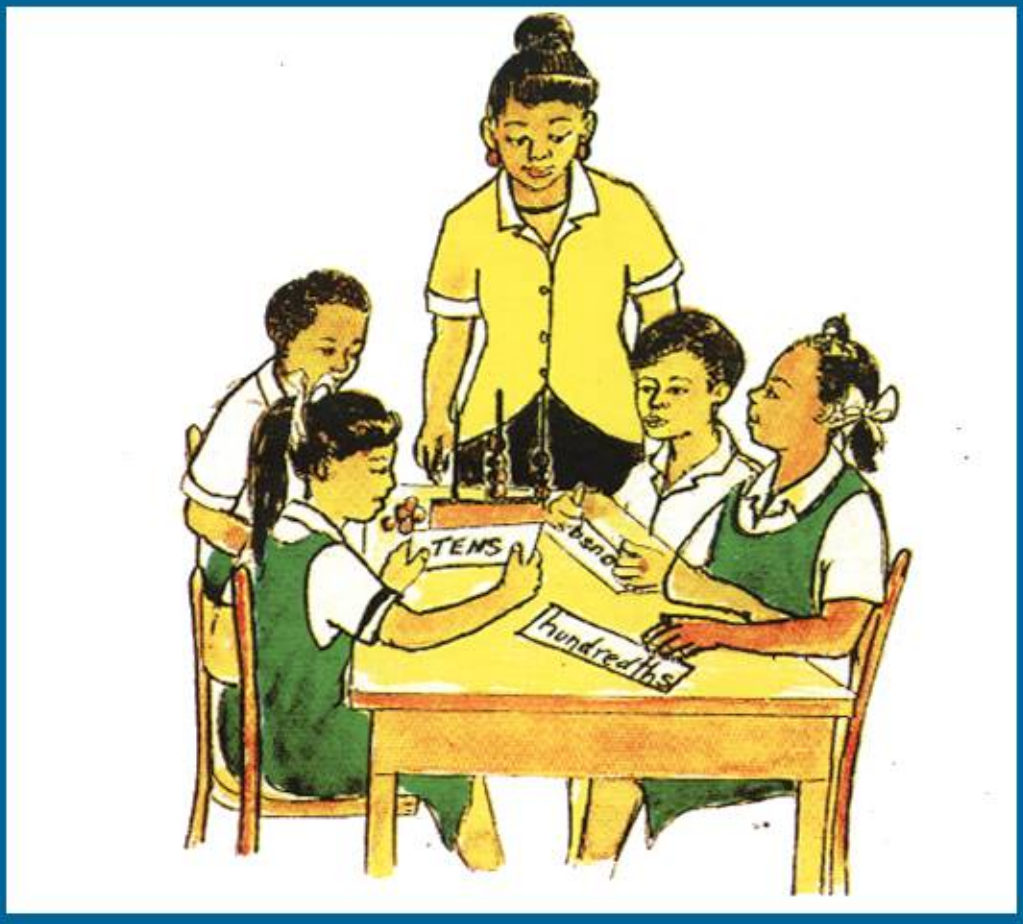
Let's Do Mathematics
Book 6



Easy Path Series

Revised Edition 2004

Let's Do Mathematics
Book 6

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AGOG/IDB Project

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LET'S DO MATHEMATICS

BOOK 6

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GOG/IDB Primary Education Improvement Programme

Easy Path Series

FOREWORD

One welcomes the publication of this series of textbooks as part of the Primary Education Improvement Project funded by the Inter-American Development Bank and the Government of Guyana.

This series of texts has been long in planning, writing and producing. In the process however, many Guyanese have developed skills in textbook writing and publication. This will serve Education well in the future.

We congratulate all those responsible for the production of these texts. They have done a good job. Guyanese children at the Primary level, and, indeed, the society as a whole, will be the beneficiaries of their labour.

Thanks to the Inter-American Development Bank for its financial support. Primary Education in Guyana will benefit considerably with the availability of relevant reading material.

Dale A. Bisnauth
Senior Minister of Education
and Cultural Development

PREFACE

I **hear** and I forget
I **see** and I remember
I **DO** and I understand
A Chinese Proverb.

Let's Do Mathematics is part of the Easy Path series, a GOG/IDB Primary Education Improvement Project.

The success of this project hinges to a great extent on the commitment and dedication of the writing team and the committee, both of which comprise experienced Primary School teachers; lecturers of the Cyril Potter College of Education and the University of Guyana; Curriculum Writers and Officers of the Ministry of Education.

This series caters for the requirements of the Primary Schools' Curriculum in Guyana and attempts to provide teachers and pupils with a clearer understanding of the topics/concepts listed. It comprises pupils' books for six (6) levels, accompanied by Teachers' Manuals and is designed to foster greater interest in the learning and teaching of Mathematics.

At each level, the book is organized into thirty (30) units which suggest a year's work. There are six (6) 'Let us look back' pages in each level. These are designed for the revision of concepts previously taught. The results of these must therefore be carefully analysized and used to the pupils' advantage. Care should be taken to ensure that each concept is fully accomplished before attempting a higher level concept.

A deliberate attempt is made to present the years' work in sequence. The emphasis throughout the course is a 'hands on' approach. Great care has been taken to ensure that the books are simple to follow and are related to the likely experiences of the pupils.

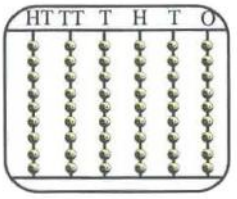
WHY MATHEMATICS?
So that recipes may be doubled
meals may be ordered
food/money may be divided
time/plants may be estimated and measured
prices in shops and stores may be compared
graphs/charts may be interpreted
bills may be paid
change calculated
and love may be shared.

LET'S **DO** MATHEMATICS

CONTENTS

UNIT 1 NUMBERS

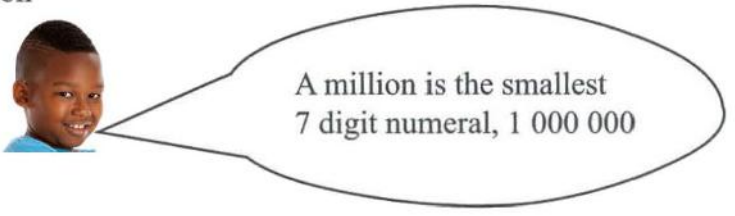
Read these 6 digit numerals:
(a) 352 871 (b) 264 593 (c) 849 726 (d) 999 999



Read the numeral shown on the abacus, nine hundred ninety-nine thousand nine hundred ninety-nine.
Add 1 to this number 999 999

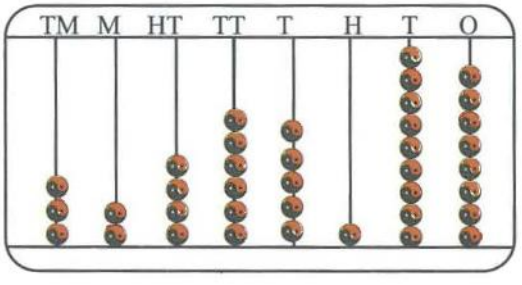
$$\begin{array}{r} + \quad 1 \\ \hline 1\,000\,000 \end{array}$$

How many digits are there in the new numeral?
1 000 000 is read as: one million

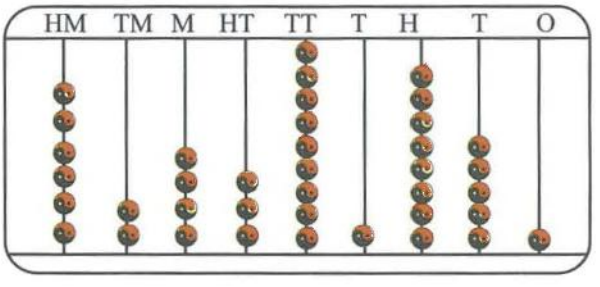


Look at abaci A and B

A



B



Let us read the number on each.
A shows:- thirty-two millions four hundred sixty-five thousand one hundred ninety-eight, 32 465 198.

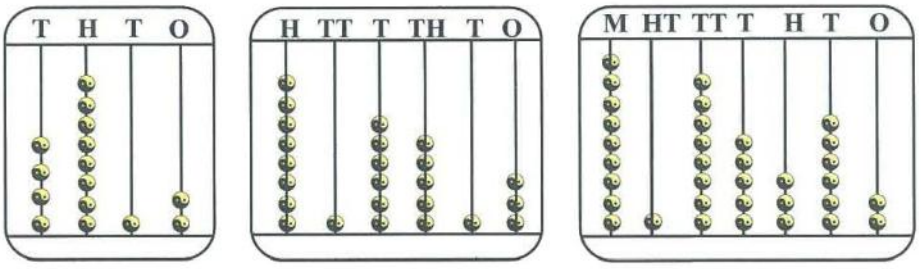
B shows:- six hundred twenty-four million three hundred ninety-two thousand eight hundred fifty-one, 624 392 851.

Million has 7 digits
tens of millions has 8 digits
hundreds of millions has 9 digits

Exercise A

1. Write the numbers shown on these abaci.

(a) (b) (c)



2. Draw an abacus. Show the following numbers:

(a) 245 (b) 1364 (c) 296 453
(d) 7 241 462 (e) 26 384 531 (f) 459 631 286

3. Copy and complete:
The first is done for you.

(a) 6 982 405 - six million nine hundred eighty-two thousand four hundred five.
(b) 5049 (c) 12 692 (d) 63 810 (e) 307 592 201 (f) 14 098 062 (g) 672 396

Place Value

Look at this place value chart.

HM	TM	M	HT	TT	T	H	T	O
7	2	1	9	8	2	3	6	5

It shows 721 982 365
Write the value of each digit in this numeral. For example:
5 is in the ones place. 5 times 1 = 5. The value of the 5 is 5.

Write the numeral in expanded form. Start with the 7 in the hundreds of million place.
Write the name for the numeral.

Exercise B

1. Write the expanded form for:
(a) 6052 (b) 4 075 631 (c) 36 291 810

2. Write the numeral for each:
(a) 500 000 + 60 000 + 4 000 + 300 + 70 + 5
(b) 6 000 000 + 40 000 + 6
(c) 200 000 000 + 900 000 + 500 + 8
(d) Two hundred and sixty thousand one hundred and twelve.

3. Write the value of the 6 in each numeral:
   (a) 63 524 (b) 604 721 (c) 609 723 429

4. Write the place value of the digit underlined.
   (a) 63 40$\underline{9}$ (b) 38 $\underline{4}$62 (c) 17$\underline{2}$ 496
   (d) 3 $\underline{1}$28 420 (e) 20$\underline{6}$ 563 594 (f) $\underline{4}$00 126 305

Comparing Numbers

6 005 001 **is greater than** 605 001. We write 6 005 001 $\boxed{>}$ 605 001
3 961 404 **is less than** 49 961 404. We write 3 961 404 $\boxed{<}$ 49 961 404.
3694 is equal to 3694. We write 3694 = 3694.

When comparing numerals we examine each digit by its place value. We use the symbols:

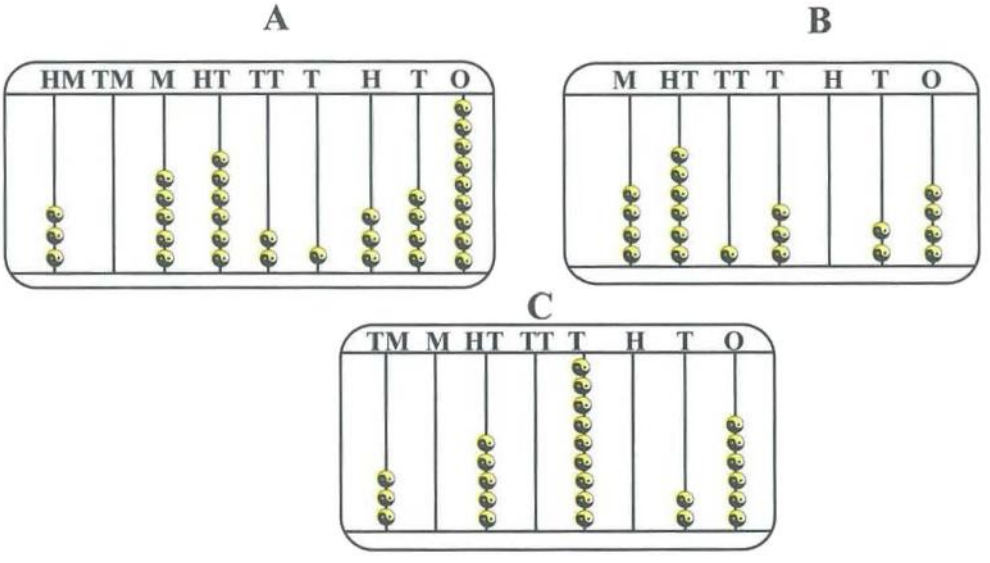
> $>$ is greater than
> $<$ is less than
> $=$ is equal to

Exercise C

1. Copy and complete. Use <, = or >

(a)	484	☐	844	(e)	3 105 000	☐	999 999
(b)	146 394	☐	146 394	(f)	4 261 001	☐	42 261 001
(c)	642 093	☐	642 093	(g)	24 484 291	☐	42 384 190
(d)	1 672 321	☐	1 762 321	(h)	455 107 145	☐	554 107 145

Ordering Numerals



(i) Read the numerals shown on each abacus.
Write the numeral shown on each abacus and the name for each.
Which abacus shows (a) the smallest number (b) the largest number.

(ii) We write these numerals in order like this

(a) (c) (b) **or** (b) (c) (a)

We order numerals beginning from the largest to the smallest or the smallest to the largest.

Exercise D

1. Order these numerals from the smallest to the largest:

(a) 3 952 001 345 607 801 2 403 500

(b) 300 000 000 4 506 001 36 000 929

(c) 2 006 001 32 006 001 332 006 001

(d) 369 000 4256 1 909 006 36 39 602 019

(e) 459 632 2 009 192 372 496 001 000

Read the order from the largest to the smallest.

Number Sequences

Look at these number lines:

(a) 200 210 220 230 240 250 260 270 280 290

(b) 5000 6000 7000 8000 9000 10 000 11 000 12 000 13 000

(c) 1 000 000 2 000 000 3 000 000 4 000 000 5 000 000 6 000 000

What do you notice about the numbers on the number lines?
As they move to the right the numbers are increased. As they move to the left the numbers are decreased.

Find the difference between each pair of numbers.
Example: in (a) the difference between any two numerals is 10.

> Remember
> We can write a number sequence by adding or subtracting.
> Look for the pattern. Follow the pattern.

Exercise E

1. Complete the sequence:
   (a) 10, 15, 20, ___, ___, ___, ___
   (b) 80, 90, 100, ___, ___, ___ ,___
   (c) 16, _, 24, 28, ___ , 36
   (d) 510, 520, 530, ___ , ___, ___, ___
   (e) 1115, 1125, 1135, ___ , ___ , ___ , ___
   (f) 9999, 10 000, 10 001, ___ , ___, ___, ___
   (g) 1 000 000, 3 000 000, 5 000 000, ___, ___ , ___, ___
   (h) 7 110 110, 7 210 110, 7 310 110, ___, ___ , ___ , ___
   (i) 26 100 120, 27 200 120, 28 300 120, ___ , ___ , ___ , ___
   (j) 5 119 000, 5 120 000, 5 121 000, ___ , ___ , ___ , ___

REVIEW

1. Write in words:
   (a) 3 009 421 (b) 42 000 121 (c) 427 000 000

2. Write the numeral for:
   (a) 2000 + 600 + 62 (b) 4 000 000 + 90 000 + 400 + 20
   (c) Sixty-three million and forty seven.

3. Write the place value of the digit underlined:
   (a) 472 3<u>6</u>9 (b) 16<u>5</u> 119 492 (c) <u>5</u>2 387 123 (d) 365 291 <u>1</u>84

4. Copy and complete using <, = or >.
   (a) 6059 ☐ 7045 (b) 428 921 ☐ 428 921
   (c) 3 964 481 ☐ 396 481 (d) 9 000 000 ☐ 100 000

UNIT 2 OPERATIONS

Addition and Subtraction

(i) Ann had 76 rubber bands in one pocket and 17 in the other.
How many rubber bands did she have in all?

Finding the answer:

$76 + 17 = \square$

$$\begin{array}{rcl} 76 & = & 70+6 \\ \underline{+17} & = & \underline{10+7} \\ & & 80+13 \\ & = & 80+10+3 \\ & = & 90+3 \\ & = & 93 \end{array}$$

OR

Add the ones → Then add all the tens

$$\begin{array}{r} 1 \leftarrow \text{1 ten} \\ +\ 76 \\ \underline{17} \\ 3 \leftarrow \text{3 ones} \end{array} \qquad 13$$

$$\begin{array}{r} 1 \\ +\ 76 \\ \underline{17} \\ 93 \end{array}$$

Ann had 93 rubber bands

(ii) Anil had 81 rubber bands. He lost 36 of them. How many were left?

Finding the answer:

Subtract the ones | Regroup 1 ten to 10 ones then subtract

$$\begin{array}{rcl} 81 - 36 = \rightarrow 81 & = & 80 + 1 \rightarrow 70 + 11 \\ \underline{-36} & = & \underline{30 + 6} \rightarrow \underline{30 + 6} \\ & & 40 + 5 = 45 \end{array}$$

OR

Subtract the ones | Regroup 1 ten to 10 ones | Subtract tens

$$\begin{array}{rrr} & {\scriptstyle 71} & {\scriptstyle 71} \\ 81 & \not{8}1 & \not{8}1 \\ \underline{-\ 36} & \underline{-\ 36} & \underline{-\ 36} \\ & 5 & 45 \end{array}$$

Anil had 45 rubber bands left.

Exercise A

Follow the examples. Do these:

1. Add or subtract:

(a)

68	54	39
+ 5	+ 6	+ 4

(b)

56	84	73
- 9	- 17	- 8

(c)

90	60	91
+ 40	+ 71	+ 10

(d)

40	88	64
- 25	- 18	- 10

Remember

In addition

- The order of the addends do not change the sum.
- Zero added to any number, gives the same number.

2. Here is an advertisement showing sale prices:

$605

$400

$25

$120

$50

$20

$200

(a) Find the total cost of:

(i) the book, pencil and folder
(ii) the sharpener, crayons and eraser
(iii) the ruler, book, folder and eraser

(b) What is the difference between the cost of:

(i) the folder and the eraser?
(ii) the ruler and the book?
(iii) the book and the folder?

(c) Make up addition and subtraction problems using the items advertised for the sale.

Look at this:

Sue had a mass of 25 kg. After a short illness she lost 5kg. In a month's time she gained 5kg. What was her mass after the one month period?

Finding the answer.

(25kg - 5kg) + 5kg. **Do the part in the brackets first**

= 20kg + 5kg

= 25kg.

Here is another example:

Anil had 179 rubber bands. If 52 of them burst and he won 52 in a game, how many rubber bands has he now?

179 - 52 (burst)
= 127 + 52 (won in game)
= 179

What did you notice about these problems?
The answer is the same number you started with.

> If a number is added to, then subtracted from a given number, the result is the given number.
> $(25 + 5) - 5 = 25$

Take turns to make up and answer similar problems.

Exercise B

1. Add these:
Regroup when necessary.

(a)	176 204 + 18	(b)	\$ 30 \$153 + \$269	(c)	135 kg 350 kg +129 kg
(d)	238 ℓ 170 ℓ + 26 ℓ	(e)	317 cm 480 cm + 25 cm	(f)	56 h 140 h +325 h

2. Subtract these:
Trade when necessary.

(a)	846 - 372	(b)	\$705 - \$ 99	(c)	561 kg - 187 kg
(a)	369 ℓ - 185 ℓ	(b)	282 cm - 106 cm	(c)	360 h - 184 h

3. Solve these problems:

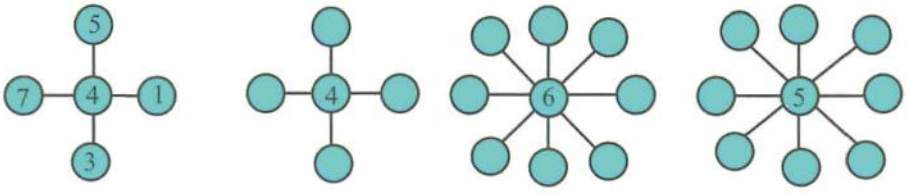
(a) The heights of three children are 120 cm, 165 cm and 112 cm.
What is their total height in cm?

(b) What is the difference in the height of the tallest and shortest child in (a)?

(c) The children in class six sold tickets for the school's concert.
The boys sold 356 tickets, the girls sold 365.
(i) How many tickets were sold altogether by class six?
(ii) Who sold more tickets, the boys or the girls?
(iii) How many more tickets were sold?

4. Copy and complete these magic wheels.
The three numbers in line should give the same total.
The first is done for you.

(a) (b) (c) (d)



12 Use numbers 1 to 9 Use numbers 1 to 12 Use numbers 1 to 15

Look at these: 585, 101, 333, 9119
Read the digits in each numeral from left to right; then from right to left.
What do you notice about the numerals?
They are the same whether you read them from left to right or right to left.

Numerals such as these are called **palindromes.**

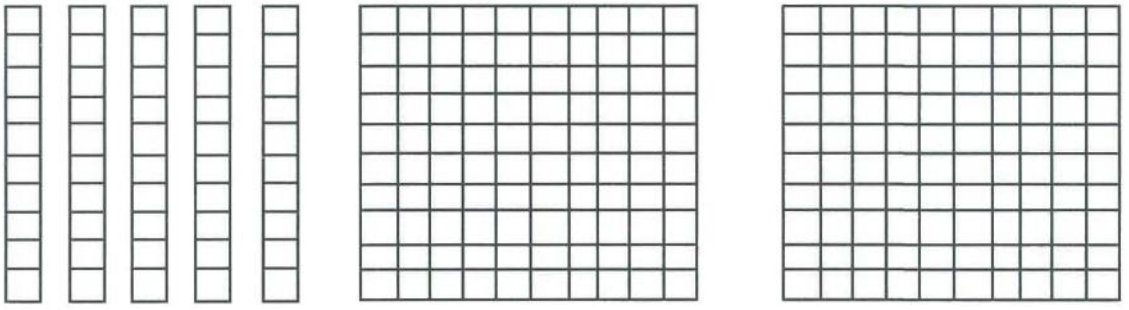
Palindromes can be made by adding. Sometimes it takes more than one step.
Let us make palindromes and count the steps.

Start with 87
+ 78 (reverse the digits and add)
165 (sum - 1 step)
+ 561 (reverse and add)
726 (sum - 2 steps)
+ 627 (reverse and add)
1353 (sum-3 steps)
+ 3531 (reverse and add)
4884 (sum - 4 steps) a palindrome in 4 steps.

Make palindromes for these numerals. Count the number of steps.
(a) 206 (b) 678 (c) 57 (d) 1279

Multiplication and Division

By 10, 100, 1000.
Look at these:
How many of each type is there? Count the squares on each.



5 tens
$5 \times 10 = 50$

Study these:

If $5 \times 10 = 50$	If $2 \times 100 = 200$
What is $50 \div 10$?	What is $200 \div 100$?

Let us find out.

	$5 \times 10 = 50$	$2 \times 100 = 200$	$3 \times 1000 = 3000$
So	$50 \div 10 = 5$	So $200 \div 100 = 2$	So $3000 \div 1000 = 3$

Try this with some other numbers. What have you found out about multiplying and dividing by 10, 100, 1000?

Exercise C

1. Find these products and quotients.

(a)	16×10	=	☐	(e)	$7500 \div 10$	=	☐
(b)	110×1000	=	☐	(f)	$1500 \div 100$	=	☐
(c)	305×100	=	☐	(g)	$83000 \div 1000$	=	☐
(d)	1524×10	=	☐	(h)	$1760 \div 10$	=	☐

2. Copy and complete:

(i) Find the multiplier:

(a)	$321 \times$	☐	=	3210
(b)	$5110 \times$	☐	=	511000
(c)	$109 \times$	☐	=	10900
(d)	$2135 \times$	☐	=	21350

(ii) Find the divisor:

(e)	$16300 \div$	☐	=	163
(f)	$8700 \div$	☐	=	87
(g)	$590000 \div$	☐	=	590
(h)	$120 \div$	☐	=	12

REVIEW

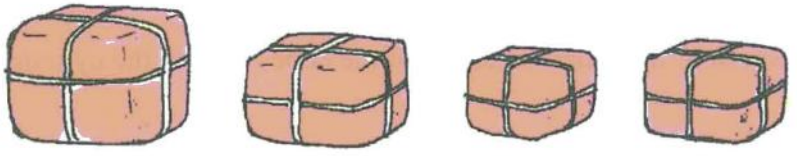
1. Find the sums and differences:

(a)	579	(b)	76	(c)	64	(d)	2830
	83		143		308		1532
	+ 175		+ 2934		+ 4070		+ 219
(e)	709	(f)	555	(g)	2034	(h)	4107
	- 304		- 117		- 235		- 1168

2. Solve these problems:

(a) Sue is 185 cm tall. Her sister is 158 cm tall. Who is taller and by how many cms?

(b) Four parcels arrived at the Post Office for Mr. King. Here is the mass of each.



45 kg **30 kg** **17 kg** **21 kg**

(i) What is their total mass?

(ii) What is the difference, in Kg, between the heaviest and the lightest parcels?

(c) Rod saved up stamps. In his collection he had 325 stamps from China, 1088 from England, 763 from Canada and 2204 from the United States of America.

(i) How many stamps were there in his collection?

(ii) Which two sets together will give the same amount as those from England?

(iii) How many more must he get from England to equal the number from the United States of America?

3. (a) Copy and complete the magic square. The sum of any three numbers in a row, column or diagonal is 150.

		80
	50	
	70	

(b) Divide each number in the magic square by 10. Will the quotients still form a magic square? What is the magic sum?

(c) Make up magic squares using other multiples of 10, 100, 1000. See if it works each time.

UNIT 3 GEOMETRY

SOLIDS

There are many things around us that we can see and touch.
These things can take up space. For example: bottles, boxes, rocks, benches, tables, cups.
Objects that you can see and touch and that take up space, are called solids.

Some solids are irregular in shape. They do not have a definite shape, for example, rocks.

We cannot say that all rocks have the same shape.

Some solids have straight even lines or smooth curved sides. These are called regular solids.
Examples of regular solids are

a toothpaste box

a milk tin


a party hat

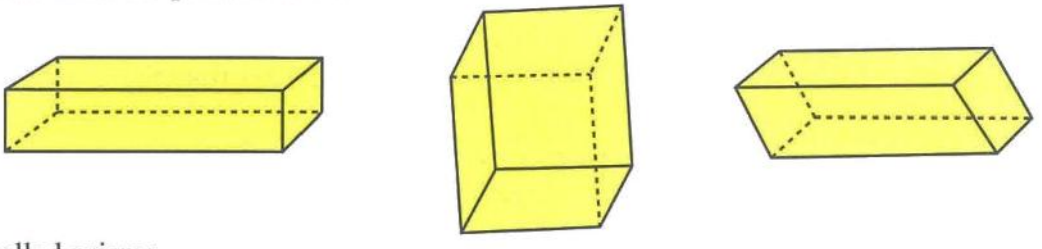

a tennis ball


a die

Can you tell which of these has the shape of the cube, cuboid, the cylinder, the sphere and the cone?
Name them.

Now make a list of other solids which have these shapes.
Cubes, cuboids, cylinders, spheres and cones.
Compare your list with your friend's list.

Look at the solids in the picture below.

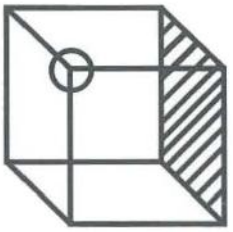


These are called prisms.

Making Models Of Solids
Can you remember the nets we made in Grade 4?
You will need scissors, cardboard and paste.
Practice making some of those nets and solids.
Name the solids you have made.

Surfaces, Edges and Vertices

Can you remember?
Some regular solids have surfaces, edges and vertices.
Look at the cube below.



One surface is shaded.
How many surfaces are there in all?
One edge is drawn brighter.
How many edges are there in all?
A circle is drawn around one vertex.
How many vertices are there in all?

Use your model cube to help you answer the questions above.

Exercise A

Copy and complete the following table.
Your models will be useful.

Shape	Name	Number of Surfaces or Faces	Number of Edges	Number of Vertices
				
				
				
				
				

Plane Shapes

Exercise B
Use your solids to trace out the shape of faces.

Example: If you put your cube on your book and trace around the face that is on your page you will get a plane shape like this.

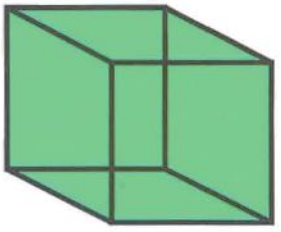
What is the name of the plane shape?
How many angles are there?
How many sides are there?

Now do the same with other solids.
Try to get as many different shapes as possible.
Name the shapes and give the number of sides and angles of each.

Example:

Solid used	Traced shape	Name of shape	Number of sides	Number of angles
Cube		Square	4	4

REVIEW

1. 

The solid above can best be described as a _____.

(a) cylinder (b) cube (c) prism (d) cuboid

2. Classify these solids according to their shapes. Say whether it's a cube, cuboid, cylinder or sphere.

(a)	toilet paper roll	(f)	a chicken cube
(b)	a tennis ball	(g)	a toothpaste box
(c)	a party hat	(h)	a marble
(d)	a die	(i)	an ice-cream cone cup
(e)	a piece of pipe	(j)	a cupboard

3. Use the above solids and state the number of edges, faces and vertices of each.

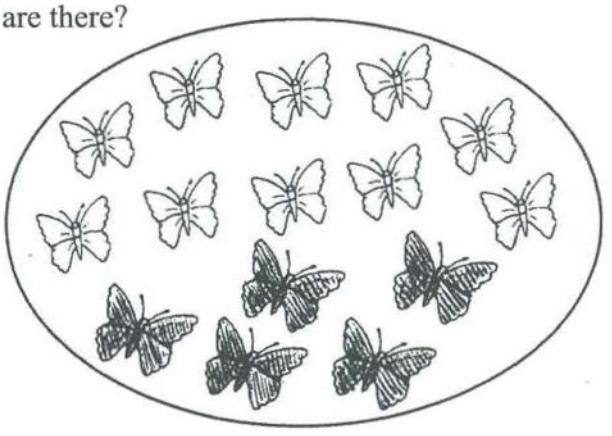
4. Copy and complete the table below.

	Shapes	Name of shapes	Number of angles	Number of sides
Plane Shapes				
				
				
				

UNIT 4 FRACTIONS

Fractional Parts of a Set

Look at the set. How many butterflies are there?
How many butterflies are shaded?
What fraction of the set is shaded?
What fraction of the set is unshaded?



We can write:
$\frac{1}{3}$ of the set is shaded.

$\frac{2}{3}$ of the set is unshaded.

Use your small objects.
Make a set of 15.

Divide your set into thirds. How many objects are there in each third?

Let us work to show how many are (i) shaded (ii) unshaded

(i) If $\frac{1}{3}$ of 15 is shaded

Then $\frac{1}{3} \times \frac{15}{1} = \frac{15}{3}$

$= 5$ are shaded

So $\frac{1}{3}$ of $15 = 5$

(ii) If $\frac{2}{3}$ of 15 is unshaded

Then $\frac{2}{3} \times \frac{15}{1} = \frac{30}{3}$

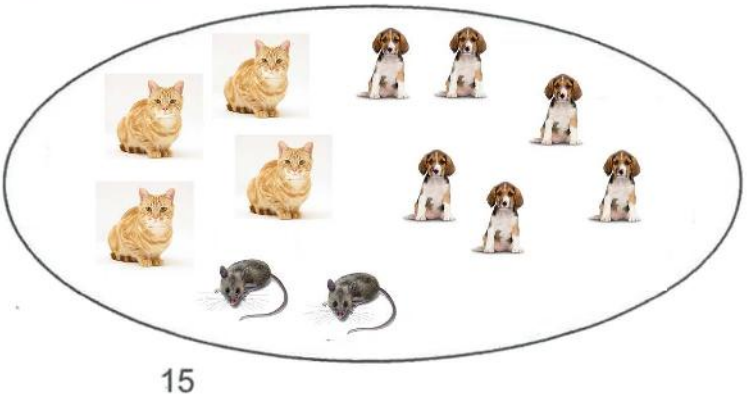
$= 10$ are unshaded

So $\frac{2}{3}$ of $15 = 10$

> Remember
> Always replace 'of' with
> a multiplication sign (×).

Exercise A

1. Study this set of animals.



(a) What fraction of this set is: (i) Kittens
(ii) Puppies
(iii) Mice

(b) Which animals, in the set are represented by each number sentence:

(i) $\frac{1}{3}$ of 12

(ii) $\frac{1}{6}$ of 12

(iii) $\frac{1}{2}$ of 12

(c) Complete each multiplication in (b) and state the number of puppies, mice and kittens in the set.

2. Calculate these:

Use your small objects or pictures to help you.

(a) $\frac{1}{10}$ of 50 (d) $\frac{2}{5}$ of 25 (g) $\frac{1}{2}$ of 100

(b) $\frac{1}{6}$ of 36 (e) $\frac{3}{8}$ of 48 (h) $\frac{3}{4}$ of 72

(c) $\frac{1}{4}$ of 48 (f) $\frac{5}{7}$ of 21 (i) $\frac{2}{3}$ of 18

3. Solve these problems:

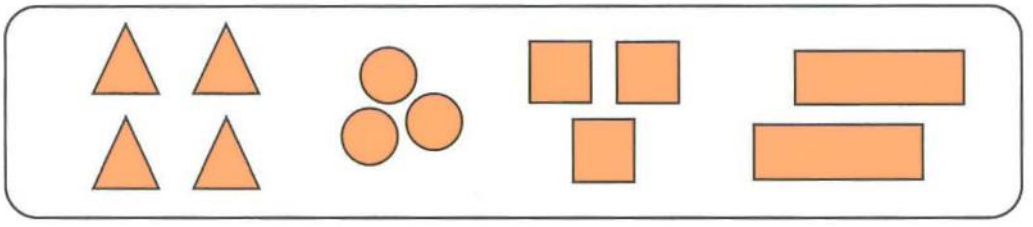
(a) At Anil's birthday party there were 21 children. $\frac{2}{3}$ of them were girls.
(i) What fraction were boys?
(ii) How many girls were at the party?
(iii) How many boys were at the party?

(b) In a case of 24 drinks, $\frac{1}{6}$ was tangerine, $\frac{1}{3}$ was banana, $\frac{2}{4}$ was orange. How many of each type were there?

(c) At the park there were 32 mini-buses. $\frac{2}{8}$ of them were blue, $\frac{2}{4}$ white and the rest were both blue and white.
How many:
(i) blue buses were there?
(ii) white buses were there?
(iii) blue and white buses were there?
(iv) what fractions were blue and white?

REVIEW

1. Look at the set of shapes:



(a) Write a number sentence to show what fraction of the set of shapes is: triangles, circles, squares, rectangles.

(b) Multiply and state the number of each shape in the set.

(c) Which two fractions represent the same number of shapes?

(d) Which shape is twice as many as the rectangles?
Write their fractions?

2. In a zoo there are 378 birds. $\frac{3}{9}$ of them were ducks, $\frac{2}{6}$ were parrots and $\frac{1}{3}$ were geese.
Which type had the:

(i) largest number (ii) smallest number?

3. Copy and complete:

(a) $\frac{2}{9}$ of 189

(b) $\frac{3}{5}$ of 250

(c) $\frac{5}{6}$ of 366

(d) $\frac{7}{8}$ of 104

(e) $\frac{3}{10}$ of 100

(f) $\frac{5}{12}$ of 144

(g) $\frac{3}{4}$ of 104

(h) $\frac{1}{2}$ of 96

UNIT 5 MEASUREMENT

Length

Let us find the lengths of some objects we see and use everyday.

Exercise A

1. (a) Estimate the lengths of these in centimetres then measure to the nearest centimetre.

(b) Use your centimetre ruler to measure to the nearest centimetre.

(c) Record your estimate and actual measures on a table like this.

Object	My Estimate	Actual Measurement
match	4 cm	5 cm

(d) Compare your estimates with the actual measurements. Write the difference in millimetres.

> Remember
> 10 mm = 1cm
> 100 cm = 1m

Draw one centimetre line and mark off in millimetres.

2. (a) Name some things that are small enough to be measured in millimetres. Here are a few: a finger nail, a pencil point, the thickness of the window glass, an exercise book, and a coin.

(b) Estimate, then measure each in millimetres.

(c) Record on a table and compare your estimates with the actual measurements.
Write the difference in millimetres.

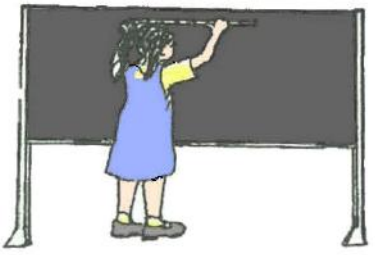
The diagram represents a metre stick.
It is 100 centimetres long.
We use it to measure in metres.

3. (a) Name some things that can be measured in metres.
e.g. the teacher's table, the door, window, floor, cupboard, chalkboard.

(b) Estimate then measure their lengths in metres.

What did you find out?
Were the measurements always in whole metres?
How can you record whole metres and parts of a metre?

Sarika measured the chalkboard in her classroom.



It measured 2 whole metres and 3 centimetres.
She said the length of the chalkboard is 2m 3 cm.

4. (a) Measure the things in (3) again.
Record in metres and centimetres when necessary.

(b) Find some things in your home which can be measured in metres and centimetres.
Measure them to find out their lengths in metres and centimetres.

Conversion

Study these:

1. If the length of my pencil is 18 centimetres. What is its length in millimetres?
Finding the answer:

Since 1 cm = 10 mm
Then a centimetre is greater than a millimetre
So 18 cm will give more millimetres

$$\begin{aligned} 1 \text{ cm} &= 10 \text{ mm} \\ 18 \text{ cm} &= 10 \times 18 \text{ mm} \\ &= 180 \text{ mm} \end{aligned}$$

Count the millimetres between 0 and 18 on your ruler.
Is the answer the same?

2. Mother bought 5 metres of ribbon to make a pattern. She cut it into 1- cm pieces. How many pieces will she get?

Finding the answer.

Since 1 m = 100 cm
Then a metre is greater than a centimetre.
So 5 metres will give more centimetres.

1 m = 100 cm
5 m = 100 × 5 cm
= 500 (1-cm) pieces

What pattern did you find?
What rule can you state for changing larger units to smaller units?

Exercise B

1. Copy and complete.
The first is done for you.

Metre	Centimetre	Millimetre
4	400	4000
7		
6		
9		

2. Write these measures in millimetres.
Remember **one centimetre is equal to ten millimetres**.
(a) 3 cm (b) 6 cm (c) 10 cm (d) 5 cm (e) 12 cm

3. Write these measurements in centimetres. The first is done for you.
(a) 1m 15 cm = (100 × 1) + 15 cm = 115 cm
(b) 3 m 30 cm
(c) 5 m 47 cm
(d) 2 m 3 cm
(e) 12 m 6 cm
(f) 4 m 90 cm

4. Measure and record parts of your body,
e.g. arms, foot, wrist, waist, etc.

Study these:

1. The length of our chalkboard is 115 cm. How long is this in metres?

   Finding the answer.

   If 100 cm $= 1$m

   Then 1 cm $= \frac{1}{100}$

   115 cm $= \frac{1}{100} \times \frac{115}{1} = \frac{115}{100}$

   $= 1\frac{15}{100}$ m or 1.15 m

2. My pen is 185 mm long. How many cm long is my pen?

   Finding the answer:

   If 10 mm $= 1$ cm

   Then 1 mm $= \frac{1}{10}$ cm

   185 mm $= \frac{1}{10} \times \frac{185}{1} = \frac{185}{10}$

   $= 18\frac{5}{10}$ cm or 18.5 cm

What rule can you state for changing smaller units to larger units?

$1 \text{ cm} = \frac{1}{100} \text{ mm}$

$1 \text{ mm} = \frac{1}{10} \text{ cm}$

$1 \text{ mm} = \frac{1}{1000} \text{ m}$

Exercise C

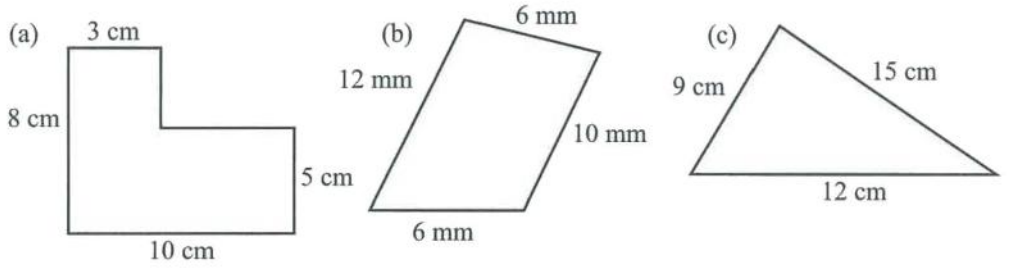
1. (a) Change to centimetres. Write your answers as decimals:
   45 mm ; 11mm ; 23 mm ; 130 mm ; 216 mm

   (b) Change to metres. Write your answers as decimals:
   206 cm ; 110 cm ; 300 cm ; 117 cm ; 222 cm

2. Copy and complete. The first is done for you.

Object	Length	Conversion
	8.6 cm	86 mm
	—	25 mm
	5.3 cm	__ mm
	__ m	196 cm
	9.2 cm	—
	2.9 m	—

3. Find the perimeter of each shape:



Convert your answer to:

(a) mm
(b) cm
(c) m

REVIEW

1. Express these measurements in metres and centimetres then in metres.
The first is done for you.

(a) 120 cm = 1m 20 cm = 1.2 m
(b) 245 cm =
(c) 104 cm =
(d) 392 cm =
(e) 157 cm =

2. Express these measurements in centimetres and millimetres then in centimetres.
The first is done for you.
12 mm = 1 cm 2 mm = 1.2 cm
56 mm =
38 mm =
17 mm =
85 mm =

3. (a) Estimate, measure, then record the heights in cm, of five pupils in your class. Compare these heights.
(b) Show each person's height in mm, cm and m. Is the comparison the same?
(c) Show the heights of these five pupils on a graph.

LET US LOOK BACK (Units 1 – 5)

1. (a) Write the answers only:

(i) 2 000 000 + 50 000 + 700 + 50
(ii) 5 000 000 + 900 000 + 5000 + 10 + 6
(iii) 600 000 000 + 200 000 + 20 000 + 400 + 50 + 5

(b) Write the numerals for each:

(i) One million three hundred thousand nine hundred.
(ii) Thirty-two million five hundred sixty thousand six hundred thirty-nine.

(c) Write the value of the numerals underlined:
(i) 9463 (ii) 312 756 (iii) 164 325 014

2. (a) Use the symbols >, < or = to compare these numerals:

(i) 6702 ☐ 6722
(ii) 1 443 000 ☐ 1 161 200
(iii) 5 371300 ☐ 53 713 000
(iv) 98 433 000 ☐ 98 343

(b) Order these numerals from the greatest to the smallest.

(i) 38 800 000, 328 300 000, 382 800 000
(ii) 62 886 000, 6 826 000, 626 862 000, 628 382 000

(c) Complete the pattern:

(i) 4000 5000 _____ 7000 ____ ____ 10 000.
(ii) 119 940 000____ 119 960 000 119 970 000 ____ _____ .

3. Write answers only:

(a) 129×1000 (b) 309×10 (c) 1760×100

(d) $\square \div 100 = 176$ (e) $23000 \div 1000$ (f) $590 \div 10 = \square$

4. Find the total of each:

(a) $762 + 137 + 200$

(b) $\$550 + \$608 + \$45$

(c) 128 cm, 30 cm, 56 cm and 9 cm

(d) 25 kg, 56 kg and 110 kg.

5. Janet picked 15 cherries. She ate 6 of them. She then picked 6 more cherries. How many cherries had Janet after the second picking?

6. A craft kit had 136 coloured beads. The art class used $\frac{3}{8}$ of them.

Find: (a) How many beads were used.

(b) How many beads remained in the kit.

7. The sales girl measured 6 m of material.

(a) How many cm did she measure?

(b) The remaining piece measured 3 m 4 cm. How many cm of material remained?

8. Draw a rectangle 8 mm by 15 mm. Find the perimeter. Write your answer in cm.

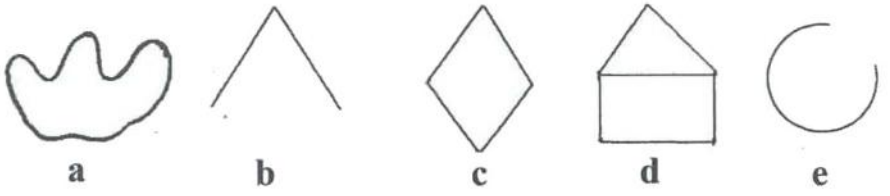
9. Write the names of these solids.

(a) (b) (c) (d)

UNIT 6 GEOMETRY

Closed and Open Shapes

Look at these shapes:



(i) Which of these are closed shapes? Why?

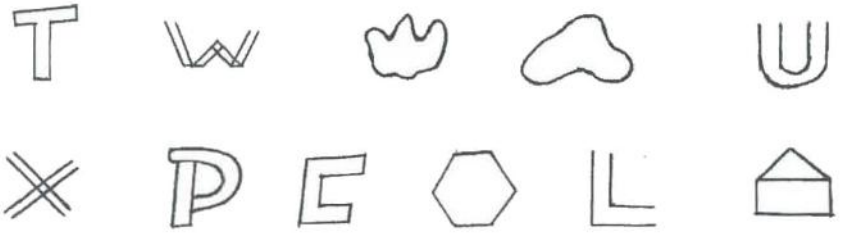
(ii) Which are open shapes? Why?

> Remember
>
> Shapes with boundaries touching are called closed shapes.
> Closed shapes have a part of space called the inside.
> Shapes with boundaries that do not touch at all corners,
> are called open shapes.

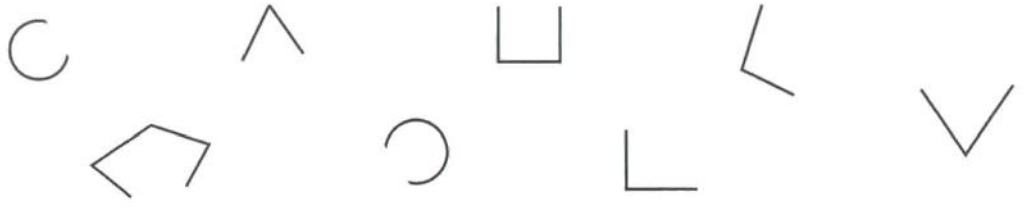
Exercise A

1. Copy and complete.

   Draw the shapes which show: (i) closed shapes (ii) open shapes.



2. Use the open shapes below and make closed shapes. Try to make a variety of closed shapes.

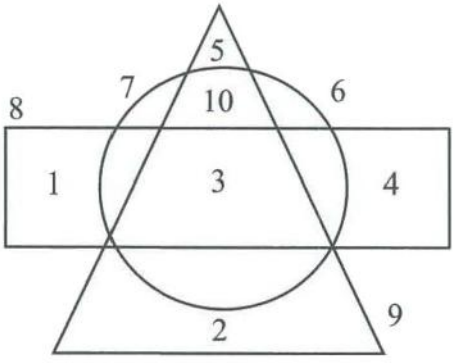


Inside, On, Outside

Can you remember we did inside, outside and on in Grade 5?
Now, place some seeds in a jar, a ruler on your book and a pen outside your bag.
Observe the items you have.

Exercise B

1. Here is a diagram.
Look at it carefully then answer
the following questions:



(a) List the numbers which are on the:
triangle, circle, rectangle.

(b) List the numbers which are inside the:
circle, triangle, rectangle.

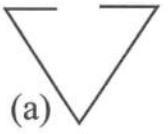
(c) List the numbers which are outside the:
circle, triangle, rectangle.

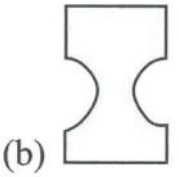
(d) How many numbers are in the:
rectangle only, triangle only?

How many members are in:
(i) all three shapes?
(ii) the circle and triangle but not in the rectangle?

Polygons

Look at shapes **(a)** and **(b)**
Are they ***polygons***?
Give reasons for your answer.

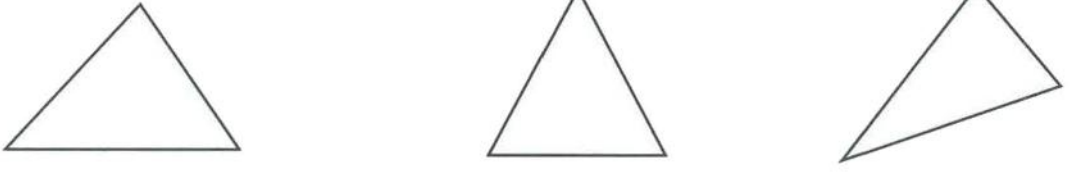




Remember
A polygon is a plane shape bounded by
only straight line segments.

So shape (a) is not a polygon because it is an open shape.
Shape (b) is not a polygon because it has curved line segments.

Polygons are divided into groups.
Look at the polygons in this group:

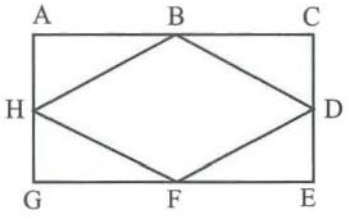


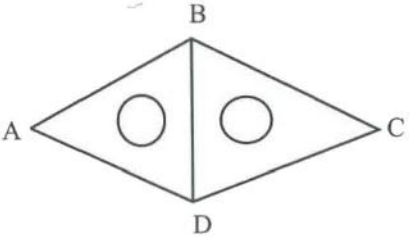
What do you know about them?
What special name is given to polygons like these?

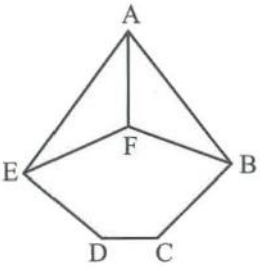
Polygons with 3 sides and 3 angles are called triangles.

Exercise C

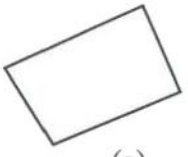
1. Identify the triangles from these shapes.



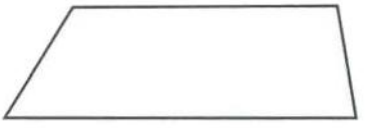




Here is another group of polygons:



(a)



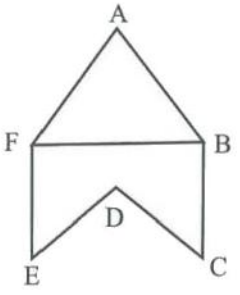
(b)

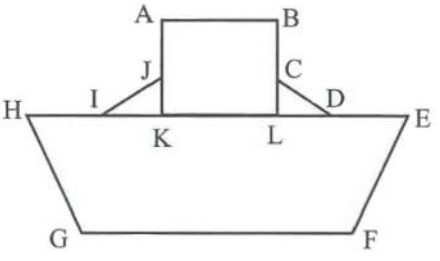
(c)

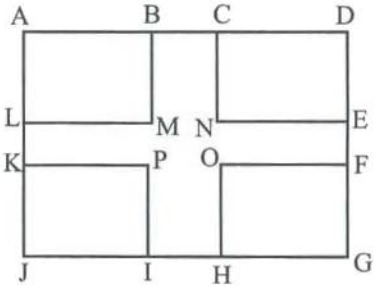
How many: (a) sides has each?
(b) angles has each?

Shapes with four sides and angles are called quadrilaterals.

2. Identify the quadrilaterals from these shapes:





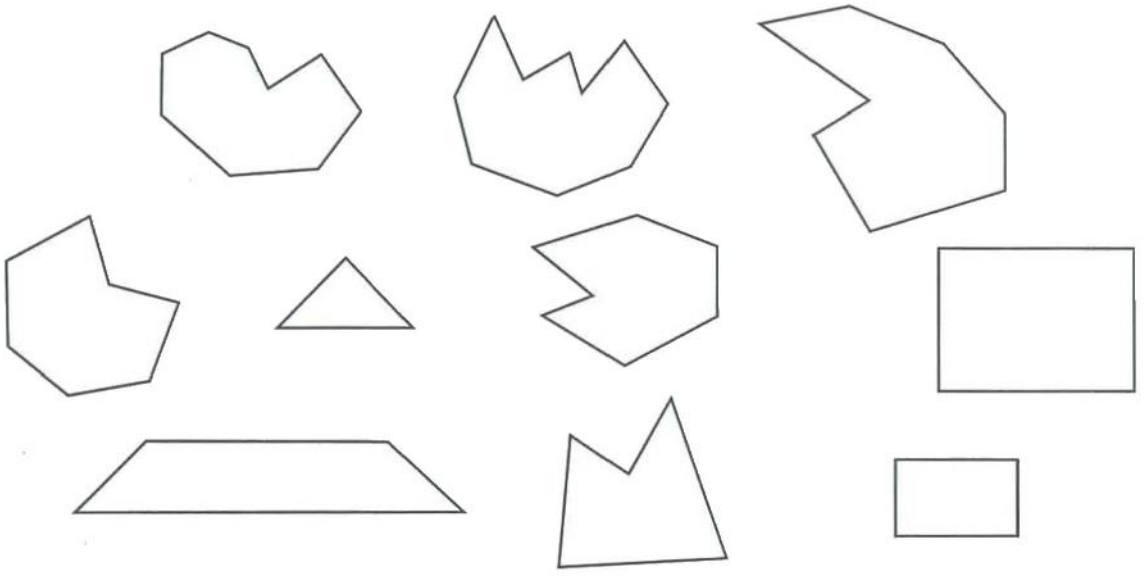


Here are some other polygons.

Polygon	Name	Number of Sides	Number of Angles
	Pentagon	5	5
	Hexagon	6	6
	Heptagon	7	7
	Octagon	8	8
	Nonagon	9	9
	Decagon	10	10

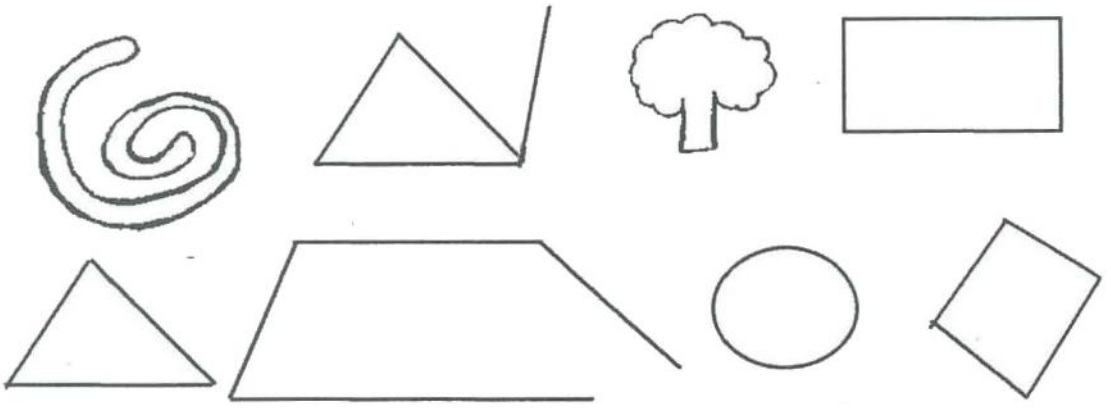
Exercise D

Here are some shapes. Group them according to the list of polygons above.

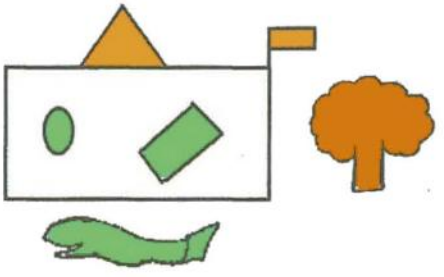


REVIEW

1. Look at these shapes. Group them under: (a) closed shapes, (b) open shapes.



2. Draw the shapes that are:
   (a) on the rectangle.
   (b) inside the rectangle.
   (c) outside the rectangle.



3. Copy and complete:

Polygon	Name	Number of Sides	Number of Angles
1. Pentagon			
2. Decagon			
3. Octagon			
4. Hexagon			
5. Heptagon			

UNIT 7 FRACTIONS

Add and Subtract

We can add or subtract fractions and mixed numbers with like denominators.

Example 1. $16\frac{5}{8} + 2\frac{3}{8}$

$= 18 + \left(\frac{5}{8} + \frac{3}{8}\right)$

$= 18 + \frac{8}{8}$

$= 18 + 1 = 19$

Example 2. $6\frac{7}{8} - 3\frac{5}{8}$

$= 3 + \left(\frac{7}{8} - \frac{5}{8}\right)$

$= 3\frac{2}{8}$

$= 3\frac{1}{4}$

Exercise A

1. Do these. Write each answer as a mixed number in its lowest terms or as a whole number:

(a) $5\frac{1}{8} + 1\frac{7}{8}$

(b) $6\frac{1}{12} + 2\frac{5}{12}$

(c) $7\frac{5}{9} + 2\frac{1}{9}$

(d) $6\frac{1}{4} + 2\frac{3}{4}$

(e) $2\frac{4}{11} - 1\frac{3}{11}$

(f) $4\frac{9}{10} - 3\frac{7}{10}$

(g) $5\frac{4}{5} - 1\frac{2}{5}$

(h) $10\frac{5}{7} - 4\frac{4}{7}$

2. Do these. Write each answer as a mixed number in lowest terms or as a whole number:

(a) $4\frac{2}{5} + 3\frac{2}{5} - 2\frac{3}{5}$

(b) $6\frac{7}{8} + 1\frac{1}{8} - 4\frac{3}{8}$

(c) $6\frac{7}{12} - 1\frac{5}{12} + 2\frac{1}{12}$

(d) $4\frac{5}{9} + 3\frac{1}{9} + 2\frac{2}{9}$

(e) $4\frac{11}{12} + 1\frac{7}{12} - 4\frac{9}{12}$

(f) $5\frac{6}{7} - 2\frac{3}{7} - 1\frac{3}{7}$

3. Complete these to make the statements true:

(a) $\square + 1\frac{1}{8} = 3\frac{5}{8}$

(b) $4\frac{1}{6} + \square = 7\frac{5}{6}$

(c) $7\frac{3}{7} - \square = 1\frac{2}{7}$

(d) $\square - 1\frac{1}{8} = 4\frac{5}{8}$

(e) $\square + 2\frac{1}{7} = 7\frac{4}{7}$

(f) $6\frac{1}{5} + 3\frac{2}{5} = \square$

(g) $2\frac{4}{11} - \square = 1\frac{1}{11}$

(h) $\frac{5}{16} + \square = \frac{7}{16}$

(i) $\square + 1\frac{7}{12} = 3\frac{11}{12}$

When adding or subtracting fractions with different denominators we use the lowest common denominator:

Example 1.

$$\frac{2}{5} + \frac{1}{2}$$

$$= \frac{2 \times 2}{5 \times 2} + \frac{1 \times 5}{2 \times 5}$$

$$= \frac{4}{10} + \frac{5}{10}$$

$$= \frac{9}{10}$$

Example 2.

$$\frac{9}{10} - \frac{3}{4}$$

$$= \frac{9 \times 2}{10 \times 2} - \frac{3 \times 5}{4 \times 5}$$

$$= \frac{18}{20} - \frac{15}{20}$$

$$= \frac{3}{20}$$

Exercise B

1. Add or subtract. Write your answers in some cases (i) as mixed numbers (ii) in their lowest terms:

(a) $\frac{1}{3} + \frac{2}{5}$ (e) $\frac{3}{4} + \frac{3}{7}$ (i) $\frac{11}{12} - \frac{3}{4}$

(b) $\frac{4}{5} + \frac{1}{6}$ (f) $\frac{5}{6} + \frac{5}{8}$ (j) $\frac{5}{6} - \frac{4}{5}$

(c) $\frac{3}{4} + \frac{7}{8}$ (g) $\frac{1}{2} - \frac{4}{11}$ (k) $\frac{4}{5} - \frac{7}{15}$

(d) $\frac{2}{3} + \frac{5}{6}$ (h) $\frac{3}{5} - \frac{3}{10}$ (l) $\frac{5}{6} - \frac{1}{8}$

2. Add and subtract. Write your answers as proper fractions or mixed numbers in lowest terms:

(a) $\frac{7}{12} + \frac{1}{6} - \frac{3}{4}$ (d) $\frac{7}{8} - \frac{1}{2} - \frac{1}{4}$ (g) $\frac{7}{11} + \frac{1}{2} - \frac{9}{22}$

(b) $\frac{3}{7} + \frac{2}{3} + \frac{11}{21}$ (e) $\frac{3}{5} + \frac{7}{10} - \frac{1}{2}$ (h) $\frac{17}{20} - \frac{4}{5} + \frac{1}{2}$

(c) $\frac{5}{6} - \frac{1}{3} + \frac{1}{2}$ (f) $\frac{7}{8} - \frac{1}{3} + \frac{1}{2}$ (i) $\frac{2}{3} + \frac{3}{4} + \frac{1}{2}$

3. Add and write your answers as mixed numbers, in lowest terms or as whole numbers.

(a) $9\frac{3}{4} + 1\frac{3}{4}$ (g) $2\frac{7}{10} + 3\frac{3}{10}$ (m) $7\frac{4}{7} + 6\frac{5}{7}$

(b) $5\frac{7}{8} + 4\frac{5}{8}$ (h) $5\frac{3}{5} + 3\frac{4}{5}$ (n) $8\frac{5}{12} + 2\frac{1}{12}$

(c) $4\frac{2}{3} + 3\frac{1}{2}$ (i) $2\frac{9}{11} + 1\frac{1}{2}$ (o) $4\frac{4}{5} + 5\frac{2}{3}$

(d) $6\frac{7}{8} + 6\frac{3}{4}$ (j) $4\frac{5}{8} + 4\frac{5}{6}$ (p) $3\frac{3}{4} + 7\frac{6}{7}$

(e) $1\frac{3}{4} + 4\frac{1}{2} + 3\frac{7}{8}$ (k) $9\frac{4}{7} + 1\frac{1}{2} + \frac{5}{14}$ (q) $8\frac{5}{6} + 2\frac{1}{3} + 1\frac{3}{4}$

(f) $6\frac{2}{5} + 7\frac{1}{2} + 2\frac{9}{10}$ (l) $1\frac{1}{6} + 1\frac{3}{4} + 3\frac{7}{8}$ (r) $2\frac{1}{3} + 1\frac{4}{5} + 7\frac{7}{15}$

Exercise C

Do these:

1. (a) $1 - \frac{7}{16}$ (d) $15 - \frac{9}{10}$ (g) $6 - 2\frac{7}{12}$

(b) $2 - \frac{11}{20}$ (e) $4 - \frac{4}{5}$ (h) $7 - 2\frac{4}{9}$

(c) $16 - \frac{3}{8}$ (f) $8 - \frac{4}{13}$ (i) $4 - 2\frac{7}{10}$

2. (a) $9\frac{1}{3} - 5\frac{2}{3}$ (c) $8\frac{5}{12} - 3\frac{7}{12}$ (e) $10\frac{1}{7} - 4\frac{5}{7}$

(b) $15\frac{1}{9} - 4\frac{7}{9}$ (d) $7\frac{1}{16} - 6\frac{5}{16}$ (f) $11\frac{1}{10} - 3\frac{7}{10}$

REVIEW

$12\frac{4}{9} - 3\frac{1}{2}$ $5\frac{1}{6} + 2\frac{2}{3}$ $16\frac{2}{3} - 4\frac{7}{8}$ $14\frac{1}{3} + 11\frac{5}{8}$

$7\frac{1}{4} - 4\frac{2}{3}$ $9\frac{3}{4} - 6\frac{7}{8}$ $6\frac{1}{6} - 2\frac{5}{8}$ $4\frac{1}{2} - 3\frac{3}{4}$

UNIT 8 DECIMALS

Decimal Tenths

$\frac{6}{10}$, $\frac{3}{10}$, $\frac{5}{10}$ are proper fractions.

We can write them as decimal fractions like this:

$\frac{6}{10} = 0.6$ $\frac{3}{10} = 0.3$ and $\frac{5}{10} = 0.5$

and call them decimal tenths.

Also $\frac{5}{100}$, $\frac{7}{100}$, $\frac{12}{100}$ are proper fractions.

We can write them as decimal fractions:

$$\frac{5}{100} = 0.05 \quad \frac{7}{100} = 0.07 \quad \frac{12}{100} = 0.12$$

We call them decimal hundredths.
We can add and subtract decimal tenths and hundredths.
Study these examples:

(a) $0.7 + 0.6 = 0.7 + 0.6 = 1.3$

(b) $11.34 - 6.12$

$= 11.34$
$- \underline{6.12}$
$\underline{5.22}$

(c) $3.14 - 1.7$

$= {}^{2}3.{}^{1}14$
$- \underline{1.70}$
$\underline{1.44}$

Notice in addition and subtraction the decimal points are set down one under the other.

Add and Subtract Decimal Tenths

Exercise A

Complete these:

1. (a) 0.8 + 0.1 (b) 0.4 + 0.4 (c) 0.7 + 0.8 (d) 0.9 + 0.9

   (e) 2.7 + 5.1 (f) 5.8 + 3.3 (g) 7.4 + 1.6 (h) 4.7 + 3.9

2. (a) 0.8 - 0.3 (b) 0.9 - 0.4 (c) 0.7 - 0.2 (d) 0.6 - 0.4

   (e) 2.6 - 0.4 (f) 5.8 - 1.3 (g) 8.7 - 4.6 (h) 8.9 - 3.7

Add and Subtract Decimal Tenths and Hundredths

Exercise B

Complete these:

1. (a) 1.84 + 0.50 + 5.63 (b) 6.75 + 8.32 + 0.70 (c) 1.80 + 7.40 + 7.37 (d) 8.44 + 4.80 + 8.40

   (e) 6.50 - 3.46 (f) 7.40 - 2.39 (g) 8.96 - 2.40 (h) 16.24 - 4.10

2. Copy and work:

   (a) 3.4 + 8.36 + 4.4 (b) 16.34 + 1.6 + 13.06 + 0.1

   (c) 18.4 - 13.39 (d) 134.32 - 15.99

   (e) 10.01 + 100.1 + 101 + 0.001 (f) 25.05 - 25

   (g) 13.16 - 10.18 (h) 24.64 + 15.46 + 12

Add and Subtract Decimal Hundredths

Exercise C

Do these:

1. (a) $5.49 + 3.13 + 1.76$ (b) $6.98 + 5.04 + 0.09$ (c) $25.31 + 6.08 + 14.67$ (d) $16.53 + 6.35 + 5.63 + 0.25$ (e) $5.15 + 0.25 + 1.14 + 1.04$

2. (a) $16.49 - 5.56$ (b) $20.63 - 1.99$ (c) $6.16 - 4.16$ (d) $46.09 - 12.51$ (e) $150.30 - 50.60$

REVIEW

1. Complete these:

(a) $5.7 + 3.6$ (b) $2.71 + 1.16$ (c) $1.34 + 1.06$

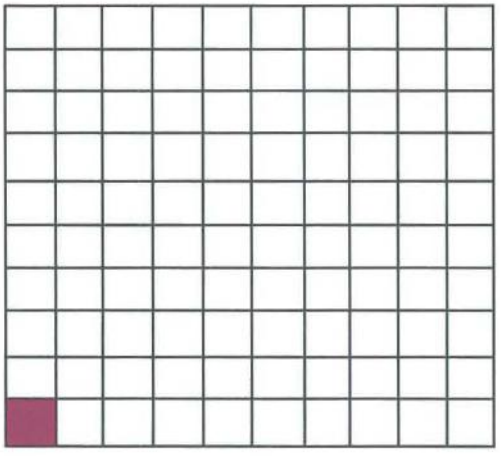
(d) $3.47 - 1.52$ (e) $9.38 - 1.79$ (f) $6.8 - 1.4$

2. (a) $6.1 + 3.4 =$ _____ (d) $17.8 - 2.95 =$ _____

(b) $5.6 + 3.2 + 4.6 =$ _____ (e) $17.17 + 4.1 + 3.7 =$ _____

(c) $10.7 - 6.8 =$ _____ (f) $15.61 - 10.16 =$ _____

UNIT 9 PERCENTAGES



Look at this square.
There are 100 equal parts.
How many parts are shaded?
We can say 1 part out of 100 parts is shaded,
i.e. one hundredth.
We may write $\frac{1}{100}$ or 1% and read it one percent.
Percent means hundredths. The symbol % stands for 'out of one hundred' 100. Percent may be written as a fraction with a denominator 100. Similarly, a fraction with denominator 100 may be written as a percent.

For you to know

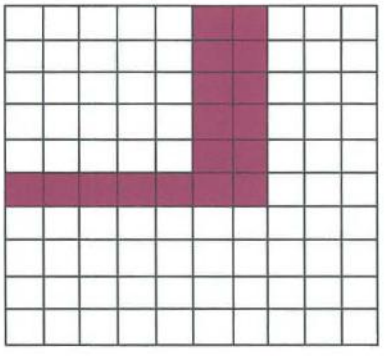
When we want to compare a number with 100 we use percent.
Cent means a hundred.
Percent means per hundred.
Percent tells how many out of a hundred.
The symbol % stands for percent.
A fraction with a denominator 100 is called percentage.

$$100\% = \frac{100}{100} \text{ or 1 whole.}$$

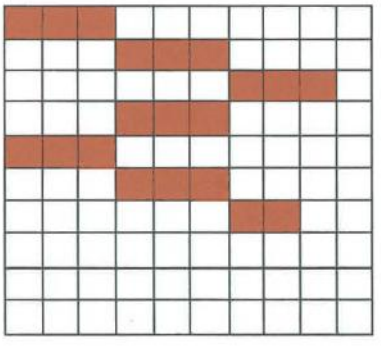
Exercise A

1. Look at each 100 square carefully.
   Count the number of squares shaded.
   Write the percentage.

(a)

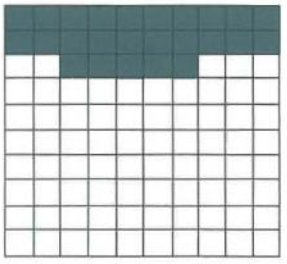


(b)



2. Draw 5 squares 10 ×10 units.

Shade to show these amounts:
(a) 10% (b) 35% (c) 46% (d) 90% (e) 18%



What fraction of this square is shaded?
What fraction is unshaded?

> Remember
> The whole is always $\frac{100}{100}$ or 100%

3. Use the squares you drew in Question 2 above.
   (a) Calculate the % shaded
   (b) Calculate the % unshaded

Fractions, Decimals and Percent

In how many ways can we express the number of shaded parts in a square?
Example: 27 out of 100 can be written as $\frac{27}{100}$ or .27 or 27%

(i) fraction $\frac{27}{100}$ - twenty seven hundredths
(ii) 0.27 decimal - zero point two seven
(iii) 27% - twenty seven percent

Notice that each form of the written expression is read differently.

Exercise B

1. Write these as fractions, decimals and percentages:
   (a) 26 out of 100 (b) 58 out of 100 (c) 15 out of 100

> **Fractions, decimal fractions and percentages may express the same fraction in different ways.**

2. Write each as a fraction with a denominator of 100 and then as a fraction in the lowest term.

Example: $50\% = \frac{50}{100} = \frac{1}{2} = 0.5$

(a) 20% (b) 10% (c) 5% (d) 35% (e) 24% (f) 75%

3. (a) Write each fraction as a percentage:

$\frac{1}{2}$, $\frac{1}{5}$, $\frac{4}{5}$, $\frac{3}{4}$, $\frac{3}{10}$, $\frac{9}{20}$, $\frac{7}{50}$, $\frac{1}{4}$, $\frac{3}{50}$, $\frac{9}{10}$

(b) Write each decimal as a percentage:
0.5 0.7 0.25

(c) Write each percentage as a decimal:
20%, 32%, 15%, 72%, 8%, 75%, 12%, 50%

(d) Write each percentage as a fraction in the lowest term:
10%, 15%, 20%, 30%, 50%, 75%, 90%, 95%

4. Copy and complete:

Fraction	Decimal	Percentage
$\frac{1}{2}$	0.5	50%
$\frac{3}{4}$		
		10%
$\frac{1}{5}$		
		80%
	0.8	
	0.35	70%
$\frac{1}{50}$		

We divide the numerator of a fraction by the denominator

Example $\frac{3}{8}$ = 3 ÷ 8

$$
\begin{array}{r}
.375 \\
8\,\overline{)\,3.000} \\
\underline{24} \\
060 \\
\underline{56} \\
40 \\
\underline{40} \\
xx
\end{array}
$$

To write a fraction as a % we multiply the fraction by 100
e.g. $\frac{3}{8}$ as a percentage means $\frac{3}{8} \times 10$

$$= \frac{300}{8}$$

$$= 37.5 \text{ or } 37\frac{1}{2}\%$$

Here are some commonly used percentages.

Remember

25%	$= \frac{1}{4}$	$33\frac{1}{3}$	%	$= \frac{1}{3}$
50%	$= \frac{1}{2}$	$66\frac{2}{3}$	%	$= \frac{2}{3}$
75%	$= \frac{3}{4}$	$12\frac{1}{2}$	%	$= \frac{1}{8}$
10%	$= \frac{1}{10}$	$37\frac{1}{2}$	%	$= \frac{3}{8}$
20%	$= \frac{1}{5}$	$62\frac{1}{2}$	%	$= \frac{5}{8}$
5%	$= \frac{1}{20}$	$87\frac{1}{2}$	%	$= \frac{7}{8}$

Percentages of Quantities

Janice saved 50% of the cost of a gift priced $300.
How much money did she save?
Find the answer using decimals.

1. Write 50% as a decimal: 0.5

   Multiply: $300 × 0.5 = 150

   50% of $300 = $150

   She saved $150

2. Using fractions and cancellation

   50% is $\frac{50}{100}$, so we find $\frac{50}{100}$ of 300

   $\frac{50}{100} \times 300 = \$150$

3. $50\% = \frac{1}{2}$

   $\frac{1}{2}$ of $300 = $150. Are the answers the same?

Exercise C

1. Find the value of:

(a)	20% of 45	(b)	8% of 75	(c)	20% of 5
	25% of 40		50% of 8		$33\frac{1}{2}$% of 60
	15% of 90		10% of 90		6% of 240
	30% of 50		$12\frac{1}{2}$% of 24		15% of 150

2. Check by calculating both.
Which is greater? Which is less?

(a)	20% of 60 or 15% of 40	(b)	10% of 50 or 50% of 50
	25% of 64 or 20% of 70		30% of 90 or 25% of 40
	50% of 250 or 30% of 300		10% of 20 or 5% of 80
	5% of 180 or 10% of 160		75% of 16 or 25% of 20

3. Calculate:

(a)	5% of \$250	(b)	50% of 25 Kg	(c)	25% of 120 cm
	75% of \$840		60% of 1 Kg		90% of 1 m
	$33\frac{1}{3}$ % of \$60		45% of 900 g		90% of 24 km

(d)	75% of 52 m ℓ	(e)	25% of 2 dozen		
	10% of 75 ℓ		75% of 1 century		
	25% of 12 ℓ		50% of 1 gross		

Problems in Percentages

Exercise D

1. A factory has 120 workers. 90% were present at work one day.
How many workers were present.

2. Mother divided \$200 between her two sons. She gave James 45% of the money.
How much money did James collect?

3. 239 boys and 211 girls attend a school. One day 10% of the total number was absent.
How many children were absent?

4. A tennis star won 75% of the 28 matches she played in 1993.
How many matches did she win?

5. 75% of the 240 bottles on a shelf are green bottles. How many green bottles are on the shelf?

Finding the whole given a percentage of it.

Example: 10% of a number is 6. What is the number?

Working out

10% of a number is 6

1% of the number is $\frac{6}{10}$

100% of the number is $\frac{6}{10} \times 100$,

The number is 60

Check your answer

N = 60

10% of 60

$= \frac{10}{100} \times \frac{60}{1} = \frac{6}{1}$

10% of 60 = 6

Exercise E

1. Find the quantity:

(a)	50% is 4	(b)	\$18 is 25%	(c)	80% is 90 mℓ
	60% is 27		\$336 is 21%		90% is 270 cm
	40% is 22		\$3 is 5%		20% is \$9
	10% is 13		30 g is 15%		8% is 1 km

Find what percentage is one number of another.

What percent of 10 is 5?

First write a fraction.

Next change the fraction to a percentage by multiplying by 100.

$\frac{5}{10} \times 100 = 50.$ Is 10% of 50 equal to 5?

Check to find out.

Exercise F

1. Use the above method to find the following. Find what percent:

(a)	7 is of 35	(b)	16 is of 20	(c)	18 is of 30
	100 is of 200		17 is of 68		25 is of 20
	12 is of 36		20 is of 80		90 is of 150

To change a fraction to a percentage, multiply the fraction by 100.

2. Using the above, express the first quantity as a percentage of the second.

(a)	\$7 : \$10	(b)	6 cm : 24 cm	(c)	60 kg : 75 kg
	\$4 : \$20		10 cm : 1 m		150 g : 1k
	\$6 : \$8		20 cm : 160 m		6g : 40 g
	\$50 : \$75		35 mm : 500 mm		18 h : 1 day
			45 cm : 200 cm		24 mℓ : 64 mℓ

3. Problems:

(a) A box contained 30 bubble gums. Sussie bought 24 gums. What percentage of the gums did Sussie buy?
(b) Frank Smith rode 27 km of the 30 km distance he had to ride. What percentage of the whole distance did he ride?
(c) A domino team played 36 games and won 30. What percentage did the team win?
(d) 16 out of 25 pupils in a class ride cycles. What percentage of the pupils ride cycles?
(e) Karen got 60 marks out of 80 in her Maths Test. Find the percentage of marks Karen got.
(f) 180 eggs were in a basket. 9 of them got cracked. What percentage of eggs got cracked?
(g) Farmer Singh planted 100 plants. 15 of them did not grow. What percentage of the plants grew?
(h) If you spelt 18 out of 20 words correctly, what percentage did you spell incorrectly?

Percentage Increases and Decreases

1. The cost of an item is \$100. The price is increased by 5%. What is the increased price?

Two ways of doing this are shown below.

(a) 5% of \$100 $= \frac{5}{\cancel{100}_{1}} \times \overset{1}{\cancel{\$100}}$

$= \$5$

(b) 100% + 5% $= 105\%$

$\frac{105}{\cancel{100}_{1}} \times \overset{1}{\cancel{100}} = \$105$

Increased price $= \$100 + \$5$

$= \$105$

Are the answers the same?

2. Decrease 125 by 12%

(a) $\frac{\cancel{12}^{3}}{\cancel{100}_{\cancel{25}_{5}}} \times \frac{\cancel{125}^{5}}{1} = \frac{15}{1}$

Decrease \$125. - \$15. = \$110.

(b) \$125 = 100%

Decrease 100% by 12%

100 - 12 = 88%

$\frac{\cancel{88}^{22}}{\cancel{100}_{\cancel{25}}} \times \frac{\cancel{125}^{5}}{1} = \frac{110}{1}$

= \$110.

Exercise G

1. Work these.

Decrease:

(a)

30	by	$33\frac{1}{3}$	%
120	by	$12\frac{1}{2}$	%
220 m	by	25%	
10 kg	by	50%	
200 kg	by	16%	

Increase:

(b)

24	by	25%
65	by	20%
40	by	10%
300	by	50%
36	by	25%

2. Problems:

(a) The price of an article marked \$100 is increased by 20%.
What is the new price?

(b) A ball costs \$75. There is an 8% increase on the price.
What is the increased price of the ball?

(c) A school enrolment of 500 is increased by 30%.
What is the new enrolment of the school?

(d) A resident school takes 300 litres of milk each day. During the holidays it is decreased by 10%. How many litres of milk are taken during the holidays?

(e) 120 bottles decreased when 5% got broken. How many bottles remained?

(f) Reduce a mass of 90 kg by $33\frac{1}{3}$ %. What is the new price?

(g) The regular price of an article was decreased from \$225 by 30%.
What is the new price?

Discounts

A discount is the amount taken away from a given price.
When a discount is given the price is decreased.
Discount is always calculated as a % of the marked or Cost Price.

Exercise H

1. At a sale, there is a 10% discount on the following items.
   (a) Find the discount of each item.
   (b) Find the sale price of each.

$1000

$750

$7000

2. (a) Find the discount of each item.
   (b) Find the cost of each item.

Regular price $1500
Sale price 20% discount.

Regular price $2500
Sale price 15% off.

Regular price $15 000
Sale price 25% discount.

Problems - Discounts

1. Dad bought a shirt. The marked price was $1900 but he received a 5% discount. How much did he pay for the shirt?

2. If the regular price is $280, the discount 20%, find (a) the discount (b) the new price.

3. A couple wishing to get married received 15% discount on each of the following items:

Items		Price
Table	-	$10 000
Bed	-	$80 000
Chair	-	$9000

Find (a) the discount on each (b) the price paid for each
(c) the total cost of the items.

Profit And Loss

A trader bought an ornament for $60 and sold it for $75.
(a) What was the cost of the article?
(b) What was it sold for?
(c) Was it sold for more or less than the cost? How much more or less?

To answer you will use these:
(a) $60 - $60 is the Cost Price or C.P.
(b) $75 - $75 is the Selling Price or S.P.
(c) More, S.P. - C.P. = Profit
(d) $15 - $15 is the Profit

Here is another problem.
Jai bought some oranges for $50. He sold them for $45.
Did he sell for more or less than he paid?
Loss = C.P. - S.P.
Loss = $ 5

Exercise I

1. Find the profit or loss:

	C.P.	S.P.
(a)	$125	$160
(b)	$20	$32
(c)	$360	$450
(d)	$3940	$4000

2. Copy and complete the table.

Cost Price	Selling Price	Profit or Loss	Amount of Profit or Loss
\$15	\$12		
\$350	\$275		
\$525	\$615		
\$2480	\$2365		
\$17 400	\$17 450		

We can find profit or loss %

Example (1) C.P. = \$40 S.P. = \$48

Profit = \$8

% profit = $\frac{\cancel{8}^{2}}{\cancel{40}_{1}} \times \cancel{100}$ = 20%

Example (2) C.P. = \$25 S.P. = \$20.

Loss = \$5

Loss% = $\frac{\cancel{5}}{\cancel{25}_{1}} \times \cancel{100}^{4}$ = 20%

Profit or loss% is always given as a percentage of the C.P.

$$\text{Profit or Loss\%} = \frac{\text{Profit or Loss}}{\text{Cost Price}} \times 100$$

Problems - Profit and Loss

(a) An article was bought for \$300 and sold for \$350. What was the profit percent?

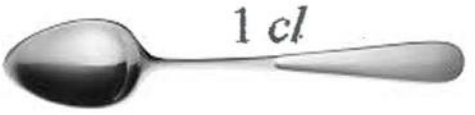
(b) Meena bought a dozen pencils for \$500. She sold them at \$50 each.
What was her profit percent?

REVIEW

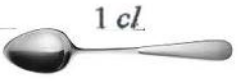
1. Write these percents as decimals:
(a) 15% (b) 95% (c) 6% (d) 25% (e) 37%
2. What is 40% of 5 dozen?
3. 30% of a set of vehicles number 75. How many vehicles are in the set?
4. 12 of the 16 louvre panes in a window are broken. What percentage is broken?
5. Workers at an Esso Station received a 20% salary increase. Mr. Boston is paid \$125 000 per month. Calculate his new monthly salary.

UNIT 10 MEASUREMENT

Do you know how much liquid can be measured from 1 millilitre (mℓ).
Take a medicine dropper, squeeze one drop of water into a spoon.
This one drop of water may be equivalent to 1 mℓ



Millilitre is the smallest unit to measure liquid.
This spoon holds 10 drops of water.
10 mℓ of water is equivalent to 1 cl of water.
This spoon is a centilitre measure - 10 mℓ = 1cℓ

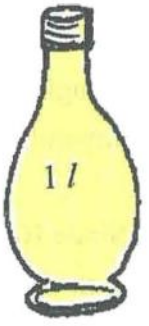
10 of these 

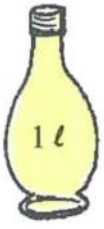
will fill this 

This 

holds 10 cℓ or 100 mℓ.

This is a decilitre measure, 10 of these 

will fill this 

This 

holds 10 dℓ or 100 cℓ or 1000 mℓ

This is a litre measure.
Read this table:

10 mℓ	=	1 cℓ	so 1 mℓ	=	$\frac{1}{10}$ cℓ	or 0.1 cℓ
10 cℓ	=	1 dℓ	so 1 cℓ	=	$\frac{1}{10}$ dℓ	or 0.1 dℓ
10 dℓ	=	1 ℓ	so 1 dℓ	=	$\frac{1}{10}$ ℓ	or 0.1 ℓ
100 mℓ	=	1 dℓ	so 1 mℓ	=	$\frac{1}{100}$ dℓ	or 0.01 dℓ
1000 mℓ	=	1 ℓ	so 1 mℓ	=	$\frac{1}{1000}$ ℓ	or 0.001 ℓ

Exercise A

1. Complete these. The first is done for you.

(a)	12 mℓ = 1 cℓ	2mℓ = 1.2 cℓ	(d)	18 mℓ = - cℓ	- mℓ = - cℓ
(b)	25mℓ = - cℓ	- mℓ = - cℓ	(e)	29cℓ = - dℓ	- cℓ = - dℓ
(c)	47 cℓ = - dℓ	- cℓ = - dℓ	(f)	51 cℓ = - dℓ	- cℓ = - dℓ

2. Complete these. The first is done for you.

(a)	5 mℓ = $\frac{5}{10}$ cℓ = 0.5 cℓ		(d)	57 mℓ = - dℓ = - dℓ	
(b)	9 mℓ = - cℓ = - cℓ		(e)	125 mℓ = - ℓ = - ℓ	
(c)	6 mℓ = - dℓ = - dℓ		(f)	265 mℓ = - ℓ = - ℓ	

Study this:

Mother bought 3.5 litres of milk to make fudge for the school party.

How many millilitres of milk did she receive?

Since 1000 millilitres = 1 litre

then 3000 millilitres = 3 litres

Since 0.5 ℓ = $\frac{1}{2}$ ℓ = 500 millilitres

Therefore 3.5 ℓ = 3500 mℓ

Similarly convert 4.5 dℓ to millilitres

Since 100 millilitres = 1 dℓ

then 400 millilitres = 4 dℓ

Since 5 cℓ = $\frac{1}{2}$ dℓ = 50 millilitres

Therefore 4.5 dℓ = 450 millilitres

Exercise B

1. Change to millilitres:

(a)	1.2 ℓ	(c) 6.4 ℓ	(e) 10.7 ℓ	(g) 4.25 ℓ	(i) 9.4 ℓ
(b)	5.3 ℓ	(d) 8.9 ℓ	(f) 7.35 ℓ	(h) 3.25 ℓ	(j) 12.75 ℓ

2. Change to centilitres:

(a)	3.6 ℓ	(c) 12.15 ℓ	(e) 7.3 ℓ	(g) 20.65 ℓ	(i) 11.9 ℓ
(b)	4.5 ℓ	(d) 16.25 ℓ	(f) 9.1 ℓ	(h) 23.95 ℓ	(j) 31.99 ℓ

A bottle contains 435 mℓ of oil. How many decilitres is that?

Remember 100 mℓ = 1 dℓ

$$\therefore\ 435\ \text{m}\ell = \frac{435}{100}$$

$$= 4.35\ \text{d}\ell$$

Similarly convert 697 cℓ to litres

Remember 100 cℓ = 1 litre

$$\text{Then}\ \ 697\ \text{c}\ell = \frac{697}{100}$$

$$= 6.97\ \ell$$

Also convert 543 dℓ to litres

Remember 10 dℓ = 1 litre

$$543\ \text{d}\ell = \frac{543}{10}\ell$$

$$= 54.3\ \ell$$

Exercise C

1. Change to decilitres:

(a) 235 mℓ	(c) 596 mℓ	(e) 1143 mℓ	(g) 641 cℓ	(i) 926 cℓ
(b) 417 mℓ	(d) 812 mℓ	(f) 368 cℓ	(h) 719 cℓ	(j) 1377 cℓ

2. Change to litres:

(a) 1325 mℓ	(c) 5709 mℓ	(e) 7528 mℓ	(g) 2821 dℓ	(i) 8349 dℓ
(b) 4016 mℓ	(d) 6433 mℓ	(0 3758 dℓ	(h) 7962 dℓ	(j) 9156 dℓ

REVIEW

1. Copy and complete this table:

	Millilitres	Centilitres	Decilitres	Litres
(a)	16	1.6	0.16	0.016
(b)	173	-	1.73	-
(c)	-	52.6	-	0.526
(d)	849	-	-	0.849
(e)	-	121.5	-	1.215
(f)	3607	-	-	-
(g)	4231	-	-	-

2. Susan mixed $\frac{1}{2}$ litre of water and $\frac{1}{8}$ litre of syrup to make drink.
How many millilitres of mixture did she have?

3. A jar contains 12 litres of oil, how many $\frac{1}{2}$ litre bottles can be filled from this jar ?

4. A bottle contains 3 litres of juice. If 17dℓ is poured out how many decilitres of juice is left in the bottle?

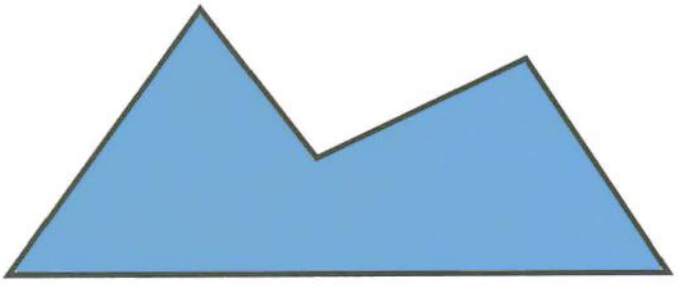
5. Change to litres:

(a)	4500 mℓ	(f)	350 dℓ
(b)	6000 mℓ	(g)	525 dℓ
(c)	7250 mℓ	(h)	875 dℓ
(d)	9500 mℓ	(i)	900 dℓ
(e)	13750 mℓ	(j)	1200 dℓ

LET US LOOK BACK (Units 6 - 10)

1. A figure with seven sides is called a _____.
(a) hexagon (b) heptagon (c) octagon (d) nonagon (e) decagon

2. The shape below has _____ angles inside.

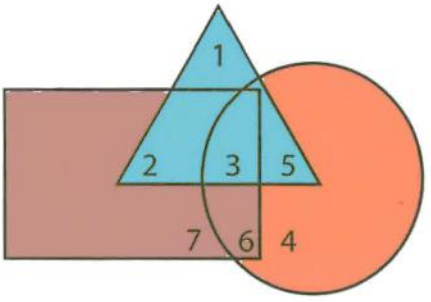


(a) 3 (b) 4 (c) 5 (d) 6 (e) 7

3. 5% is the same as

(a) $\frac{5}{100}$ (b) $\frac{100}{5}$ (c) $\frac{5}{10}$ (d) $\frac{10}{5}$ (e) 5

4. Study this diagram carefully then answer questions (a) and (b).



(a) Which number is in the rectangle and the circle but not in the triangle?

(b) Which number is in the triangle, the rectangle and the circle?

5. (a) $3\frac{1}{2} + 2\frac{7}{8} =$ _____

(b) $5\frac{1}{4} + 2\frac{3}{8} =$ _____

(c) $6\frac{2}{3} + 3\frac{1}{2} - \frac{5}{6} =$ _____

6. (a) $10.001 + 1.1 + 1.11 =$ _____

(b) $1.34 - 0.642 =$ _____

(c) $3 - 1.65 =$ _____

7. 35% of \$700 = _____

8. Write $15\frac{1}{2}\%$ as a decimal.

9. $12\frac{1}{2}\%$ written as a fraction is _____.

10. (a) A village population was increased from 1800 to 2000 persons. What is the percentage increase?

(b) After selling an article for \$165. Harry made a profit of 10%. What was the buying price?

UNIT 11 OPERATIONS

Multiplication

Denise multiplied 6 by 8
Her answer was 48 i.e. $6 \times 8 = 48$
6 and 8 are factors of 48
48 is the product of the factors 6 and 8.

Factor × factor = product

Exercise A

1. Copy and complete:

×	9	5	0	4	2
3					
6					
5					

Let us multiply:

(a) 15 × 3

(b) 39 × 40

(c) 56 × 14

224 ← 56 × 4
560 ← 56 × 10
784

(d) 304 × 126

1824 ← 304 × 6
6080 ← 304 × 20
30400 ← 304 × 100
38304

2. (a) 42 × 3
(b) 64 × 10
(c) 46 × 84
(d) 810 × 30
(e) 347 × 26
(f) 725 × 394
(g) 1012 × 20
(h) 2852 × 64
(i) 1286 × 104
(j) \$ 310 × 3
(k) \$ 6102 × 5
(l) \$ 716 × 20
(m) \$ 408 × 36

3. Solve these problems:

(a) A mini bus has 13 seats. There are 24 such buses at the park. How many passengers will be able to board the buses?
(b) Find the cost of 76 books at \$208 each.
(c) A store sells carpets at \$1425 each. What will be the cost of 24 carpets?

(d) There are 36 rows of tiles and 4 tiles in each row. How many tiles are there in all?
(e) Judy has 35 pages in her photograph album. Each page has 4 photographs. How many photographs are there in Judy's album?

Division

Here is a multiplication sentence $5 \times 2 = 10$
Here are two related division sentences $10 \div 2 = 5$; $10 \div 5 = 2$
Division is the inverse of multiplication.

$7 \times 7 = 49$ $\quad 49 \div 7 = 7$
$8 \times 2 = 16$ $\quad 16 \div 2 = 8$
$\quad\quad\quad\quad\quad 16 \div 8 = 2$

Exercise B

1. Write division sentences for each multiplication.
   (a) $8 \times 3 = 24$ (c) $6 \times 7 = 42$ (e) $5 \times 6 = 30$
   (b) $6 \times 5 = 30$ (d) $9 \times 4 = 36$ (f) $4 \times 8 = 32$
2. Copy and complete:
   (a) $15 \div 3 = \square$ (d) $28 \div \square = 7$ (g) $\square \div 8 = 7$
   (b) $\square \div 9 = 7$ (e) $35 \div 5 = \square$ (h) $16 \div 4 = \square$
   (c) $12 \div \square = 6$ (f) $3 \div \square = 6$ (i) $54 \div \square = 9$

Finding the quotient
$218 \div 3$

$$\begin{array}{r} 72 \\ 3\overline{)218} \\ -\,21 \\ \hline 008 \\ -\,6 \\ \hline 2 \end{array}$$

72 quotient
divisor 3 dividend
2 remainder

Remember to:

(1) Divide
(2) Multiply
(3) Subtract
(4) Bring down

3. Find the quotient and remainder:

(a)	$72 \div 6$	(f)	$52 \div 3$	(k)	$80 \div 20$	(p)	$95 \div 31$
(b)	$357 \div 7$	(g)	$486 \div 9$	(l)	$509 \div 3$	(q)	$447 \div 6$
(c)	$280 \div 53$	(h)	$347 \div 67$	(m)	$540 \div 72$	(r)	$738 \div 61$
(d)	$5208 \div 6$	(i)	$2452 \div 4$	(n)	$1450 \div 7$	(s)	$3428 \div 8$
(e)	$4\overline{)360}$	(j)	$8\overline{)504}$	(o)	$60\overline{)127}$	(t)	$11\overline{)470}$

4. (a) A carton will hold 72 tins of orange juice. How many cartons are needed to pack 4680 tins?
   (b) A tank holds 357 litres of fuel. A small bucket holding 17 litres is used to empty the tank. How many times will the bucket be filled in the process?

(c) A provision vendor bought 28 kg of plantains for $1120. How much did 1 kg of plantains cost?
(d) How many $20 bills are there in $1580?

Test For Divisibility: 2, 3, 5, 9, 10
Examine these:
80, 172, 24, 316, 2018
What do you notice about the digits in the ones place?
The digits in the ones place are: 0, 2, 4, 6, 8. They are divisible by 2.

Every number which is divisible by 2, has a 0, 2, 4, 6, or 8 in its ones place. Even numbers are divisible by 2.

Exercise C

1. Which are divisible by 2?
   (a) 28, 23, 32, 41, 95, 60, 97.
   (b) 111, 146, 504, 468, 379.
   (c) 3097, 1470, 8493, 7128, 5022.

Look at this:

Number	Sum of digits	
93	9 + 3	= 12
36	3 + 6	= 9
42	4 + 2	= 6
126	1 + 2 + 6	= 9
285	2 + 8 + 5	= 15

The multiples of 3 are 3, 6, 9, 12...
Are the sum of the digits multiples of 3?
Then the sum of the digits are divisible by 3.

Every number divisible by 3 has the sum of the digits divisible by 3.

2. Copy and complete:

Number	Sum of the digits	Divisible by 3 - Yes or No
72		
39		
417		
521		
1344		

Suzie counted numbers using multiples of 5:
5, 10, 15, 20, 25, 30, 35, 40, 45

Every number which has a 0 or 5 in the ones place, is divisible by 5.

3. (a) Which number divides all of these? Say why.
15, 205, 300, 955, 1000.

(b) Copy and complete the table:

Numbers	Divisible by 2, 5, 10
20	
535	
1316	
102	
275	
324	
1120	
8040	

A number may be divisible by more than one of the divisors.
Look at the number 72
The sum of the digits is 9. The numeral is divisible by 9 , so 72 is divisible by 9.
72 has a 2 in the ones place. It is an even number and divisible by 2.

Numbers divisible by 9 have the sum of their digits divisible by 9.

4. Find the sum of the digits of each number. Copy and tick ☑ those that are divisible by 9.

Numbers	Sum of Digits	Divisible by 9
63		
48		
93		
345		
801		
7587		
5381		
8217		

Every number divisible by 10 has a zero in the ones place.

5. (a) Which of these are divisible by 10?
312, 120, 230, 108, 810, 170

(b) Copy and learn.
Test for divisibility:

2	A number is divisible by 2 if the digit in the ones place is a 0, 2, 4, 6, or 8.
3	A number is divisible by 3 if the sum of its digits is divisible by 3.
5	A number is divisible by 5 if the digit in the ones place is 0 or a 5.
9	A number is divisible by 9 if the sum of its digits is divisible by 9.
10	A number is divisible by 10 if the digit in the ones place is a zero.

REVIEW

1. Copy and complete:
Place a tick ☑ to show which numbers are divisible by those indicated

Divisible By

Number	2	3	5	9	10
40					
69					
72					
450					
1251					
2570					

2. (a) $6543 \div 70$ (b) $215 \div 5$ (c) $94 \div 6$ (d) $720 \div 40$

3. (a) $\begin{array}{r} 614 \\ \times\ 32 \\ \hline \end{array}$ (b) $\begin{array}{r} 86 \\ \times\ 5 \\ \hline \end{array}$ (c) $\begin{array}{r} \$7.63 \\ \times\ 15 \\ \hline \end{array}$ (d) $\begin{array}{r} \$6.40 \\ \times\ 39 \\ \hline \end{array}$

4. A bucket holds 8 ℓ of water. How much water will 36 such buckets hold?

5. A bolt of cloth with a length of 252 m was cut into dress lengths of 3 m each. How many dress lengths were obtained?

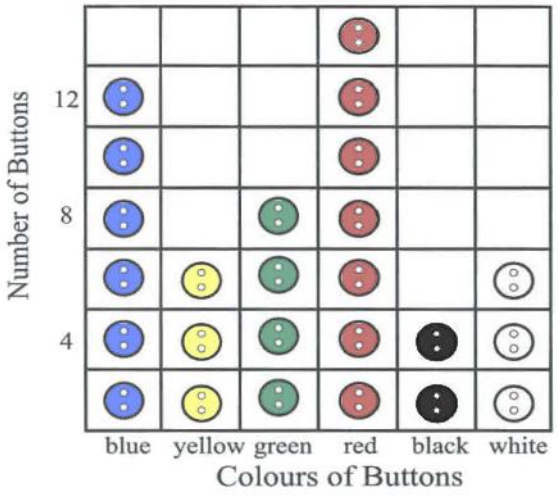
6. A bus carries 35 passengers. How many buses are needed to carry 175 passengers?

UNIT 12 GRAPHS

Bar Graphs

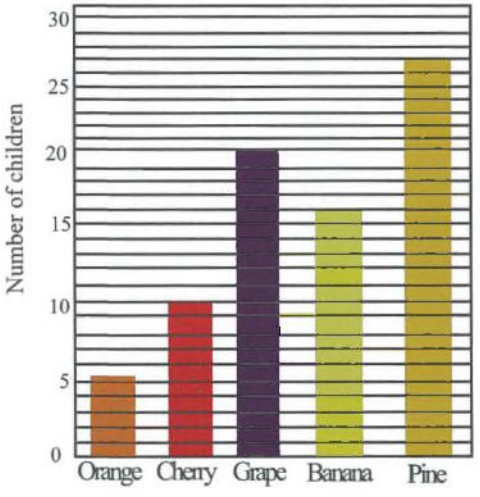
Exercise A

1. Joel had a box of coloured buttons. The graph shows the number of buttons for each colour.



(a) How many green buttons were in Joel's box?
(b) How many of the buttons were blue?
(c) For which colour did he have the most buttons?
(d) Which two colours had the same amount of buttons?
(e) How many buttons did Joel have in all?

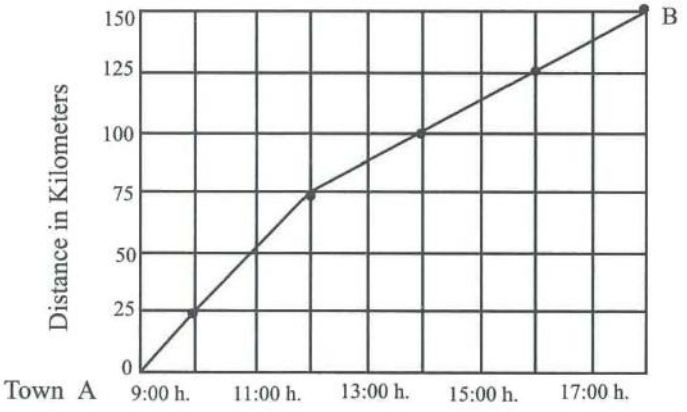
2. The bar graph tells about the flavour of drinks that children enjoy at a camp.



(a) Which was the least enjoyed flavour?
(b) How many children liked Pine?

(c) Which flavour is liked by twice the number of children who liked Cherry?
(d) How many children attended the camp?

3. This graph shows the time taken to travel by mini-bus from town A to town B.



Answer these questions using the information in the graph:

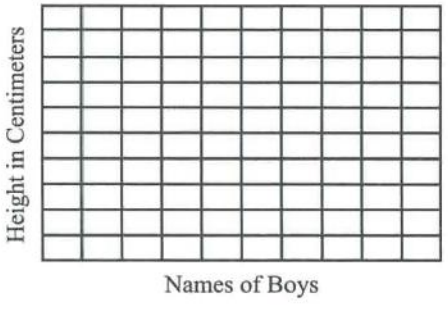
(a) How far from the starting point was the mini-bus at 10:00 hours?
(b) How long did the minibus take to travel 50 km?
(c) How far from the starting point was the mini-bus at 15:00 hours?
(d) How far apart is town A from town B?
(e) How many hours does it take to travel from town A to town B?

Exercise B

1. This chart shows the height of five boys in a class.

Names	Height
Rai	113 cm
Marlon	125 cm
Nizam	90 cm
Richard	102 cm
Ravi	120 cm

(a) Now draw a bar graph to show the information contained in the table.



(b) Use the information in the graph to answer these questions:

(i) Who is the tallest boy in the class?
(ii) Which boy's height is equal to three-fourths the height of Ravi?
(iii) What is the average height of the boys?
(iv) Which boy is eleven centimetres taller than Richard?
(v) Who is thirty centimetres shorter than Ravi?

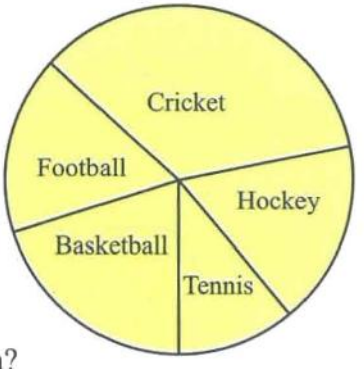
2. (a) Use a ruler to measure the handspans of 3 girls and 3 boys in your group. Then write the measurements on a chart.

(b) Draw a graph to show the information contained in the chart you have made. Use the bar graph in number 1 (a) as a guide.

(c) Look at the graph you have drawn then answer these questions:

(i) What is the average length of the boys' handspans?
(ii) What is the average length of the girls' handspans?
(iii) What is the average length of the handspans of the children in your group?
(iv) Which total is greater, the boys' or the girls'?

Pie Charts



3. This graph shows the favourite sport of the children of a class.
Use the information to answer these questions:

(a) Which sport was chosen by most children?
(b) Which sport was played by more children, football or hockey?
(c) Which sport was played by the least amount of children?

4. This chart contains information on how Mr. Kissoon spends his monthly salary of $75 000

Now draw a pie chart to show the information contained in the chart.
Now answer these questions using the information given:

(a) How much money does Mr. Kissoon spend on food?
(b) How much does he spend on rent?
(c) What percentage of his money is spent on travelling?
(d) Which two commitments take the same amount of money?
(e) What amount is left after spending on food, rent and travelling?

Things to do	Amount
Rent	15%
Food	40%
Travelling	$\frac{1}{4}$
Entertainment	0.1
Savings	Rest

UNIT 13 GRAPHS

This table shows the number of cookies eaten by four girls at a party.

Names	Number of cookies	Number of tallies
Bibi	8	𝍸 111
Candida	14	𝍸 𝍸 1111
Rehanna	10	𝍸 𝍸
Michelle	16	𝍸 𝍸 𝍸 1

The pictograph represents the information from the tally chart.

Number of cookies

Bibi	
Candida	
Rehanna	
Michelle	

N. B. In this pictograph, represents 2 cookies.

Remember

(a) When we draw pictographs we can use one picture to represent more than one object.

(b) We can also use part of the object to represent more than one object.

Exercise A

1. This chart shows the number of stamps 4 boys collected.

Names	Number of stamps	Number of tallies
Dave	25	
Keith	20	
Rohan	45	
Ravi	30	

Copy and draw the tallies to complete the chart.

2. Now use the information on the tally chart to draw a pictograph. Use  to represent 5 stamps.

Study the graph then answer the questions:

(a) What is the total number of stamps collected?
(b) What fraction of this total was collected by Ravi?
(c) What percentage was collected by Keith?
(d) Who collected the lowest percentage of the stamps?

3. This chart shows the subjects liked by children in Class 5.
Copy and complete using tallies:

Subjects	Number of children	Number of tallies
Language Arts	10	
Mathematics	20	
Science	8	
Social Studies	10	

4. Draw a bar graph using the information on the tally chart.
Answer these questions :

(a) How many children are there in the class?
(b) What percentage of the class like Mathematics?
(c) Which subject is liked by the same number of children as that of Social Studies and Science?
(d) Which two subjects can have the same number of children if one child moves from one subject to the other?
(e) What is the average number of children who like Science and Social Studies?

Exercise B

1. The table shows how Mr. Brown cultivated his land.

Crop	Land space used
Yams	$\frac{1}{5}$
Eddoes	25%
Corn	$\frac{3}{20}$
Bananas	30%
Plantains	0.1

Represent this information on a Pie Chart.

Answer these questions:

(a) What percentage of the land does he use to grow corn?
(b) Which crop is grown on the smallest plot of land?
(c) Which crop is grown on the largest plot?
(d) What percentage of the land grows yams?

2. Here is a table of how Candy spent her pocket money of $500 in December.

What was done	Amount Spent
Books	$\frac{1}{2}$
Soft drinks	20%
Biscuits	$\frac{1}{4}$
Savings	$25.00

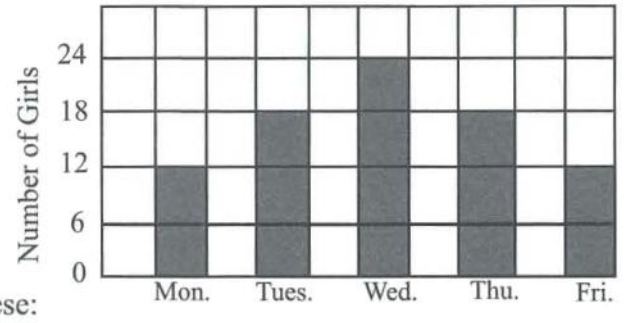
Show this on a Pie chart and answer these questions:

(a) What percentage of her money was spent on books?
(b) How much money was spent on drinks?
(c) How much money was spent on biscuits?
(d) How much money was spent on books, drinks and biscuits together?
(e) What fraction of the money was saved?

REVIEW

1. Make a tally chart to show:
Four boys went fishing. Martin caught 9 fish, Roy 6 more than Martin while Keith caught 4 less than Roy. Carl caught 8 fish.
Show the information from the tally chart on a pictograph.

2. This bar graph shows the attendance of girls in a week.



Answer these:

(a) On which day were most girls present?
(b) If there were 24 girls in the class, how many were absent each day?
(c) How many more girls were absent on Friday than on Tuesday?
(d) How many more girls were present on Wednesday than on Friday?

UNIT 14 NUMBERS

Odd and Even Numbers

0	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30
1	3	5	7	9	11	13	15	17	19	21	23	25	27	29	

Look at the even numbers, they can be divided by 2 and leave no remainders. Even numbers have a 0, 2, 4, 6 or 8 in the ones place.
Look at the odd numbers, they cannot be exactly divided by 2. Odd numbers have a 1, 3, 5, 7 or 9 in the ones place.

Exercise A

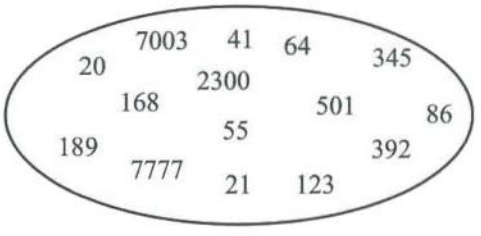
1. Here are some digits: 9, 2, 3, 4, 5, 6, 1, 8, 7
   Combine them to make 6 even numbers and 6 odd numbers.

2. Which of these are (a) odd (b) even?
   5, 198, 40, 203, 312, 174, 2000, 219, 85, 111, 824, 347.

3. Write the next three odd numbers:
   115, 117, 119, _____, _____, _____
   Write the next three even numbers
   408, 410, 412, _____, _____, _____

4. List these sets:
   (a) the set of even numbers between 407 and 420.
   (b) the set of odd numbers between 125 and 142.

5. Sort into odd and even numbers:



Look at these:

(a) $6 + 4 = 10$ (b) $8 + 5 = 13$ (c) $3 + 9 = 12$
In (a) we add two even numbers; the result is an even number.
What is added and what is the result in (b) and (c).

When we add two even numbers the answer is even.

Exercise B

Do these and state the result in terms of Odd or Even Numbers.

1. Subtract:
   (a) an even number from an even number.
   (b) an odd number from an odd number.
   (c) an even number from an odd number.
   (d) an odd number from an even number.

2. Multiply:
   (a) an even number by an even number.
   (b) an odd number by an odd number.
   (c) an even number by an odd number.

3. Divide:
   (a) an even number by an even number.
   (b) an odd number by an odd number.
   (c) an even number by an odd number.
   (d) an odd number by an even number.

4. Copy and complete these:

+	E	O
E		
O		

(a)

+	4	5	6	7	8
0	4				
1			7		
2					

(b)

×	0	1	2	3
2				6
3				
4				
5				

(c)

Ordinals

Numbers can be used to tell the positions of things and places. For example: members of a set; days of the week; months of the year; names of streets, etc.

Jack is the third of six children.
Kathy lives in Fourth Street.
May is the fifth month of the year.
Third, fourth and fifth are ordinals. They show positions.

We write ordinals in a special way. Example: 3rd, 4th, 5th, 1st

Exercise C

Sun	Mon	Tue	Wed	Thur	Fri	Sat

1. This calendar shows Sunday as the frst day of the week. Which day is the 3rd day.

2. Jeremy is absent from school on the 4th day of every week.
What is the name of the day when he is absent?

3. Complete these:

(a) 10th, _____, 12th, _____, _____, 15th
(b) _____, 29th, _____ , _____ , 32nd
(c) 50th,_____ , _____, _____, 54th

4. Here is a page from Mr Simpson's diary.

Sun 21st	Attended church service
Mon 22nd	Purchased motor spares
Tue 23rd	Visited Jack's school
Wed 24th	Appointment with supervisor
Thur 25th	Atrip out of town
Fri 26th	A quiet day in office
Sat 27th	Shopping with the family

(a) On which day and date did he:

(i) go to church?
(ii) go out of town?
(iii) go shopping?
(iv) visit his son's school?
(v) purchase motor spares?

(b) On what date was there little or no activity?

5. Use a calendar for this year.
On which day is:
(a) Labour Day?
(b) Christmas Day?
(c) Independence Day?
(d) All Fools'Day?

6. If this is a leap year and today is 28th February, then tomorrow will be?

7. At a class test, the following pupils gained these percentages: Elizabeth 30%, Prince 50%, Rasheed 35%, Indrani 45% and Natasha 40%. Use a table. Rank these scores in order beginning with the highest percentage. Record under these headings:

Name of Pupil	Percentage	Position

Wedding Anniversaries are Social Events. Some of them have special names.
Here are three special ones.

25th	Silver	1st
50th	Golden	5th
60th	Diamond	10th

Find out the significance of other anniversaries.

Roman Numerals

Do you remember we spoke about Roman Numerals in Grade 4?
Now read these:

i	=	1	v	=	5	X	=	10	L	= 50	C = 100
iv	=	4	ii	=	2	CC	=	200			
ix	=	9	iii	=	3						
XL	=	40	XX	=	20						
XC	=	90	XXX	=	30						

Exercise D

1. Write these Roman Numerals in Standard form:

(a)	xi	xix	XLV	xlix	xcix	xcv
(b)	xv	xxix	Lxiv	Lxv	xc	xcvii
(c)	xxxv	ccc	cxv	ccxv	cix	CCCXL

2. Write Roman Numerals for:

(a)	(b)	(c)
56	82	108
14	95	269
33	47	152
20	9	300

Prime Numbers

Some numbers have 2 factors while others have more than 2 factors.

Exercise E

1. Write the factors of 4, 1, 3, 8, 10, 7, 12
   Record on a table like this:

Number	Factor	Number of Factors
4	1, 2, 4	3

Remember
A number that has only 2 different factors is a prime number.

2. Write the missing factors:

$\square \times 11 = 11$	$1 \times \square = 2$
$3 \times \square = 3$	$\square \times \square = 17$
$1 \times \square = 23$	$\square \times \square = 13$

Did you notice that each number has only (these) two factors, 1 and itself?
1 is not a prime number. It does not have two different factors.

3. Let us find the Prime Numbers from 1 to 100.
   (a) Draw a grid. Write the numbers 1 to 100.

   Follow the instructions:

   (b) Cross off 1 like this ~~1~~
   (c) Circle 2. Cross out all the multiples of 2 i.e ~~2~~, ~~4~~, 6, 8.
   (d) Circle 3. Cross out all the multiples of 3.
   Note: Some multiples are already crossed out.

   (e) Circle 5. Cross out all the multiples of 5.
   (f) Circle 7. Cross out all the multiples of 7.
   (g) Circle all the remaining numbers.

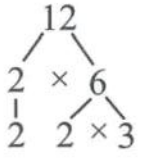
   Look at 3 and 5. What is the difference between them?
   5 - 3 = 2. (3 and 5 are twin primes) Twin Primes have a difference of 2 between them.

4. Write 7 other twin primes between 1 and 100.

Prime Factors

The factors of 12 are 1, 2, 3, 4, 6, 12.
The Prime Factors of 12 are 2 and 3.
We can find Prime Factors of numbers using any of these 2 methods.
(1) Factor Tree (2) Repeated Division

Factor Tree



2 is a prime number 6 is not.
Break up 6 into factors.
Each factor is now a prime number.

Prime Factors of $12 = 2 \times 2 \times 3$

Repeated Division

2 | 12	$12 \div 2 = 6$	The divisors are prime factors.
2 | 6		Prime Factors of $12 = 2 \times 2 \times 3$.
3 | 3		Do these two methods have the same answer?
1		

Exercise F

1. (a) Use a prime factor tree to find the prime factors of:
   (i) 4, 6, 8, 10, 9
   (ii) 14, 20, 21, 36

Prime Factors are written from the smallest to the greatest.

(b) Use repeated division to find the Prime Factors of:
30, 24, 20, 27, 42

2. Copy and complete these Factor Trees:

(a) 24 → 4×6 → □□□□

(b) 16 → $4 \times$ □ → □□□□

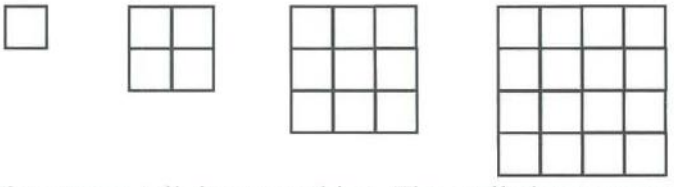
(c) 27 → 3×9 → $3 \times$ □□

Prime Factors of 24 Prime Factors of 16 Prime Factors of 27

Square Numbers

Kathy used dots to make a pattern.

Andy used squares. His pattern looked like this.

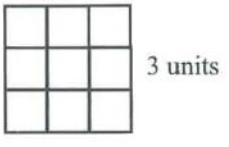


Both patterns tell the same thing. They tell about square numbers.
Dot patterns as well as squares can be used to show square numbers.

A number which can form a square is a square number.
All square numbers have two factors which are the same.
A square number is the product of a whole number and itself.

2 squared is written 2^2
2 squared means $2 \times 2 = 4$

$3 \times 3 = 9$ sq. units
9 is a sq. number



Exercise G

1. (a) Draw dot patterns to represent:
   25, 36, 49, 64
   (b) Write the square of these numbers. The first is done for you.
   9, 10, 11 and 12. $9^2 = 9 \times 9 = 81$
   (c) Write all the square numbers from 1 to 144.

   (d) Find the values of these squares:
   1^2, 2^2, 3^2, 4^2, 11^2, 12^2
   (e) Solve these:

   (i) $2^2 + 3^2$ (iii) $7^2 + 5^2$ (v) $10^2 - 6^2$
   (ii) $4^2 + 5^2$ (iv) $12^2 + 3^2$ (vi) $8^2 - 4^2$

REVIEW

1. Write the prime number in each set:

   (a) {3, 6, 9, 15, 21, 43}
   (b) {83, 90, 61, 53, 72}
   (c) {7, 48, 23, 59, 60}

2. Write the factors of these prime numbers: 2, 5, 23 and 61.

3. A patient visited a doctor on the 12th of the month. He has to return to clinic 6 days after the day of his visit.
   On what date will he return?

4. A library book, borrowed on the 20th day of the month, has to be returned five days after.
   On what date must it be returned?

5. The opening show of a movie will be on the 18th of the month. The movie will show for six days. The final show will be on the _____ of the month.

6. Work these. The first is done for you.

   $16 = 4^2$ 144 121
   25 36 100

7. Make 2 sets, one with Odd numbers and one with Even numbers.
   510, 201, 32, 13, 475, 84, 999.

UNIT 15 MEASUREMENT

MASS

The amount of matter an object contains is called its mass.
The mass of objects is measured in grams and kilograms.
The kilogram is used to measure heavy things. For example: sugar cane, cement, fertilizer, flour.
The gram is used to measure light objects, for example: spice, curry powder, baking powder, geera.

Exercise A

1. (a) Estimate the mass of each of these items, in kilograms. They can be found in your school:

(b) Use a balance and your kilogram mass to find the actual mass of each to the nearest kilogram.

(c) Record your estimates and the actual measurements on a table like this:

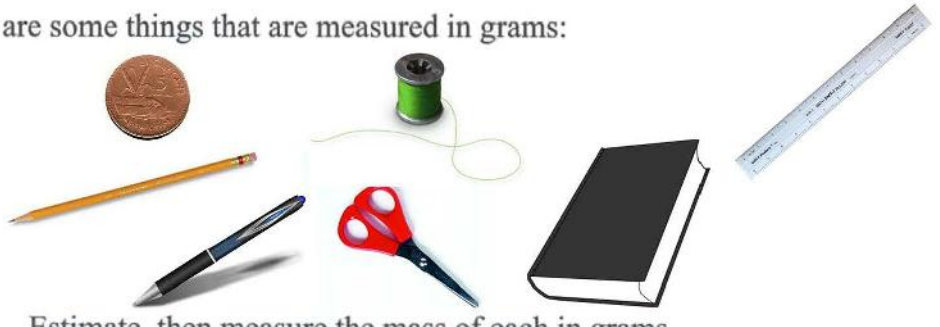
Object	Estimate in Kg	Actual mass in Kg
my book bag	3	2

(d) Compare the measurements on the table. How close were your estimates?

2. (a) Estimate the mass of your friend's bag and books. Use a scale to check your estimates.

(b) Compare your estimate with the actual mass. What are your findings?
1 gram is a very small part of a kilogram
1000 g = 1kg
We use grams to balance lighter things.

3. Here are some things that are measured in grams:



(a) Estimate, then measure the mass of each in grams.

(b) On a table, record and compare your estimates and the actual mass of the objects.

4. Use the kilogram and gram masses to measure these:

Record their mass as _____kg _____ g
Example: 5 large dictionaries = 2 kg 250 g

(a) 5 mathematics text books
(b) 2 large boxes of chalk
(c) 3 pupils' book bags
(d) All the exercise books in your group.

Conversion

Study these:

1. If a bag of coffee has a mass of 135 kg.
What is it mass in grams?
Find the answer:

If 1 kg = 1000 g
Then 135 kg = 1000 × 135
= 135000 g

2. Look at this packet of curry.
Write its mass in kilograms.

Finding the answer:

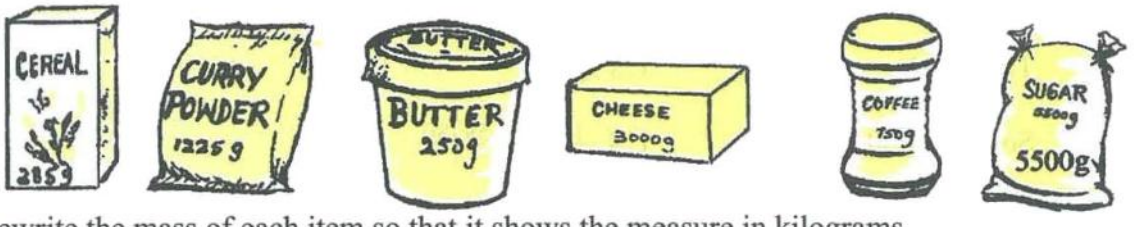
If 1kg = 1000 g
Then 1g = $\frac{1}{1000}$ kg
So 250 g = $\frac{1}{1000} \times \frac{250}{1}$ = $\frac{250}{1000}$ kg
= 0.250 kg

What have you observed in changing one unit to the other?

To change kg to g multiply by 1000.
To change g to kg divided by 1000.

Exercise B

1. Here are some items bought at the supermarket.



Rewrite the mass of each item so that it shows the measure in kilograms.

2. Express in grams:
The first is done for you.

(a) 3 kg 100 g = (1000 × 3) + 100 g = 3100 g

(b) 1 kg 755 kg

(c) 5 kg 220 g

(d) $5\frac{3}{4}$ kg

(e) $2\frac{3}{4}$ kg

3. Write these in grams:
(a) 2 kg (b) 5 kg 320 g (c) $\frac{1}{100}$ kg (d) $1\frac{1}{4}$ kg

4. (a) Here is a table of equivalent masses.
Copy and complete:

Kilograms	Grams
70	____
____	1850
2.525	____
____	750

Foreign Currency Exchange

Each country has its own currency (money).
When visiting another country, we exchange our money to that of the country we are visiting.

Example: Trudy is travelling from Guyana to the United States of America. She plans to spend three months there. She goes to the Cambio. The exchange rate (selling) is US$1.00 = G$200. She has G$59 780. How much US dollars will she receive?
Finding the answer:

If G$200 = US$1.00

Then G$1 = US $\frac{1.00}{\$200}$

So G$59 780 = US $\frac{1.00}{\$200} \times \frac{59780}{1}$

= US$298.90

The currency exchange rate changes constantly. Each currency has a different exchange rate. Here are some rates. Use these to do the following exercises.

	TODAY'S BUYING	RATES SELLING
£1	= G$300	355.00
US	= G$200	202.00
Cdn.	= G$30	145.00
TT	= G$27	33.00
Bds.	= G$94	99.00

Study this:
Trudy returns to Guyana with US$210.00. How much G$ will she receive at the exchange rate on the board?

Finding the answer.

If US$1.00 = G$200 (buying)
Then US$210.00 = 200 × 210.00
= G$42 000

> Remember
> Buying means the Cambio buys from you at the given rate.
> Selling means the Cambio sells to you at the given rate.

Study the rates given, then do these exchanges:

Exercise C

1. Complete these based on (i) rates given on previous page (ii) current rates.

   (a) Find the equivalent amounts in G$.

US$9.00	TT$81.00
TT$55.00	CDN$210.00
CDN$15.00	US$108.00
STG£23.00	BDS$75.00
BDS$36.00	STG£66.00

   (b) Copy and complete:

G$ to	Foreign Currency
1900	£
3400	Bds
15 288	Cdn
11 780	TT
33 320	US

2. Solve these problems:

   (a) A souvenir of Guyana was priced at G$750. If the exchange rate was STG£1.00 = G$300. How many sterling pounds will an Englishman need to exchange to purchase the souvenir?

(b) If hotel accomodation is G$625 per day. What will it cost a Trinidadian to spend 7 days here at an exchange rate TT$ 1.00 = G$30

(c) Marie went to the Cambio to exchange US$175.00. If the rate that day was US$1.00 = G$200. What was her amount in G$?

(d) A dealer had these items for sale:

His exchange rates were:
US$1.00 = G$200
TT$1.00 = G$ 30
Bds$1.00 = G$ 94.00
Cdn$1.00 = G$ 130.00
What is the cost of each item in G$?

REVIEW

1. (a) Write these amounts in kg and g.

$3\frac{3}{4}$ kg $5\frac{1}{5}$ kg $7\frac{1}{2}$ kg $9\frac{1}{4}$ kg

(b) Re-write the measures in (a) as kilograms. Use decimal notation.

(c) Write these measures as grams.
5.120 kg $7\frac{1}{4}$ kg 3.753 kg

13 kg 350 g 10 kg 155 g $4\frac{2}{5}$ kg

2. (a) How many 45 g bags can be filled from a 2 kg bag of salt?

(b) If Cdn$1.00 = G$130
How many Cdn$ can be bought with:
(i) G$10 500?
(ii) G$8925?

How many G$ will Susie receive in exchange for:
(i) Cdn$90 (ii) Cdn$105 (iii) Cdn$15?

3. Marie bought an article priced at US$135. She paid for it in G$.
If the exchange rate was US$1.00 = G$200,
What was the equivalent value of the article in G$?

LET US LOOK BACK (Units 10 - 15)

1. (a) 22 × 30 560 × 24 126 × 81 912 × 103 $4.36 × 5 $21.90 × 40

(b) A family of 7 went to the movies. If a ticket costs \$125, how much did the family spend?

(c) Each row in a concert hall has 64 seats. If there are 12 rows, how many seats are there?

2. (a) It takes 3 m of cloth to make a suit. How many suits can be made from 300 m of cloth?

(b) Crayons are packed in packets of 20. How many packets are needed for 840 crayons?

3. Write the squares of these:

(a) 6 (b) 11 (c) 3 (d) 4 (e) 10 (f) 5

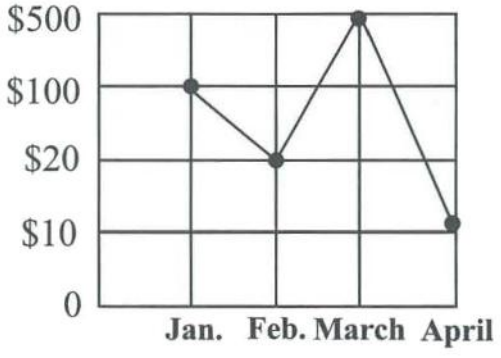
4. Which of these are divisible by 2, 3, 5 or 10?

78, 194, 784, 4026, 95 160, 275, 305, 600

5. Copy and complete:

6 kg	= – g		125g	=	– kg	5000g	=	– kg
3 kg 250g	= – g		$5\frac{1}{2}$ kg	=	– g	$3\frac{1}{4}$ kg	=	– g

6. This graph shows the money Janet saved in her School's Thrift Society.



(a) How much did Janet save each month?

(b) In which month did she save the most?

(c) What was her average monthly saving?

(d) Janet hopes to double this amount by July. How much will she have then?

7. Which of these does the Roman Numeral CXIV represent?

140 104 114 141

UNIT 16 SETS

Members or Elements of Sets

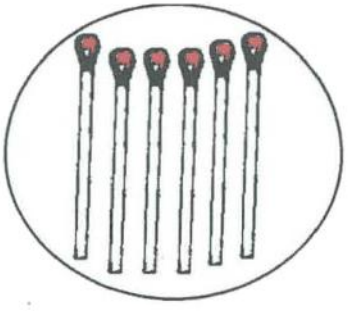
In everyday life we often use different words to mean a collection or group of things which are alike in some way.
Example:

In mathematics we use the word set to describe a group/collection of objects of the same kind.
We would say:

a set of mangoes
a set of cards
a set of birds

A set is a collection of things which are alike in some way.
Each thing shown in a set is called a member of the set.

A



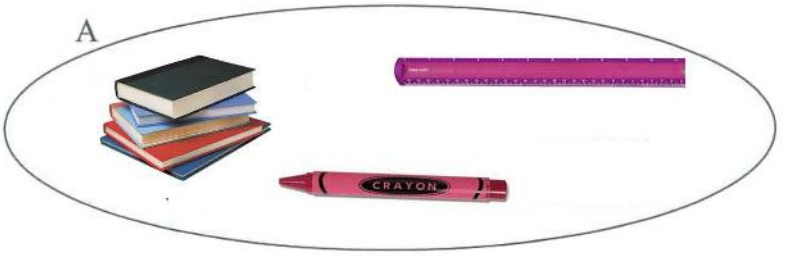
In the diagram above marked A, there is group of match-sticks.
It is a set of match sticks.

(a) How many match-sticks are there?
(b) Copy and complete:
A is a set of _____ with ☐ members.

Words, letters or numbers may also be members of sets.
Example (8, 6, 3, 9, 12) is a set of 5 whole numbers.
Notice that when things belong to a set, a loop is drawn around them. We use curly brackets to list elements of a set. Each is separated by a comma. So a set of tools can be shown as:

or as {fork, shovel, hoe, rake, pitch-fork}

The set below contains books, a crayon and a ruler.



The members of set A are a crayon, a ruler and books.

A = {crayon, ruler, books}

Another word for 'members' is 'elements'

Ruler is a member of Set A

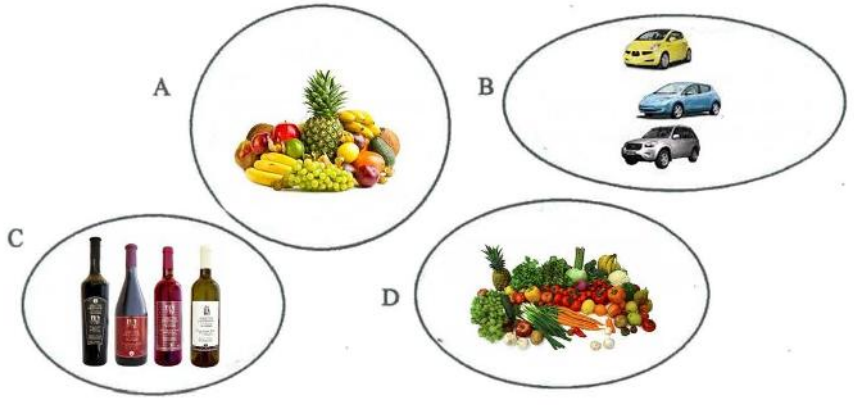
Ruler is an **element of** Set A

We use the symbol $\in$ to mean **' is a member of '** or **' is an element of '**
So we can write **Books $\in$ A**

If set A = {3, 4, 5, 6, 7}
then 3 $\in$ A
4 $\in$ A and so on

Is 8 a member of set A?
8 is not a member of set A?
We write 8 $\in$ A
$\notin$ means **' is not a member of '**

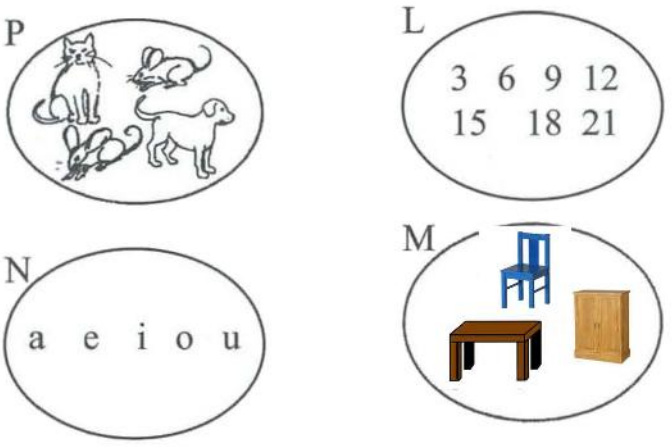
Exercise A



1. Copy and complete the following for each of the sets above:

A is a set of _____ with ☐ members.
B is a set of _____ with ☐ members.
C is a set of _____ with ☐ members.
D is a set of _____ with ☐ members.

2. Describe in words each of the following sets: P, L, N and M.
State the number of members in each set.



3. Use the curly brackets to list the elements of the following sets:

(a) months of the year.
(b) odd numbers between 30 and 40.
(c) letters between a and h in the alphabet.
(d) the months of the year beginning with J.
(e) the names of five animals beginning with D.

Equal and Equivalent Sets

Two sets are equal when they have identical elements.

Set A is equal to set B because the same elements from A are represented in B.

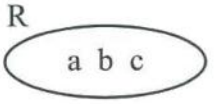
Set C is equal to Set D, but Set C is not equal to Set E.
Can you say why?

For sets to be equal they must have the identical members.

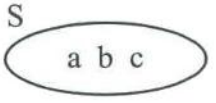
Two sets are equivalent if they have the same number of elements.
These elements need not be identical.
Set R is equivalent to Set S because they have three members each.

Example:

R



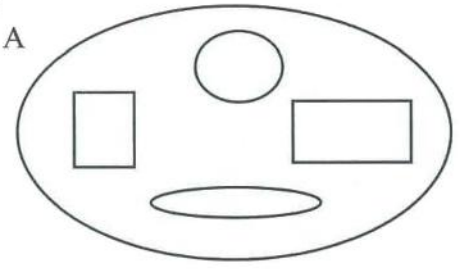
S



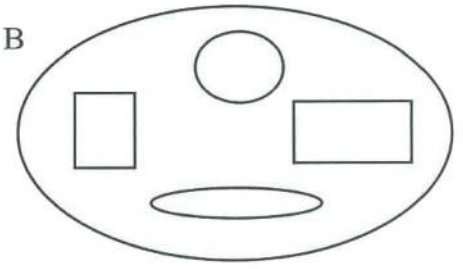
For sets to be equivalent they must have the same number of elements in each.

Look at these sets:

A

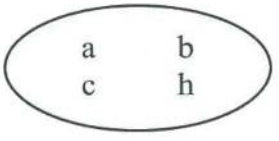


B

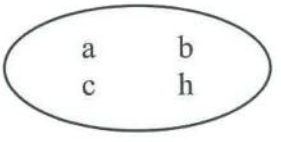


Is set A equal to Set B?
Is Set A equivalent to Set B?

B



P



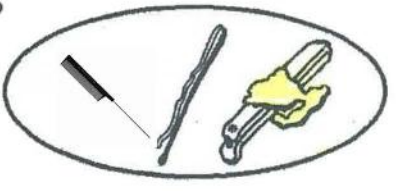
Look again at these two sets.
Is set B equal to Set P?
Is set B equivalent to Set P?

Equal sets are always equivalent.

Are equivalent sets always equal?
Look at these two sets.

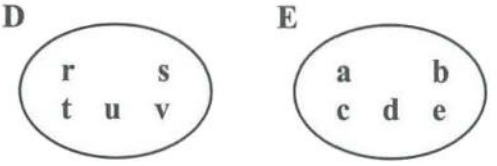
A

B

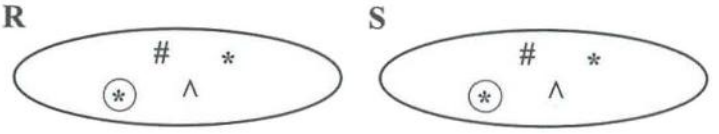


Is set A equivalent to Set B?
Is set A equal to Set B?

Look again at these two sets .
Is set D equivalent to Set E?
Is set D equal to Set E?



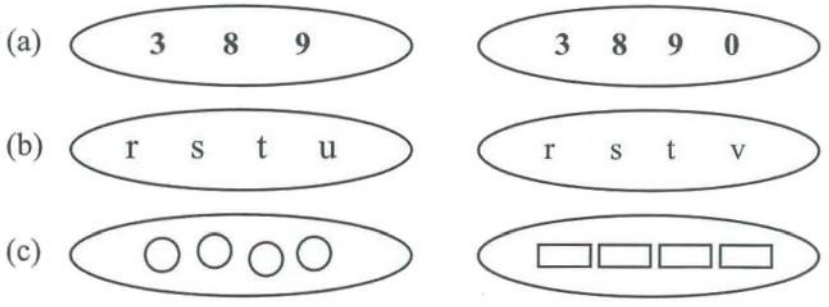
Now do the same for these two sets.
Is set R equivalent to set S?
Is set R equal to set S?



Equivalent sets are not always equal.

Exercise B

1. Which of these sets are equal?
   Which are equivalent?
   Which are neither equal nor equivalent?



2. Say which sets are equal and which are equivalent:

A	= { 6, 8 10, 12 }	D	= { 12, 10, 8, 6 }
B	= { 5, 8, 10, 6 }	E	= { 10, 12, 6, 8 }
C	= {a, r, s, t, v}	F	= { 3, 6, a, e }

Sub-Sets

Mr. Harry wanted someone to help him lift a box.
There were three boys around - Joe, Peter and John.

If we look at the set of boys - Joe, Peter and John
Mr. Harry could have asked:

(1) all three of them or (2) Joe only

or	(3)	Joe and Peter	or	(4)	Peter only
or	(5)	Joe and John	or	(6)	John only
or	(7)	Peter and John	or	(8)	none of them

These are all possible choices from the original set of boys and are called subsets.

Example: List all the subsets of the following set:

$A = \{ a, b, c \}$

The subsets are:

(1)	{a, b, c}	(3)	{a, b}	(5)	{a, c}	(7)	{c}
(2)	{b, c}	(4)	{a}	(6)	{b}	(8)	{ }

Notice: 8 has nothing, it is called the empty set and is written { }

We say that {a, b, c} is a subset of A
{a, b} is a subset of A
{a, c} is a subset of A and so on...

In Mathematics we write $\subset$ to mean **'is a subset of'**

So $\{a, b, c\} \subset A$
$\{a, b\} \subset A$
$\{a, c\} \subset A$ and so on...

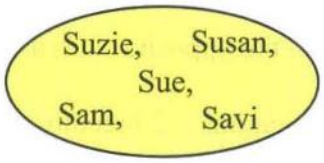
Exercise C

1. Using curly brackets list all the subsets of the following sets:
   (a) $A = \{b, c, d\}$
   (b) $B = \{3, 9\}$
   (c) $C = \{\text{cow, horse, donkey}\}$
   (d) $D = \{1, 3, 5\}$

2. Using the symbol $\subset$ list all the subsets of
   (i) {x, y, z}
   (ii) {3, 8, 12}

REVIEW

1. Describe in words the set opposite.



2. Use curly brackets and list the set of odd numbers between 16 and 24.
3. (a) Which of these sets are equal?
   (b) Which are equivalent?

4. List all the subsets of the following set.
   (a) {r, s, t} (b) {1, 3, 5} (c) {p, q}

UNIT 17 MEASUREMENT

Perimeter

(a) Use your ruler. Measure to find the distance around the top of your desk, table and chalkboard.
Example: this desk is 90 cm long and 60 cm wide.
Perimeter is $90 + 90 + 60 + 60 = 300$ cm.

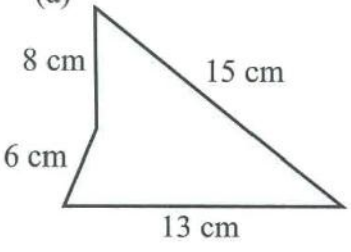
> Remember
> Perimeter is the sum of the distance around a closed shape.

(b) You can also use a piece of string to find perimeter of shapes.
Take a piece of string and use it to measure around the shape you choose.
Record your answer. Now use it to measure the perimeter of other shapes, for example, a leaf.

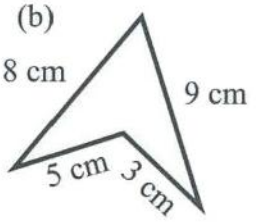
Exercise A

1. Find the perimeter of these shapes.

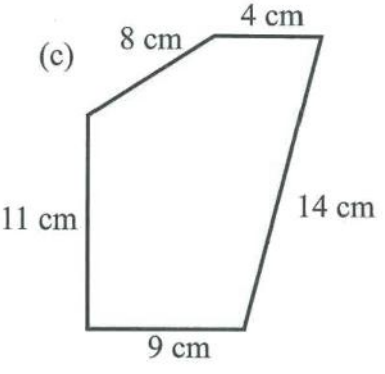
(a)



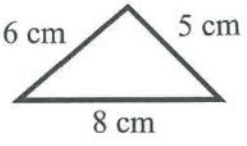
(b)



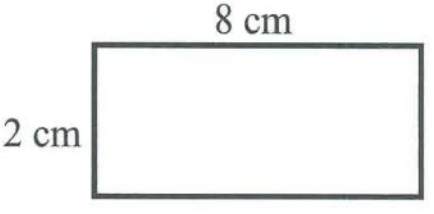
(c)



(d)

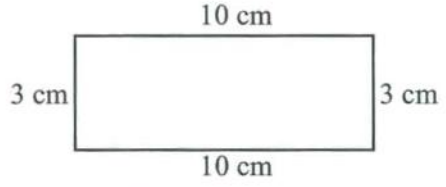


Here is a regular shape, the opposite sides are equal.
Find its perimeter.
Perimeter is equal to 2 lengths + 2 breadths $= 2\ell + 2b$
or $2(\ell + b)$ or $2 \times (\ell + b)$
$P = 2(\ell + b)$
This is a formula for finding perimeter of rectangles.
$P = 2(\ell + b)$

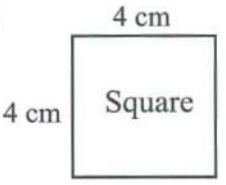


2. Using this formula, find the perimeter of each shape.

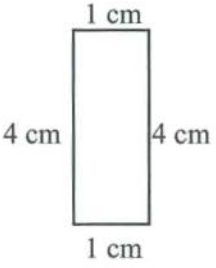
(a)



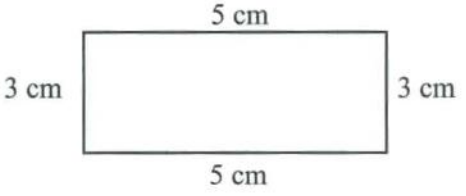
(b)



(c)



(d)



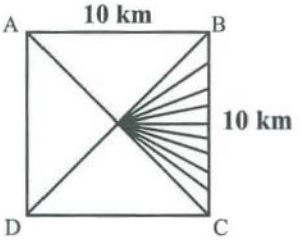
3. Problem solving:
   (a) Find the perimeter of a field 120 m by 30 m.
   (b) The length of a desk is 90 cm. Its breadth is 30 cm. Find the perimeter.
   (c) A plot of land is 300 m by 200 m. What length of barbed wire is needed to go around it once?
   (d) The perimeter of a square is 36 cm. What is the length of one side?
   (e) A rectangular track is 400 m by 100 m. If Savita ran around it 3 times, what distance did she cover?

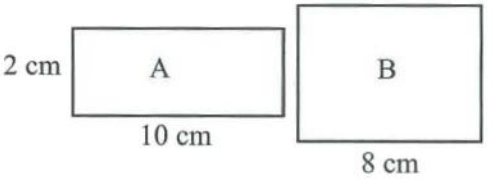
REVIEW

1. Calculate and complete:

	Length	Width	Perimeter
a.	5 cm	4 cm	--
b.	6 cm	--	20 cm
c.	--	5 cm	40 cm
d.	3 cm	2 cm	--
e.	--	7 cm	35 cm

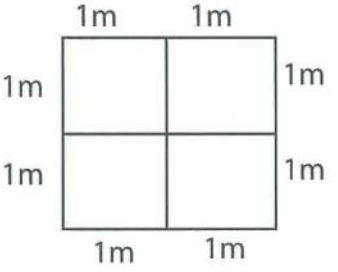
2. Solve the following problems:
   (a) Find the perimeter of a square with length 8 cm.
   (b) The diagram ABCD represents a square field of sides 10 km. What is the perimeter of the unshaded part?
   (c) If the two rectangles have the same perimeter, Find the length of rectangle B.





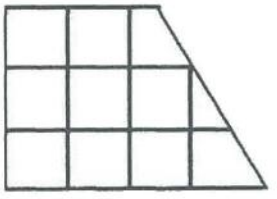
UNIT 18 MEASUREMENT

Area

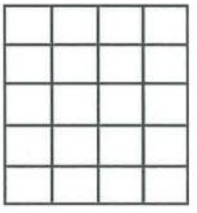


Area is the amount of surface a shape covers.
It is always measured in squares, for example, m^2, cm^2,
Example: The area of the shape opposite is 4 m^2

We can find the area of irregular shapes by using a grid.
Look at this shape.
If 1 small square is 1 cm^2, then the area of this shape is about 9 cm^2.



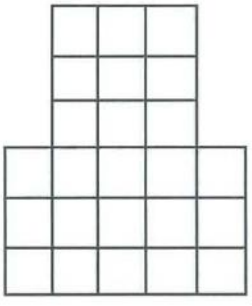
Can you tell the area of this shape.
If you said 20 cm^2, then you are right.



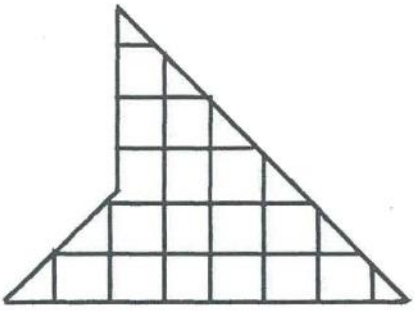
Exercise A

1. Now find the area of these irregular shapes.

(a)



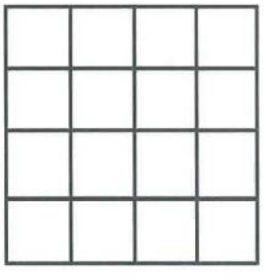
(b)



(c)

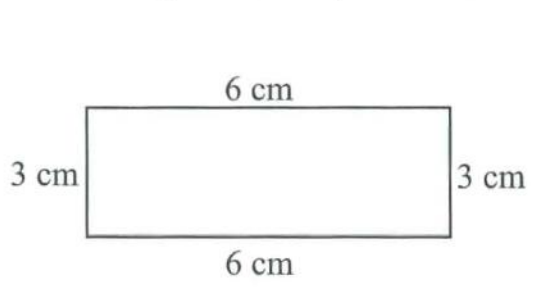
We can also find the area of shapes using a **formula**. This can only be done with regular shapes.

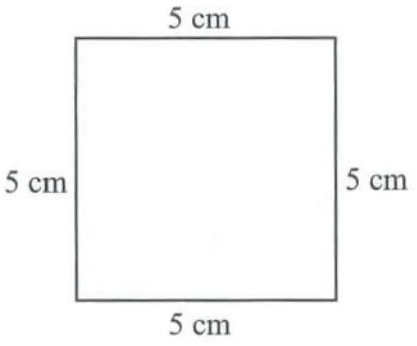
Look at this shape. Count the squares.
We get 16. The area is then 16 cm^2.
We find there are 4 rows of 4
Area then = $4 \times 4 = 16$ cm^2
Where 4 represents length and 4 represents the breadth.
So area = L × B.

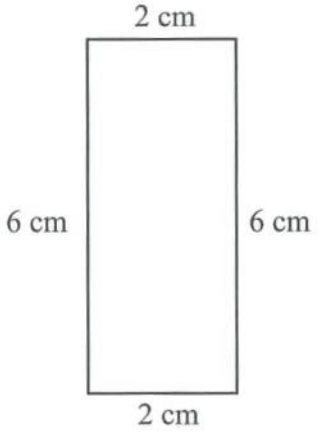


Exercise B

1. Using the formula, find the area of:



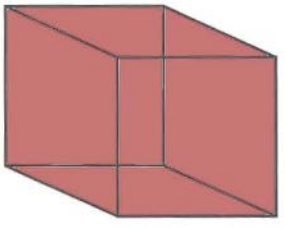




2. Problem Solving:

(a) Find the area of a classroom 15 m long by 10 m wide.
(b) Find the area of a rectangular field 200 m by 50 m.
(c) What is the area of carpet needed to cover a floor 14 m by 6 m?
(d) A classroom is 20 m long by 15 m wide. If each child occupies a space of 2 m^2, how many children can fit in the class?
(e) Draw a figure 6 cm by 4 cm. What is its area?
(f) The area of a book is 20 cm^2. If the length is 5 cm, find the width.
(g) The area of a square is 64 cm^2. Find its length.

Area of Cubes



Remember a cube has 6 equal faces.
Let us find the area of this cube.
First we find the area of one face.
This is $3 \times 3 = 9$ cm^2

Since there are 6 equal faces we multiply 9 cm^2 by 6.
So the area of the cube is 54 cm^2.
Now use your ruler or strips of cardboard with mm markings to calculate the area of cubes you have collected. For example, boxes, dice, etc.

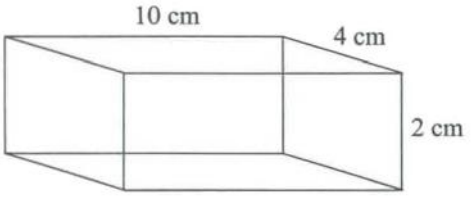
> Remember
> Find the area of one face then multiply by 6.

Exercise C

1. Find the total surface area of these cubes:
   (a) One side measuring 4 cm.
   (b) Area of one face 25 cm^2.
   (c) Area of one face is 81 cm^2.

Area of Cuboids

A cuboid has six rectangular faces.
The opposite faces are equal.
Find the area of this cuboid.



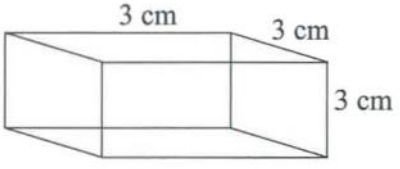
1. First we can find the area of each surface and add them together.
   For example: $10 \times 4 = 40\ cm^2$, $4 \times 2 = 8\ cm^2$, $10 \times 2 = 20\ cm^2$
   Total $= 40 + 40 + 8 + 8 + 20 + 20 = 136\ cm^2$
2. Find the area of one of each opposite surface, multiply by 2 and then add each set together.

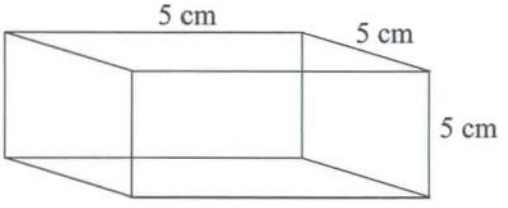
e.g.	$10 \times 4 =$	$40 \times 2 =$	$80\ cm^2$
	$10 \times 2 =$	$20 \times 2 =$	$40\ cm^2$
	$4 \times 2 =$	$8 \times 2 =$	$16\ cm^2$
		Total =	$136\ cm^2$

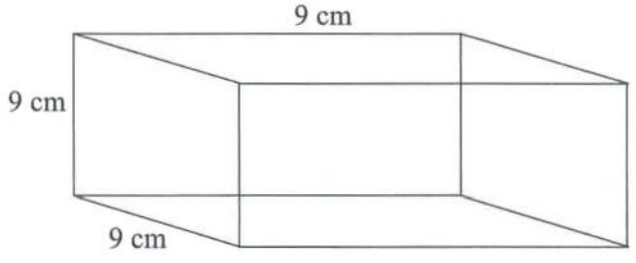
Now use your ruler or strips of cardboard with mm markings to calculate the area of the cuboids you collected. You can use methods one or two.

Exercise D

Find the total surface area of these cuboids.

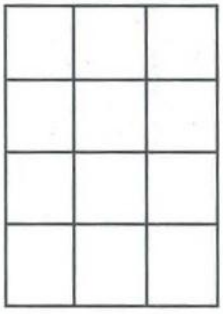


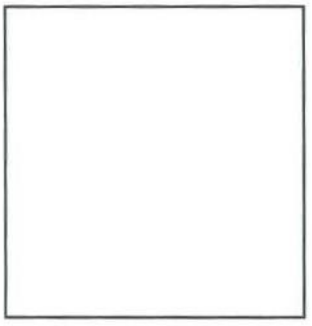


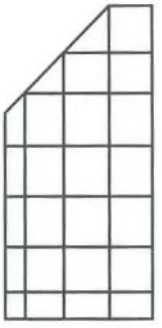


REVIEW

A. Measure and find the area of these shapes:







B. Copy and fill in the missing measures:

	Length	Width	Area
1.	4 cm	3 cm	-
2.	5 cm	-	15 cm^2
3.	-	8 cm	32 cm^2
4.	5 cm	2 cm	-
5.	7 cm	-	63 cm^2

C. Solve these problems:

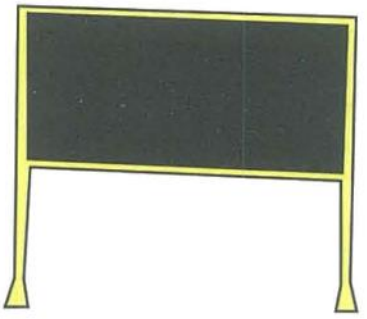
(1) The ratio of the length of a playground to its width is 2:1. If the length is 60 metres. Find its area.

(2) The area of a room is divided into 4 equal parts, each 4 m by 3 m. What is the area of half of the room?

(3) The area of 4 equal squares is 100 cm^2. The length of a side of one square is _____cm.

UNIT 19 GEOMETRY

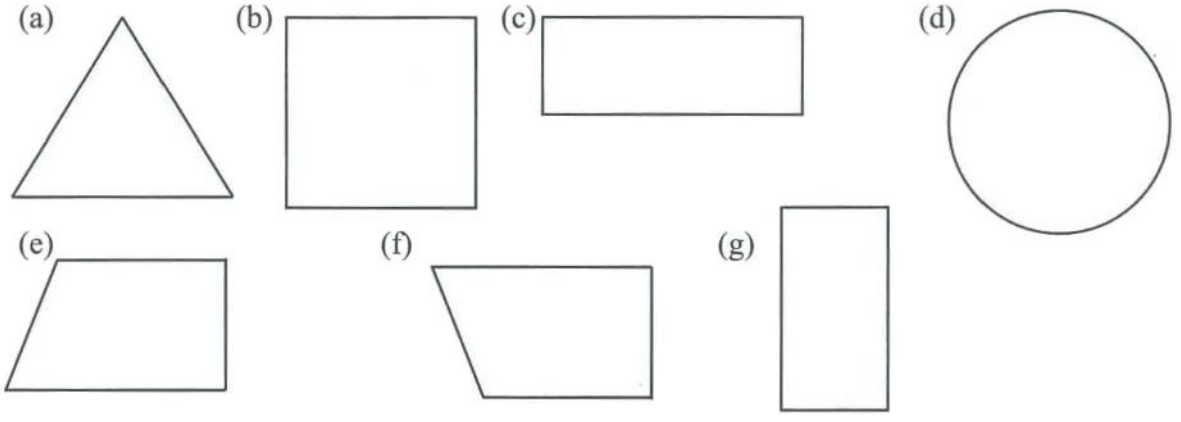
Angles



There are many examples of straight lines around you.
Examples: The edges of the blackboard.
The edges of your book.
The edges of the cupboard.

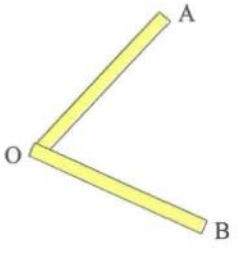
Some of these lines meet while others never meet.
Run your finger along the edge of your book.
Lines A and C never meet.
A and B; B and C; C and D; A and D; meet at each corner.
Look around your classroom and identify straight lines that meet.
Two straight lines that meet at a point form an angle.
Remember we talked about angles in Grades 4 and 5.

Exercise A
Look at the shapes below. Write down the number of angles you can see inside each one.



Comparing Angles

Let's make a simple instrument to help you compare the sizes of angles.
Take two cardboard strips (each $\frac{1}{2}$ cm wide and 10 cm long). Fasten one end of each strip together with a drawing pin as in the drawing below.



Write letters A and B on the free ends of the strips and O where the strips meet.

Now OA and OB are the arms of the angle, close the arms so that AO goes on OB.

Now open slowly - as you open the arms, the angle gets bigger.
As you close the arms, the angle gets smaller.
Use your instrument to find out which of these angles is larger.

Now, look at these angles.

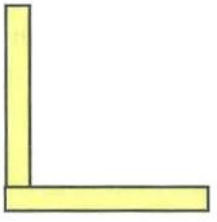
Use your cardboard instrument to check if they are the same size.

Those with same size are called right angles.

Now close the arms of the right angle.
Has the angle become larger or smaller?
Here are some angles smaller than a right angle.

Angles that are smaller than the right angle are called acute angles.

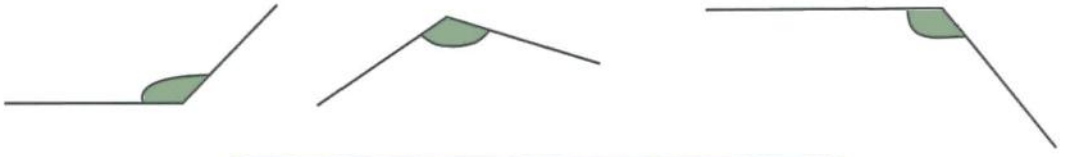
Get your cardboard apparatus again
and make a right angle.



Now open the arms until both arms make a straight line.

This is a straight angle. It has 2 right angles.

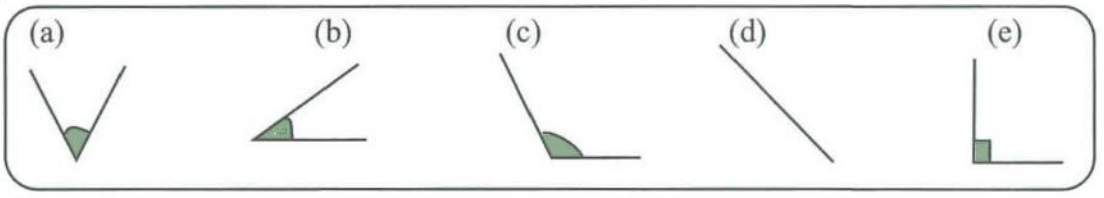
The angles below are greater than a right angle. Use your cardboard instrument to check if they are more than 90° and less than 180°



An angle which is more than a right angle but less than a straight angle is an obtuse angle.

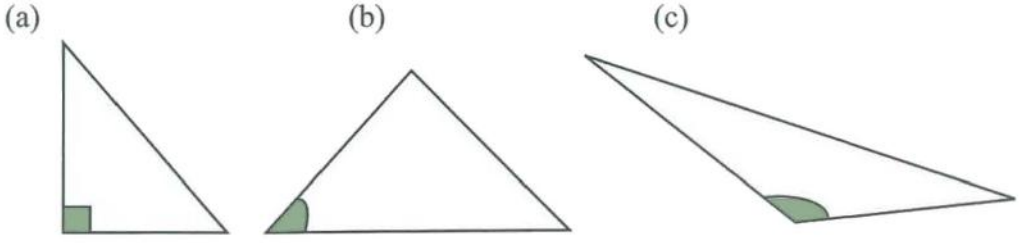
Exercise B

Sort out the different angles from the big set. You may use your cardboard instrument to help you.



Triangles

Can you remember what is an acute angle? An obtuse angle? A right angle?
Look at the triangles below. Name the angle that is marked in each.

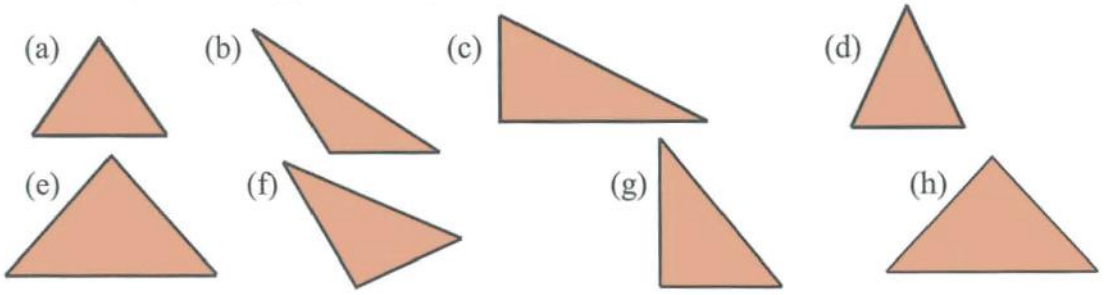


1. A triangle which has a right angle is called a right-angled triangle.
   Triangle (a) above is a right angled triangle.
2. A triangle which has three acute angles is called an acute angled triangle.
   Triangle (b) above is an acute angled triangle.
3. A triangle which has an obtuse angle is called an obtuse angled triangle.
   Triangle (c) above is an obtuse angled triangle.

   Every triangle must belong to one of these three sets.

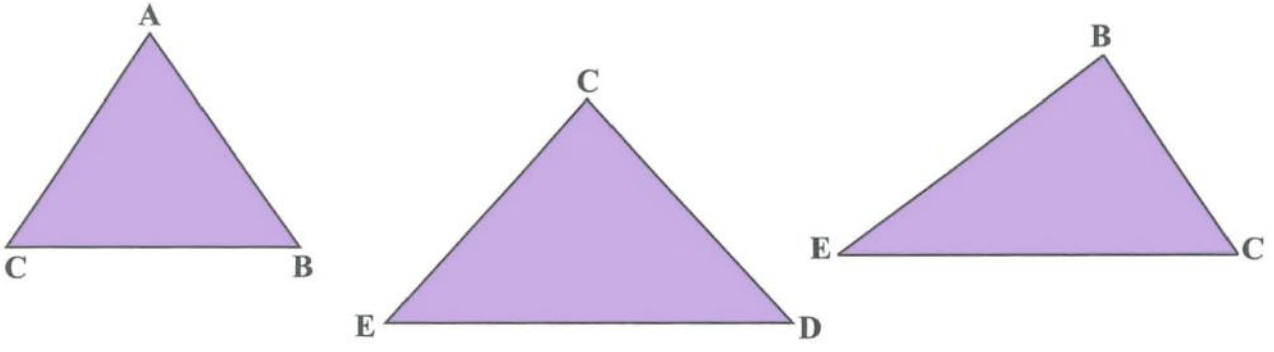
Exercise C

Study these triangles then copy and complete the table below.



Right angled triangle	Acute angled triangle	Obtuse angled triangle

Triangles have special names according to their sides.
Measure the sides of each triangle below and write down the measurements.



A triangle with all its sides equal in length is called an **equilateral triangle.**

For example: AB = AC = BC = 4 cm

A triangle which has two sides equal is an **isosceles triangle.**

For example: CD = CE = 5 cm

A triangle with unequal sides is a **scalene triangle.**

For example: BEC is a scalene triangle

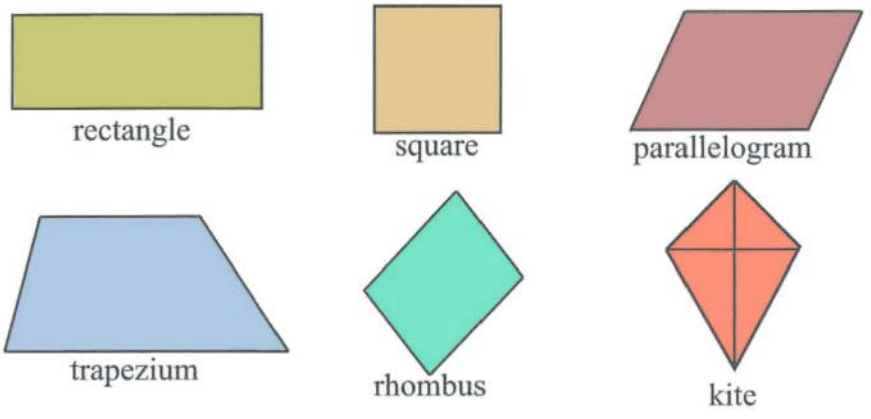
Now name the triangles you have measured.

Exercise D

1. Why is a triangle called an isosceles triangle?
2. How many sides are equal in an equilateral triangle?
3. Why is a scalene triangle different from an isosceles triangle?
4. What can you say about the angles of:
   - an equilateral triangle?
   - an isosceles triangle?
   - a scalene triangle?

Quadrilaterals

A quadrilateral is a closed figure with four sides.
Now draw some quadrilaterals of your own.
Some quadrilaterals have special names.



Remember

A quadrilateral is a plane four-sided figure.
A trapezium is a quadrilateral with one pair of opposite sides parallel.
A parallelogram is a quadrilateral with opposite sides equal and parallel.
A rhombus is a quadrilateral with all the sides equal.
A rectangle is a quadrilateral whose angles are all 90°.
A square is a quadrilateral with all the sides equal.
A kite is a quadrilateral with two pairs of adjacent sides equal.

Exercise E

1. Answer these questions:

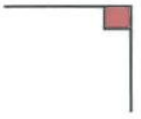
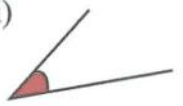
   (a) A plane four-sided figure is called a _____ .
   (b) A figure with all its four sides equal is called a _____ .

(c) How many equal adjacent sides has a kite?
(d) Name the quadrilateral that has the opposite sides parallel.

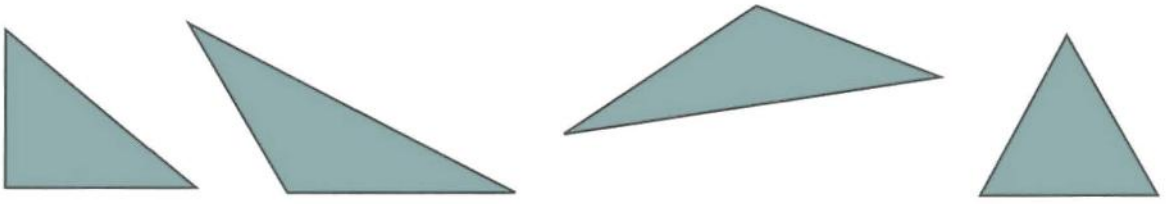
REVIEW

1. Draw and mark off the angles of these triangles:

   (a) Acute angled triangle.
   (b) Obtuse angled triangle.
   (c) Right angled triangle.

2. Match these to the correct angles: (i)  (ii)  (iii) 

   (a) Less than a right angle.
   (b) Equal to a right angle.
   (c) Greater than a right angle.

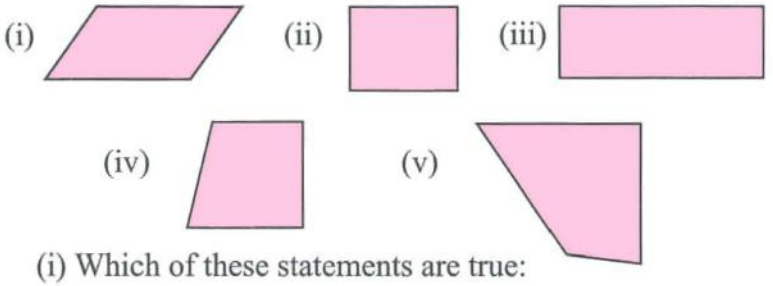
3. 

   (i) (ii) (iii) (iv)

   Which of the triangles above is/are obtuse angled triangle(s):

   (a) i only (d) i and iv only.
   (b) ii only (e) ii and iii only.
   (c) iii only

4. Study these figures then answer the questions which follow:

   (i) Which of these statements are true:

   (a) All the figures are parallelograms.
   (b) All the figures are rectangles.
   (c) All the figures are quadrilaterals.
   (d) All the figures are squares.

   (ii) The figure which is square is numbered:

   (a) (i) (b) (ii) (c) (iii) (d) (iv)

UNIT 20 AVERAGES

If Sarwan scored 62 runs, 19 runs, 50 runs, 5 runs, 77 runs and 75 runs in 6 innings, we can say that his average score is

$62 + 19 + 50 + 5 + 77 + 75 = \square$

$\square \div 6$

$= \square$

The average or arithmetic mean of a number of quantities is -
The sum of all the quantities ÷ the number of quantities

Remember

$$A = \frac{\text{sum of quantities}}{\text{number of quantities}}$$

Exercise A

1. Find the average of:

(a)	3, 6 and 12	(f)	20cm, 18cm, 17cm, 10cm and 25cm
(b)	32, 54, 58 and 68	(g)	701, 391, 621 and 451
(c)	70, 75, 80, 72 and 73	(h)	134 km, 205 km and 126 km
(d)	56, 49, 62, 46, 73 and 38	(i)	18 kg, 20 kg, 19 kg, 28 kg and 25 kg
(e)	15.1, 14.2, 15.8, 14.5	(j)	$184, $200, $324 and $260

2. Problems:

(a) The mass of 5 boys is 55 kg, 45 kg, 41 kg, 56 kg and 58 kg.
What is the average mass of the boys?

(b) A trader made these profits on her selling days. Monday $850, Tuesday $1000, Wednesday $700, Thursday $950 and Friday $800.
What was her average profit per day?

(c) Nancy made scores of 67, 87, 60 and 56 in her test.
To pass the test her average must be at least 60.
Did she pass the test?

(d) A vendor's fudge sale for a school week showed the following:
Monday- $275, Tuesday- $220, Wednesday - $200,
Thursday - $191 and Friday $150.
What was her average sale per day?

(e) The distances covered by a mini-bus driver for the week are: 10 km, 15 km, 25 km, 12 km, 5 km, 22 km and 37 km.
Find the average distance covered on each trip.

(f) Dad likes to read books. Here is a table of the number of pages read in one week.

Day	Number of Pages
Sunday	25
Tuesday	20
Wednesday	43
Friday	32

Find the average number of pages Dad read each day.

(g) The members of Dorcas Club held a tea party. They sold 10, 17, 4, 25,12 6 and 24 tickets. Find the average. How many tickets were sold by each member?

(h) Here are the scores of some cricketers:

Gary	38	runs
Nix	9	runs
Danny	36	runs
Abdool	0	runs
Thomas	8	runs
Charles	23	runs

Find the average score of these cricketers:

(i) 6 pupils scored 75%, 80%, 63%, 65%, 72% and 89% in a Mathematics test. Find the average percent scored,

(j) The average height of 8 girls is 154 cm. What is their total height?

(k) The average mass of 3 parcels is 45 kg 520 g. What is their total mass?

(l) The average salary earned by 5 factory workers is $4065. Find their total earnings.

Exercise B

(a) A bowler takes 6 wickets for 306 runs. Find his bowling average.

(b) The cost of 24 books amounts to $19 200. What is the average cost?

(c) The total mass of 4 parcels is 12.76 kg. Find the average mass.

(d) 5 boxes weigh a total of 20.5 kg. Find the average mass.

(e) Jenny scored 224 runs in 7 innings. Find her average score per innings.

(f) Copy and complete the table:

Number in all	280	5608	?	?
Number of groups	5	8	3	10
Average	?	?	915	4260

Jenny's average score on four tests is 23. Three of the test scores are 18, 24, 21. What is the fourth score?

Average on 4 tests	=	23
Sum of 4 tests	=	$23 \times 4 = 92$
Sum of three given scores	=	$18 + 24 + 21 = 63$
Fourth score	=	$92 - 63 = 29$

We can find missing scores when given the average and other scores.

Exercise C

1. (a) Ade's average score for three tests was 85. Her first two scores were 75 and 90. What was her score on the third test?
   (b) The average of 6 numbers is 21. Five of the numbers are: 23, 20, 16, 25 and 26. Find the sixth number.
   (c) The average mass of five packages is 28 kg. The average mass of four of them is 20 kg. Find the mass of the fifth package.
   (d) Carlos patches punctured tyres. His average saving for 4 weeks was $38. His average saving for 3 weeks was $42. How much did he earn in the fourth week?
   (e) 379 library books were borrowed in 5 weeks. For four weeks 75, 79, 85 and 80 books were borrowed. How many books were borrowed in the last week?
   (f) A small school has five classes. Prep class, Primary 1, 2, 3 and 4.

Class	Number of pupils
Primary 4	7
Primary 3	16
Primary 2	10
Primary 1	15
Prep.	-

   The average number of pupils in the school is 14. How many children are in Prep?

2. A pastry caterer made pastries six days each week. On Monday she made 36, Tuesday 20, Wednesday 40, Thursday 35 and Friday 48. She made 192 pastries in all.
   (a) How many did she make on Saturday?
   (b) What was the average number of pastries made for the six days?

Problems

Time

1. Workers in a store work from 07:30 h to 16:00 h. In a five day week how many hours do they work?
2. How long is the sun up if it rises at 05:45 h and sets at 18:10 h?
3. A trip which lasted 4 h 20 min ended at 13:00 h. When did the trip start?
4. School assembles at 9:00 h and dismisses at 15:00 h. There is a lunch break from 12:00 h to 13:00 h. How many hours are spent in classroom work?

Mass

1. Which has a greater mass?

   (a) 4 articles each with a mass of 125 g or
   (b) 8 articles each with a mass of 240 g.

2. A tin of pineapple juice has a mass of 120 g. What is the mass in kilograms of 42 such tins?

3. An empty carton has a mass of 85 g. Six packages each with a mass of 195 g are placed into the carton. What is the mass of the carton?
4. The mass of a sack of sugar is 22.5 kg. A grocer wishes to fill smaller bags with a mass of 2.5 kg. How many such bags can be filled from the larger one?

Length

1. How many pencils of length 16 cm placed end to end are required to stretch 12 m?
2. How many lengths of ribbon each 2.5 cm can be cut from a length 2 m?
3. Mother placed 2 litres of milk at the breakfast table. The family used 50mℓ. How many mℓ of milk were left?

Capacity

1. How many 50 mℓ glasses of milk can be filled from 10 ℓ?
2. The gas station attendant sold 2 litres, 8 litres, 6 litres and 3 litres of kerosene at different times in the day. If kerosene costs $145 a litre, what was the total amount of money collected by the attendant?

Percentage, Profit and Loss, Discounts

1. Find (a) 30% of 8 m (b) 12.5% of 720 g
2. (a) Increase 620 cm by 20%
   (b) Decrease 560 g by 10%
3. 5% of a number is 20. Find the number.
4. An article is marked $2540. It is reduced to $2286. Find the percentage reduction.
5. In a test, a pupil scored 221 marks out of 340. Find the percentage of marks scored.
6. A watch marked $6000 is increased by 12%. Find the new cost price of the watch.
7. An article is bought for $55 and sold for $75. Find the percentage profit.
8. A stove is bought for $800 and sold for 25% profit. Find the selling price.
9. Dad bought an article for $60 and sold it at a loss of 15%. What was the selling price?

Perimeter, Area

1. A rectangular plot is 30 m by 25 m.
   Find (a) the perimeter (b) the area
2. A rectangular carpet is laid on a floor 42 m by 36 m. Find the area of the carpet.
3. What is the area of a dictionary page 24 cm by 13 cm?

REVIEW

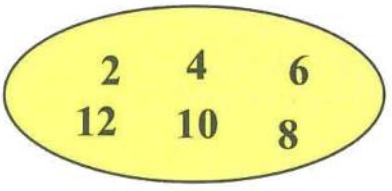
1. I bought these items in the shop at an average cost of $1250.
   Three of the items cost $1950, $2100 and $380. What was the cost of the fourth item?

2. A cycle shop mended 6 tyres, 5 tyres, 3 tyres and 10 tyres in 4 days. On the average, how many tyres were mended a day?

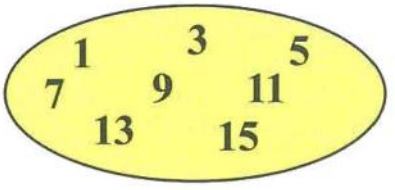
3. Find the average of these quantities:

   (a) 30, 18 and 6.
   (b) 22, 15, 20 and 43.
   (c) 104 cm and 72 cm.

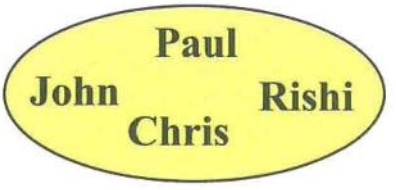
LET US LOOK BACK (Units 16 - 20)



A



B



C

1. (a) How many members are in set A?
   (b) Which set has names of persons?
   (c) Which set is made up of odd numbers only?
   (d) List all the subsets of C.

2. Find the average of:

   (a) 60, 30, 15.
   (b) 25 cm, 10 cm, 12 cm, 13 cm.
   (c) 50 ℓ, 45 ℓ, 22 ℓ, 33 ℓ, 15 ℓ.
   (d) 15.2, 2.3, 1.4.

3. (a) The total ages of three boys is 35 years 3 months. Find their average age.
   (b) Five numbers add up to 60. The average of four of them is nine and one number is 13. Find the fifth number.

4. Solve these problems:

   (a) Find the perimeter of a square whose length is 5.5 cm.
   (b) The perimeter of a rectangle is 32 cm. If the length is 10 cm, find the width of one side.
   (c) What is the cost of covering a rectangular floor 6 m by 4 m, if the carpet costs \$450 per m^2 ?
   (d) The area of a square is 169 cm^2 . Find the length of one side.

UNIT 21 NUMBERS

Time /Numbers

What you need to remember about time:

60 seconds	=	1 minute
60 minutes	=	1 hour
24 hours	=	1 day
7 days	=	1 week
52 weeks	=	1 year
12 months	=	1 year

Exercise A

1. Give the answers for these:

   (a) The total number of days in March, April and May.
   (b) The number of days in the first six months of a leap year.
   (c) The number of months in $1\frac{1}{2}$ years.
   (d) The number of weeks in $5\frac{1}{2}$ years.
   (e) The number of years in 48 months.
   (f) The number of years in 156 weeks.

   Now study these:

   (i) Mr. Simon served as Headteacher of our school from 1983 to 1993.
   He was Headteacher for a period of 10 years.
   He was a headteacher for 1 **decade.**

   (ii) Today Mother Janey would be 100 years old. She would become a centurion.
   100 years = 1 century

2. Do these:

   (a) 5 decades = — years
   (b) $3\frac{1}{2}$ decades = — years
   (c) 8 decades = — years
   (d) $9\frac{1}{2}$ decades = — years
   (e) 10 decades = — years
   (f) 10 decades = — century

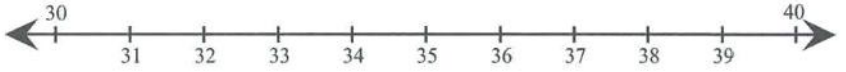
3. (a) What fraction of a century is:
   25 years; 50 years; 20 years; 75 years?

   (b) What percentage of a century is:
   30 years; 45 years; 57 years; 84 years?

   (c) What decimal of a decade is:
   3 years; 7 years; 4 years; 9 years?

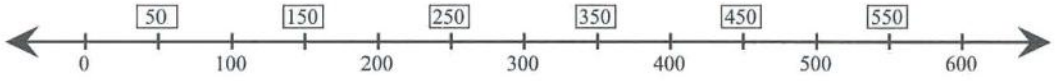
Rounding Whole Numbers

Look at the number line below:



In the number line above, between which two tens do these numbers lie?
(a) 32 (b)36 (c) 35 (d) 38
They all lie between 30 and 40.
Now since 32 is nearer to 30, we can say that 32 is almost 30 or rounded to 30.
35 is midway between 30 and 40 so 35 is rounded to 40.

This number line is marked in hundreds



In the number line above, between which two hundreds do 327 and 395 lie?
The numbers 327 and 395 are between 300 and 400
327 is nearer to 300, so 327 is rounded to 300
395 is nearer to 400, so 395 is rounded to 400

Now let us round these two numbers to the nearest hundred without a number line.
Look at 327. Is the digit in the tens place greater or less than 5?
Since it is less than 5, 327 is rounded to 300.
Look at 395. Is the digit in the tens place greater or less than 5?
Since it is greater than 5, 395 is rounded to 400.

A number such as 350 is midway between 300 and 400
It also has 5 in the tens place.
So 350 is rounded to the greater hundred.
350 is rounded to 400.

We can round to the nearest 1000 in the same way.
4426 is rounded to 4000

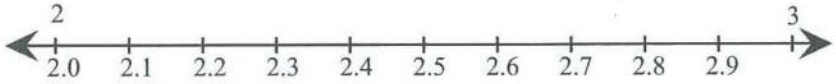
Exercise B

1. Round each number to the nearest ten.

   (a) 39; 44; 88; 265; 317; 532
   (b) 456; 843; 670; 907; 1762; 3750
   (c) 1769; 4318; 7473; 9941; 10 500; 13 219

Rounding Decimals

Look at this number line



Between which two whole numbers does each of these numbers lie?
2.3, 2.7, 2.5, 2.9
These numbers lie between 2 and 3

2.3 is nearer to 2, so 2.3 is rounded to 2
2.7 is nearer to 3, so 2.7 is rounded to 3

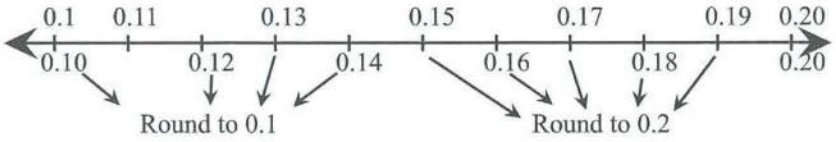
Similarly 2.9 is nearer to 3, so 2.9 is rounded to 3
But 2.5 is midway between 2 and 3, so 2.5 is rounded to the larger whole number.
2.5 is rounded to 3.

Note:- To round a decimal to the nearest whole, first you must know between which two whole numbers the decimal lies.

Exercise C

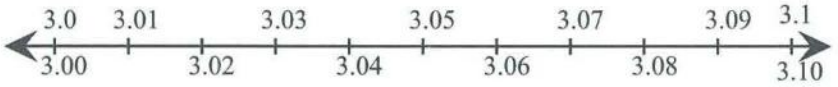
1. Round to the nearest whole number
   1.2; 4.6; 5.4; 8.1; 15.5; 18.7; 25.8; 30.4; 50.9

   Study this number line



   0.11; 0.12; 0.13 and 0.14 are nearer to one tenth so round to 0.1
   0.16; 0.17; 0.18 and 0.19 are nearer to two tenths so round to 0.2

   Here is another number line. Study it.



   What is 3.02 rounded to the nearest tenth?
   3.02 rounded to the nearest tenth is 3.0
   What is 3.06 rounded to the nearest tenth?
   3.06 rounded to the nearest tenth is 3.1

To round a decimal to the nearest tenth.
Look at the digit in the hundredths place.
If the digit in the hundredths place is 5, 6, 7, 8 or 9, you increase the digit in the tens place by l.
If the digit in the hundredths place is 0, 1, 2, 3 or 4, leave the digit as it is, in the tens place.

Exercise D

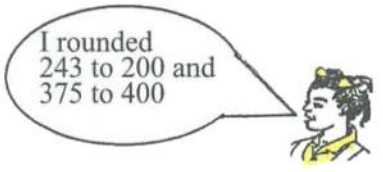
1. Round these decimals to the nearest tenth.
   (a) 3.12; 4.05; 5.26; 0.78; 0.93; 1.79; 0.84; 6.97
2. Round these amounts to the nearest dollar.

(a)	$6.95	(d)	$45.50	(g)	$108.09
(b)	$9.99	(e)	$62.25	(h)	$560.89
(c)	$20.33	(f)	$91.15	(i)	$750.32

Estimating Answers

To estimate an actual sum, we round numbers to the nearest ten, hundred or thousand then add.
Look at these:

$$\begin{array}{r} 243 \\ +\ 375 \\ \hline \end{array}$$

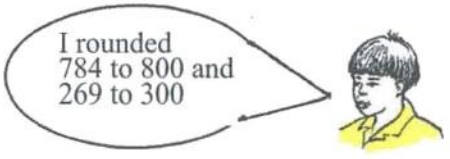


$$\begin{array}{r} 200 \\ +\ 400 \\ \hline 600 \end{array}$$
Estimated Sum

$$\begin{array}{r} 243 \\ +\ 375 \\ \hline 618 \end{array}$$
Actual Sum

Similarly we estimate the actual difference:

$$\begin{array}{r} 784 \\ -\ 269 \\ \hline \end{array}$$



$$\begin{array}{r} 800 \\ -\ 300 \\ \hline 500 \end{array}$$
Estimated Difference

$$\begin{array}{r} 784 \\ -\ 269 \\ \hline 515 \end{array}$$
Actual Difference

Exercise E

1. Round each number to the nearest hundred. Estimate the sum, then find actual sum.
   (a) $\begin{array}{r} 293 \\ +\ 425 \\ \hline \end{array}$ (b) $\begin{array}{r} 541 \\ +\ 366 \\ \hline \end{array}$ (c) $\begin{array}{r} 1752 \\ +\ 2681 \\ \hline \end{array}$ (d) $\begin{array}{r} 3924 \\ +\ 4512 \\ \hline \end{array}$

2. Round each number to the nearest thousand. Estimate each sum or difference. Then find actual sum or difference.
   (a) $\begin{array}{r} 1324 \\ +\ 2657 \\ \hline \end{array}$ (b) $\begin{array}{r} 4935 \\ +5271 \\ \hline \end{array}$ (c) $\begin{array}{r} 3724 \\ -\ 1951 \\ \hline \end{array}$ (d) $\begin{array}{r} 6856 \\ -\ 4720 \\ \hline \end{array}$

To estimate a product or quotient, we round numbers to the nearest ten, hundred, thousand.

Estimating the Answer for Product

1. A classroom has 28 chairs. How many chairs are there in 13 similar classrooms?

Problem	→	Round each number to the nearest 10, 100.	→	Multiply the rounded number. Multiply the actual numbers.
28×13		28×13 $\downarrow \quad \downarrow$ 30×10		$28 \times 13 = 304$ $30 \times 10 = 300$

More examples:

2. 33×42
   $\downarrow \quad \downarrow$
   $30 \times 40 = 1200$

3. 729×6
   $\downarrow$
   $700 \times 6 = 4200$

Estimating the answer for 1-digit quotients.
We can estimate 1-digit quotients by using the first digit of the divisor.

Study this

$$\begin{array}{r} 9 \\ \hline 53\,)\,482 \\ -477 \\ \hline 5 \end{array}$$

Divide 48 by the 5-digit in 53
Multiply 53 by the quotient
$53 \times 9 = 477$
Then subtract.

Sometimes an estimate is too large.
Example:

$$\begin{array}{r} 6 \\ \hline 54\,)\,312 \\ -324 \end{array}$$

Try again →

$$\begin{array}{r} 5 \\ \hline 54)\,312 \\ -270 \\ \hline 42 \end{array}$$

Sometimes an estimate is too small. Remainder is greater than the divisor.
Example:

$$\begin{array}{r} 6 \\ 73\overline{)528} \\ -438 \\ \hline 90 \end{array}$$

Try again →

$$\begin{array}{r} 7 \\ 73\overline{)528} \\ -511 \\ \hline 17 \end{array}$$

Exercise F

1. Estimate the products. Then find the actual product.
   (a) 45×21 (c) 87×63 (e) 582×54
   (b) 72×46 (d) 377×25 (f) 882×78

2. Find the quotients and remainders by estimation.

   (a) $41\overline{)375}$ (c) $54\overline{)476}$ (e) $73\overline{)487}$ (g) $49\overline{)356}$

   (b) $33\overline{)200}$ (d) $65\overline{)229}$ (f) $82\overline{)572}$ (h) $43\overline{)354}$

REVIEW

1. A famous West Indian cricketer made three and a half centuries during a Test match. How many runs did he actually make?
2. Some Samaan trees live for thirty-five years. How many decades is this?
3. Grandpa was born in 1904 and died in 1983. Grandma lived for three and a half decades. Who lived longer?

4. Copy and complete this table.

		Rounded to nearest ten	Rounded to nearest hundred	Rounded to nearest thousand
(a)	2763			
(b)	5946			
(c)	6812			
(d)	9350			
(e)	11 634			

5. Round to the nearest tenth; whole number:
   53.2 79.6 98.9 105.7 19.25 33.43 68.12 154.69

UNIT 22 DECIMALS

Multiply Decimals - Whole Numbers Times Decimal.

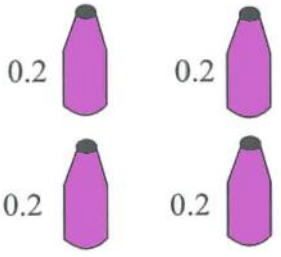
Study this problem.
Three girls started to paint a wall
Each girl painted 0.3 of it.
How much of the wall did the three girls paint?

We can solve this problem in three ways:

1. $0.3 + 0.3 + 0.3 = 0.9$ (repeated addition)
2. Another way $3 \times \frac{3}{10} = \frac{3}{1} \times \frac{3}{10} = \frac{9}{10} = 0.9$
3. Still another way $3 \times 0.3 = 0.9$

Here is another example:-

Father shared milk from a litre bottle to his four children. Each child received 0.2 of a litre. How much of the milk did father share in all?



1. Each child received 0.2 ℓ
   4 children received $0.2 + 0.2 + 0.2 + 0.2 = 0.8$ (repeated addition).
2. Another way $4 \times \frac{2}{10} = \frac{4}{1} \times \frac{2}{10} = \frac{8}{10}$
3. Still another way $4 \times 0.2 = 0.8$

What do you notice about the answer each time?
Each time the product shows that there is one digit after the decimal point.

> The product of a whole number and a decimal tenths has one decimal place after the decimal point.

Exercise A

1. (a) 2×0.2 (b) 2×3.7 (c) 4×0.1 (d) 3×6.9 (e) 5×0.3 (f) 5×5.7 (g) 6×0.4 (h) 8×2.6
2. (a) 0.3×7 (b) 4.5×2 (c) 0.9×5 (d) 6.8×4 (e) 0.4×1 (f) 2.9×3 (g) 0.6×8 (h) 7.5×6

Tenths Times Tenths

Look at this:

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

$$0.5 \times 0.3 = 0.15$$

0.5: decimal tenths; 0.3: decimal tenths; 0.15: decimal with two decimal places

Here is another example:

$$1.6 \times 1.2 = 1.92$$

1.6: decimal tenths; 1.2: decimal tenths; 1.92: decimal with two decimal places

Worked like this:

$$\begin{array}{rl} 1.6 & \rightarrow \text{1 decimal place} \\ \times\ 1.2 & \rightarrow \text{1 decimal place} \\ \hline 160 & \\ +\ 32 & \\ \hline 1.92 & \rightarrow \text{2 decimal places} \end{array}$$

3. Do these. The first is done for you.

(a) $\begin{array}{rl} 0.4 & \rightarrow \text{1 decimal place} \\ \times\ 0.3 & \rightarrow \text{1 decimal place} \\ \hline 0.12 & \rightarrow \text{2 decimal places} \end{array}$

(b) $\begin{array}{r} 0.7 \\ \times\ 0.5 \\ \hline \\ \hline \end{array}$

(c) $\begin{array}{r} 0.8 \\ \times\ 0.4 \\ \hline \\ \hline \end{array}$

(d) $\begin{array}{r} 1.6 \\ \times\ 0.8 \\ \hline \\ \hline \end{array}$

(e) $\begin{array}{r} 12.8 \\ \times\ 2.3 \\ \hline \\ \hline \end{array}$

(f) $\begin{array}{r} 3.8 \\ \times\ 0.2 \\ \hline \\ \hline \end{array}$

(g) $\begin{array}{r} 19.5 \\ \times\ 0.6 \\ \hline \\ \hline \end{array}$

Decimal Multiplied by 10 and 100.

Look at these:

(a) $0.7 \times 10 = \frac{7}{10} \times \frac{10}{1} = \frac{70}{10} = 7$

(b) $0.16 \times 10 = \frac{16}{100} \times \frac{10}{1} = \frac{160}{100} = 1.6 = 1.6$

(c) $3.5 \times 10 = \frac{35}{10} \times \frac{10}{1} = \frac{350}{10} = 35 = 35$

Have you noticed any difference between the answers and the decimal that was multiplied by 10?
If not, you may notice the difference after completing Exercise B.

Exercise B

1. Work these as shown.

(a) 0.5×10 (c) 0.9×10 (e) 0.04×10

(b) 0.26×10 (d) 6.7×10 (f) 7.8×10

> To multiply a decimal by 10, move the decimal point one place to the right.

Look at these:

(a) $0.5 \times 100 = \frac{5}{10} \times \frac{100}{1} = \frac{500}{10} = 50$

(b) $0.23 \times 100 = \frac{23}{100} \times \frac{100}{1} = \frac{2300}{100} = 23$

2. Work these as shown above:

(a) $0.3 \times 100 =$ (c) $0.09 \times 100 =$ (e) $0.7 \times 100 =$

(b) $0.28 \times 100 =$ (d) $0.45 \times 100 =$ (f) $9.6 \times 100 =$

3. Do these:

(a) 100×0.07 (c) 100×0.25 (c) 5.15×100

(b) 100×2.4 (d) 8.3×100 (f) 100×0.13

> To multiply a decimal by 100. move the decimal point two places to the right.

4. Complete these to make the statements true.

(a) $\square \times 10 = 6$ (e) $0.8 \times \square = 6$

(b) $0.54 \times \square = 5.4$ (f) $\square \times 100 = 50$

(c) $100 \times \square = 25$ (g) $0.01 \times 10 = \square$

(d) $6.3 \times 100 = \square$ (h) $0.04 \times \square = 4$

5. Copy and complete this table:

Number	× 10	× 100
6		
2.7		
0.54		
9.8		
362.05		

6. Try these:

(a) A boy drinks 2.6 ℓ of water in 1 day. How many litres of water would he drink in a week?
(b) A piece of string is 0.9 cm long. What is the length of 18 such pieces of string?
(c) 1 packet of potatoes weighs 2.5 kg. What would be the weight of 4.3 packets?
(d) Mrs. Jones buys 3.2 kg of meat every day. How much meat would she buy in 6 weeks?

REVIEW

1. Multiply:

(a) 20×0.1 (c) 5.263×53 (e) 34×0.2 (g) 7.8×16
(b) 62.5×24 (d) 5.06×81 (f) 20.64×32 (h) 0.0201×25

2. Work these in the shortest possible way:

(a) 67.3×10 (e) 89.62×10 (i) 0.397×10
(b) 5.568×10 (f) 0.925×10 (j) $4.568 \times 10 \times 10$
(c) 2.06×100 (g) 0.3184×100 (k) 7.239×100
(d) 65.345×100 (h) 87.231×100 (1) 96.57×100

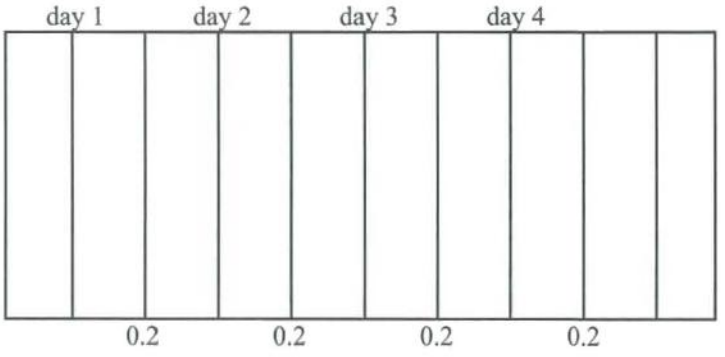
3. Do these:

(a) 7.6×0.9 (d) 29.4×3.8 (g) 3.09×4.6
(b) 7.63×5.1 (e) 5.37×0.85 (h) 0.362×6.7
(c) 0.925×8.3 (f) 12.6×0.92 (i) 7.43×0.19

UNIT 23 DECIMALS

Divide Decimals by Whole Numbers.

(a) Peter had 0.8 of a garden to weed. He worked for 4 days doing an equal part each day. What part did he weed in 1 day?



0.8 or 8 tenths put into 4 equal parts show that each equal part is 0.2.
Therefore $0.8 \div 4 = 0.2$, so in 1 day Peter did 0.2 of the work.
Find out if your answer is correct ($0.2 \times 4 = 0.8$)

(b) $0.35 \div 5$
This is 35 hundredths to be divided by 5.
Let us do it like this:

$$\begin{array}{r} 0.07 \\ 5\overline{)0.35} \\ -\,00 \\ \hline 35 \\ -\,35 \\ \hline 00 \end{array}$$

Check by multiplying $0.07 \times 5 = 0.35$

Now study these:

(a) $0.2 \times 4 = 0.8$ $\quad$ $0.8 \div 4 = 0.2$

0.2		4		0.8	0.8		4		0.2
↑		↑		↑	↑		↑		↑
one decimal place		no decimal place		one decimal place	one decimal place		no decimal place		one decimal place

(b)

0.07	×	5	=	0.35		0.35	÷	5	=	0.07	
↑		↑		↑		↑		↑		↑	
two decimal places		no decimal place		two decimal places		two decimal places		no decimal place		two decimal places	

What can you say about the decimal points when the decimal is multiplied and divided by the whole number.

When dividing a decimal by a whole number, the decimal point in the quotient is placed in the same way as the number to be divided.

Exercise A

1. Try these:

(a) $5\overline{)10.75}$ (c) $4\overline{)4.32}$ (e) $8\overline{)24.08}$ (g) $9\overline{)45.45}$

(b) $13\overline{)39.52}$ (d) $25\overline{)50.75}$ (f) $28\overline{)56.84}$ (h) $40\overline{)90.20}$

2. Now do these:

(a) What is the quotient when 0.54 is divided by 6?
(b) Divide 13.5 by 5
(c) 48.8 divided by 8
(d) What is the quotient when 31.2 is divided by 8?
(e) Divide 10.89 by 9.

Decimal Divided by Decimal

Look at this:

$0.36 \div 0.3$

This can be written as $\frac{0.36}{0.3}$

(i) Change the divisor to a whole number by multiplying by 10.
(ii) Change the dividend by multiplying by 10.

$$\frac{0.36}{0.3} \times \frac{10}{10} = \frac{3.6}{3} = 1.2$$

Check your answer

1.2	×	0.3	=	0.36
↑		↑		↑
one decimal place		one decimal place		two decimal places

To divide a decimal by a decimal make the divisor a whole number by moving the decimal point. Move the decimal point the same number of places in the dividend.

Exercise B

1. Do these. Follow the pattern of the one done for you.

(a) $6.4 \div 0.8 = \dfrac{6.4 \times 10}{0.8 \times 10} = \dfrac{64}{8} = 8$

(b) $0.24 \div 0.4$ (e) $0.96 \div 0.3$ (h) $25.05 \div 2.5$

(c) $214.38 \div 0.9$ (f) $507.74 \div 1.4$ (i) $37.74 \div 3.7$

(d) $1.189 \div 4.1$ (g) $48.48 \div 1.6$ (j) $36.12 \div 1.2$

Look at this:

$$49 \div 0.07 = \frac{49}{0.07}$$

$$= \frac{49 \times 100}{0.07 \times 100} = \frac{4900}{7} = 700$$

Check your answer $700 \times 0.07 = 49.00 = 49$

2. Do these. The first one is done for you.

(a) $1.64 \div 0.04 = \dfrac{1.64 \times 100}{0.04 \times 100} = \dfrac{164}{4} = 41$

(b) $0.66 \div 0.06$ (e) $1.08 \div 0.36$ (h) $4.8 \div 0.20$

(c) $1.05 \div 0.35$ (f) $1.75 \div 0.25$ (i) $717.6 \div 0.39$

(d) $8.791 \div 0.53$ (g) $3.926 \div 0.32$ (j) $0096 \div 0.03$

Divide Decimals by 10 and 100

Look at these:

$1.9 \times 10 = 19$ likewise $3.56 \times 100 = 356$

$\therefore 19 \div 10 = 1.9$ $\therefore$ $356 \div 100 = 3.56$

3. Complete these problems:

(a) $3.2 \times 10 = 32$ $\therefore 32 \div 10 =$ ___

(b) $6.8 \times 10 = 68$ $\therefore 68 \div 10 =$ ___

(c) $0.09 \times 10 = 0.9$ $\therefore 0.9 \div 10 =$ ___

(d) $4.61 \times 10 = 46.1$ $\therefore 46.1 \div 10 =$ ___

(e) $13.25 \times 10 = 132.5$ $\therefore 132.5 \div 10 =$ ___

(f) $29.17 \times 10 = 291.7$ $\therefore 291.7 \div 10 =$ ___

Look at these division problems. What is the divisor in each problem?
What do you notice about the dividend and the quotient in each problem?

4. Copy and complete these:

(a)	0.46×100	=	46	$\therefore$	46	$\div$	100	=	—.
(b)	5.1×100	=	510	$\therefore$	510	$\div$	100	=	—.
(c)	12.9×100	=	1290	$\therefore$	1290	$\div$	100	=	—.
(d)	19.43×100	=	1943	$\therefore$	1943	$\div$	100	=	—.
(e)	37.5×100	=	3750	$\therefore$	3750	$\div$	100	=	—.
(f)	9.6×100	=	960	$\therefore$	960	$\div$	100	=	—.

Look at the division problems.
What is the divisor in each problem.
What do you notice about the dividend and the quotient in each problem?

To divide a decimal by 10, move the decimal point one place to the left. Put in zeros if needed.

To divide a decimal by 100, move the decimal point two places to the left. Put in zeros if needed.

Exercise C

1. Do these:

(a)	$42.3 \div 10$	(d)	$58.6 \div 10$	(g)	$15.15 \div 100$
(b)	$70.9 \div 10$	(e)	$239.4 \div 10$	(h)	$365.2 \div 100$
(c)	$153.3 \div 10$	(f)	$129.4 \div 100$	(i)	$23.65 \div 100$

Changing Fractions to Decimals.

Look at these:

(i) $\frac{9}{10} = 0.9$	(iii) $\frac{37}{100} = 0.37$
(ii) $\frac{1}{2} = \frac{1}{2} \times \frac{5}{5} = \frac{5}{10} = 0.5$	(iv) $\frac{7}{20} = \frac{7}{20} \times \frac{5}{5} = \frac{35}{100} = 0.35$

2. Change these fractions to tenths or hundredths, and then write as decimals.

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

(b) $\frac{1}{20}$; $\frac{3}{20}$; $\frac{9}{20}$; $\frac{4}{25}$; $\frac{7}{25}$; $\frac{3}{50}$

Now let us write $\frac{1}{8}$ as a decimal. To do this, we divide 1 by 8.

First write 1 as 1.000

$$
\begin{array}{r}
0.125 \\
8)\overline{1.000} \\
\underline{-\ 8} \\
20 \\
\underline{-\ 16} \\
40 \\
\underline{-\ 40} \\
00
\end{array}
$$

The answer is 0.125, $\therefore \frac{1}{8} = 0.125$

Here is another example. Write $\frac{19}{40}$ as a decimal.
First write 19 as 19.000

$$
\begin{array}{r}
0.475 \\
40)\overline{19.000} \\
\underline{-160} \\
300 \\
\underline{-280} \\
200 \\
\underline{-200} \\
000
\end{array}
$$

The answer is 0.475, $\therefore \frac{19}{40} = 0.475$

3. Change these fractions to decimals by dividing:

(a) $\frac{3}{8}$; $\frac{5}{8}$; $\frac{7}{8}$; $\frac{7}{40}$; $\frac{9}{40}$

(b) $\frac{11}{40}$; $\frac{13}{40}$; $\frac{29}{40}$; $\frac{33}{40}$; $\frac{37}{40}$

Look at this chart:

$\frac{1}{2} = 0.5 = 0.50$ $\frac{1}{4} = 0.25$ $\frac{3}{4} = 0.75$	$\frac{1}{5} = 0.2 = 0.20$ $\frac{2}{5} = 0.4 = 0.40$ $\frac{3}{5} = 0.6 = 0.60$ $\frac{4}{5} = 0.8 = 0.80$	$\frac{1}{8} = 0.125$ $\frac{3}{8} = 0.375$ $\frac{5}{8} = 0.625$ $\frac{7}{8} = 0.875$
$\frac{1}{20} = 0.05$; $\frac{3}{20} = 0.15$; $\frac{7}{20} = 0.35$; $\frac{9}{20} = 0.45$;		
$\frac{1}{25} = 0.04$; $\frac{3}{25} = 0.12$; $\frac{7}{25} = 0.28$; $\frac{9}{25} = 0.36$;		

Exercise D

1. Use the chart in Exercise C to convert these to decimals:

   (a) $3\frac{1}{2}$; $8\frac{3}{5}$; $4\frac{1}{8}$; $6\frac{1}{20}$; $9\frac{7}{20}$; $7\frac{5}{8}$

   (b) $2\frac{9}{20}$; $5\frac{7}{8}$; $3\frac{3}{4}$; $8\frac{1}{4}$; $6\frac{1}{25}$; $4\frac{3}{25}$

2. Write these as fractions in their lowest terms:
   (a) 0.05; 0.50; 0.15; 0.40; 0.25
   (b) 0.625; 0.875; 0.28; 0.36; 0.45

REVIEW

1. Do these:

(a)	0.05	÷	5	(e)	15.65	÷	15
(b)	0.39	÷	3	(f)	37.6	÷	8
(c)	0.16	÷	4	(g)	79.8	÷	6
(d)	0.54	÷	2	(h)	29.55	÷	5

2. Try these:

(a)	0.482	÷	0.15	(c)	11.32	÷	0.08
(b)	61.55	÷	25	(d)	20.45	÷	0.6

3. Follow the arrows to complete:

(a) 7.3 → (× 10) → ☐ → (÷ 10) → 7.3

(b) 4.9 → (÷ 10) → ☐ → (× 10) → 4.9

(c) 81 → (× 100) → ☐ → (÷ 100) → 81

(d) ☐ → (× 100) → 95 → (÷ 100) → ☐

(e) ☐ → (× 100) → 63 → (÷ 100) → ☐

(f) ☐ → (× 100) → 52 → (÷ 100) → ☐

UNIT 24 NUMBERS

Prime and Composite Numbers

We cannot define prime and composite numbers unless we know what factors are.
Look at 23. What numbers can 23 be divided by without leaving a remainder?
$23 \div 1 = 23$
$23 \div 23 = 1$
Therefore the only factors of 23 are 1 and 23.

What are the factors of 47?
The factors of 47 are 1 and 47.
1 and 47 are the only whole numbers that can divide 47 without leaving a remainder.

23 and 47 have only two factors; 1 and the number itself.
They are prime numbers.

Look at 36 - What numbers can divide 36 without leaving a remainder?
1, 2, 3, 4, 6, 9, 12, 36 can divide 36 without leaving a remainder.
The factors of 36 are: 1, 2, 3, 4, 6, 9, 12 and 36.
36 has more than two factors. 36 is not a prime number.
It is a composite number.

Follow these steps. Make a chart. Write numerals 1 to 100 in rows often.

Step 1: Cross out 1, since it has only one factor.
Step 2: Circle 2, cross off every other number after 2.
Step 3: Circle 3, cross off every third number (count those already crossed out).
Step 4: Circle 5, cross off every fifth number (count those already crossed off).
Step 5: Circle 7, cross off every seventh number.
Step 6: Circle the remaining numbers. The circled numbers are prime numbers.

Exercise A

1. Use your chart.
   (a) What are the prime numbers between 1 and 100? Write them.
   (b) What are composite numbers between 1 and 100? Write them.

We can use prime numbers to find the Greatest Common Factor of two or more numbers.
Look at the Prime Factorization of 15 and 30.

Prime Factors of 15 are $\boxed{3} \times \boxed{5}$
Prime Factors of 30 are $2 \times \boxed{3} \times \boxed{5}$

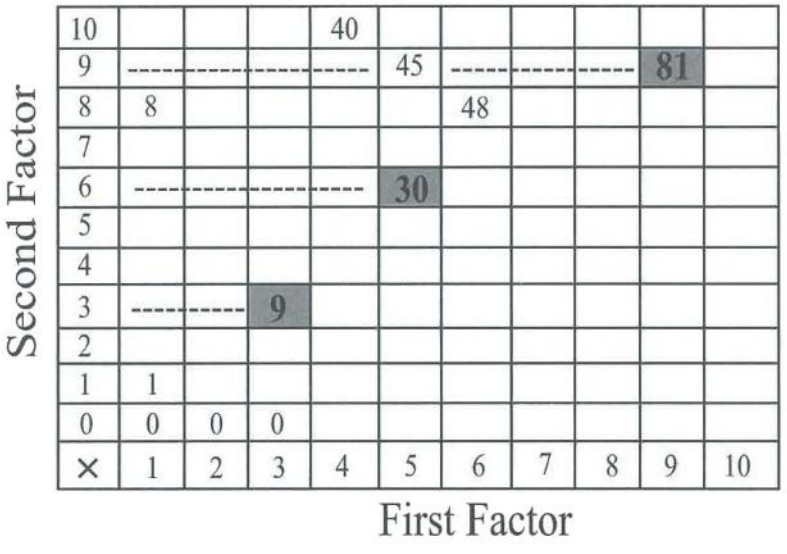
Greatest Common Factor of 15 and 30 $= 3 \times 5 = 15$.

2. Use prime factorization to find the H.C.F of these:

(a)	$20 = 2 \times 2 \times 5$	(c)	$16 = 2 \times 2 \times 2 \times 2$
	$30 = 2 \times 3 \times 5$		$28 = 2 \times 2 \times 7$
(b)	$39 = 3 \times 13$	(d)	$40 = 2 \times 2 \times 2 \times 5$
	$90 = 2 \times 3 \times 3 \times 5$		$56 = 2 \times 2 \times 2 \times 7$
(e)	32, 24	(f)	12, 21, 30
(g)	28, 42	(h)	20, 48
(i)	32, 100	(j)	70, 135

Factors and Multiples

Look at this chart.



Follow the broken lines on the chart.
Can you tell why 9, 30 and 81 are written in those squares?
These numbers are products of the factors shown at the bottom of the chart and those to the left.
Hence $3 \times 3 = 9$; $5 \times 6 = 30$; $9 \times 9 = 81$

Exercise B

1. Now make a chart like the one above. Multiply the first factor by the second one and write the product in each box.
2. Find the products that appear more than once.
   e.g. $1 \times 12 = 12$; $2 \times 6 = 12$; $4 \times 3 = 12$

Note this: 12 is a product, it is also a multiple of 2, 3, 4, 6 and 12.
The product of two factors is the multiple.

3. Using the chart write as many multiples of:

(a) 5 (b) 8 (c) 7 (d) 6 (e) 3 (f) 9

4. Write 12 multiples of:

(a) 4 (b) 10 (c) 13 (d) 14

Ratio - Multiples of Sets

Study this:

2 erasers for $40

We can think of 2 for $40 as a ratio.

Write $\frac{2}{40}$ → erasers
→ dollars

This type of fixed ratio is called a rate.
Now : If 2 erasers cost $40, how much will 4 erasers cost?
Write an equivalent fraction for this:

$$= \frac{2}{40} = \frac{4}{\square} = \boxed{\frac{2}{40}} \times 2 \times 2 = \frac{4}{80}$$

Exercise C

1. Now complete these charts:

(a)

Oranges	4	8	12	16	20
Cost	$100				

(b)

Eggs	3	9	12	15	18
Cost	$90				

(c) 3 boxes of cookies for $80; 12 boxes of cookies for _____
(d) 6 limes for $120; ____ limes for $360
(e) 7 days in 1 week; ____ days in 6 weeks.
(f) 4 cans of beans for $640; ____ cans for $1280

Mathematical Symbols

+ plus sign of addition
- minus sign of subtraction
× sign of multiplication
÷ sign of division
( ) parenthesis or brackets
' of ' sign of multiplication

Now let us look at the rule of the signs.

1. When brackets are used in a mathematical sentence, the part of the problem that comes within the brackets must be worked first.

Example (a) $21 - (8 + 5)$ (b) $(20 \div 5) + 6$

$= 21 - 13$ $= 4 + 6$

$= 8$ $= 10$

Exercise D

1. Do these:

(a) $27 + (18 \div 3)$ (e) $(13 + 5) \div 9$ (i) $42 \div (14 + 7)$

(b) $20 - (25 - 5)$ (f) $(17 - 6) \times 6$ (j) $30 \div (9 + 6)$

(c) $17 + (23 - 11)$ (g) $14 - (27 \div 3)$ (k) $(14 + 14) \div 7$

(d) $(30 + 6) \div 6$ (h) $66 + (2 \times 2)$ (l) $(12 + 18) \div 5$

When × or ÷ occurs with + or - , the multiplication or division must be done first.

Example (a) $8 \times 3 + 7$ (b) $24 \div 2 + 6$

$= 24 + 7$ $= 12 + 6$

$= 31$ $= 18$

When × and ÷ occur together in the same problem, do the ÷ before the × or in case of fractions use reciprocals.

2. Work these:

(a) $4 + 6 \times 3$ (d) $60 \times 2 + 20$ (g) $26 - 10 \div 5$

(b) $16 + 16 \div 8$ (e) $35 \div 5 + 5$ (h) $24 - 24 \div 8$

(c) $15 \times 2 - 20$ (f) $16 \times 2 - 11$ (i) $100 \div 25 + 10$

When + and - occur in the same number sentence add before subtracting.

N.B. The first number in the number sentence is often a plus number.

Example: (a) $9 - 3 + 7$ (b) $14 - 6 + 11$

Plus numbers are 9 and 7 $14 + 11 = 25$

Add them $9 + 7 = 16$ $25 - 6 = 19$

Subtract 3 $16 - 3 = 13$

3. Work these:

(a) $18 + 5 - 7$ (b) $25 + 3 - 9$ (c) $26 + 16 - 22$

(d) $50 + 17 - 40$ (e) $12 - 1 + 8$ (f) $23 - 7 + 9$

(g) $30 - 9 + 10$ (h) $40 - 8 + 12$ (i) $81 - 60 + 7$

Remember

The order of signs in operations is **BODMAS** -

Brackets **O**f **D**ivision **M**ultiplication **A**dditon **S**ubtraction

REVIEW

1. Which set has prime numbers between 30 and 40?
   (a) {31, 33} (b) {31, 35} (c) {31, 37} (d) {32, 35}

2. Which set has composite numbers between 1 and 10?
   (a) {2, 4, 6, 7} (b) {3, 4, 6, 9} (c) {4, 6, 8, 9} (d) {1, 4, 6, 9}

3. What is the sum of the prime numbers between 40 and 50?

4. Complete these:

   (a) $3 \times m = 27 \quad \therefore \quad m = \square$
   (b) $6 \times p = 48 \quad \therefore \quad p = \square$
   (c) $9 \times n = 63 \quad \therefore \quad n = \square$
   (d) $t \times 5 = 35 \quad \therefore \quad t = \square$
   (e) $w \times 8 = 64 \quad \therefore \quad w = \square$

5. Write the first 4 multiples of each of these numbers.

   (a) 7 (b) 9 (c) 11 (d) 14 (e) 16

6. If 4 coconuts cost $200. What is the cost of 12?

7. If a tray of eggs cost $900. Find the cost of 36 trays?

8. Work these:

   (a) $27 \div 3 \times 6$ (c) $40 - 4 \times 7$ (e) $75 \div 5 + 8$
   (b) $36 + 10 - 12$ (d) $53 - 28 + 11$ (f) $62 + 11 - 50$

UNIT 25 FRACTIONS

Multiply Fractions and Mixed Numbers

Exercise A

1. Copy and complete. The first one is done for you.

(a) $\frac{1}{6}$ of $\frac{2}{3}$ $= \frac{1}{6} \times \frac{2}{3} = \frac{2}{18} = \frac{1}{9}$

(b) $\frac{1}{4}$ of $\frac{2}{5}$ (d) $\frac{2}{3}$ of $\frac{5}{6}$ (f) $\frac{3}{10}$ of $\frac{1}{5}$ (h) $\frac{1}{6}$ of $\frac{4}{5}$

(c) $\frac{2}{5}$ of $\frac{5}{7}$ (e) $\frac{3}{5}$ of $\frac{2}{7}$ (g) $\frac{5}{4}$ of $\frac{8}{15}$ (i) $\frac{1}{12}$ of $\frac{4}{5}$

2. Copy and complete. The first one is done for you.

(a) $\frac{2}{3} \times 1\frac{1}{4} = \frac{2}{3} \times \frac{5}{4} = \frac{10}{12} = \frac{5}{6}$

(b) $\frac{1}{4} \times 1\frac{1}{3}$ (e) $\frac{5}{6} \times 3\frac{1}{3}$ (h) $\frac{4}{9} \times 6\frac{1}{3}$

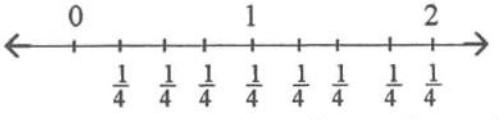
(c) $4\frac{1}{5} \times \frac{7}{15}$ (f) $3\frac{1}{2} \times \frac{3}{7}$ (i) $1\frac{1}{4} \times 1\frac{1}{3}$

(d) $2\frac{1}{3} \times 1\frac{4}{5}$ (g) $1\frac{3}{5} \times 3\frac{1}{2}$ (j) $1\frac{1}{3} \times 2\frac{1}{5}$

> Remember
> To multiply with mixed numerals change them to improper fractions.

Dividing Fractions

How many $\frac{1}{4}$'s are there in 2?



$\frac{1}{4} \div 2 = \frac{1}{4} \times \frac{1}{2} = \frac{1}{8}$

The number line shows that there are 4 quarters in 2.
Here is another way to divide.

$= 4 \div \frac{1}{4} = \frac{4}{1} \times \frac{4}{1} = 16$ quarters

This reads 16 quarters or $\frac{16}{4}$

To divide a fraction or a mixed numeral by a fraction or mixed numeral, multiply by the reciprocal of the numeral

e.g. $\frac{1}{4} \div \frac{1}{2} = \frac{1}{4} \times \frac{2}{1} = \frac{2 \times 1}{4 \times 1} = \frac{2}{4} = \frac{1}{2}$

Exercise B

Copy and complete:

1. $\frac{5}{12} \div \frac{1}{4}$
2. $\frac{7}{9} \div \frac{1}{3}$
3. $\frac{1}{6} \div \frac{3}{10}$
4. $1\frac{2}{5} \div 3\frac{1}{3}$
5. $1\frac{1}{4} \div 6\frac{2}{3}$
6. $\frac{3}{4} \div 1\frac{4}{5}$
7. $\frac{3}{4} \div 1\frac{1}{8}$
8. $\frac{3}{5} \div 2\frac{1}{2}$
9. $\frac{3}{4} \div \frac{1}{4}$
10. $\frac{5}{6} \div 2\frac{1}{2}$

Commutative Principle

Remember

You can change the **order** of the operations - the result is the same.

Here are some examples:

1. Addition - $\frac{2}{5} + \frac{3}{4} = \frac{3}{4} + \frac{2}{5}$
2. Subtraction - $(\frac{3}{4} + \frac{1}{4}) + \frac{1}{5} = \frac{1}{5} + (\frac{3}{4} + \frac{1}{4})$
3. Multiplication - $\frac{1}{4} \times \frac{1}{3} = \frac{1}{3} \times \frac{1}{4}$

Exercise C

1. Find the value of the letters in each case:

   (a) $1\frac{1}{3} + 2\frac{1}{2} = 2\frac{1}{2} + P$

   (b) $A + 3\frac{1}{4} = 1\frac{1}{3} + 3\frac{1}{4}$

   (c) $\frac{1}{3} - \frac{1}{8} = X - \frac{1}{8}$

   (d) $3\frac{1}{2} \div B = 3\frac{1}{2} \div 1\frac{1}{4}$

   (e) $1\frac{1}{5} \times 1\frac{1}{3} = 1\frac{1}{3} \times M$

2. Which of these statements is true?

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

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

(c) $\frac{1}{2} + (\frac{1}{4} + \frac{3}{4}) = \frac{3}{4} + (\frac{1}{2} + \frac{1}{4})$

(d) $\frac{2}{3} \div (\frac{1}{4} + \frac{1}{3}) = \frac{1}{3} \div (\frac{2}{3} + \frac{1}{4})$

(e) $\frac{3}{5} - (\frac{1}{8} + \frac{1}{9}) = \frac{1}{9} - (\frac{3}{5} + \frac{1}{8})$

Exercise D

Copy and complete. One is done for you.

$2\frac{1}{2} \times 1\frac{1}{5} = 1\frac{\cancel{5}^{1}}{\cancel{2}} \times \frac{\cancel{6}^{3}}{\cancel{5}1}$

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

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

(b) $3\frac{1}{5} \times 1\frac{1}{8}$

(c) $2\frac{1}{3} \times \frac{3}{7}$

(d) $5\frac{1}{2} \times \frac{3}{11}$

(e) $\frac{1}{5} \times \frac{2}{3}$

(f) $\frac{8}{9} \times 1\frac{1}{4}$

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

(h) $\frac{3}{4} \times \frac{7}{8}$

LET US LOOK BACK (Units 20 - 25)

1. $7.46 \times 10 =$ _____.

(a) 0.746 (b) 7.460 (c) 74.6 (d) 746 (e) 7460

2. $6.52 \div 100 =$ _____.

(a) 0.0652 (b) 0.652 (c) 6.52 (d) 65.2 (e) 652

3. 0.75 written as a fraction in its lowest terms _____.

(a) $\frac{75}{10}$ (b) $\frac{15}{20}$ (c) $\frac{75}{100}$ (d) $\frac{3}{4}$ (e) $\frac{5}{7}$

4. $2\frac{1}{4}$ written as a decimal is _____.

(a) 2.14 (b) 2.25 (c) 2.41 (d) 22.5 (e) 9.4

5. $3\frac{1}{4} \div 6\frac{1}{2} =$ _____.

(a) $21\frac{1}{8}$ (b) $2\frac{1}{2}$ (c) $2\frac{1}{8}$ (d) $\frac{5}{8}$ (e) $\frac{1}{2}$

6. (a) $1.06 \times 10 =$
(b) $72.4 \times 100 =$
(c) $10 \times 0.1 =$
(d) $100 \times 0.5 =$
(e) $1.67 \times 2.1 =$
(f) $44.4 \times 0.04 =$

7. (a) $15.3 \div 10 =$
(b) $2.01 \div 100 =$
(c) $0.45 \div 5 =$
(d) $0.45 \div 0.5 =$
(e) $3.54 \div 0.3 =$
(f) $14.52 \div 1.2 =$

8. Change to fractions in lowest terms:

(a) 0.75 (b) 0.625 (c) 0.5 (d) 0.35 (e) 0.84

9. Write as decimals
(a) $2\frac{3}{4}$ (b) $\frac{1}{8}$ (c) $3\frac{5}{100}$ (d) $\frac{3}{5}$ (e) $\frac{1}{20}$

10. Find the value of the letters.

(a) $X \times 6 = 24$ $\therefore X =$
(b) $12 \times Y = 108$ $\therefore Y =$
(c) $12 \times 10 \times P = 12 \times 6 \times 10$ $\therefore P =$
(d) $124 = 6 \times R$ $\therefore R =$
(e) $18 \times 5 \times 8 = 5 \times 18 \times S$ $\therefore S =$

11. List the prime numbers between (a) 6 and 20 (b) 24 and 30

12. Copy and complete:

(a) $6 \times 27 \div 3$ (b) $40 - 4 \times 3$ (c) $150 - 26 + 81$ (d) $132 - 6 \times 12$ (e) $12 \times 5 - 3 \times 4$

13. (a) The first five multiples of 8 are _____.
(b) The first five multiples of 7 are _____.

14. (a) $1\frac{5}{4} \times \frac{4}{3}$ (b) $1\frac{2}{7} \times \frac{1}{3}$ (c) $4\frac{3}{4} \times 1\frac{1}{3}$

15. (a) $\frac{5}{10} \div \frac{3}{5}$ (b) $\frac{12}{25} \div 1\frac{1}{6}$ (c) $3\frac{1}{4} \div 1\frac{3}{8}$

3. Write as decimals:

(a)	six tenths	(d)	$\frac{5}{100}$	(g)	$\frac{80}{100}$
(b)	three hundredths	(e)	$\frac{8}{10}$	(h)	$\frac{7}{10}$
(c)	nine hundredths	(f)	$\frac{70}{100}$	(i)	$\frac{98}{100}$

Decimal Tenths; Hundredths; Thousandths

A place value chart can help you read decimals.

Example:

tens	ones	.	tenths	hundredths	thousandths
1	5 0	. .	7 2	9 3	 1

fifteen and seventy-nine hundredths or fifteen point seven nine.
two hundred and thirty-one thousandths or zero point two three one.

In 15.79, the 7 is in the **tenths' place**. Its value is 7 tenths.
The 9 is in the **hundredths' place**. Its value is 9 hundredths.
In 0.231, the 1 is in the **thousandths' place**. Its value is 1 thousandth.

What do you notice about decimal tenths, hundredths and thousandths?

1 digit after the decimal point means tenths.
2 digits after the decimal point means hundredths.
3 digits after the decimal point means thousandths.

Let us write the numerals, from the chart, in expanded form and as fractions.

$15.79 = 10 + 5 + \frac{7}{10} + \frac{9}{100}$ Use equivalent fractions with denominators 100.

$= 10 + 5 + \frac{70}{100} + \frac{9}{100} = 15\frac{79}{100}$

$0.231 = \frac{2}{10} + \frac{3}{100} + \frac{1}{1000}$

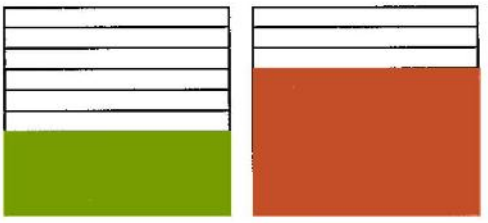
Use equivalent fractions with denominators 1000

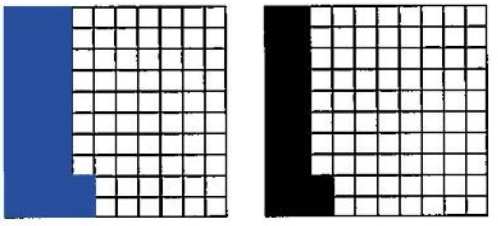
$\frac{200}{1000} + \frac{30}{1000} + \frac{1}{1000}$

$\frac{231}{1000}$

Comparing Decimals

Look at these:

(a) 

(b) 

Which shaded part is greater in each pair?
Write decimals for the shaded parts.

We find that:
(a) 0.4 < 0.7 (b) 0.32 > 0.22

We write zeros to help us compare decimals.
To compare 0.6 and 0.16
We rewrite 0.6 as an equal decimal hundredths 0.60
We find that 0.60 > 0.16
We reason also that from the digits in the tenths place 0.6 and 0.1

$\frac{6}{10} > \frac{1}{10}$ so 0.6 > 0.16

Let us try another way:
To compare 5.23 and 5.321
We rewrite 5.23 as 5.230
We examine .230 and .321
We find that .230 < .321
So 5.230 < 5.321

Again the digits in the tenths' place tell that $\frac{2}{10} < \frac{3}{10}$
Notice that the digits in the ones' place are the same. For example, 5.

Exercise D

1. Write > or <

(a)	12.2 □ 1.22	(e)	3.16 □ 1.99
(b)	0.48 □ 0.91	(f)	0.5 □ 0.3
(c)	1.352 □ 1.351	(g)	5.213 □ 3.512
(d)	0.412 □ 2.42	(h)	3.41 □ 3.3

2. Order quantities in the problems from greatest to least:

(a) In a week, a mini bus made trips of:
15.10 km; 15.11 km; 12.7 and 12.17 km

Let us try this method for (a) and (b) on previous page.

$\frac{3}{5}$ is the same as $3 \div 5$

$\frac{3}{5}$ as a decimal $= 0.6$

$$5\overline{)3.0}\quad 0.6,\ 30,\ 00$$

$\frac{4}{10}$ is the same as $4 \div 10$

$\frac{4}{10}$ as a decimal $= 0.4$

$$10\overline{)4.0}\quad 0.4,\ 40,\ 00$$

To write a fraction as a decimal,
divide the numerator by the denominator.

Exercise E

1. Write these fractions as decimals:

(a) $\frac{7}{8}$ (c) $\frac{6}{40}$ (e) $\frac{3}{8}$ (g) $\frac{12}{50}$

(b) $\frac{3}{12}$ (d) $\frac{15}{20}$ (f) $\frac{4}{25}$ (h) $\frac{9}{12}$

2. Copy and complete:

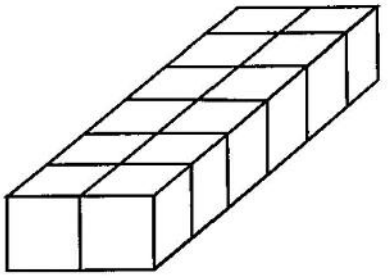
Fraction	Decimal
$\frac{1}{4}$	----
----	0.75
$\frac{2}{5}$	----
----	0.5
$\frac{3}{8}$	----
----	.25

3. Write these decimals as fractions in their lowest terms.

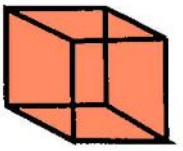
(a) 8.3 (b) 16.05 (c) 12.55 (d) 5.07 (e) 10.32 (f) 9.019

UNIT 27 - MEASUREMENT

Volume is the amount of space occupied by a solid.
Look at this shape. It is divided into unit cubes.
The number of cubes tells the volume.
Count the cubes to find the volume.
What is the volume?
The volume is 12 unit cubes.

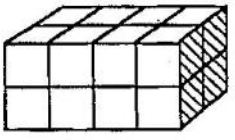


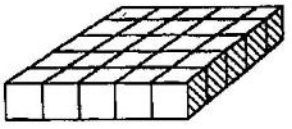
Now if the dimensions of each cube are 1 cm by 1 cm by 1 cm our answer would be 12 cm^3.

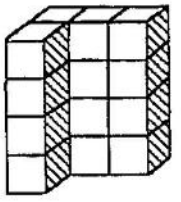


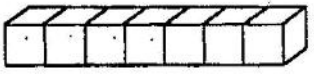
Exercise A

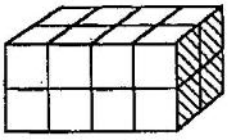
Find the volume of each shape by counting the cubes. Each cube is 1 cm by 1 cm by 1 cm. Write your answer in cm^3.







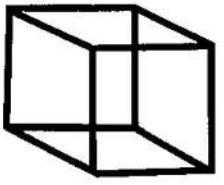


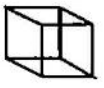


Finding the Volume

(a) Take a chalkbox.

Fill it neatly with match boxes.
How many match boxes did you get?
If one match box is 3 cm by 5 cm by 1 cm.
Can you find the volume of the match box?
3 cm × 5 cm × 1 cm = 15 cm^3
If there are 20 match boxes then the volume of the chalkbox = 20 × 15 = 300 cm^3





(b) Find the volume of water in a bucket if 1 litre = 1000 cm^3.
You need 2 buckets of the same size, one empty and one filled with water, and a litre measure.

How many litres did you get?

REVIEW

1. Find the volume of a box 10 cm long, 6 cm wide and 4 cm high.

2. Find the volume of a rectangular block 3 metres long, 2 metres wide and 1 metre high.

3. A tank 60 cm long, 40 cm wide and 50 cm high is filled with water. How many litres of water does it hold if 1000 cm^3 = 1 litre?

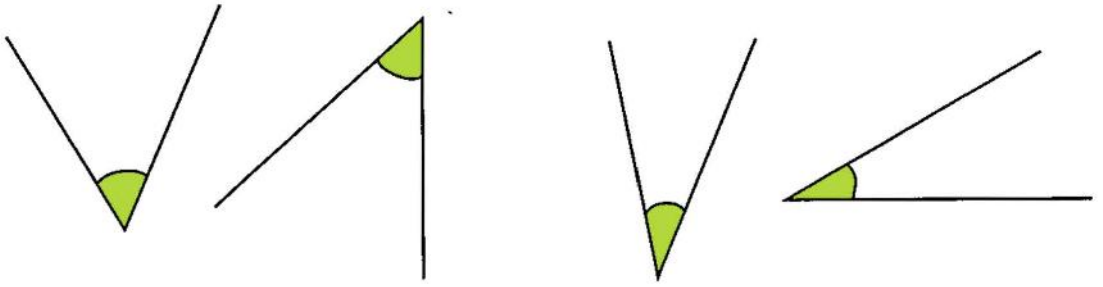
4. 1 litre = 1000 cm^3. Find the volume of a tank which holds 40 litres.

5. How many cubes of edge 3 mm will be needed to make a larger cube of edge 9 mm?

6. Copy and complete:

	Length	Width	Heigth	Volume
1.	3 cm	--	1 cm	6 cm^3
2.	--	5 cm	2 cm	40 cm^3
3.	6 cm	3 cm	4 cm	--
4.	--	2 m	1 m	8 cm^3
5.	5 m	3 m	--	30 cm^3

What type of angles are shown below?



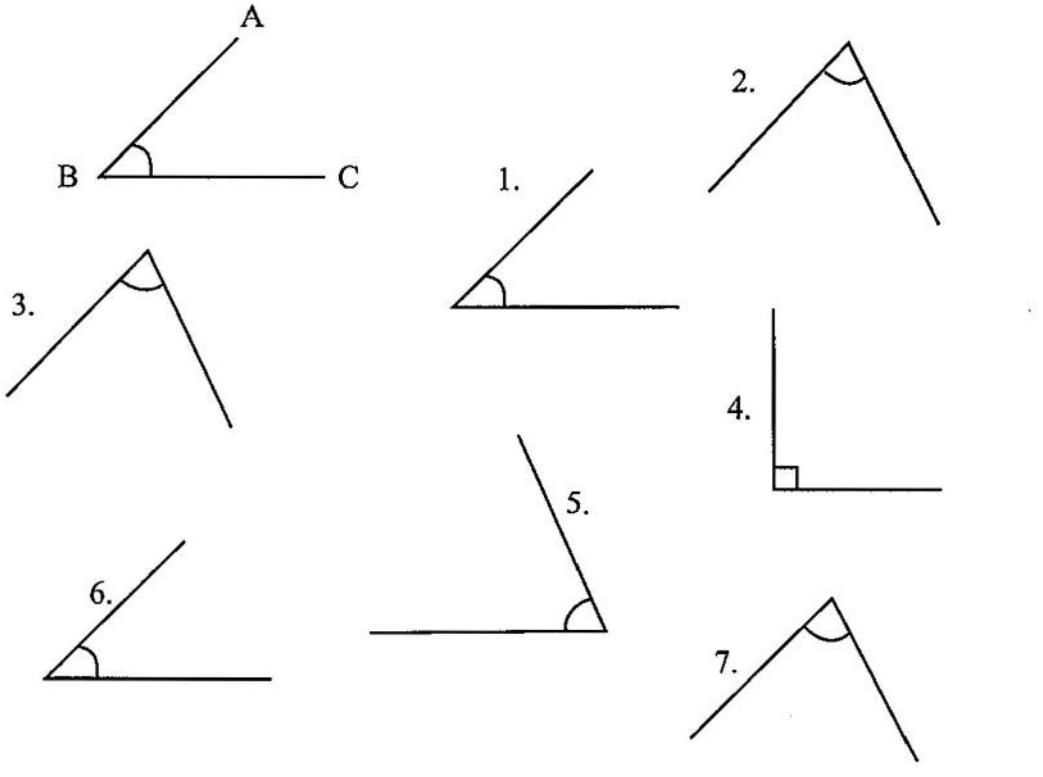
Use different ways to compare the size of the angles.

When angles are the same size we say they are congruent.

Exercise B

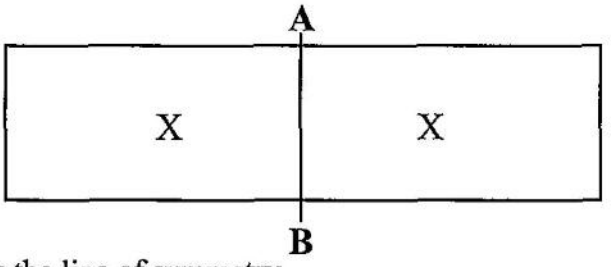
Use your cardboard instrument to compare the angles below or trace angle ABC on thin paper.

Find out all the angles that are congruent to angle ABC.



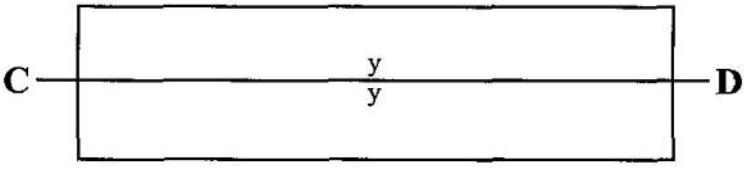
Symmetry

When a figure is separated into two matching parts we say the figure is symmetrical. The line that separates the figure is called the **line of symmetry.**



In the figure above, AB is the line of symmetry.
The balanced parts are marked with X's
The two parts are always congruent.

Sometimes there are more than one line of symmetry.

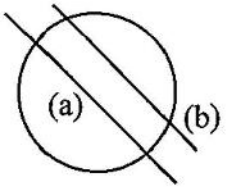


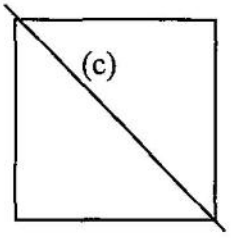
In the same figure we see that, CD is another line of symmetry. The balanced parts are marked Y's. Remember the balanced parts are always congruent.

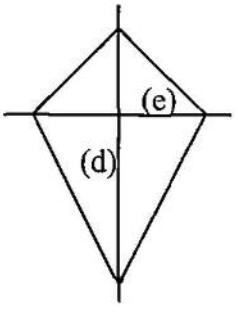
In the figure we used there are two lines of symmetry.
Use tracing paper to check the congruency of the parts.

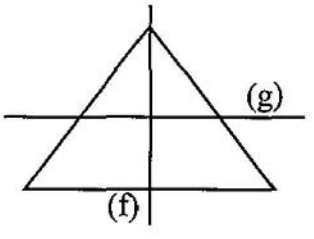
Exercise E

Which is a line of symmetry for each figure below.







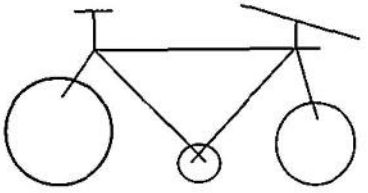


Perpendicular, Intersecting and Parallel Lines

If you look around you some lines meet.

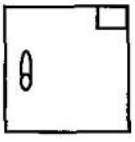
the roof of a house

part of a door



the bars or a bicycle frame

Some lines meet at 90°

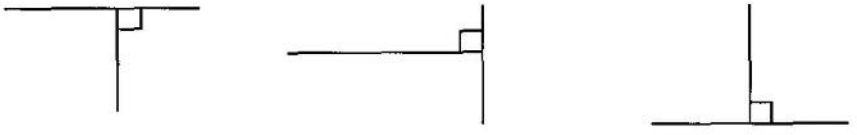


The top edge of the door and one side make 90°.

The desk foot and the top make 90°.

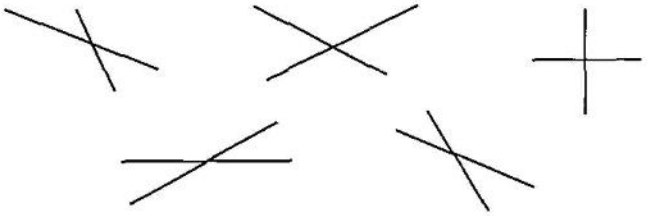
> Lines that meet at 90° are perpendicular lines.

Here are some perpendicular lines:

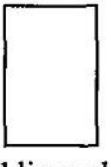


Name other perpendicular lines around you.

Some lines meet and cross each other. We say that these lines intersect.
These lines intersect at different angles.



Some lines never meet no matter how far they are drawn. Such lines are called parallel lines.



Example: the two sides of the door are parallel,
the top and bottom are also parallel.

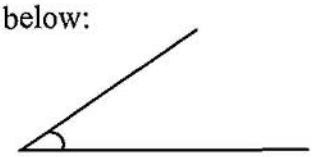
Parallel lines always run in the same direction.

Exercise H

Say which of these angles are acute, obtuse, right or straight.

(1) 180°	(2) 75°	(3) 96°	(4) 90°	(5) 36°
(6) 25°	(7) 98°	(8) 120°	(9) 179°	(10) 3°

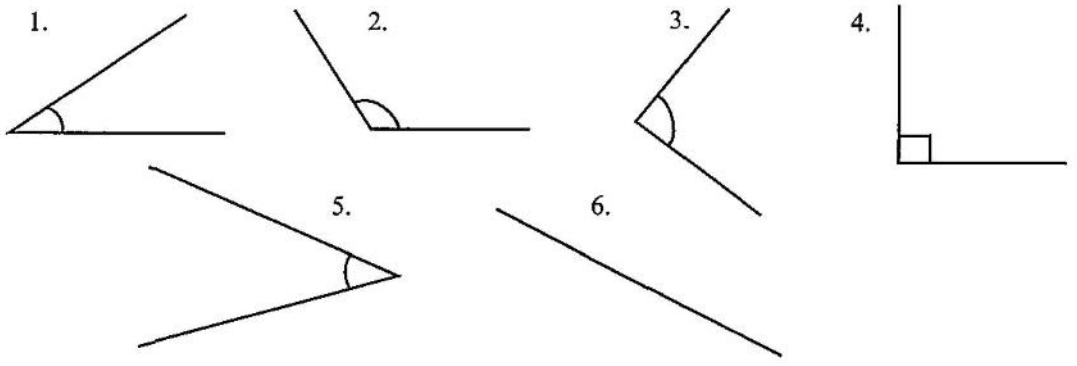
Look at the angle below:



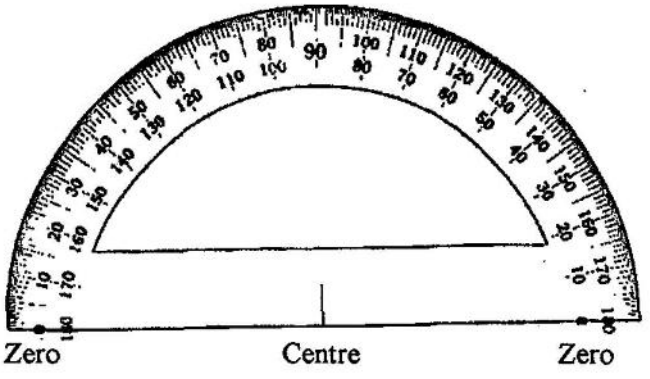
Can you estimate its size?
It is about half of a right angle (90°)
So it is about 45°

Exercise 1

Estimate the size of each angle below then compare your answers with those of your friends.

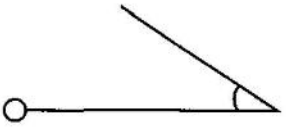


To measure angles accurately, we use an instrument called a protractor with the degrees marked on it. Most protractors show a half circle and the degrees are marked from the left side and from the right. This makes it easier to use.



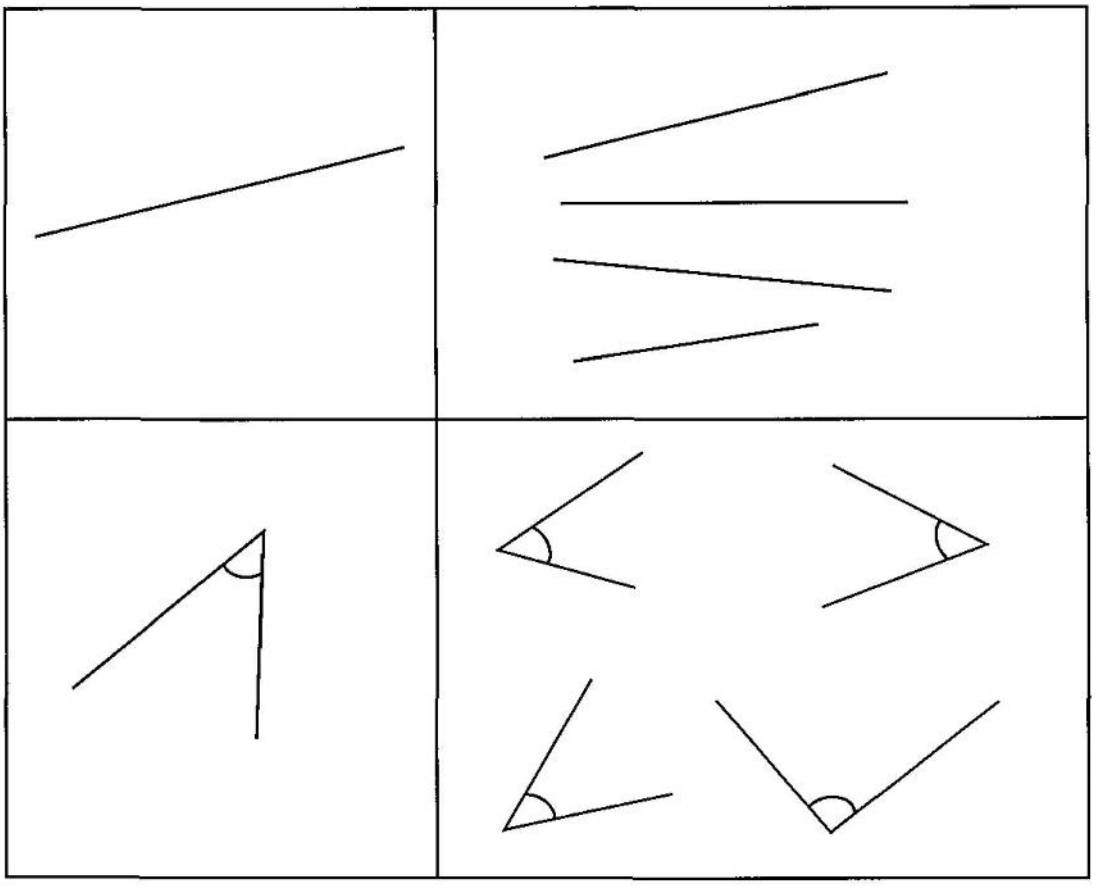
If the angle is on the left side.
We start to count from the zero on the left.

If the angle is on the right side.
We count from the zero on the right.



REVIEW

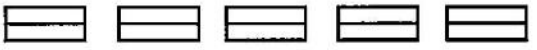
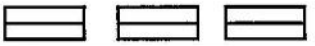
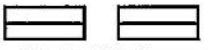
Which diagram on the right is congruent to the diagram on the left?



(c) Which level has the least number of children?
(d) Which level has twice the number of children as level 6?

2. Study this pictograph. Each  stands for 50 km.

PEACE LORD'S MINI-BUS

DAY	KILOMETERS DRIVEN
Friday	
Saturday	
Sunday	
Monday	
Tuesday	

(a) How many km did the mini bus travel on Sunday?
(b) On which day did the mini bus travel the longest distance?
(c) On which day did it travel 150 km?
(d) On which day did it travel 500 km altogether?
(e) On which day did the mini bus travel the least? Can you say why?

3. Bob counted the cars, buses and trucks he saw. He made a chart.

Kind of vehicle	Number
Cars	45
Buses	10
Trucks	25

Copy and complete this pictograph Bob started. He let  stand for 5 vehicles.

Vehicles Bob Saw

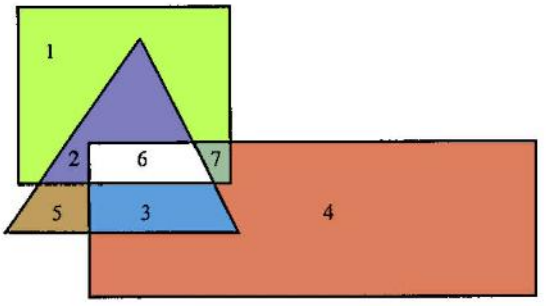
Kind of Vehicle	Number of vehicles
Cars	
Buses	
Trucks	

(b) How many people subscribe to the Rock Magazine?
(c) Which magazine has the least subscribers?
(d) Which magazine has the most subscribers?
(e) What is the total number of people who subscribe to these magazines?
(f) What is the average number of subscribers?

Exercise B

Venn Diagrams

1. The diagram below is made up of three plane shapes - a square, a triangle and a rectangle.



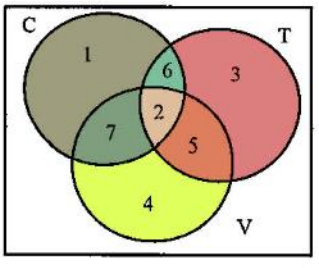
Study the diagram carefully, then answer these questions.

(a) Which number is in the square only?
(b) Which number is in the triangle only?
(c) Which number is in the rectangle only?
(d) Which number is in the square and rectangle only?
(e) Which numbers are in the triangle and rectangle only?
(f) Which number is in the square and rectangle only?
(g) Which number is in all the shapes?

2. Study the information below.

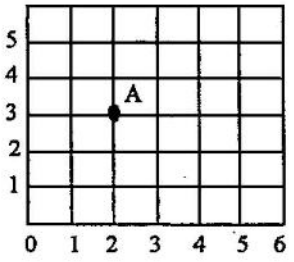
In a class of 28 boys, 1 plays cricket only, 3 play tennis only and 4 play volley ball only, 7 play cricket and volley ball only, 5 play volleyball and tennis only, 6 play cricket and tennis only.

Two boys play all three games.
We can put this information on a Venn diagram:



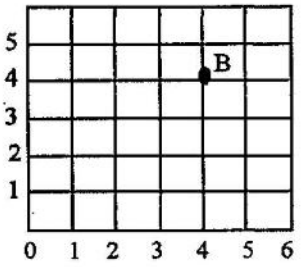
Cricket = C
Tennis = T
Volleyball = V

(c)



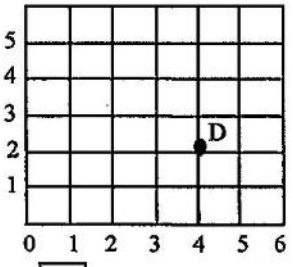
2 to the right, up ☐

(d)



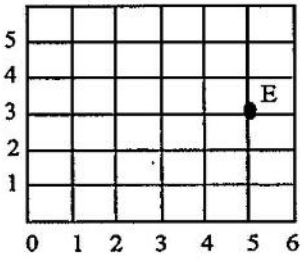
4 to the right, up ☐

(e)



☐ to the right, up 2

(f)



☐ to the right, up 3

(i) To locate the points in each one of these you have to follow the directions along the horizontal line then up the vertical line.

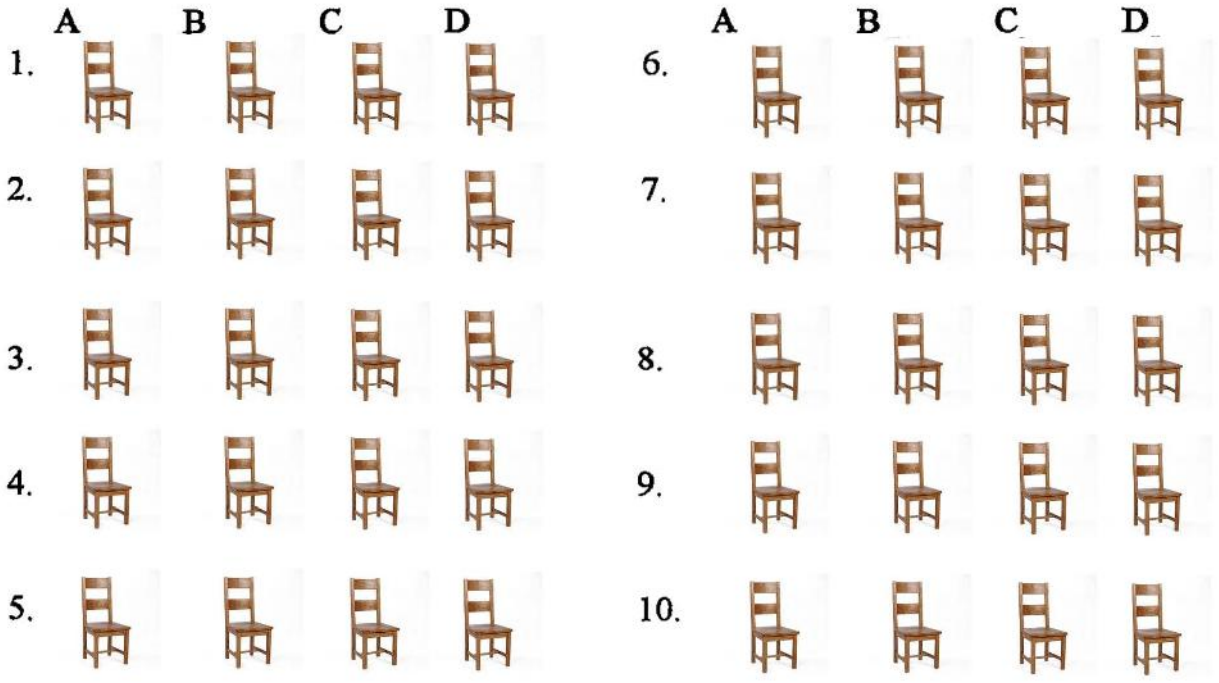
(ii) The numbers used form an **ordered pair.** They are the coordinates of the point For example: 4, 2 are coordinates of D.

> The first coordinate is always the horizontal coordinate.
> The second coordinate is always the vertical coordinate.

Let us look again at Exercise B and make a chart using the coordinates and points.

Point	Ordered pair (coordinates)
P	(3, 1)
F	(4, 3)
A	(2, 3)
B	(4, 4)
D	(4, 4)
E	(5, 3)

3. Here is a concert hall with numbers and letters used for finding your seat. Study it carefully.

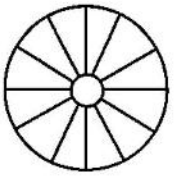


Ken has a ticket marked 3D. Can you find Ken's seat?

Now draw the concert hall in your books and then shade the seats of each of these children:

Bill - 2C, Tom - 4D, Ali - 2D, Ram - 7C, Sue - 4B,
Joe - 3A, Ted - 9A, Darin - 3C, Naz - 2B, Kim - 10D

How many diameters are shown in this wheel?

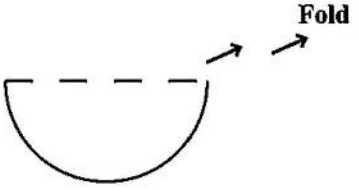


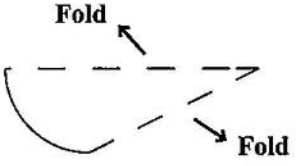
Diameters must pass through centre.

Use your template, cut out circles and fold to show diameter in different positions.

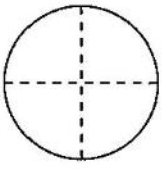
The Radius

Cut out a circle. Fold in half.



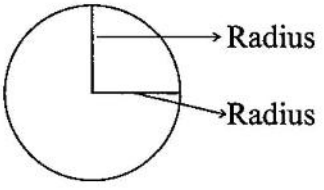


Fold in quarters.

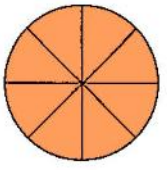


Open your fold.

The point where the folded lines meet is the centre of the circle.
The line from the centre to the circumference is the radius.
More than one are called radii.

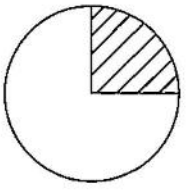


Count and number the radii in this circle.



Sector and Chord

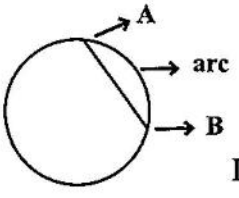
Use a cut-out circle. Fold to show a radius.
Shade the part between the radii.



→ **sector**

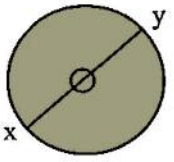
1. A sector is a part of a circle between two radii.

2. An arc is a part of the circumference of a circle.

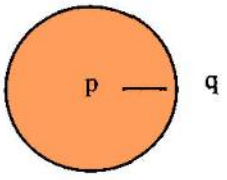


Line AB is an Arc.

7. Line xy is called the _____ of the circle.

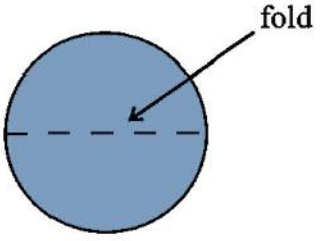


8. PQ is the _____ of the circle.



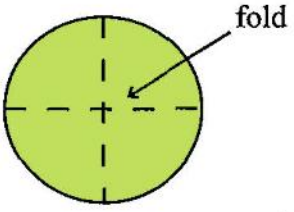
Radius and Diameter

Use your template. Cut out two circles.



Fold to show: Diameter

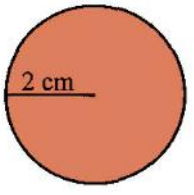
Radius



What can you say about a radius and a diameter?

> Remember
> A radius is drawn from the centre
> and a diameter passes through the centre.

If the radius of this circle is 2 cm. What will be the length of the diameter?



So we can say the radius of a circle is half of a diameter
or one diameter = 2 radii.

LET US LOOK BACK (Units 26 - 30)

1. (a) Write as decimals:

   (i) three hundredths (ii) seven tenths (iii) 105 thousandths

   (b) Write in order of size, largest first:

   (i) 0.55; 5.05; 0.505; 5.55; 5.555
   (ii) 0.11; 1.101; 11.01; 10.11; 1.011

   (c) Write each one putting a decimal point to show that the value of the 5 is five hundredths - (i) 3450 (ii) 205 (iii) 6905 (iv) 15 (v) 785

2. (a) Write these fractions as decimals:

   $\frac{7}{8}$ $\frac{3}{20}$ $5\frac{2}{5}$ $3\frac{1}{4}$ $\frac{7}{25}$ $\frac{3}{50}$

   (b) Write these decimals as fractions:
   .075 4.6 16.12 .375 0.09

3. Find the volume of these cuboids:

	Length	Breadth	Height
(a)	7 cm	6 cm	5 cm
(b)	18 mm	15 mm	40 mm
(c)	30 cm	12 cm	8 cm

4. (a) The inside measurements of a tank are 35 cm long, 20 cm wide and 15 cm deep. Find the volume of the tank.
   (b) If 1000 cm^3 is equal to 1 litre, how many litres of water will the tank hold?

5. (a) Draw 2 line segments AB and CD so that they intersect at point E.
   (b) Draw a pair of (i) parallel lines (ii) perpendicular lines.

6. 

   (a) Is the measure of angle Y the same as the measure of angle Z?
   (b) Does the length of the drawing change the measure of the angle?

7. (a) The distance around a circle is the _____.
   (b) Write the radius if the diameter of a circle is 8 mm.
   (c) The radius of a circle is 10 mm. What is the diameter?

10. Use the symbols $>$, $<$ or $=$ to compare these decimals.

(a) 0.803 ☐ 0.809

(b) 18.4 ☐ 1.8

(c) 3.854 ☐ 3.854

(d) 6.40 ☐ 60.4

(e) 0.1 ☐ 0.01

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