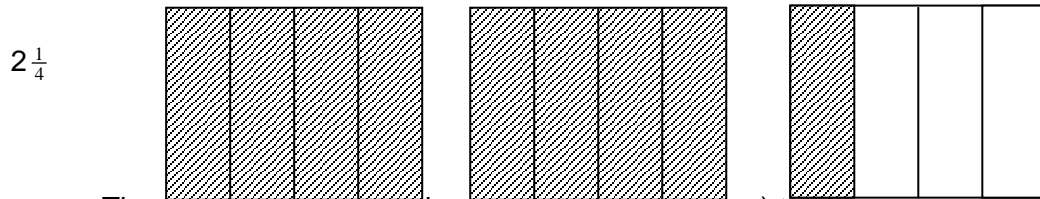
Lesson 7: Multiplication of Mixed Numbers by Proper Fractions and Mixed Numbers

Outcome

Multiply mixed numbers by proper fractions and mixed numbers.

Teaching for Understanding

1. Show the children the example below.



Then draw diagrams to show the mixed numbers a) to c).

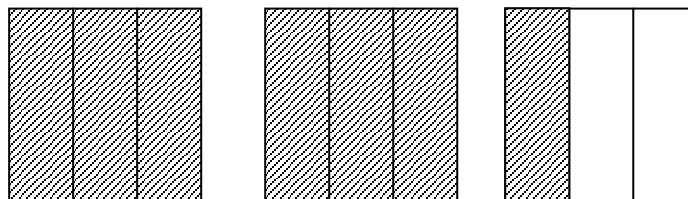
a) $1\frac{1}{4}$

b) $2\frac{1}{3}$

c) $3\frac{4}{5}$

2. Write this on the board : $\frac{3}{4} \times 2\frac{1}{3}$

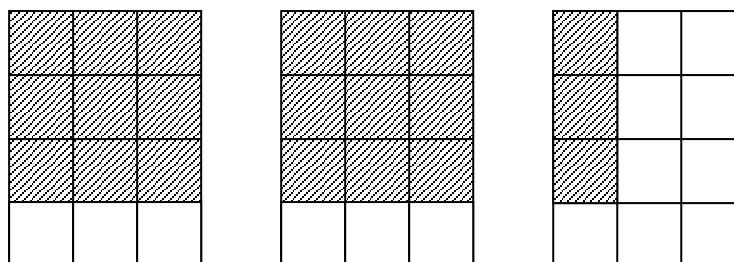
Ask a child to draw a diagram to represent $2\frac{1}{3}$.



Ask class to rename $2\frac{1}{3}$ (improper fraction $\frac{7}{3}$)

They can read $\frac{7}{3}$ by looking at the diagram.

Now ask another child to divide the same diagram into quarters. Then shade it $\frac{3}{4}$ of $2\frac{1}{3}$ using coloured chalk.



$\frac{3}{4}$ of $2\frac{1}{3}$

Let the class count the coloured part of diagram ($\frac{21}{12}$)

Write it out as an equation $\frac{3}{4} \times 2\frac{1}{3} = \frac{21}{12}$

Now do the same equation using the algorithm method.

eg: $\frac{4}{3} \times 2\frac{1}{3} = \frac{1}{3} \times \frac{7}{3}$ change to improper fraction
 $= \frac{3 \times 7}{4 \times 3}$ multiply fractions
 $= \frac{21}{12}$
 $= 1\frac{9}{12}$

Give them another example follow the given steps (both ways).

Now write this on board $1\frac{1}{2} \times 2\frac{2}{3}$. Let the children solve it using an algorithm.

eg: $1\frac{1}{2} \times 2\frac{2}{3}$ change to improper fractions
 $= \frac{3}{2} \times \frac{8}{3}$ multiply numerators, multiply denominators
 $= \frac{3 \times 8}{2 \times 3}$ change improper fractions to a mixed number
 $= \frac{24}{6}$ in this case the answer is not a mixed number, it is a whole number.
 $= 4$

Group Work

Put children into groups of five. Let each group discuss and work out answers to the following.

- Choose the correct mixed number from column B for the improper fractions in column A.

A		B
a)	$\frac{4}{3}$	$(1\frac{1}{3})$
b)	$\frac{6}{4}$	$(1\frac{2}{4})$
c)	$\frac{9}{5}$	$(1\frac{4}{5})$
d)	$\frac{11}{6}$	$(1\frac{5}{6})$
e)	$\frac{13}{4}$	$(3\frac{1}{4})$

- Draw diagrams to show these mixed numbers.

a) $2\frac{2}{3}$
b) $1\frac{5}{8}$

- Work out the following using diagrams:

a) $\frac{3}{4} \times 1\frac{2}{3}$ $(1\frac{1}{4})$
b) $2\frac{1}{4} \times \frac{2}{3}$ $(1\frac{1}{2})$

Individual Application

- Change to improper fractions:

a) $2\frac{3}{4}$ $(\frac{11}{4})$
b) $3\frac{2}{5}$ $(\frac{17}{5})$
c) $4\frac{1}{2}$ $(\frac{9}{2})$
d) $7\frac{2}{3}$ $(\frac{23}{3})$

- Change to mixed numbers:

a) $\frac{22}{5}$ $(4\frac{2}{5})$
b) $\frac{17}{3}$ $(5\frac{2}{3})$
c) $\frac{19}{4}$ $(4\frac{3}{4})$
d) $\frac{36}{7}$ $(5\frac{1}{7})$

- Solve these using diagrams and then solve using algorithms:

a) $2\frac{2}{3} \times \frac{3}{4}$ (2)
b) $2\frac{1}{2} \times \frac{3}{5}$ $(1\frac{1}{2})$

Additional Exercise

- Write these fractions in their simplest form:

a)	$\frac{8}{24}$	$(\frac{1}{3})$
b)	$\frac{12}{48}$	$(\frac{1}{4})$
c)	$\frac{27}{36}$	$(\frac{3}{4})$

2. Solve the following using algorithms:

a)	$2\frac{5}{6} \times 3\frac{2}{3}$	$(10\frac{7}{18})$
b)	$3\frac{2}{3} \times 1\frac{1}{4}$	$(4\frac{7}{12})$
c)	$2\frac{3}{8} \times 1\frac{2}{3}$	$(3\frac{23}{24})$
d)	$3\frac{1}{2} \times 2\frac{1}{3}$	$(8\frac{1}{6})$

Lesson 8: Divisions of Fractions and Uses of the Reciprocal of a Fraction

Outcome

Find the reciprocal of a fraction and of a whole number.

Use the reciprocal of a fraction when dividing fractions.

eg: dividend \div divisor = dividend \times reciprocal of divisor

$$\frac{3}{4} \div \frac{1}{2} = \frac{3}{4} \times \frac{2}{1}$$

$$= \frac{1}{3}$$

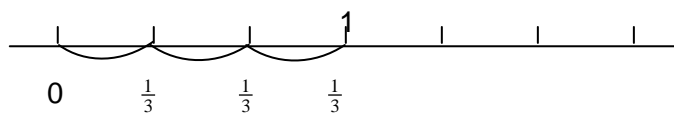
Teaching Aids

Chart or blackboard

Teaching for Understanding

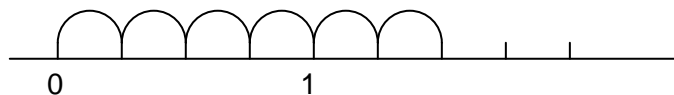
1. Draw 2 number lines on the blackboard or chart and let 2 children mark the solutions for the following number sentences.

a) $3 \times \frac{1}{3}$ on the number line



Therefore $3 \times \frac{1}{3} = 1$

b) $6 \times \frac{1}{4}$ on the number line



Therefore $6 \times \frac{1}{4} = 1\frac{2}{4}$ or $1\frac{1}{2}$

Do more examples : $5 \times \frac{1}{5}$, $4 \times \frac{1}{4}$, $8 \times \frac{1}{8}$

Write these pairs of fractions on the blackboard:

$$\frac{3}{4}, \frac{4}{3}; \frac{2}{5}, \frac{5}{2}; \frac{1}{7}, \frac{7}{1}$$

Ask the class what relationship they notice between the numbers of each pair. Let them multiply each pair. Does each pair have 1 as the product? (yes)

Tell them that the fractions of each pair are called **reciprocals** of each other; reciprocals always have a product of 1.

Ask children more questions on reciprocals of $\frac{2}{3}$, $(\frac{3}{2})$, $\frac{3}{5}$ $(\frac{5}{3})$.

2. Write a question like this on the board: $\frac{3}{4} \div 5$

Ask the class what it means. (It means that $\frac{3}{4}$ is divided into 5 equal parts.)

It also means 'What is $\frac{1}{5}$ of $\frac{3}{4}$?' or: $\frac{1}{5} \times \frac{3}{4}$ or $\frac{3}{4} \times \frac{1}{5}$

$$\frac{3}{4} \div 5 = \frac{3}{4} \times \frac{1}{5}$$

So 5 and $\frac{1}{5}$ are reciprocals.

Give one more example: $\frac{2}{3} \div 4$

Let the children change that division to multiplication and then solve it:

$$\begin{aligned} \frac{2}{3} \div 4 & \quad \text{reciprocal} \\ = \frac{2}{3} \times \frac{1}{4} \\ = \frac{2 \times 1}{3 \times 4} \\ = \frac{2}{12} = \frac{1 \times 2}{6 \times 2} = \frac{1}{6} \end{aligned}$$

Let them see a fraction divided by a fraction:

$$\begin{aligned} \frac{3}{4} \div \frac{1}{2} \\ = \frac{3}{4} \times \frac{2}{1} \\ = \frac{3 \times 2}{4 \times 1} \\ = \frac{6}{4} \\ = 1 \frac{2}{4} = 1 \frac{1}{2} \end{aligned}$$

Group Work

Divide children into three groups. They find the answers together, using rectangle diagrams to help them, if necessary.

- | | | |
|----|--------------------------------|--|
| 1. | $\frac{2}{5} \div 10$ | $(\frac{2}{50} \text{ or } \frac{1}{25})$ |
| 2. | $\frac{5}{6} \div 60$ | $(\frac{5}{360} \text{ or } \frac{1}{72})$ |
| 3. | $\frac{3}{8} \div 12$ | $(\frac{3}{96} \text{ or } \frac{1}{32})$ |
| 4. | $\frac{3}{5} \div \frac{1}{2}$ | $(\frac{6}{5} \text{ or } 1 \frac{1}{5})$ |
| 5. | $\frac{4}{7} \div \frac{8}{2}$ | $(\frac{8}{56} \text{ or } \frac{1}{7})$ |
| 6. | $\frac{4}{9} \div \frac{2}{3}$ | $(\frac{12}{18} \text{ or } \frac{2}{3})$ |

Individual Application

1. Write the reciprocals of the numbers:

- | | | |
|----|----------------|------------------|
| a) | 4 | $(\frac{1}{4})$ |
| b) | $\frac{1}{4}$ | (4) |
| c) | 6 | $(\frac{1}{6})$ |
| d) | $\frac{5}{6}$ | $(\frac{6}{5})$ |
| e) | 7 | $(\frac{1}{7})$ |
| f) | $\frac{14}{7}$ | $(\frac{7}{14})$ |

2. Divide the following:

- | | | |
|----|----------------------------------|--|
| a) | $\frac{3}{5} \div 9$ | $(\frac{3}{45} \text{ or } \frac{1}{15})$ |
| b) | $\frac{4}{9} \div 12$ | $(\frac{4}{108} \text{ or } \frac{1}{27})$ |
| c) | $\frac{3}{8} \div 24$ | $(\frac{3}{192} \text{ or } \frac{1}{64})$ |
| d) | $\frac{4}{7} \div \frac{2}{3}$ | $(\frac{12}{14} \text{ or } \frac{6}{7})$ |
| e) | $\frac{7}{10} \div \frac{7}{15}$ | $(\frac{49}{150})$ |

$$f) \quad \frac{3}{4} \div \frac{15}{24} \quad \left(\frac{72}{60} \text{ or } 1\frac{1}{5} \right)$$

Additional Exercise

1. Give the reciprocals of these fractions:

$$\frac{2}{5}, \frac{3}{7}, 7, \frac{4}{9}, 9 \quad \left(\frac{5}{2}, \frac{7}{3}, \frac{1}{7}, \frac{9}{4}, \frac{1}{9} \right)$$

2. Solve these division problems:

$$\begin{array}{ll} a) & 2\frac{1}{2} \div \frac{4}{5} \quad \left(3\frac{1}{6} \right) \\ b) & 3\frac{2}{3} \div \frac{15}{21} \quad \left(5\frac{2}{15} \right) \\ c) & 5\frac{1}{4} \div \frac{7}{8} \quad (6) \end{array}$$

Lesson 9: Review and Practice Work from Lesson 8 Included Examples Involving Mixed Numbers

Outcome

Divide fractions including mixed numbers, using reciprocals.

Teaching Aids

Blackboard or chart

Teaching for Understanding

Ask pupils to give reciprocals of $3, \frac{1}{4}, \frac{2}{3}, \frac{4}{5}, \frac{2}{1}, \frac{3}{2}, \frac{4}{3}$ etc.

Now ask for the reciprocal of $1\frac{1}{3}$. Write $1\frac{1}{3}$ on the board.

Discuss how to find the reciprocal of $1\frac{1}{3}$.

$$1\frac{1}{3} = \frac{4}{3} \quad - \text{change to an improper fraction}$$

So the reciprocal of $\frac{4}{3}$ is $\frac{3}{4}$.

Give more mixed numbers and ask the children to work out their reciprocals.

Now write this sum on the board and discuss it with them.

$$\begin{aligned} & 1\frac{1}{2} \div \frac{1}{4} \\ = & \frac{3}{2} \div \frac{1}{4} \quad - \text{change to improper fraction} \\ = & \frac{3}{2} \times \frac{4}{1} \\ = & \frac{3 \times 4}{2 \times 1} \\ = & \frac{12}{2} \\ = & 6 \end{aligned}$$

Now write this one $1\frac{1}{3} \div 1\frac{1}{4}$

Ask the class for the first step: (change mixed numbers to improper fractions)

Ask for the next step: ("Dividend x Reciprocal of Divisor")

This is known as the rule for finding the quotient when working with fractions.

$$\begin{aligned} & 1\frac{1}{3} \div 1\frac{1}{4} \\ = & \frac{4}{3} \div \frac{5}{4} \\ = & \frac{4}{3} \times \frac{4}{5} \\ = & \frac{4 \times 4}{3 \times 5} \\ = & \frac{16}{15} \\ = & 1\frac{1}{15} \end{aligned}$$

Group Work

Put children into groups of five or six. Let them discuss and solve the following in their groups.

1. Change these mixed numbers to improper fractions:

$$\begin{array}{ll} \text{a)} & 2\frac{1}{2} \qquad \qquad \qquad \left(\frac{5}{2}\right) \\ \text{b)} & 3\frac{3}{4} \qquad \qquad \qquad \left(\frac{15}{4}\right) \\ \text{c)} & 4\frac{3}{5} \qquad \qquad \qquad \left(\frac{23}{5}\right) \end{array}$$

2. Complete these by writing in the missing number or numeral:

$$\begin{array}{ll} \text{a)} & \frac{5}{1} \times \frac{1}{\boxed{5}} = 1 \\ \text{b)} & \frac{1}{2} \times \frac{\boxed{2}}{1} = 1 \\ \text{c)} & \frac{3}{4} \times \frac{4}{\boxed{6}} = 1 \\ \text{d)} & \frac{2}{3} \times \frac{3}{2} = \boxed{1} \\ \text{e)} & \frac{3}{5} \times \frac{\boxed{5}}{3} = 1 \\ \text{f)} & \frac{4}{7} \times \frac{\boxed{7}}{4} = 1 \\ \text{g)} & \frac{\boxed{5}}{8} \times \frac{8}{5} = 1 \\ \text{h)} & \frac{\boxed{5}}{6} \times \frac{6}{5} = 1 \end{array}$$

Individual Application

1. Change to mixed numbers and simplify to their lowest terms:

$$\begin{array}{ll} \text{a)} & \frac{10}{4} \qquad \qquad \qquad \left(2\frac{1}{2}\right) \\ \text{b)} & \frac{15}{10} \qquad \qquad \qquad \left(1\frac{1}{2}\right) \\ \text{c)} & \frac{12}{8} \qquad \qquad \qquad \left(1\frac{1}{2}\right) \\ \text{d)} & \frac{15}{9} \qquad \qquad \qquad \left(1\frac{2}{3}\right) \end{array}$$

2. Find the reciprocals of these numbers:

$$\begin{array}{ll} \text{a)} & 4 \qquad \qquad \qquad \left(\frac{1}{4}\right) \\ \text{b)} & 2\frac{1}{4} \qquad \qquad \qquad \left(\frac{4}{9}\right) \\ \text{c)} & 7 \qquad \qquad \qquad \left(\frac{1}{7}\right) \\ \text{d)} & 6\frac{3}{5} \qquad \qquad \qquad \left(\frac{5}{33}\right) \end{array}$$

3. Solve the following:

$$\begin{array}{ll} \text{a)} & \frac{3}{4} \div \frac{1}{2} \qquad \qquad \qquad \left(1\frac{1}{2}\right) \\ \text{b)} & \frac{3}{8} \div \frac{3}{4} \qquad \qquad \qquad \left(\frac{1}{2}\right) \\ \text{c)} & \frac{5}{6} \div \frac{2}{3} \qquad \qquad \qquad \left(1\frac{1}{4}\right) \\ \text{d)} & 2\frac{2}{5} \div \frac{2}{5} \qquad \qquad \qquad \left(6\right) \\ \text{e)} & 3\frac{1}{3} \div 2\frac{1}{2} \qquad \qquad \qquad \left(1\frac{1}{3}\right) \end{array}$$

f) $2\frac{1}{4} \div 1\frac{1}{2}$ **($1\frac{1}{2}$)**

Additional Exercise

1. Solve these problems:

a) $1\frac{1}{3} \div \frac{1}{2}$ **($2\frac{2}{3}$)**
 b) $3\frac{3}{5} \div 1\frac{2}{3}$ **($2\frac{4}{25}$)**
 c) $2\frac{1}{4} \div 1\frac{1}{2}$ **($1\frac{1}{2}$)**

2. Solve these problems:

- a) A rectangle has an area of 60 sq. cm. It is $3\frac{1}{4}$ cm wide. How long is it? **($18\frac{6}{13}$)**
 b) How many lengths $1\frac{1}{2}$ metres long can be cut from a stick $10\frac{1}{2}$ metres long? **(7 pieces)**

Lesson 10: Assessment

Group Work

In groups of five or six, children help each other to work out the following:

1. Complete the following:

a) $\frac{16}{32} = \frac{\quad}{8} = \frac{\quad}{24}$ **(4, 12)**
 b) $3\frac{5}{9} = -$ **($\frac{82}{9}$)**
 c) $\frac{24}{7} = -$ **($3\frac{3}{7}$)**
 d) $\frac{4}{11} = \frac{12}{\quad} = \frac{20}{\quad}$ **(33, 55)**

2. Find answers to the following:

a) $\frac{3}{4} + \frac{5}{6} =$ **($1\frac{7}{12}$)**
 b) $2\frac{2}{3} + 4\frac{2}{5} =$ **($7\frac{1}{15}$)**
 c) $\frac{5}{6} - \frac{3}{8} =$ **($\frac{11}{24}$)**
 d) $6\frac{2}{5} - 2\frac{3}{4} =$ **($3\frac{13}{20}$)**
 e) $\frac{3}{4} \times 2\frac{1}{2} =$ **($1\frac{7}{8}$)**
 f) $4\frac{2}{3} \div \frac{7}{21} =$ **(14)**

Individual Application

1. Change to mixed numbers:

a) $7\frac{27}{36}$ **($\frac{279}{36} = 7\frac{27}{36}$)**
 b) $\frac{32}{48}$ **($\frac{2}{3}$)**

2. Change to an improper fraction:

$6\frac{3}{7}$ **($\frac{45}{7}$)**

3. Write in its simplest form:

$\frac{28}{36} = \frac{\boxed{14}}{\boxed{18}} = \frac{\boxed{7}}{\boxed{9}}$

4. Solve these fraction problems:

a) $3\frac{2}{3} + 4\frac{5}{6} =$ **($8\frac{1}{2}$)**

$$\begin{aligned} \text{b)} \quad & 7\frac{1}{4} - 2\frac{3}{5} = \left(4\frac{13}{20}\right) \\ \text{c)} \quad & 3\frac{4}{5} \times 2\frac{2}{3} = \left(8\frac{13}{15}\right) \\ \text{d)} \quad & \frac{7}{8} \div 2\frac{1}{3} = \left(\frac{3}{6}\right) \end{aligned}$$

5. Write the equivalent fraction for:

$$\text{a)} \quad \frac{5}{6} = \frac{\boxed{20}}{\boxed{24}}$$

$$\text{b)} \quad 3\frac{2}{3} = \frac{\boxed{11}}{\boxed{30}} = \frac{\boxed{44}}{\boxed{12}}$$

Additional Exercise

Solve these problems:

1. In our school last Friday, children spent $2\frac{1}{4}$ hours cleaning and $1\frac{3}{5}$ hours singing. How much time was spent cleaning and singing? **$\left(3\frac{17}{26}\right)$**
2. The tank was $\frac{5}{6}$ full of water. After 2 days, it was $\frac{3}{4}$ full. What fraction of the water in the tank was used in the 2 days? **$\left(\frac{1}{12}\right)$**

UNIT 5: DECIMALS

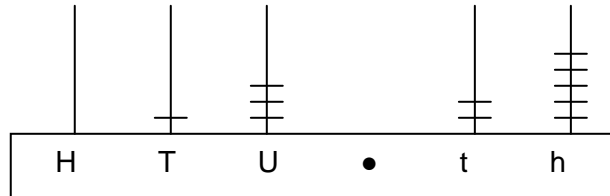
Lesson 1: Read and Write Decimals to Two Places and Change Fractions to Decimals

Outcome

Read and write decimals to two places on the abacus and number line.
Change fractions to decimals in cases such as $2\frac{3}{100} = 2.03$.

Teaching for Understanding

1 a) Draw the following on the blackboard :



Ask the children whether they remember the values of the rings on the abacus above:

What is the value of the first ring? (1 ten)

The other three rings? (3 ones) (2 tenths) (5 hundredths)

What is the number represented by the rings? $13\frac{25}{100}$

Do you remember a decimal fraction equivalent to $13\frac{25}{100}$? **(13.25)**

At this stage write beside the abacus on the board as follows :

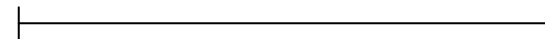
1 ten 3 ones 2 tenths 5 hundredths
= $10 + 3 + .2 + .05$
= 13.25

1 b) Show the following decimal numbers on the abacus and have the children read them out :

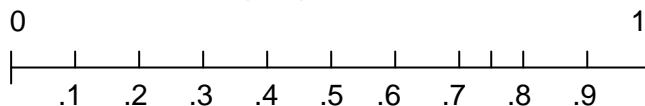
20.7 367.5 2.57 786.09

2. Ask the help of the children to do the following on the blackboard :

a) Draw a number line.



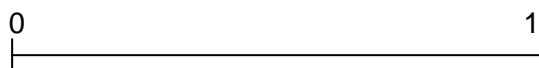
b) Divide it into 10 equal parts.



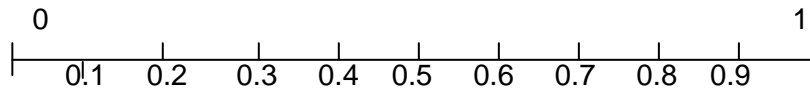
Name the points between 0 and 1.

Group Work

Put the children in groups of five or six. Let them discuss and draw a number line as shown below :

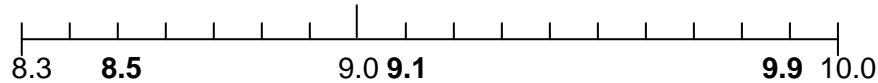


1. Divide it into 10 equal parts and name the points.

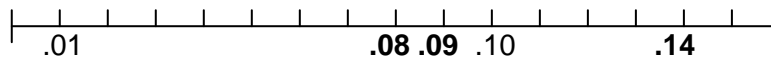


2. Put in the numerals correctly on the number line.

a) 8.5, 9.1, 9.9



b) .08, .09, .14



Individual Application

1. Arrange these distances in order from the shortest to the longest.

7.8 km., 9.9 km., 8.0 km., 0.9 km., 5.6 km.
0.9 km., 5.6 km., 7.8 km., 8.0 km., 9.9 km.

2. Arrange the masses in order from the lightest to the heaviest.

0.05 kg., 0.09 km., 2.43 kg., 0.34 kg., 0.01 kg.
0.01 kg., 0.05 kg., 0.09 kg., 0.34 kg., 2.43 kg.

3. Write these fractions in decimal form.

Fraction	$2\frac{1}{10}$	$3\frac{12}{100}$	$4\frac{16}{100}$	$3\frac{39}{100}$	$6\frac{27}{100}$	$7\frac{40}{100}$
Decimal	2.1	3.12	4.16	3.39	6.27	7.40

Fraction

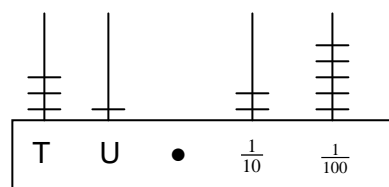
Decimal Form

$\frac{7}{10}$
 $\frac{9}{10}$
 $9\frac{9}{100}$
 $25\frac{19}{100}$
 $127\frac{8}{10}$

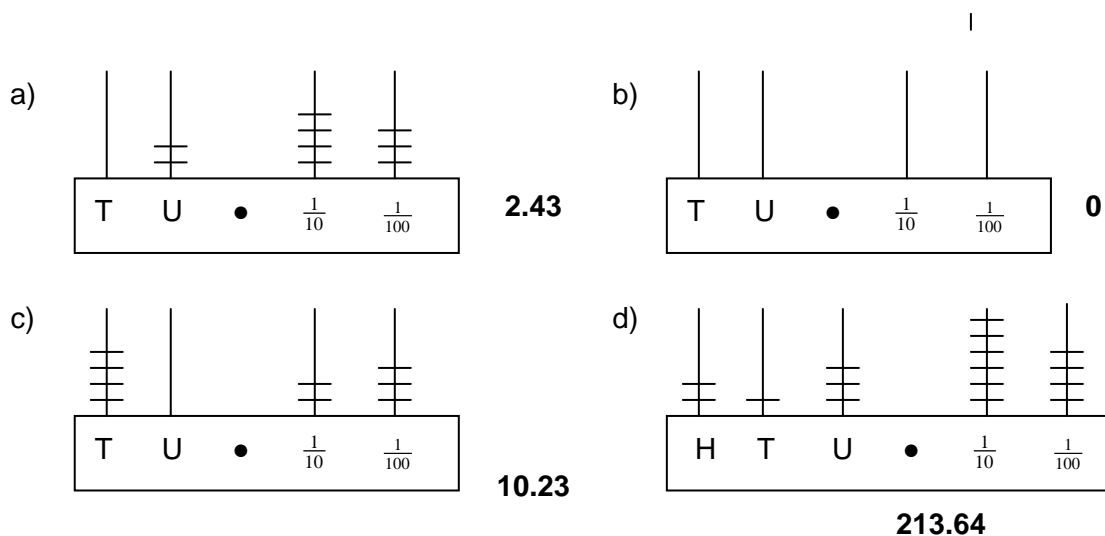
0.7
0.9
9.09
25.19
127.8

Additional Exercise

1. Record the number illustrated on each abacus in these three different ways :



3 tens 1 unit 2 tenths 5 hundredths
 $30 + 1 + .2 + .05$
31.25



2. Write one of the symbols = (equal to), < (less than) or > (greater than)

- | | | | | | | | |
|----|----------------|---|------|----|----------------|---|-----|
| a) | $\frac{8}{10}$ | = | 0.8 | d) | $\frac{8}{10}$ | < | 0.9 |
| b) | $\frac{8}{10}$ | > | 0.68 | e) | $\frac{8}{10}$ | < | 1.9 |
| c) | $\frac{8}{10}$ | < | 1.6 | | | | |

Lesson 2: Add and Subtract Decimals, Involving Tenths and Hundredths

Outcome

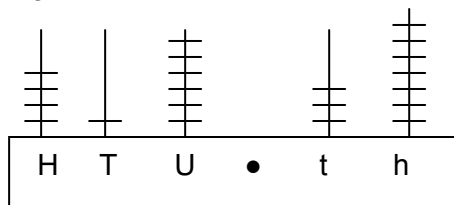
Add and subtract decimals involving tenths and hundredths.

Teaching Aids

Abacus

Teaching for Understanding

Let children sit in the front of the classroom. Discuss with them the value of the rings on each rod on the abacus below :



- a) Express the number shown as a decimal fraction. **416.37**
- b) Explain 416.37 in expanded notation. **$400 + 10 + 6 + \frac{3}{10} + \frac{7}{100}$**

3 a) Work out the following example with the children, without carrying:

H	T	U	•	t	h
1	4	8	•	5	3
+	2	1	•	3	6
1	6	9	•	8	9

- b) Work out the next example with them but include carrying:

H	T	U	•	t	h
6	3	2	•	8	9
+	2	9	•	4	3
6	6	2	•	3	2

- c) Give them the following exercise to work out. They can use column form with diagrams for the first two sums, then do the rest without diagrams:

- | | | |
|-------|------------------------|---------------|
| (i) | $148.53 + 11.36$ | 159.89 |
| (ii) | $454.78 + 320.43$ | 775.21 |
| (iii) | $632.89 + 1.2$ | 634.09 |
| (iv) | $568.08 + 98.99 + 2.3$ | 669.37 |

3. Work out the following examples with the children:

In one, exclude borrowing in decomposition form and the other, include borrowing in decomposition form.

- a)

H	T	U	•	t	h
4	6	8	•	5	6
- 1	2	4	•	3	2
3	4	4	•	2	4

H	T	U	•	t	h
6	7	14	•	17	10
- 1	3	6	•	9	6
5	4	8	•	8	4

- b) Work out the differences :

- | | | |
|------|-------------------|---------------|
| (i) | $674.68 - 32.43$ | 642.25 |
| (ii) | $784.79 - 185.78$ | 599.01 |

Group Work

Put children in groups of five. They work together to do the following.

- a) Use column form with diagrams to work out the first sums and the next without carrying:

- | | | |
|-----|------------------|---------------|
| (i) | $26.54 + 213.38$ | 239.92 |
|-----|------------------|---------------|

(ii) $358.57 + 24.34 + 3.6$ **386.51**

- b) Subtract (i) excluding borrowing in decomposition form and (ii) including borrowing in decomposition form:

(i) $463.75 - 141.23$ **322.52**

(ii) $645.72 - 216.85$ **428.87**

Individual Application

1. Add the first two sums using column form with a diagram and the next two without:

a) $352.43 + 436.35$ **788.78**

b) $574.65 + 187.76$ **762.41**

c) $753.68 + 34.53$ **788.21**

d) $544.76 + 157.88$ **702.64**

2. Subtract the following:

a) $12.23 - 1.16$ **11.07**

b) $120.68 - 24.79$ **95.89**

3. Tina had \$45.68 in the bank. She took out \$5.99 to buy a CD. How much money did she have left in the bank?

Additional Exercise

1. Work out the following:

a) $64.35 + 25.54$ **89.89**

b) $37.68 - 15.24$ **21.76**

c) $342.05 + 69.76$ **411.81**

d) $46.34 - 28.57$ **17.77**

2. Taake bought 3 tuna fish which weighed 5.64 kg, 8.36 kg and 6.2 kg. What was their total weight? **20.2 kg**

Lesson 3: Identifying the Place Value of the Digits in the Range .001 to .999

Outcome

Identify the place value of digits to 3 decimal places.

Teaching Aids

Abacus

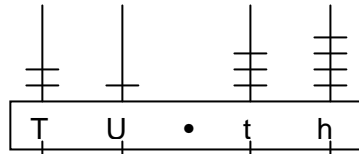
Teaching for Understanding

1. Let children sit in the front of the classroom. Ask them to give the values of the digits in the following decimal numerals.

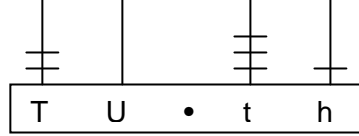
a) 21.53

b) 412.15

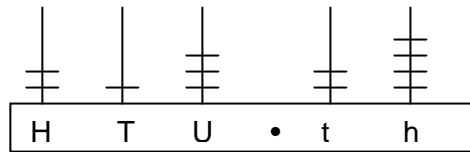
c)



d)



e)



2. Write the following pattern on the board for the class to complete:

1000, 100, 10, 1, $\frac{1}{10}$,

Then ask the class to show how the pattern works:

i.e. $1000 \div 10 = 100$

$100 \div 10 = 10$

$10 \div 10 = 1$

$1 \div 10 = \frac{1}{10}$

$\frac{1}{10} \div 10 = \frac{1}{100}$

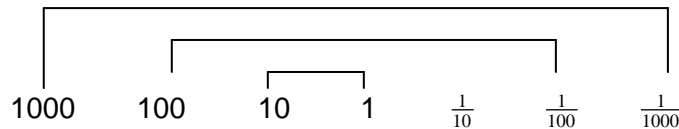
$\frac{1}{100} \div 10 = \frac{1}{1000}$

$(\frac{1}{10} \times \frac{1}{10})$

$(\frac{1}{100} \times \frac{1}{10})$

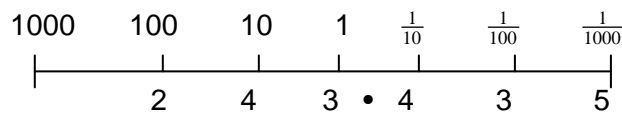
Multiply by the reciprocal of 10

3. Rewrite the above pattern thus:



Then use the chart to indicate the value of these decimal numerals:

a) 243.435



$= 200 + 40 + 3 + \frac{4}{10} + \frac{3}{100} + \frac{5}{1000}$

b) 279.599

$200 + 70 + 9 + \frac{5}{10} + \frac{9}{100} + \frac{9}{1000}$

c) 1,234.567

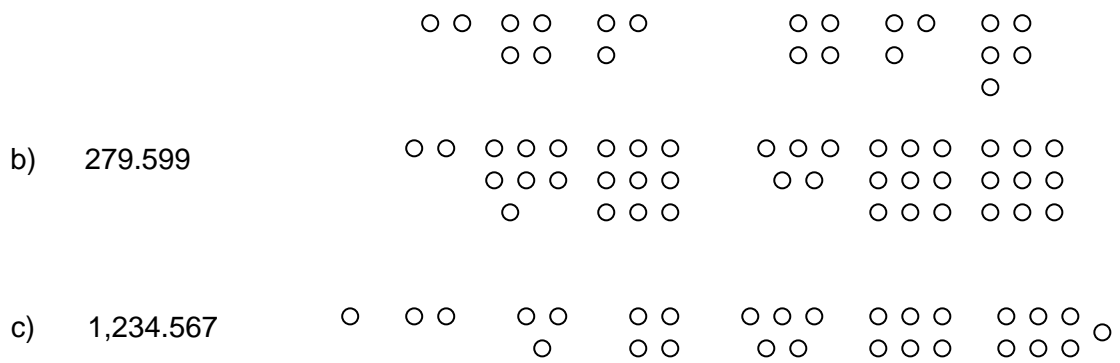
$1000 + 200 + 30 + 4 + \frac{5}{10} + \frac{6}{100} + \frac{7}{1000}$

Group Work

Divide children in groups of five or six:

1. Let them draw a number chart and illustrate the following numerals:

a) 243.435 T H T U • t h th



2. Complete the following:

Fraction	Expanded Notation	Decimal Form
$24 \frac{41}{100}$	$20 + 5 + \frac{4}{10} + \frac{1}{100}$	25.41
$95 \frac{219}{1000}$	$90 + 5 + \frac{2}{10} + \frac{1}{100} + \frac{9}{1000}$	95.219
$81 \frac{3}{10}$	$80 + 1 + \frac{3}{10}$	81.3

Individual Application

1. Complete the following:

Fraction	Expanded Notation	Decimal Fraction
$81 \frac{3}{10}$	$80 + 1 + \frac{3}{10}$	81.3
$246 \frac{45}{100}$	$200 + 40 + 6 + \frac{4}{10} + \frac{5}{100}$	246.45
$225 \frac{36}{100}$	$200 + 20 + 5 + \frac{3}{10} + \frac{6}{100}$	225.36

2. Record the number illustrated on the counting board in the three ways (above):

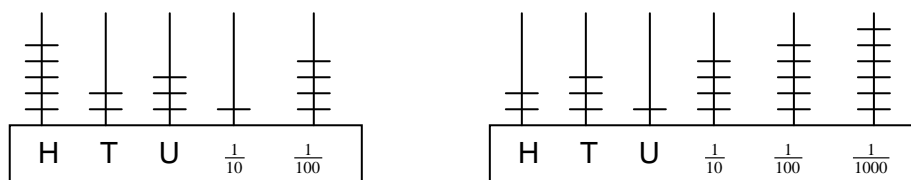


3 units + 2 tenths + 5 hundredths + 4 thousandths

$$3 + \frac{2}{10} + \frac{5}{100} + \frac{4}{1000}$$

Individual Application

Write the numbers illustrated on the abacus as decimals:



523.14

231.456

Additional Exercise

1. Complete the pattern:

- a) 4.12, 4.13, 4.14, **4.15, 4.16**
- b) 5.621, 5.622, 5.623, **5.624, 5.625**
- c) 8.999, 8.998, 8.997, **8.996, 8.995**

2. Write these as decimals:

- a) $85\frac{3}{10}$ **85.3** c) $85\frac{2}{100}$ **85.02**
- b) $185\frac{112}{1000}$ **185.112**

3. Write these in expanded notation:

- a) $47\frac{7}{10}$ **$40 + 7 + \frac{7}{10}$**
- b) $253\frac{25}{100}$ **$200 + 50 + 3 + \frac{2}{10} + \frac{5}{100}$**
- c) 545.37 **$500 + 40 + 5 + \frac{3}{10} + \frac{7}{100}$**
- d) 368.156 **$300 + 60 + 8 + \frac{1}{10} + \frac{5}{100} + \frac{6}{1000}$**

Lesson 4: Addition and Subtraction of Decimals to Three Places

Outcome

Add and subtract decimals to three places.

Teaching Aids

Teaching for Understanding

Have children sit in the front of the classroom and discuss with them how to find the answers to these sums (three decimal places).

1. (2.629 + 12.34)

$$\begin{array}{r}
 \text{T} \quad \text{U} \quad . \quad \text{t} \quad \text{h} \quad \text{th} \\
 2 \quad . \quad 6 \quad 2 \quad 9 \\
 + 1 \quad 2 \quad . \quad 3 \quad 4 \quad 0 \\
 \hline
 1 \quad 4 \quad . \quad 9 \quad 6 \quad 9
 \end{array}$$

Addition of decimal numbers
without carrying

2. (28.879 + 16.145)

$$\begin{array}{r}
 \text{T} \quad \text{U} \quad . \quad \text{t} \quad \text{h} \quad \text{th} \\
 2 \quad 8 \quad . \quad 8 \quad 7 \quad 9 \\
 + 1 \quad 6 \quad . \quad 1 \quad 4 \quad 5 \\
 \hline
 4 \quad 5 \quad . \quad 0 \quad 2 \quad 4
 \end{array}$$

Addition of decimal numbers
including carrying

3. $(28.879 - 16.145)$

	T	U	.	t	h	th
	2	8	.	8	7	9
-	1	6	.	1	4	5
	1	2	.	7	3	4

Subtracting of decimal numbers without borrowing

4. $(72.865 - 33.786)$

	T	U	.	t	h	th
	7	2	.	8	6	5
-	3	3	.	7	8	6
	3	9	.	0	7	9

Subtraction of decimal numbers including borrowing and decomposition

Group Work

Let children sit in groups of five or six and work together to solve the following. Match the columns by arrows: number (a) has been done.

a)	63 tenths	$\frac{89}{100}$
b)	$13.6 - 2.8$	six hundred and forty three hundredths
c)	0.01	4.8
d)	$3.2 + 45.02$	one hundredth
e)	$6 - 2.4$	1.18
f)	$0.36 + .82$	6.3
g)	89 hundredths	10.8
h)	600.43	4.4
i)	$4 + 0.8$	48.22
j)	$8 - 3.6$	seven hundreds and twenty six hundredths
k)	$3.2 + 4.06$	3.6

Individual Application

1. What is the value of '3' in the following numbers:

- | | | |
|----|-------|---------------------|
| a) | 43.25 | 3 ones |
| b) | 0.38 | 3 tenths |
| c) | 60.03 | 3 hundredths |
| d) | 36.78 | 3 tens |

2. Work out the following:

- | | | |
|----|--------------------|----------------|
| a) | $33.683 + 21.114$ | 54.797 |
| b) | $124.387 + 63.968$ | 188.355 |
| c) | $98.938 - 63.726$ | 35.212 |
| d) | $187.326 - 96.458$ | 90.868 |

Additional Exercise

Work out the following:

- | | | |
|----|----------------------|----------------|
| 1. | $8 + 43.4$ | 51.4 |
| 2. | $9.2 + 3.68 + 3.008$ | 15.888 |
| 3. | $145 + 663 + 0.03$ | 808.03 |
| 4. | $4 - 0.34$ | 3.66 |
| 5. | $27 - 16.106$ | 10.894 |
| 6. | $754.365 - 426.786$ | 327.579 |

Lesson 5: Multiplication of Decimals by Whole Numbers in the Range 1-100

Outcome

Multiply decimals by whole numbers in the range 1 to 100.

Teaching for Understanding

Let children sit in the front of the classroom.

1. Ask them to complete the following.

- a) $1.2 = 12$ tenths
- b) $8.58 = 858$ hundredths
- c) $.24 = 24$ hundredths
- d) $1.37 = 137$ hundredths
- e) $.237 = 237$ thousandths
- f) $1.246 = 1246$ thousandths

2. Write the following numbers using decimal notation.

- a) 169 thousandths = **.169**
- b) 169 tenths = **16.9**
- c) 169 hundredths = **1.69**
- d) 15 thousandths = **0.015**
- e) 265 units = **265.0**

3. Revise the algorithm first with them.

eg: $2.3 \times 10 = 23.0$
 $23 \times 10 = 230$
 $2.12 \times 10 = 21.2$

What happens when a decimal is multiplied by 10?
(each digit shifts one place to the left)

- a) Solve the following using an algorithm:

- 1. $5.7 \times 10 = 57$
- 2. $45.0 \times 10 = 450$
- 3. $56 \times 10 = 45.6$
- 4. $568 \times 10 = 45.68$

- b) Calculate the answers with the class:

1. 2.3×5 **11.5**
2. $.23 \times 25$ **5.75**
3. 5.3×3 **15.9**

eg: 23 tenths

x 5

115 tenths = 11.5

23 hundredths

x 25

115

+ 46

575 hundredths = 5.75

Group Work

Divide children in groups of five or six. Let them discuss and complete the following:

- 1
 - a) $2.6 = 26$ tenths
 - b) $7.34 = 734$ hundredths
 - c) $.52 = 52$ hundredths
 - d) $2.3 = 230$ hundredths
 - e) $.237 = 237$ thousandths
 - f) $2.356 = 2356$ thousandths

- 2
 - a) 65 hundredths = **.65**
 - b) 65 thousandths = **.065**
 - c) 65 tenths = **6.5**
 - d) 246 thousandths = **.246**
 - e) 246 hundredths = **2.46**
 - f) 246 tenths = **24.6**

3. Calculate the following:

a) 3.6×5

b) $.36 \times 5$

eg: 36 tenths

x 5

180 tenths = **18.0**

36 hundredths

x 5

180 hundredths = **1.80**

Individual Application

Follow the steps of the 'thinking' method to the following multiplication sums in questions 1 and 2. Read through this example before you begin.

eg: 2.9

x 5

—

Think of 29 instead of 2.9

x 5


145

x 5

145


Then think of 29 tenths = 2.9 and 145 tenths = 14.5

I multiply 29 x 5

$$\begin{array}{r} 29 \\ \times 5 \\ \hline 145 \end{array}$$


$$\begin{array}{r} 29 \\ \times 5 \\ \hline 145 \end{array}$$

Now 29 is 29 tenths or 2.9 "145" is 145 tenths or 14.5. So my answer is 14.5



$$\begin{array}{r} 2.9 \\ \times 5 \\ \hline 14.5 \end{array}$$

1. Solve these multiplication sums using the 'thinking' method.

eg: $\begin{array}{r} 2.6 \\ \times 2 \\ \hline \end{array}$

$\begin{array}{r} 26 \text{ tenths} \\ \times 2 \\ \hline 52 \text{ tenths} = 5.2 \end{array}$

Answer 5.2

a) $\begin{array}{r} 1.36 \\ \times 12 \\ \hline 16.32 \end{array}$

b) $\begin{array}{r} 1.23 \\ \times 4 \\ \hline 4.92 \end{array}$

2. Solve these using the 'thinking' method:

a) $\begin{array}{r} 3.9 \\ \times 9 \\ \hline 35.1 \end{array}$

c) $\begin{array}{r} 3.6 \\ \times 8 \\ \hline 28.8 \end{array}$

b) $\begin{array}{r} 7.12 \\ \times 26 \\ \hline 185.12 \end{array}$

d) $\begin{array}{r} 0.016 \\ \times 22 \\ \hline 0.352 \end{array}$

Additional Exercise

1. Solve these using the 'thinking' method:

a) $\begin{array}{r} 4.6 \\ \times 7 \\ \hline 32.2 \end{array}$

c) $\begin{array}{r} 14.6 \\ \times 17 \\ \hline 248.2 \end{array}$

b) $\begin{array}{r} 1.46 \\ \times 7 \\ \hline 10.22 \end{array}$

d) $\begin{array}{r} 0.82 \\ \times 14 \\ \hline 11.48 \end{array}$

2. Calculate the following using the example in (a):

a) $5.6 \times 8 = 448$ tenths
= 44.8

b) $4.25 \times 17 = 7225$ hundredths
= 72.25

c) $24.7 \times 25 = 6175$ tenths
= 617.5

d) $35.6 \times 6 = 2136 \text{ tenths}$
 $= 213.6$

Lesson 6: Multiplication of Decimals Involving Tenths in Multiplicand and Multiplier

Outcome

Multiply decimals involving tenths in multiplicand and multiplier.

Teaching Aids

Chart or blackboard

Teaching for Understanding

1. Let children sit in the front to solve the following using an algorithm.

a) $\frac{1}{2}$ of $\frac{3}{4} = \frac{1}{2} \times \frac{3}{4}$
 $= \frac{1 \times 3}{2 \times 4}$
 $= \frac{3}{8}$

b) $\frac{3}{4}$ of $\frac{2}{5}$

2. Ask the children to complete the following table.

	Fraction	Decimal
9 tenths	$\frac{9}{10}$	0.9
2 tenths	$\frac{2}{10}$	0.2
3 tenths	$\frac{3}{10}$	0.3
<input type="text"/> tenths	$\frac{6}{10}$	0.6
7 tenths	$\frac{7}{10}$	0.7
2 hundredths	$\frac{2}{100}$.02
65 hundredths	$\frac{65}{100}$	0.65

- 3 a) Write $\frac{1}{10} \times \frac{1}{10}$ on the board and solve with the class using the algorithm method, as follows:

$$\frac{1}{10} \times \frac{1}{10} = \frac{1 \times 1}{10 \times 10} = \frac{1}{100}$$

emphasize that **tenths x tenths = hundredths**

b) Then $\frac{5}{10} \times \frac{3}{10} = \frac{5 \times 3}{10 \times 10} = \frac{15}{100}$

Express the question in words and write on the board.

i.e. 5 tenths x 3 tenths equal 15 hundredths

- c) Have the children write the following in words:

(i) $\frac{3}{10} \times \frac{6}{10} = \frac{3 \times 6}{10 \times 10} = \frac{18}{100}$

$$(ii) \quad \frac{9}{10} \times \frac{7}{10} = \frac{9 \times 7}{10 \times 10} = \frac{63}{100}$$

d) Ask the class to write these in fractions:

$$(i) \quad 4 \text{ tenths} \times 5 \text{ tenths equals } 20 \text{ hundredths} \quad \left(\frac{4}{10} \times \frac{5}{10} = \frac{20}{100} \right)$$

$$(ii) \quad 1 \text{ tenth} \times 8 \text{ tenths equals } 8 \text{ hundredths} \quad \left(\frac{1}{10} \times \frac{8}{10} = \frac{8}{100} \right)$$

e) Have the class calculate this: $\frac{4}{10} \times \frac{5}{10}$ in two ways

$$\text{i.e. First } \frac{4}{10} \times \frac{5}{10} = \frac{20}{100}$$

Second 4 tenths x 5 tenths equals 20 hundredths

4. Now pose the question 0.6×0.2 and solve with the class thus:

$$\begin{aligned} 0.6 \times 0.2 &= 6 \text{ tenths} \times 2 \text{ tenths} \\ &= (6 \times 2) \text{ hundredths} \\ &= 12 \text{ hundredths} \\ &= 0.12 \end{aligned}$$

Repeat the above with class for:

$$(i) \quad 0.3 \times 0.8 \quad \quad \quad \mathbf{0.24}$$

$$(ii) \quad 0.7 \times 0.2 \quad \quad \quad \mathbf{0.14}$$

Group Work

Put children in groups of five or six. Let them discuss and complete the following:

$$\begin{aligned} 1. \quad 0.1 \times 0.6 &= 1 \text{ tenth} \times \boxed{} \text{ tenths} \\ &= (\boxed{} \times 6) \text{ hundredths} \\ &= 6 \quad \quad \quad ? \\ &= 0.06 \end{aligned}$$

$$\begin{aligned} 2. \quad 0.6 \times 0.9 &= \mathbf{6} \text{ tenths} \times 9 \text{ tenths} \\ &= (\mathbf{6} \times \mathbf{9}) \text{ hundredths} \\ &= \mathbf{54} \text{ hundredths} \\ &= \mathbf{0.54} \end{aligned}$$

$$\begin{aligned} 3. \quad 0.23 \times 0.5 &= 23 \text{ hundredths} \times \mathbf{5} \text{ tenths} \\ &= (\mathbf{23} \times \mathbf{5}) \text{ hundredths} \\ &= \mathbf{0.115} \text{ thousandths} \\ &= 0.115 \end{aligned}$$

Individual Application

1. Complete the following:

$$\begin{aligned} a) \quad 3.4 \times 0.4 &= \mathbf{34} \text{ tenths} \times 4 \text{ tenths} \\ &= (\mathbf{34} \times \mathbf{4}) \text{ hundredths} \\ &= \mathbf{136} \text{ hundredths} \\ &= \mathbf{1.36} \end{aligned}$$

$$\begin{aligned}
 \text{b) } 0.25 \times 0.07 &= \mathbf{25} \text{ hundredths} \times 7 \text{ hundredths} \\
 &= (\mathbf{25} \times 7) \text{ thousandths} \\
 &= \mathbf{175} \text{ thousandths} \\
 &= \mathbf{0.175}
 \end{aligned}$$

$$\begin{aligned}
 \text{c) } 3.45 \times 1.2 &= \mathbf{345} \times 12 \text{ tenths} \\
 &= (\mathbf{345} \times 12) \text{ thousandths} \\
 &= \mathbf{4140} \text{ thousandths} \\
 &= \mathbf{4.140}
 \end{aligned}$$

2. Solve these using an algorithm as follows:

$$\begin{array}{rcl}
 \text{i.e. } 3.46 & \longrightarrow & 346 \text{ hundredths} \\
 \times 1.2 & \longrightarrow & \times 12 \text{ tenths} \\
 \hline
 002 & & 692 \\
 346 & & 346 \\
 \hline
 4.152 & \longleftarrow & 4152 \text{ thousandths} \left(\frac{4152}{1000} = 4152 \div 1000 = 4.152 \right)
 \end{array}$$

$$\begin{array}{rcl}
 \text{a) } 2.53 & \longrightarrow & \mathbf{253} \text{ hundredths} \\
 \times 2.2 & \longrightarrow & \mathbf{22} \text{ tenths} \\
 \hline
 & & 506 \\
 & & \mathbf{506} \\
 \hline
 5.566 & \longleftarrow & 5566 \text{ thousandths}
 \end{array}$$

3. Study the pattern and then solve these:

$$\begin{array}{rcl}
 3.46 & (2 \text{ decimal places}) \\
 \times 1.2 & (1 \text{ decimal place}) \\
 \hline
 692 \\
 346 \\
 \hline
 4.152 & (3 \text{ decimal places})
 \end{array}$$

$$\begin{array}{rcl}
 \text{a) } 2.34 \times 0.4 & & \mathbf{0.936} \\
 \text{b) } 3.45 \times 2.2 & & \mathbf{5.65} \\
 \text{c) } 42.5 \times 0.24 & & \mathbf{10.20}
 \end{array}$$

Additional Exercise

1. Solve these sums using an algorithm.

$$\begin{array}{rcl}
 \text{a) } 0.23 \times 0.5 & & \mathbf{0.115} \\
 \text{b) } 2.15 \times 0.3 & & \mathbf{0.645} \\
 \text{c) } 3.42 \times 2.4 & & \mathbf{8.2} \\
 \text{d) } 4.6 \times 0.23 & & \mathbf{1.058} \\
 \text{e) } 24.2 \times 0.48 & & \mathbf{11.616}
 \end{array}$$

Lesson 7: Multiplication of Decimals by 10, 100 and 1000

Outcome

Multiply decimals by 10, 100, and 1000.

Teaching Aids

Teaching for Understanding

Let the children sit in the front of the classroom:

1. Have them solve for the following:

a)	26×10	260	e)	$26 \div 10$	2.6
b)	68×10	680	f)	$68 \div 10$	6.8
c)	26×100	2600	g)	$26 \div 100$.26
d)	6×1000	6000	h)	$6 \div 1000$.006

2. Then ask the class to suggest the rules for multiplication and division:

- a) multiplying whole numbers by 10 (each digit shifts one place to the left in multiplication, but shifts to the right in division)
- b) multiplying whole numbers by 100 (each digit shifts two places to the left in multiplication, but shifts to the right in division)
- c) multiplying whole numbers by 1000 (each digit shifts three places to the left in multiplication, but shifts to the right in division)

Note: Division is the opposite of multiplication ($25 \times 10 = 250 \div 10$).

3. Teta filled up 10 bags with gravel. Each bag of gravel weighed 45.6 kg. What was the total mass for the 10 bags of gravel? **456 kg.**

- a) Read the problem with children and decide what is required (the mass for 10 bags of gravel)
- b) Decide what operation to be used to get the final answer (45.6×10)
- c) Then solve:
Total mass for 10 bags = 45.6

$$\begin{array}{r} \times 10 \\ 45.6 \\ \hline 456.0 \text{ kg} \end{array}$$

(Working (a) apply the thinking method first)

45.6 is 456 tenths

Therefore 4560 tenths which is 456.0.

So my answer is 456

(Working (b) apply the rule in no. 2)

$$\begin{array}{ccccccc} & H & T & U & T & & \\ & & 4 & 5 & . & 6 & \times 10 \\ 4 & \swarrow & 5 & \swarrow & 6 & \swarrow & \end{array}$$

Group Work

Let children sit in groups of five or six.

1. Have them discuss and solve this problem using the rule in (2).
Taake filled 100 bags with sand. Each bag of sand weighed 36.5 kg.
What was the total mass of the 100 bags of sand? **3650**

2. Solve the following sums using the rule of multiplication by 10, 100 and 1000.

a)	46.7×10	467	4.67
b)	4.725×100	472.5	0.04725
c)	45.67×1000	45670	0.04567

3. Solve the questions in (2) but change the multipliers to divisors.
i.e. $46.7 \div 10$

Individual Application

- Solve the following using the thinking method:
 - 24.6×10 **246**
 - 3.452×100 **345.2**
 - 3.12×1000 **3120**
- Solve these sums using the multiplication and division rules of 10, 100, and 1000:

a) 4.2×10	42	f) $54.13 \div 10$	5.413
b) 3.46×10	34.6	g) $742.5 \div 100$	7.425
c) 56×100	5600	h) $45.6 \div 1000$	0.0456
d) 35.67×100	3567	i) $2.43 \div 100$	0.0243
e) 5.248×1000	5248	j) $3.63 \div 10$	0.363

Additional Exercise

- Solve these sums using the thinking method:

a) 24.3×10	243	c) 46.7×1000	46700
b) 35.4×100	3540		
- Solve these sums using the multiplication and division rules of 10, 100 and 1000:

a) 4.36×10	43.6	d) $24 \div 10$	2.4
b) 7.25×100	725	e) $467.2 \div 100$	4.672
c) 9.72×1000	9720	f) $25.6 \div 1000$.0256

Lesson 8: Dividing Decimals Using the Division Algorithm

Outcome

Divide decimals using the division algorithm.

Teaching for Understanding

Have children sit in the front of the classroom.

- Solve $6 \overline{) 39.12}$ with the class using the two methods given below:

T	U	•	t	h
3	9	•	1	2
3	6			
	3		1	
	3		0	
			1	2
			0	1

$$\begin{aligned}
 39.12 \div 6 &= 6 + (3.1 \div 6) \\
 &= 6 + (31 \text{ tenths} \div 6) \\
 &= 6 + 5 \text{ tenths} + (1 \text{ tenth} + 2h) \div 6 \\
 &= 6 + 5 \text{ tenths} + (12h \div 6) \\
 &= 6 + 5 \text{ tenths} + 2 \text{ hundredths} \\
 &= \underline{6.52}
 \end{aligned}$$

Discuss and compare the two methods above. Then calculate this equation: $20.16 \div 3$ using an algorithm.

i.e.

$$\begin{array}{r}
 \underline{6.72} \\
 3 \overline{) 20.16} \\
 \underline{18} \\
 21 \\
 \underline{21} \\
 6
 \end{array}$$

$$\frac{6}{0}$$

Group Work

Divide the children into groups of five or six.

1. Let them discuss and complete the following using the two methods above.

a)

$$\begin{array}{r} 7.26 \\ 5 \overline{) 36.3} \\ \underline{35} \\ 13 \\ \underline{10} \\ 30 \\ \underline{30} \end{array}$$

b)

$$\begin{array}{r} 3.63 \\ 6 \overline{) 21.78} \\ \underline{18} \\ 37 \\ \underline{36} \\ 18 \\ \underline{18} \end{array}$$

c)

$$\begin{aligned} 36.3 \div 5 &= 7 + (13 \div 5) \\ &= 7 + (13 \text{ tenths} \div 5) \\ &= 7 + 2 \text{ tenths} + (3 \text{ tenth} + 0 \text{ hundredths}) \\ &= 7 + 2 \text{ tenths} + \mathbf{6 \text{ hundredths}} \\ &= 7 + 2 \text{ tenths} + 6 \text{ hundredths} \\ &= \underline{7.26} \end{aligned}$$

d)

$$\begin{aligned} 21.78 \div 6 &= 3 + (37 \div 6) \\ &= 3 + (37 \text{ tenths} \div 6) \\ &= 3 + 6 \text{ tenths} + (1 \text{ tenths} \div 6) \\ &= 3 + 6 \text{ tenths} + (18 \text{ hundredths} \div 6) \\ &= 3 + 6 \text{ tenths} + 3 \text{ hundredths} \\ &= \mathbf{3.63} \end{aligned}$$

Individual Application

1. Solve these division sums using the two methods noted above:

a) $35.64 \div 4$ **8.91**

b) $43.25 \div 5$ **8.65**

2. Solve the following using an algorithm as in (a).

a)

$$\begin{array}{r} 5.73 \\ 5 \overline{) 28.65} \\ \underline{25} \\ 36 \\ \underline{35} \\ 15 \\ \underline{15} \end{array}$$

b) $29.04 \div 6$ **4.84**

c) $18.69 \div 7$ **2.67**

Additional Exercise

1. Do the following divisions in short form:

- a) $18.56 \div 8$ **2.32**
 b) $15.04 \div 4$ **3.76**
 c) $1.65 \div 15$ **0.11**
 d) $0.198 \div 18$ **0.011**

Lesson 9: Division of Decimals by Whole Numbers Less Than 20

Outcome

Divide decimals by whole numbers less than 20.

Teaching for Understanding

Let children sit in the front of the classroom.

1. Have the class provide the missing numerals:

(a)	(b)
12 tens = 120	1.4 = 14 tenths
41 tens = 410	2.1 = 21 tenths
32 units = 32	12.1 = 121 tenths
11 hundreds = 1100	0.26 = 26 hundredths
17 tens = 170	24.6 = 246 tenths
141 units = 141	2.46 = 246 hundredths

2. Solve the following with the class using contracted form as follows:

$$\begin{array}{r} .19 \\ 13 \overline{) 2.48} \\ \underline{13} \\ 118 \\ \underline{117} \\ r = 1 \end{array}$$

Explanation:

$$24 \text{ tenths} \div 13 = 1 \text{ tenth}$$

$$24 \text{ tenths} \div 13 \text{ tenths} = 11 \text{ tens}$$

$$(11 \text{ tenths} + 8 \text{ hundredths} \div 13)$$

$$= 118 \text{ hundredths} \div 13 = 9 \text{ hundredths}$$

$$9 \times 13 = 117$$

$$r = 1$$

a) $\begin{array}{r} .21 + 4r \\ 12 \overline{) 2.56} \end{array}$

b) $\begin{array}{r} .049 + 5r \\ 15 \overline{) .740} \end{array}$

Group Work

Put the class in groups of five or six.

1. Do the following in contracted form:

a) $1.8 \div 12$ **1 + 5r** b) $1.43 \div 18$ **0.07 + 17r**

2. Calculate the following:

- a) $24.65 \div 10$ **2.465**
 b) $34.6 \div 100$ **0.346**
 c) $47.5 \div 1000$ **0.0475**

3. Solve these using the short way:

- a)
$$\begin{array}{r} \text{0.11} \\ 15 \overline{) 1.65} \end{array}$$
 b)
$$\begin{array}{r} \text{0.011} \\ 18 \overline{) 0.198} \end{array}$$

Individual Application

1. Solve these using the contracted form:

- a)
$$\begin{array}{r} \\ 15 \overline{) 1.8} \end{array}$$
 0.12
 b)
$$\begin{array}{r} \\ 20 \overline{) 2.4} \end{array}$$
 0.12
 c)
$$\begin{array}{r} \\ 16 \overline{) 0.176} \end{array}$$
 0.011

2. Do these sums in short form:

- a)
$$\begin{array}{r} \\ 12 \overline{) 3.79} \end{array}$$
 0.31 + 7r
 b)
$$\begin{array}{r} \\ 19 \overline{) 0.95} \end{array}$$
 0.05
 c)
$$\begin{array}{r} \\ 14 \overline{) 4.34} \end{array}$$
 0.31

Additional Exercise

1. Solve this problem:
 Tom wanted to share \$1.95 equally among 15 boys.
 How much would each boy get? **0.132**

Lesson 10: Assessment

Group Work

Put children in groups of five or six.

1. Complete the table:

Number	Fractions	Decimals
4 tenths	$\frac{4}{10}$.4
15 tenths	$\frac{15}{10}$	1.5

6 hundredths	$\frac{6}{100}$.06
125 hundredths	$\frac{125}{100}$	1.25
26 thousandths	$\frac{26}{1000}$	0.026

2. Add and subtract these sums:

- a) $7.42 + 5.64$ **13.06**
b) $63.4 - 25.7$ **37.7**

3. Complete these sums:

- a) 4.673×100 **467.3** c) $2.4 \div 10$ **0.24**
b) 0.0243×1000 **24.3** d) $47.5 \div 1000$ **0.0475**

4. Calculate the following:

- a) 36.5×15 **547.5**
b) $4.32 \div 12$ **0.36**

Individual Application

1. Convert the following fractions to decimals:

- a) $\frac{7}{10}$ **0.7** c) $\frac{245}{100}$ **2.45**
b) $\frac{26}{100}$ **0.26** d) $\frac{1}{2}$ **0.5**

2. Solve these problems:

- a) $25.2 + 4.24 + 3.5$ **32.94**
b) $47.6 - 28.7$ **18.9**

3. Calculate the following:

- a) 2.45×16 **39.20**
b) $4.72 \div 15$ **$0.31 + \frac{7}{100}$**

4. Solve the following:

- a) 0.436×100 **436**
b) $52.46 \div 1000$ **0.05246**

5. Meere wanted to share \$2.80 among 14 girls.
How much would each get? **20c.**

UNIT 6: PERCENTAGES

Lesson 1: Introducing Percentages

Outcome

State the meaning of percentage.

Use the symbol %.

State too that a percentage can be less or greater than 100.

Teaching Aids

Chart, with shown on it :

The meaning of percentage
a symbol % to represent per cent
some examples of percentages (written in words and figures)

Teaching for Understanding

Let the children sit together in the front of the classroom. Put up a chart (see under Teaching Aids) for them to see. Explain the meaning of percentage on the chart and the symbol replacing the word. (Per cent means per 100, or for every hundred, and the symbol used is %.)

Go over some examples on the chart for them to get a clear understanding.

eg: ➡ 20% means twenty per cent or twenty per hundred
➡ 125% means hundred and twenty five per cent/per hundred
➡ Ten per cent means 10%
➡ Fifteen per hundred means 15%

Group Work

Divide the children into two groups. Let them play a look and write game. They will sit lined up in their teams. The children in front will start the game. They stand, turning away from the blackboard. You give a signal for them to look back. Quickly write any percentage in words for them to write in figures.

eg: twenty-five per cent – 25%
a hundred and thirty-two per cent – 132%

The first child to get the correct answer will get a point for his/her team. The team with more points is the winner.

Individual Application

Write in figures:

- | | | |
|----|---------------------------------|-------------|
| 1. | eight per cent | 8% |
| 2. | twenty-four per cent | 24% |
| 3. | forty-five per cent | 45% |
| 4. | sixty-eight per cent | 68% |
| 5. | ninety per cent | 90% |
| 6. | hundred and twelve per cent | 112% |
| 7. | two hundred and twenty per cent | 220% |
| 8. | three hundred and two per cent | 302% |

Additional Exercise

Write the correct answer in the space provided.

- | | |
|----|--|
| 1. | Fifty-four per cent means 54% or 54 per hundred |
| 2. | 70% means 70 per cent or seventy per hundred |
| 3. | eighty-six per cent means 86 % or 86 per hundred |
| 4. | hundred and five per cent means 105 % or 105 per hundred |
| 5. | two hundred per cent means 200 % or 200 per hundred |
| 6. | two hundred and ten per cent means 210% or 210 per hundred |

Lesson 2: Writing Percentages as Fractions and Vice Versa

Outcome

Write percentages as fractions and fractions as percentages.

Teaching Aids

A chart with examples of percentages changing to fractions and vice versa.
Cards with percentages and fractions written on them.

eg: $\boxed{50\%} = \boxed{\frac{1}{2}} = \boxed{10\%} = \boxed{\frac{1}{10}}$

Teaching for Understanding

Let the children sit together in the front of the classroom. Put up the chart for explanation (mentioned in T/aid).

Remind the children that percentage means per hundred. Use examples shown on chart.

eg: 1. $25\% = \frac{25}{100}$ (written as a fraction)
 \downarrow - these fractions can be simplified
 $\frac{25}{100} \div \frac{25}{25} = \frac{1}{4}$ (division is done in simplification)
 $= 25\% = \frac{1}{4}$

Give three more examples, letting children do some of the work to check their understanding.

(changing fractions to percentages)

eg: $\frac{1}{4} \times \frac{25}{25} = \frac{25}{100}$ (multiply to get the common denominator 100)
 $= 25\%$

You have to provide the explanation as the children work the examples.

Group Work

Put the children in groups of five or six. Each member should be given cards with either a percentage or a fraction written on each. A child with a percentage card sticks his/her card on the chart. Another child who has the matching fraction sticks his/her card next to the percentage card.

eg:

Percentage	Fraction
$\boxed{20\%}$	$\boxed{\frac{1}{5}}$
$\boxed{10\%}$	$\boxed{\frac{1}{10}}$

Each member has to stick all the cards he/she has under the correct heading written on the chart.

Put up the groups work for display.

Individual Application

1. Match to their correct pair:

A

40% $(\frac{2}{5})$
 75% $(\frac{3}{4})$
 30% $(\frac{3}{10})$
 $\frac{4}{5}$ **(80%)**
 $\frac{9}{10}$ **(90%)**
 $\frac{1}{5}$ **(20%)**
 70% $(\frac{7}{10})$
 $\frac{1}{20}$ **(5%)**

B

$\frac{7}{10}$
 80%
 5%
 $\frac{2}{5}$
 $\frac{3}{10}$
 90%
 $\frac{3}{4}$
 20%

Additional Exercise

1. Change these percentages to fractions:

a) 45% $(\frac{9}{20})$
 b) 80% $(\frac{4}{5})$
 c) 65% $(\frac{13}{20})$
 d) 12% $(\frac{3}{25})$
 e) 50% $(\frac{1}{2})$

2. Change these fractions to percentages: eg: $\frac{1}{2} \times \frac{50}{50} = \frac{50}{100}$

a) $\frac{1}{5}$ **(20%)**
 b) $\frac{3}{10}$ **(30%)**
 c) $\frac{1}{4}$ **(25%)**
 d) $\frac{3}{5}$ **(60%)**
 e) $\frac{7}{10}$ **(70%)**

Lesson 3: Writing Percentages as Decimals and Vice Versa

Outcome

Write percentages as decimals and decimals as percentages.

Teaching Aids

A chart with examples of percentages as decimals and vice versa
 cards of percentages and decimals:

eg:

50%	0.5	30%	0.3	25%	0.25
-----	-----	-----	-----	-----	------

= = = = =

Teaching for Understanding

Let the children sit together in front. Put up the chart (see above). Give an explanation of each example for the children to understand:

eg: a) $10\% = \frac{10}{100}$ (divide 10 by 100)

1. (percentage to decimal) =
$$\begin{array}{r} 0.1 \\ 100 \overline{) 10.00} \\ \underline{10 \ 0} \end{array} = \underline{\underline{0.1}}$$

b) $25\% = \frac{25}{100} \rightarrow \begin{array}{r} 0.25 \\ 100 \overline{) 25.00} \\ \underline{20 \ 0} \\ 500 \\ \underline{500} \end{array} = \underline{\underline{0.25}}$

2. (decimal to percentage)

a) $0.1 = \frac{1}{10} \times \frac{100}{1}$ (Multiply by 100 to find the percentage)
 $= \frac{10}{1} = 10\%$

b) $0.25 = \frac{25}{100} \times \frac{100}{1} = 25\%$

Give 2 examples for the children to do to check their understanding.

Group Work

Put the children in groups of six. Give each group a set of prepared cards (decimals/percentages) that match.

Turn all the cards upside down. Each child in the group will take a turn to take two cards. If the two cards match, that child takes those cards and has another turn. If the two cards do not match, then he/she will turn the cards upside down again and the turn goes to the next child.

The child who gets the most cards that match (percentage to decimal) is the winner.

Individual Application

Fill in this table.

Percentage	Fraction	Decimal
40%	$\frac{2}{3}$	0.66
50%	$\frac{1}{2}$	0.5
25%	$\frac{1}{4}$	0.25
2%	$\frac{1}{50}$	0.02

35%	$\frac{7}{20}$	0.35
75	$\frac{3}{4}$	0.75
80%	$\frac{4}{5}$	0.8
8%	$\frac{2}{25}$	0.08

Additional Exercise

1. Change these percentages into decimals.

- | | | |
|----|-----|-------------|
| a) | 20% | 0.2 |
| b) | 6% | 0.06 |
| c) | 45% | 0.45 |
| d) | 9% | 0.09 |
| e) | 60% | 0.6 |

2. Change these decimals into percentages.

- | | | |
|----|------|------------|
| a) | 0.03 | 3% |
| b) | 0.15 | 15% |
| c) | 0.8 | 80% |
| d) | 0.28 | 28% |
| e) | 0.36 | 36% |

Lesson 4: Finding a Percentage of a Number

Outcome

Find the percentage of any number (following the steps).

Teaching Aids

A chart with an example worked in two different ways (see below)

Cards (with percentage questions and different cards with answers)

Teaching for Understanding

Let the children sit together in the front of the classroom. Put up the chart of examples. Go through the examples step by step for them to follow.

Example 1: 20% of 35

To find	Means	Proportion	Solve	Answer
20% of 35	20 per 100 How many per 35?	$\frac{20}{100} = \frac{x}{35}$	$\frac{20}{100} = \frac{x}{35}$ $100X x = 20 \times 35$ $\frac{100x}{100} = \frac{700}{100}$ $x = \underline{7}$	20% of 35 is <u>7</u>

Example 2: 20% of 35

$$\begin{aligned}
 &= \frac{20}{100} \times 35 \\
 &= \frac{2}{10} \times 35 \\
 &= \frac{1}{5} \times \frac{35}{1} \\
 &= \frac{25}{100} \\
 &= 7
 \end{aligned}$$

Let the children do some examples on the blackboard to check their understanding. They can use any method demonstrated above.

1. 25% of 16 **4**
2. 30% of 80 **24**
3. 50 % of 124 **62**

Group Work

Put the children into groups of five or six. Give them charts and cards with percentage questions on them as well as the answers on different cards:
eg:

20% of 60	12
40% of 25	10

Each child must have a percentage question work to tackle first (like above). If that child gets the correct answer, he/she takes the correct answer card and matches them together by sticking them onto the prepared chart. For example:

Working Out	Answers
20% of 60	12
40% of 25	10

See that each child has a turn. Display their work for checking by other groups.

Individual Application

Fill in the boxes to complete the work below.

1. 10% of 30

$$\begin{aligned}
 &= \frac{10}{100} \times \frac{30}{1} \\
 &= \frac{1}{10} \times \frac{30}{1} \\
 &= \frac{1}{10} = 3 \\
 \text{Answer} &= 3
 \end{aligned}$$

2. 50% of 46

$$\begin{aligned}
 &= \frac{50}{100} \times \frac{46}{1} \\
 &= \frac{1}{2} \times \frac{46}{1} \\
 &= \frac{46}{2} \\
 \text{Answer} &= 23
 \end{aligned}$$

3. **20%** of 50

$$\begin{aligned} & \frac{20}{100} \times \frac{50}{1} \\ & \frac{1}{5} \times \frac{50}{1} \\ & = \frac{50}{5} \\ & = 10 \end{aligned}$$

4. **75%** of 84

$$\begin{aligned} & = \frac{75}{100} \times \frac{84}{1} \\ & = \frac{3}{4} \times \frac{84}{1} \\ & = \frac{252}{4} \\ & = \mathbf{63} \end{aligned}$$

5. **25%** of 124

$$\begin{aligned} & = \frac{25}{100} \times \frac{124}{1} \\ & = \frac{1}{4} \times \frac{124}{1} \\ & = \frac{124}{4} \\ & = 31 \end{aligned}$$

Additional Exercise

Find each percentage.

1. What is 30% of 150? **45**
2. What is 80% of 200? **160**
3. There were 28 questions set in a Maths Test. 75% of them were answered. How many questions were:
a) answered? **21 questions**
b) not answered? **7 questions**
4. A kerosene stove cost \$80.00. A discount of 30% was made on the cost of this stove.
a) How much money was the discount? **\$24.00**
b) What was the new cost of the stove? **\$56.00**
5. There were 50 members in a table tennis club. 20% were absent from the competition.
a) How many members were absent? **10**
b) How many members attended the competition? **40**

Lesson 5: Finding the Original Number when a Percentage is Known

Outcome

Find the original number using a known percentage by follow the steps.
Work out the original number in problems.

Teaching Aids

A chart of two or three examples showing how to work out the answer in steps (as in the example on cards below)

Cards with the steps for working out set out separately. Prepare four questions for group work.

eg:

$$10\% \text{ of } \square = 5$$

$$\frac{10}{100} \times a = 5$$

$$\frac{10a}{100} = 5$$

$$10a = 5 \times 100$$

$$10a = 500$$

$$\frac{10a}{10} = \frac{500}{10}$$

$$a = 50$$

(i) $20\% \text{ of } n = 17$

(ii) $30\% \text{ of } n = 18$

(iii) $50\% \text{ of } n = 40$

(Do the above : i – iii on cards showing the steps, as in the example to the left, for group work.)

Teaching for Understanding

Let the children sit together in the front of the classroom. Put up the chart with examples on the lesson (above). Explain step by step how to find the original number when the percentage is known.

eg: Find 10% of $n = 30$

$$10\% \text{ of } n = 30$$

$$\frac{10}{100} \times \frac{n}{1} = 30$$

multiply both sides with 100 $\longrightarrow \frac{100}{1} \times \frac{10n}{100} = 30 \times 100$

divide both sides by 10 $\longrightarrow \frac{10n}{10} = \frac{3000}{10}$

$$n = 300$$

OR

$$10\% \text{ of } n = 30$$

$$\frac{10}{100} \times \frac{n}{1} = 30$$

$$\frac{1}{10} \times \frac{n}{1} = 30$$

$$\frac{10}{1} \times \frac{1n}{10} = 30 \times 10$$

$$(1n) \text{ or } n = 300$$

Do two more examples of the same kind, this time letting the children help to do the working step by step to check their understanding.

1. 40% of $n = 40$
2. 25% of $n = 16$

Group Work

Divide the children into four groups. Give each group a question prepared with a card for each step. One child picks the problem card. Then another has to pick the first working out step, and another the next step until all the children in the group have had a turn to complete the steps of the problem:

eg 1:	20% of $n = 17$
2	$\frac{20}{100} \times \frac{n}{1} = 17$
3	$\frac{1}{5} \times \frac{n}{1} = 17$
4	$\frac{1n}{5} = 17$
5	$\frac{n}{5} \times \frac{5}{1} = 17 \times 5$
6	$n = 85$

Stick the cards of steps on a chart. Display their work for others to check. Hang up for later use.

Individual Application

Match the problem with the original number.

A		B
1.	5% of $n = 3$ (60)	$n = 110$
2.	15% of $n = 12$ (80)	$n = 120$
3.	40% of $n = 30$ (75)	$n = 60$
4.	50% of $n = 55$ (110)	$n = 75$
5.	60% of $n = 75$ (125)	$n = 125$
6.	70% of $n = 84$ (120)	$n = 80$

Additional Exercise

Work out the following.

1. If 40% of $n = 26$, what is n ? **65**
2. If 50% of $n = 60$, what is n ? **120**
3. 70% of the birds are blue. How many birds are there altogether if there are 28 blue ones? **40 birds**

- | | | | |
|----|--------------------|--------------------|---------------------|
| | | (b) <u>\$12.00</u> | (d) \$1.20 |
| 3. | 50% of n = \$62.00 | (a) \$12.40 | (c) <u>\$124.00</u> |
| | | (b) \$1.24 | (d) \$12.04 |
| 4. | 80% of n = 10 | (a) 125.5 | (c) 1.25 |
| | | (b) 125 | (d) <u>12.5</u> |
| 5. | 90% of n = 90.9 | (a) 10.1 | (c) 1.01 |
| | | (b) <u>101</u> | (d) 100.1 |

Additional Exercise

Write an equation for each of the following, then solve. Read the examples first.

- eg 1: Eleven is 55% of what number? 2. 2% of what number is 18 ?

$$11 = 55\% \text{ of } n$$

$$11 = \frac{55}{100} \times \frac{n}{1}$$

$$11 = \frac{11}{20} \times n$$

$$11 \times 20 = 11n$$

$$20 = n$$

$$2\frac{1}{2}\% \text{ of } n = 18$$

$$2\frac{1/2}{100} \times \frac{n}{1} = 18$$

$$\frac{5/2}{100} \times \frac{n}{1} = 18$$

$$\frac{5}{200} \times \frac{n}{1} = 18$$

$$\frac{1}{40} \times n = 18$$

$$\frac{1n}{40} \times \frac{40}{1} = 18 \times 40$$

$$n = 720$$

- | | | |
|----|---------------------------|-------------|
| 1. | 15 is 75% of what number? | 20 |
| 2. | 8 is 40% of what number? | 20 |
| 3. | 7 is 5% of what number? | 140 |
| 4. | 66 is 3% of what number? | 2200 |
| 5. | 36 is 12% of what number? | 300 |

Lesson 7: Finding What Percentage of One Number is Another Number

Outcome

Find what percentage of one number is another, by following steps.

Teaching Aids

A chart of examples for the demonstration

Blank charts for group work

Cards for writing steps on

Teaching for Understanding

Let the children sit together in the front of the classroom and look at the example on the chart, as follows.

What percentage of 80 is 20?

$$n \% \text{ of } 80 = 20$$

$$\frac{n}{100} \times \frac{80}{1} = 20$$

$$\frac{80n}{100} = 20$$

$$\left(\frac{5}{4}\right) \times \frac{4}{5} n = \frac{20}{1} \times \left(\frac{5}{4}\right)$$

$$n = 25\%$$

Follow the steps in order for the children to understand well. Give two more examples for the children to check their understanding.

- eg: i) What percentage of 90 is 60? **66.6%**
ii) What percentage of 8 is 0.5? **6.25%**

Group Work

Put the children into groups of five or six. Give each member flash cards. They have to write up their own rules for the steps of calculating what percentage of one number is another (as above), giving an example problem.

Example:

1. Write an equation for the problem.
2. Change the percentage to a fraction with a common denominator of 100.
3. Multiply the fraction with the original numbers.
4. Simplify the fraction to its lowest form.
5. Multiply with its reciprocal to both sides of the equation.
6. Lastly the value of the percentage is known.

The steps should go along with the problem. Each member should write up the steps on flash cards. Stick up the steps on the chart for display and later use.

Individual Application

Write the equation and then solve:

1. What percentage of 20 is 5? **25%**
2. What percentage of 16 is 8? **50%**
3. What percentage of 25 is 7? **28%**
4. What percentage of 24 is 12? **50%**
5. What percentage of 375 is 125? **33.33%**

Additional Exercise

Match to the correct percentage.

- | | | |
|---|---|-----|
| 1. What percentage of 5 hrs. is 30 mins? | → | 25% |
| 2. 85 cents is what percentage of \$3.40? | → | 5% |
| 3. What percentage of 300 is 48? | → | 75% |
| 4. What percentage of 8 is 0.4? | → | 10% |
| 5. What percentage of 48 is 36? | → | 16% |

Lesson 8: More Work on Finding What Percentage of One Number is Another

Outcome

Become familiar with the method of calculating what percentage one number is of another.

Teaching Aids

Use teaching aids from lesson 7

Teaching for Understanding

Let the children sit together in the front of the classroom where they can see the blackboard.

Put up an example for the children do in steps as they did in Lesson 7.

eg: What percentage of 80 is 40?

$$\frac{n}{100} \times \frac{80}{1} = 40$$

$$\left(\frac{5}{1}\right) \times \frac{4n}{5} = 40 \quad (5)$$

$$\frac{4n}{4} = \frac{200}{4}$$

$$n = 50\%$$

Give 2 more examples:

a) What percent of 1 litre is 250 mls?

b) What percent of 1 day is 6 hrs?

Group Work

Put the children into groups of six. Each group will work out the following problem in steps.

What percentage of \$3 is 24¢? **8%**

One child does step 1, another does step 2 and so on until they get to step 6. See group work in Lesson 7 for the steps. Follow these steps in solving the question above.

Further examples for the group to do :

- | | |
|--|------------|
| 1. What percentage of 38 is 19? | 50% |
| 2. What percentage of \$2 is 20¢? | 5% |
| 3. What percentage of 1 day is 18 hrs? | 75% |

Do the work on a chart. Display the charts.

Individual Application

Work out the following:

- | | | |
|----|---|------------|
| 1. | What percentage of 36 is 27? | 75% |
| 2. | What percentage of 40 is 16? | 40% |
| 3. | What percentage of 70 is 14? | 20% |
| 4. | What percentage of \$2.00 is 80¢? | 40% |
| 5. | What percentage of 1 litre is 840 mls.? | 84% |

Additional Exercise

Write Yes or No.

- | | | |
|----|--|------------|
| 1. | 45 out of 50 as a percentage = 80%. | No |
| 2. | \$35 out of \$70 as a percentage = 50%. | Yes |
| 3. | Maata scored 64 marks out of 80 in an English test. Her score expressed as a percentage is 80%. | Yes |
| 4. | There are 40 pupils in a class. 14 of them are absent. The number of absentees expressed as a percentage is 12%. | No |
| 5. | 14 out of 70 expressed as a percentage = 20%. | Yes |

Lesson 9: Solving Percentage Problems

Outcome

Solve percentage problems by working out the answers in steps.

Teaching Aids

A chart with two examples of percentage problems (see below)
Charts for group work

Teaching for Understanding

Let the children sit in the middle where they can see you. Work out step by step the examples on the chart.

Example 1: There are 28 children in Class 6. If 21 of these went on an excursion, what percentage of the class :

1. went? 2. did not go?

1. Percentage of the class which went on the excursion :

$$\frac{\text{No. of children went}}{\text{Total no. of children in class}} \times \frac{100}{1}$$

$$\frac{21}{28} \times \frac{100}{1}$$

$$3 \times 25$$

$$= 75\%$$

2. Percentage of the class which did not go :

a)	No. of children in class	No. of children went	No. of children did not go
	28	21	7
		-	
			=

$$\text{b) } \frac{\text{No. of children did not go}}{\text{Total no. of children in class}} \times \frac{100}{1}$$

$$\begin{aligned} & \frac{7}{28} \times \frac{100}{1} \\ &= \frac{1}{4} \times \frac{100}{1} \\ &= 25\% \end{aligned}$$

Example 2: In a team of 10 players, 40% of them are sick. How many of them are:

a) sick b) not sick

a) Sick Players

40% of 10

$$\frac{40}{100} \times \frac{10}{1} = 4 \text{ players}$$

b) Not Sick

$$100\% - 40\% = 60$$

$$\frac{60}{100} \times \frac{10}{1} = 6 \text{ players}$$

Group Work

Put the children into groups of five or six. Give each group a chart to do their work on.

They solve the problems following the steps given in the teacher's example in Teaching for Understanding (above).

1. In a test, Maria scored 44 marks out of 55. What percentage is this?
Solve this question following the steps of the teacher's example (1). **80%**
2. There are 50 choir members, 20% of them are absent. How many are:
 - a) absent? **10**
 - b) present? **40**

Each member has to do one of the steps to solve the problem as in the teacher's example (2).

Display each group's work for other groups to check. Hang up charts for future use.

Individual Application

Solve these problems:

1. Kelly earns \$20 a week. If she saves 15% of her salary, how much does she save over one year? **\$156.00**
2. In an examination, 75% of a class of 32 students passed. How many students passed? **24**
3. In a week of 40 periods, 6 periods are given to English. What percentage of the school week is spent on English? **15%**

4. In a table tennis club with 80 members, 55% are girls. How many boys are in the club? **36 boys**
5. Atata got 42 out of 70 in a Maths test. What is her mark expressed as a percentage? **60%**

Additional Exercise

Work out these problems:

1. Taam caught 45 fish. He sold 18 fish to his neighbours and he kept the rest. What percentage of his catch:
 - a) did he sell? **40%**
 - b) did he did not sell? **60%**
2. There are 280 students in Meere's school. 25% are boys. How many are:
 - a) boys? **70 boys**
 - b) girls? **210 girls**
3. Max got 36 out of 60 marks in a maths test and 56 out of 80 in an English test. In which subject did Max get the best mark, expressed as a percentage? **English**
4. In a box there are 35 apples, 20% of them are rotten:
 - a) How many rotten apples are there? **7**
 - b) How many that are not rotten? **28**
5. Miita saved \$270. He spent \$60 on decorations. What percentage of his money:
 - a) did he spend? **18.18%**
 - b) did he keep in his savings account? **81.81%**

Lesson 10: Assessment

Teaching Aids

Question and answer cards for group work.

Prepare question cards and answer cards beforehand like the ones below.

eg:

50% of 48	24
10% of 60	6
60% of 95	57
25% of 104	26
40% of 110	44
75% of 124	93

Group Work

- Put the children into groups of six. Give each member a card with a question on it and space to work out the answer. Each of them has to work out the answer, then pick the card with the correct answer on it. They should stick them both on the chart for display and correction if necessary.

Answers :

50% of 48 = 24 **25% of 104 = 26**
10% of 60 = 6 **40% of 110 = 44**
60% of 95 = 57 **75% of 124 = 93**

- Write these in percentage form (%)

a)	25 per cent	25%
b)	56 per hundred	56%
c)	84 per cent	84%
d)	104 per cent	104%
e)	138 per hundred	138%
- Write these percentages as fractions in their simplest form.

a)	15%	$(\frac{3}{20})$
b)	64%	$(\frac{16}{25})$
c)	75%	$(\frac{3}{4})$
d)	80%	$(\frac{4}{5})$
e)	92%	$(\frac{23}{25})$
- Change these fractions into percentages.

a)	$\frac{3}{5}$	60%
b)	$\frac{3}{10}$	30%
c)	$\frac{1}{20}$	5%
d)	$\frac{7}{10}$	70%
e)	$\frac{1}{4}$	25%
- Write these decimals as percentages.

a)	0.4	40%
b)	0.35	35%
c)	0.2	20%
d)	0.75	75%
e)	0.9	90%

6. Change these percentages into decimals.
- | | | |
|----|------|-------------|
| a) | 12% | 0.12 |
| b) | 24% | 0.24 |
| c) | 86% | 0.86 |
| d) | 116% | 1.16 |
| e) | 108% | 1.08 |
7. Find the percentage of these numbers.
- | | | |
|----|------------|-----------|
| a) | 10% of 60 | 6 |
| b) | 25% of 200 | 50 |
| c) | 30% of 250 | 75 |
| d) | 50% of 112 | 56 |
8. Find the original number (n).
- | | | |
|----|---------------|------------|
| a) | 20% of n = 13 | 65 |
| b) | 40% of n = 36 | 90 |
| c) | 75% of n = 72 | 96 |
| d) | 80% of n = 80 | 100 |
9. Write the equation and then solve.
- | | | |
|----|--------------------------------|------------|
| a) | What percentage of 36 is 18? | 50% |
| b) | What percentage of 48 is 12? | 25% |
| c) | What percentage of 120 is 18? | 15% |
| d) | What percentage of 140 is 112? | 80% |
10. Solve these problems :
- | | | |
|----|---|----------------|
| a) | Sam gained 33 out of 60 marks in a science test. Give his mark as a percentage. | 55% |
| b) | Peter had \$140. He spent 30% of it on school items: | |
| | (i) How much did he spend? | \$42.00 |
| | (ii) How much money was there left? | \$98.00 |
| c) | 35 children in Class 6 sat an examination in maths. 14 of them passed: | |
| | (i) What percentage of children passed the test? | 40% |
| | (ii) How many did not pass? | 21 |