Mathematics Class 5

Term 3

Teacher's Guide

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

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CONTENTS

UNIT 23: GRAPHS

Lesson 1: Collecting and Organising Information into a Data Table

Outcome

Collect and organise information into a data table.
Recording information using a tally.

Teaching Aids

A data table on a chart (as an example), charts, rulers (group work)

Teaching for Understanding

Let the children sit together in front. Put up the chart with the data table for them to see.
Explain how to collect and organise the information in this data table.

Example: Collect children's favourite pets and record as shown below.

Favourite Pets	Tally	Frequency
Dog	~~||||~~ ~~||||~~ ||	12
Cat	~~||||~~ |||	8
Pig	||||	4
Fowl	~~||||~~ ~~||||~~ ||||	14

Group Work

Divide the children into two groups. Let them record information in a table following your example above. Collect and organise information in a data table on

Group 1: Favourite games.
Group 2: Favourite food.

Make their tables on charts. Display to each other's group. Keep the tables for use in Lesson 2.

Individual Application

Fill in the correct information to complete this data table.

Children's Transport to School	Tally	Frequency
On Foot	𝍸 𝍸 𝍸 |	
Bicycle		13
Motorbike		9
Truck	𝍸 𝍸 𝍸	
Bus	𝍸 𝍸 𝍸 𝍸 ||	
Saloon car		7

Additional Exercise

Make your own data table. Collect and organise information on the months in which class members were born.

Lesson 2: Interpreting Information from a Data Table

Outcome

Interpret information from a data table.

Teaching Aids

Use data tables done in Lesson 1.

Teaching for Understanding

Make sure the children sit in front, where they can see everything you do. Put up the data table made in teacher's example (in Lesson 1) on the children's favourite pets.
Discuss the table, then put up questions that will make the children interpret information from this table. The class will answer orally from the table.

eg: i) How many kinds of pets are shown in the table? **(4)**
ii) Show the number of children who favoured each pet. **(dog -12, cat - 8, pig - 4, fowl - 14)**
iii) Which pet is favoured the most? **(Fowl)**
iv) Which pet is the least favoured? **(Pig)**
v) How many children are there in the class altogether? **(38)**
vi) What number do these strokes (卌) in the tally stand for? **(5)**

Group Work

Divide the children into two groups (as in Lesson 1). Using their own data table (in Lesson 1), make up their own questions about it. Each group has to write its own questions under the data table (on chart). Exchange their work for the other group to contribute the answers.

Display in the classroom for later reference.

Individual Application

Answer the questions, using the table below.

Children' s Transport to School	Tally	Frequency
Foot	𝍸 𝍸 𝍸 𝍷	16
Bicycle	𝍸 𝍸 𝍷𝍷𝍷	13
Motorbike	𝍸 𝍷𝍷𝍷𝍷	9
Truck	𝍸 𝍸 𝍸	15
Bus	𝍸 𝍸 𝍸 𝍸	20
Saloon Car	𝍸 𝍷𝍷	7

1. What information does this table classify?
   (the children's transport to school)
2. How many kinds of transport does the table show? **(6)**
3. Name the kind of transport that occurs most often. **(Bus)**
4. Which kind of transport is the slowest? **(Foot)**
5. What kind of transport that occurs the least often? **(saloon car)**
6. How many children are there altogether? **(80)**
7. How many more children go by bus than on foot? **(4)**

Additional Exercise

Make a data table from the information given below:

In a bag there are 5 red marbles, 7 blue marbles, 11 yellow marbles, 9 green marbles and 13 white marbles. How can you make your table?

Colours of Marbles	Tally	Frequency
Red	𝍸	5
Blue	𝍸 𝍷𝍷	7
Yellow	𝍸 𝍸 𝍷	11
Green	𝍸 𝍷𝍷𝍷𝍷	9
White	𝍸 𝍸 𝍷𝍷𝍷	13

Lesson 3: Constructing and Interpreting a Bar/Column Graph

Outcome

Construct and interpret a bar or column graph.
Bar and column graphs are the same.

Teaching Aids

Charts with graphs already prepared on, for example, colours (horizontal, vertical).
Charts, rulers, pencils (for group work/activity)
Data tables from Lesson 1and 2

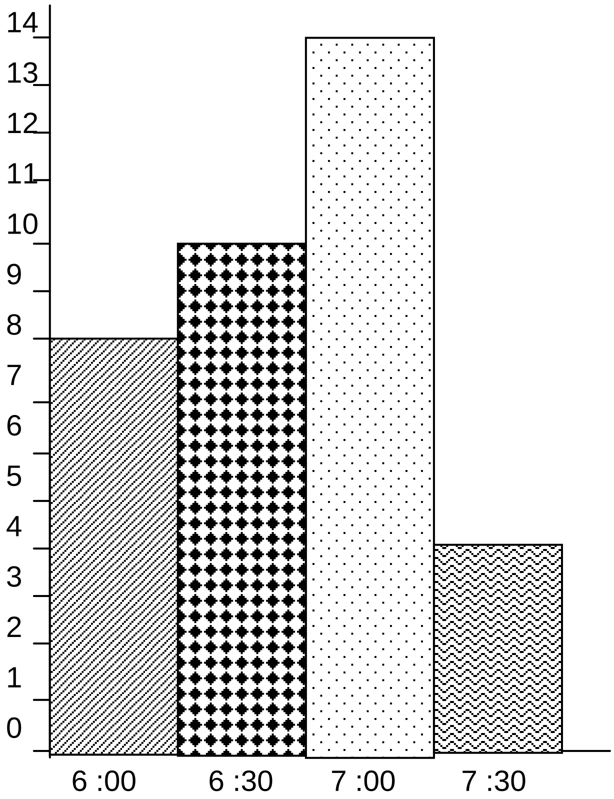
Teaching for Understanding

Have the children seated in front. Put up the examples of bar/column graphs (prepared on the charts) for the children to see. Tell them that the bar graph is the same as the column graph and can present information either vertically or horizontally. It has two axes (x, y) and it should have a title. Point these out on the charts

eg. Construct a bar/column graph from this table.

Time Children Eat Dinner	Tally	Frequency
6 :00	卌 |||	8
6 :30	卌 卌	10
7 :00	卌 卌 ||||	14
7 :30	||||	4

Time Childen Eat Dinner



Answer these questions from the graph.

1. How many children eat dinner at 6:00? **(8)**
2. How many children eat at 7:30?**(4)**
3. How many children are there altogether? **(36)**
4. At what time do most of the children eat their dinner? **(7.00)**
5. Which column represents the most number of children? **(7.00)**

Group Work

Divide the children into two groups as in Lesson 1 and 2. Use the data table from Lessons 1 and 2 to construct a bar/column graph on a chart as shown in your example. They have to make up some questions about their graphs. Each group member then has to calculate answers for the questions. Display and hang up their graphs along with their data tables.

Individual Application

1. Construct a bar/column graph from this data table.

Children's Age	Tally	Frequency
Ten	卌 卌 ǀǀ	12
Eleven	卌 ǀǀǀǀ	9
Twelve	卌 ǀ	6

2. Use your graph to answer these questions.

a) How old is the biggest group of children? **(Ten)**
b) How many more children are aged 10 years than 12 years? **(6)**
c) What age are the oldest children? **(12 years)**
d) How many children are shown in the graph? **(27)**

Additional Exercise

Construct a horizontal bar/column graph from this data table and then make up three questions about your graph.

Favourite Colour	Tally	Frequency
Blue	ǀǀǀǀ	4
Red	卌 ǀ	6
Yellow	卌 ǀǀǀ	8

Lesson 4: Constructing a Scaled Picture Graph or Pictograph

Outcome

Construct a scaled picture graph.

Teaching Aids

An example of a picture graph prepared on a chart, data tables
Charts, rulers, pencils and colours
Glue (if really needed)
Pair of scissors (for children's activity)

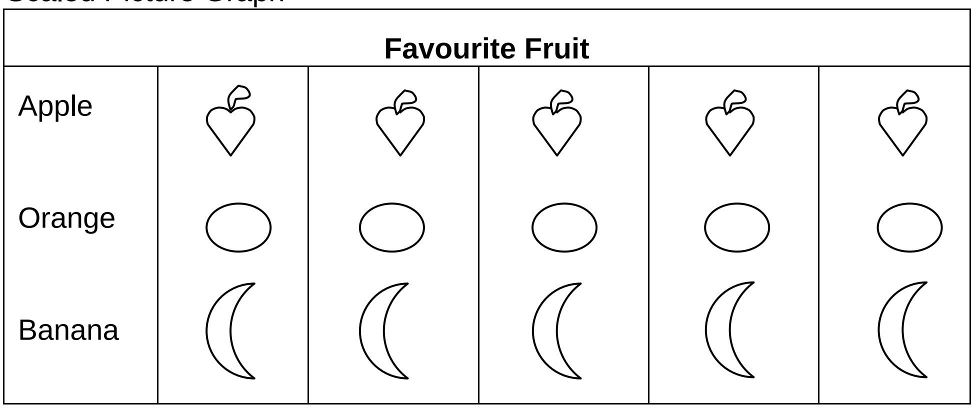
Teaching for Understanding

Have the children seated in front. Put up a data table and a picture graph based on the table for the children to see. Discuss with them how to make a picture graph.

eg:

Favourite Fruit	Tally	Frequency
Apple	𝍸	5
Orange	𝍷	1
Banana	𝍷𝍷𝍷	3

Scaled Picture Graph



Colour the pictures.

Group Work

Divide the children into two groups or more if it is a big class.
Give each group a data table from which to construct their own scaled picture graph:

eg:
1. Transport to school
2. Favourite pets
3. Classroom furniture

Group 1:

Transport to School	Tally	Frequency
Bus	卌 ||	7
Walk	卌 ||||	9
Bike	||||	4
Motorbike	||	2

Group 2:

Favourite Pets	Tally	Frequency
Dog		8
Cat	卌 |||	6
Pig	卌 |	3
	|||	

Group 3:

Classroom Furniture	Tally	Frequency
Table	||||	4
Chair	||	2
Desk	卌 |||	8

Display to other group, then hang for later use.

Individual Application

Construct your own scaled picture graph from this data table and write three questions about it.

Dog's Lunch	Tally	Frequency
Fish	||||	4
Coconut	||	2

Additional Exercise

Construct your scaled picture graph from the information below:

There are 5 mackerel tins, 3 bottles, 4 battery boxes and 2 bottle lids in a big box.

Lesson 5: Assessment

Group Work

Divide the children into two groups. Let each group make a data table about the time they go to bed.
Collect the data and record it on a chart.

Individual Application

1. Fill in the correct information to complete this data table

Favourite Game	**Tally**	**Frequency**
Football	**(**𝍸 𝍸 𝍷𝍷𝍷𝍷**)**	14
Volleyball	**(**𝍸 𝍷𝍷𝍷**)**	8
Basketball	𝍸 𝍸 𝍸 𝍷	**16**
Table Tennis	𝍸 𝍸 𝍷𝍷𝍷	**13**
Tennis	**(**𝍸 𝍷𝍷𝍷𝍷**)**	9

2. Answer these questions from the table in No. 1.

a) How many children preferred football? **(14)**
b) Which game is the least popular? **(volleyball)**
c) Name the games in the table that are enjoyed by the children.
(football, volleyball, basketball, table tennis, tennis)
d) How many more children favoured basketball than table tennis? **(3)**
e) Find the difference between the most favoured game and the least favoured game. **(8)**

3. Construct a horizontal bar/column graph from this data table.

Our Writing Hand	**Tally**	**Frequency**
Right hand	𝍸 𝍷𝍷𝍷	8
Left hand	𝍷𝍷𝍷𝍷	4

4. Construct a scaled picture graph from this data table.

Home Pets	**Tally**	**Frequency**
Dog	| |	2
Pig	| | | |	4
Cat	|	1
Fowl	| | |	3

UNIT 24: SYMMETRY

Lesson 1: Lines of Symmetry

Outcome

Identify the lines of symmetry of shapes by paper folding.

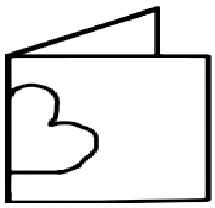
Teaching Aids

Sheet of paper, pair of scissors.

Teaching for Understanding

In our earlier work on symmetry, we saw that a line of symmetry (or an axis of symmetry) divides a figure or shape into two identical or congruent parts. Demonstrate how to form lines of symmetry by paper folding.

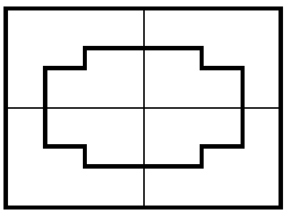
Fold a sheet of paper. Draw any shape as shown below. Cut out the shape and then open out the paper.



Ask, Is the fold a line of symmetry?

Group Work

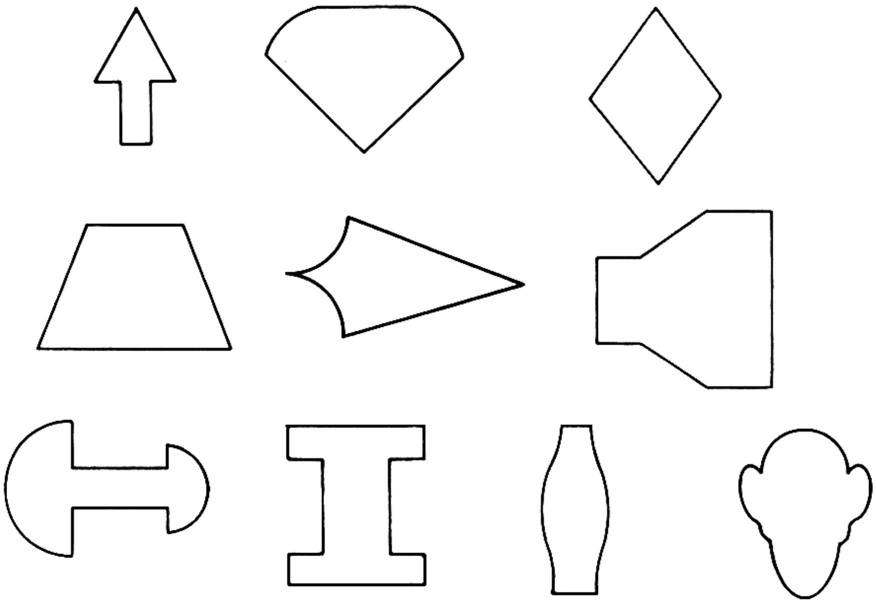
In groups of six, children fold a sheet of paper, then fold it in half again the other way. They draw any shape as demonstrated above, making sure that the edge of the shape they draw is against the last fold. They cut out the shape, being careful not to cut along the fold, and then open out the paper. It should look like this.



How many lines of symmetry does the opened-out shape have?

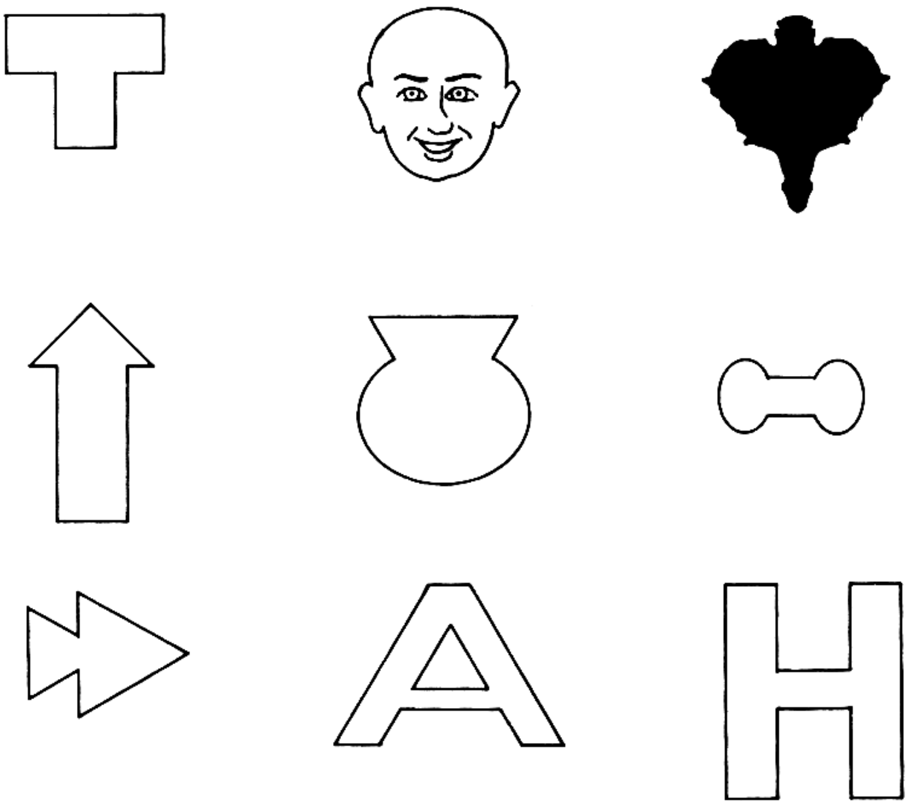
Individual Application

Trace these figures and draw the lines of symmetry (notice that some have more than one).



Additional Exercise

Copy these shapes into your books and draw the lines of symmetry with a dotted line.



Lesson 2: Rotational Symmetry

Outcome

Identify point and rotational symmetry.
Define rotational symmetry.

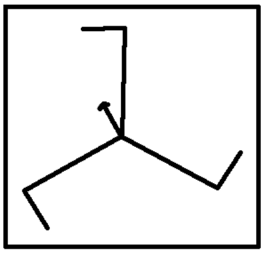
Teaching Aids

Plain paper, tracing paper, sharp pencil.

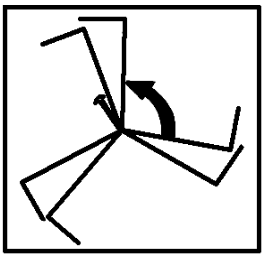
Teaching for Understanding

Explain to the children that rotational symmetry is the kind of symmetry where a shape will fit onto itself after it has been turned, or rotated, about a point. For example, a tracing of the design on the front cover will fit onto the original figure after it is turned through one-third of a circle about the centre of the design.

Push pin through centre.



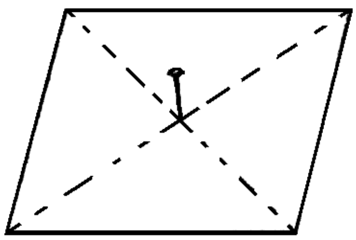
Tracing of design



Tracing fits over original design after one-third of a turn.

The design itself can be turned three times so that it fits onto itself; it has a rotational symmetry order of 3.

This shape



can be turned twice to fit onto itself; it has rotational symmetry order of 2.

(An understanding of line symmetry and rotational symmetry is important because the geometry the pupils will do later in their schooling is based on these ideas.)

Group Work

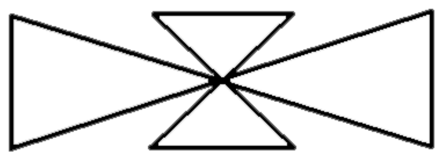
Put children into groups of six.
They draw an equilateral triangle on a piece of plain paper.
They trace the shape and cut it out with a pair of scissors.
They mark one corner of the cut-out triangle and push a pen through the centre of the triangle.
They put it on top of the triangle drawn on the plain paper and rotate it.
Then they count how many times the cut-out triangle has fitted onto the triangle on the paper by the time it has returned to its original position, that is, rotated through 360^{o}.
They record their answers.
Each group presents its findings.

Individual Application

Complete the table.

Shapes	**Number of Axes of Symmetry**	**Order of Rotational Symmetry**
Square		
Rectangle		
Parallelogram		
Isosceles Triangle		
Equilateral Triangle		
Regular Pentagon		

Additional Exercise



1. How many axes of symmetry has the shape above?
2. What is the order of rotational symmetry of this shape?

Lesson 3: Lines of Symmetry in Regular Polygons

Outcome

Identify lines of symmetry in regular polygons.
Identify regular polygons.

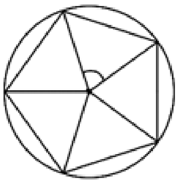
Teaching Aids

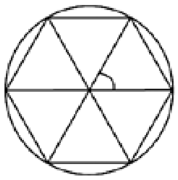
Cut-out regular polygons (equilateral triangle, square, pentagon)

Teaching for Understanding

Who can explain or show by drawing what is meant by lines of symmetry? What is another word for a line of symmetry? (axis of symmetry). In the last two lessons we discovered lines of symmetry for some shapes by folding and cutting or drawing axes. Today, we will discover lines of symmetry in regular shapes. Show some regular shapes and explain what regular means to the children.

Fold the shapes so that one matches exactly on top of the other. Record the answers on the blackboard. A regular polygon is a polygon which has all its sides of equal length and all its sides angles equal. The simplest examples are an equilateral triangle and a square. Then demonstrate how to draw regular polygons inside a circle such as these.





Group Work

Put children into groups of six .
Provide each group with a sheet of paper, a pair of scissors and a protractor.
Draw these polygons inside a circle as demonstrated above:

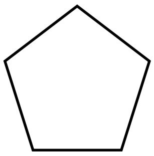
1. a regular pentagon 2. a regular hexagon 3. a regular octagon

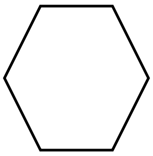
Cut out the regular shapes.
Fold to find the lines of symmetry.
A reporter to present findings to the class.

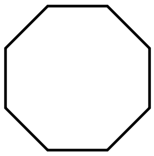
Individual Application

Copy these shapes into your book and draw their axes of symmetry.

1. a regular pentagon 2. a regular hexagon 3. a regular octagon







Additional Exercise

Draw any three regular polygons and mark their lines of symmetry with dotted lines.

Lesson 4: Lines of Symmetry in Irregular Polygons

Outcome

Identify lines of symmetry in irregular polygons.
Identify irregular polygons.

Teaching Aids

Cut out irregular polygons.

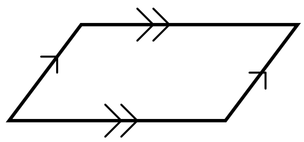
Teaching for Understanding

What did you do in your Maths lesson yesterday? (Found the lines of symmetry in regular polygons).

Good! Today we will look at lines of symmetry in irregular polygons. Can anybody tell us what an irregular polygon is? (A polygon having angles or sides of different sizes). The simplest examples are rectangle, parallelogram, isosceles triangle and scalene triangle. Pick up a irregular pentagon and invite a child to fold it to find lines of symmetry. Do you find a line of symmetry? Why? (The sides and angles are not equal).

Group Work

Put children into group of six .
Each group traces this parallelogram and cuts out the figure.

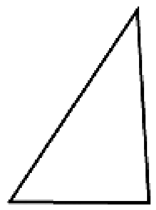


By folding, try to find an axis of symmetry.
Groups present their findings.

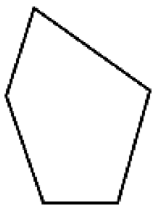
Individual Application

Mark the lines of symmetry with dotted lines for these figures.

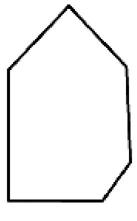
Irregular Triangle



Irregular Pentagon



Irregular Hexagon



Additional Exercise

Draw any two irregular polygons and mark their lines of symmetry with dotted lines.

Lesson 5: Assessment

Group Work

Put children in groups of six.
Fold a sheet of paper, then fold in half again. Draw any shape (make sure the shape you draw is against the last fold).
Cut out the shape and then open the paper.
How many lines of symmetry does the opened out shape have?

Individual Application

How many lines and orders of rotational symmetry has each of these figures?

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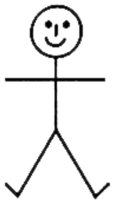

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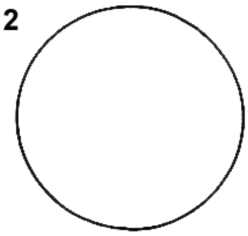

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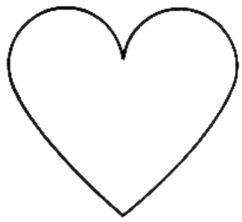

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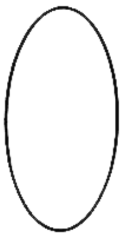

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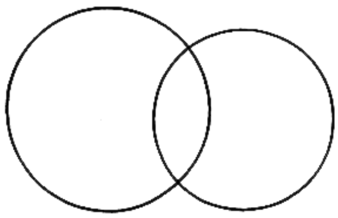

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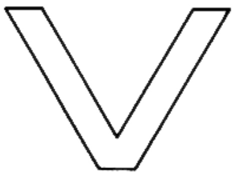

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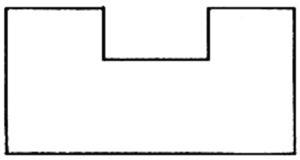

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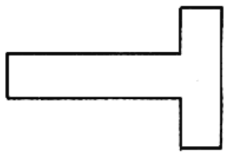

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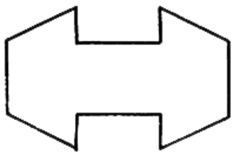

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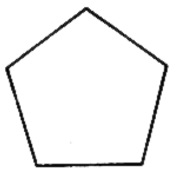

UNIT 25: FRACTIONS

Lesson 1: Introduction and Comparison of Fractions

Outcome

Identify types of fractions such as proper fractions, improper, mixed and equivalent fractions.
Compare fractions by using symbols <, > or =.

Teaching Aids

Blackboard, chalk, flash cards with fractions, a chart with fractions.

Teaching for Understanding

Pick up one flash card at a time and discuss with the children such as follows:

$\boxed{\frac{1}{2}}$ Ask children to name the fraction. What type of fraction is this? It is a **proper fraction**.

To be a proper fraction the number on top must be smaller than the number on the bottom. Other examples are $\frac{3}{5}$, $\frac{7}{8}$ and $\frac{29}{101}$.

$\boxed{\frac{5}{4}}$ This is an **improper fraction**.

An improper fraction is a fraction in which the top number (the numerator) is larger than the bottom number (the denominator). For example, $\frac{17}{10}$, $\frac{123}{100}$.

$\boxed{2\frac{3}{4}}$ A **mixed number** consists of a whole number and a fraction.

For example $\boxed{3\frac{1}{3},\ 6\frac{4}{5}.\ \frac{2}{3},\ \frac{4}{6},\ \frac{6}{9},\ \frac{10}{15},\ \frac{14}{21}\ \text{etc.}}$

These are equivalent fractions because they all cancel down to $\frac{2}{3}$ in their simplest form, so they are all equal in value. Such fractions are said to be equivalent to each other.

Write $\frac{1}{2}$ on the blackboard and allow the children to give equivalent fractions such as $\frac{1}{2}$, $\frac{2}{4}$, $\frac{3}{6}$, $\frac{4}{8}$ etc. Explain that all equivalent fractions are all equal. No equivalent fraction is greater or less than the other.

Put up a chart with fractions like this:

<table>
<tr><td colspan="16" align="center">1</td></tr>
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Identify equivalent fractions and compare fractions as well from the table.
Use symbols >, < and =.

Example: $\frac{1}{8} < \frac{1}{4}$, $\frac{3}{8} > \frac{4}{16}$, $\frac{4}{8} = \frac{1}{2}$ and so on.

Group Work

Put children in groups of six.
Group members work together to provide five equivalent fractions for each of these fractions.

$\frac{2}{5}$, ___, ___, ___, ___, ___ ($\frac{4}{10}$, $\frac{6}{15}$, $\frac{8}{20}$, $\frac{10}{25}$, $\frac{12}{30}$)

$\frac{1}{4}$, ___, ___, ___, ___, ___ ($\frac{2}{8}$, $\frac{3}{12}$, $\frac{4}{16}$, $\frac{5}{20}$, $\frac{6}{24}$)

$\frac{1}{6}$, ___, ___, ___, ___, ___ ($\frac{2}{12}$, $\frac{3}{18}$, $\frac{4}{24}$, $\frac{5}{30}$, $\frac{6}{36}$)

$\frac{3}{5}$, ___, ___, ___, ___, ___ ($\frac{6}{10}$, $\frac{12}{20}$, $\frac{15}{25}$, $\frac{18}{30}$, $\frac{9}{15}$)

$\frac{1}{3}$, ___, ___, ___, ___, ___ ($\frac{2}{6}$, $\frac{3}{9}$, $\frac{4}{12}$, $\frac{5}{15}$, $\frac{6}{18}$)

A reporter from each group to present the group's work.

Individual Application

Put >, or < or = in the box to make the statement correct.

1. $\frac{3}{4}$ $\square$ $\frac{7}{8}$ **(<)**
2. $\frac{1}{2}$ $\square$ $\frac{1}{8}$ **(>)**
3. $\frac{16}{16}$ $\square$ 1 **(=)**
4. $\frac{1}{4}$ $\square$ $\frac{1}{8}$ **(>)**
5. $\frac{6}{8}$ $\square$ $\frac{3}{4}$ **(=)**
6. 1 $\square$ $\frac{14}{16}$ **(>)**
7. $\frac{8}{8}$ $\square$ **=)**
8. $\frac{2}{4}$ $\square$ $\frac{5}{8}$ **(<)**
9. $\frac{2}{2}$ $\square$ **>)**
10. $\frac{3}{8}$ $\square$ **>)**

Additional Exercise

Write five for each of the following.

1. Proper fractions ___, ___, ___, ___, ___.
2. Improper fractions ___, ___, ___, ___, ___.
3. Mixed fractions ___, ___, ___, ___, ___.
4. Equivalent fractions ___, ___, ___, ___, ___.

Lesson 2: Converting Fractions into Decimals

Outcome

Convert fractions into decimals and vice versa.

Teaching Aids

Blackboard, chalk.

Teaching for Understanding

Yesterday we looked at types of fractions. What were they? Today we are going to convert a fraction into a decimal and vice versa. Can anybody convert $\frac{2}{5}$ into a decimal? If no one can do it, do it on the blackboard with the children.

Example: (i) $\frac{2}{5} \rightarrow$ $\begin{array}{r} .4 \\ 5\overline{)\,20} \\ \underline{20} \end{array}$ (ii) $0.4 \rightarrow \underbrace{\overbrace{\frac{4}{10} = \frac{2}{5}}^{\div 2}}_{\div 2}$

Answer = 0.4

Group Work

In groups of six, children to convert these fractions into decimal and vice versa. Show working out as shown above.

1. $\frac{4}{10}$ **(0.4** $\rightarrow \frac{4}{10} = \frac{2}{5}$ **)**
2. $\frac{3}{6}$ **(0.5** $\rightarrow \frac{5}{10} = \frac{1}{2} = \frac{3}{6}$ **)**
3. $\frac{4}{5}$ **(0.8** $\rightarrow \frac{8}{10} = \frac{4}{5}$ **)**
4. $\frac{3}{4}$ **(0.75** $\rightarrow \frac{75}{100} = \frac{3}{4}$ **)**
5. $\frac{5}{8}$ **(0.625** $\rightarrow \frac{625}{1000} = \frac{25}{40} = \frac{5}{8}$ **)**

Move around assisting where necessary.
Groups present their work.

Individual Application

Convert these fractions into decimals and vice versa. Show your working out. Example: $\frac{4}{5} = 0.8 \rightarrow \frac{8}{10} = \frac{4}{5}$

1. $\frac{6}{10}$ **(0.6** $\rightarrow \frac{6}{10}$ **)**
2. $\frac{2}{5}$ **(0.4** $\rightarrow \frac{4}{10} = \frac{2}{5}$ **)**
3. $\frac{3}{5}$ **(0.6** $\rightarrow \frac{6}{10} = \frac{3}{5}$ **)**
4. $\frac{1}{4}$ **(0.25** $\rightarrow \frac{25}{100} = \frac{1}{4}$ **)**
5. $\frac{3}{8}$ **(0.375** $\rightarrow \frac{375}{1000} = \frac{15}{40} = \frac{3}{8}$ **)**

Additional Exercise

Match the fractions with decimal fractions.

1.	$\frac{7}{10}$	0.5
2.	$\frac{5}{6}$	0.7
3.	$\frac{1}{5}$	0.875
4.	$\frac{2}{4}$	0.83
5.	$\frac{7}{8}$	0.2

Lesson 3: Converting Fractions to Percentages

Outcome

Convert fractions into percentages and vice versa.

Teaching Aids

Blackboard, chalk.

Teaching for Understanding

Who can tell me what we did yesterday for Maths? How did you convert fractions into fractions? How did you convert decimal fractions into fractions?

Today we will change fractions into percentages. Any volunteer to show how to do this? Then convert $\frac{2}{5}$ into percentage together with the children on the blackboard. For example: $\rightarrow \frac{2}{5} \times \frac{100}{1} = \frac{200}{5}$

$$5 \overline{)200} = 40$$

Answer = 40%

Tell the children that the symbol for percentage is %. Percent means per 100. The % symbol can be seen as 100 in disguise.

Then convert 40% into a fraction. To do this just put 40 over 100 like this $\frac{40}{100}$. Simplify $\frac{40}{100}$ you will get $\frac{2}{5}$. Thus, $\frac{2}{5}$ is equivalent to $\frac{40}{100}$.

Group Work

Put children into groups of five.
Each group converts these fractions into percentages and vice versa.

1.	$\frac{20}{100}$	**(20%)**	4.	$\frac{25}{100}$	**(25%)**
2.	$\frac{6}{10}$	**(60%)**	5.	$\frac{4}{5}$	**(80%)**
3.	$\frac{15}{100}$	**(15%)**			

Visit each group and assist where necessary.
Mark each group's work.

Individual Application

Write these fractions as percentages.

1.	$\frac{3}{5}$	**(60%)**	6.	$\frac{11}{25}$	**(44%)**
2.	$\frac{3}{20}$	**(15%)**	7.	$\frac{3}{10}$	**(30%)**
3.	$\frac{7}{25}$	**(28%)**	8.	$\frac{15}{20}$	**(75%)**
4.	$\frac{4}{8}$	**(50%)**	9.	$\frac{4}{10}$	**(40%)**
5.	$\frac{27}{50}$	**(54%)**	10.	$\frac{3}{12}$	**(25%)**

Additional Exercise

Write each of the following percentages as a fraction with a denominator of 100.

1.	25%	$\left(\frac{25}{100}\right)$	6.	75%	$\left(\frac{75}{100}\right)$
2.	20%	$\left(\frac{20}{100}\right)$	7.	4%	$\left(\frac{4}{100}\right)$
3.	5%	$\left(\frac{5}{100}\right)$	8.	40%	$\left(\frac{40}{100}\right)$
4.	12%	$\left(\frac{12}{100}\right)$	9.	50%	$\left(\frac{50}{100}\right)$
5.	30%	$\left(\frac{30}{100}\right)$	10.	35%	$\left(\frac{35}{100}\right)$

Lesson 4: Adding Mixed Numbers with Like Denominators

Outcome

Add mixed numbers with like denominators.

Teaching Aids

Blackboard, chalk.

Teaching for Understanding

In Lesson 1, we looked at mixed fractions, can anybody give one mixed fraction? That's right, a mixed fraction consists of a whole number and a fraction ($4\frac{1}{2}$, $3\frac{5}{10}$ etc). Today we will add mixed fractions with like denominators,
for example:

$3\frac{1}{5} + 2\frac{3}{5}$ Add the whole numbers first.

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

Group Work

In groups of five, the children work together to work out the following addition sums.

1. $1\frac{1}{4} + 1\frac{1}{4}$ **($2\frac{1}{2}$)**
2. $1\frac{1}{5} + 2\frac{2}{5}$ **($3\frac{3}{5}$)**
3. $2\frac{2}{7} + 3\frac{1}{7}$ **($5\frac{3}{7}$)**
4. $2\frac{2}{5} + 3\frac{1}{5}$ **($5\frac{3}{5}$)**
5. $3\frac{3}{7} + 2\frac{2}{7}$ **($5\frac{5}{7}$)**

Visit each group to make sure group members are all contributing. Correct each group's work.

Individual Application

Calculate the sum.

1. $4\frac{1}{12} + 2\frac{5}{12}$ **($6\frac{6}{12} = 6\frac{1}{2}$)**
2. $4\frac{3}{11} + 2\frac{7}{11}$ **($6\frac{10}{11}$)**
3. $2\frac{7}{20} + 6\frac{11}{20}$ **($8\frac{18}{20} = 8\frac{9}{10}$)**
4. $3\frac{3}{5} + 4\frac{1}{5}$ **($7\frac{4}{5}$)**
5. $2\frac{4}{10} + 4\frac{5}{10}$ **($6\frac{9}{10}$)**

Additional Exercise

Work out the sum.

1. $3\frac{3}{5} + 4\frac{1}{5}$ **($7\frac{4}{5}$)**
2. $2\frac{4}{10} + 4\frac{5}{10}$ **($6\frac{9}{10}$)**
3. $3\frac{9}{15} + 7\frac{3}{15}$ **($10\frac{12}{15} = 10\frac{4}{5}$)**
4. $1\frac{1}{4} + 2\frac{3}{4}$ **($3\frac{4}{4} = 4$)**
5. $4\frac{2}{3} + 2\frac{2}{3}$ **($6\frac{4}{3} = 7\frac{1}{3}$)**
6. $4\frac{5}{8} + 3\frac{3}{8}$ **($7\frac{8}{8} = 8$)**
7. $2\frac{3}{5} + 1\frac{4}{5}$ **($3\frac{7}{5} = 4\frac{2}{5}$)**
8. $1\frac{2}{3} + 2\frac{2}{3}$ **($3\frac{4}{3} = 4\frac{1}{3}$)**
9. $5\frac{4}{5} + 6\frac{3}{5}$ **($11\frac{7}{5} = 12\frac{2}{5}$)**
10. $3\frac{3}{4} + 2\frac{3}{4}$ **($5\frac{6}{4} = 6\frac{2}{4} = 6\frac{1}{2}$)**

Lesson 5: Subtracting Mixed Numbers with Like Denominators

Outcome

Subtract mixed numbers with like denominators.

Teaching Aids

Blackboard, chalk.

Teaching for Understanding

What was the topic yesterday children? (Adding mixed numbers with like denominators). Today, we are going to subtract mixed numbers with like denominators. Like the addition, subtract the whole numbers first.

For example:

$4\frac{3}{4} - 2\frac{1}{4} = 2\frac{2}{4} = 2\frac{1}{2}$

Answer = $2\frac{1}{2}$

Do more examples on the blackboard with the children such as:

1. $3\frac{4}{5} - 2\frac{2}{5} =$ **($1\frac{2}{5}$)**
2. $6\frac{5}{7} - 4\frac{3}{7} =$ **($2\frac{2}{7}$)**

Group Work

Put children in groups of five.
Group members work together to find the differences.

1. $4\frac{6}{10} - 1\frac{3}{10}$ **($3\frac{3}{10}$)**
2. $5\frac{5}{6} - 3\frac{2}{6}$ **($2\frac{3}{6}$)**
3. $7\frac{8}{9} - 6\frac{1}{9}$ **($1\frac{7}{9}$)**
4. $6\frac{4}{8} - 3\frac{3}{8}$ **($3\frac{1}{8}$)**
5. $9\frac{6}{12} - 4\frac{5}{12}$ **($5\frac{1}{12}$)**

Move around and assist each group.
Mark each group's work.

Individual Application

Calculate the difference.

1. $4\frac{5}{12} - 2\frac{1}{12}$ **($2\frac{4}{12} = 2\frac{1}{3}$)**
2. $4\frac{7}{11} - 2\frac{3}{11}$ **($2\frac{4}{11}$)**
3. $6\frac{11}{20} - 2\frac{7}{20}$ **($4\frac{4}{20} = 4\frac{1}{5}$)**
4. $4\frac{3}{5} - 3\frac{1}{5}$ **($1\frac{2}{5}$)**
5. $4\frac{5}{10} - 2\frac{4}{10}$ **($2\frac{1}{10}$)**

Additional Exercise

Work out the difference.

1. $4\frac{3}{5} - 3\frac{1}{5}$ **($1\frac{2}{5}$)**
2. $4\frac{5}{10} - 2\frac{4}{10}$ **($2\frac{1}{10}$)**
3. $7\frac{9}{15} - 3\frac{3}{15}$ **($4\frac{6}{15} = 4\frac{2}{5}$)**
4. $2\frac{3}{4} - 1\frac{1}{4}$ **($1\frac{2}{4} = 1\frac{1}{2}$)**
5. $4\frac{2}{3} - 2\frac{1}{3}$ **($2\frac{1}{3}$)**
6. $4\frac{5}{8} - 3\frac{3}{8}$ **($1\frac{2}{8} = 1\frac{1}{4}$)**
7. $2\frac{4}{5} - 1\frac{1}{5}$ **($1\frac{3}{5}$)**
8. $2\frac{2}{3} - 1\frac{2}{3}$ **(1)**
9. $6\frac{4}{5} - 5\frac{3}{5}$ **($1\frac{1}{5}$)**
10. $3\frac{3}{4} - 1\frac{1}{4}$ **($2\frac{2}{4} = 2\frac{1}{2}$)**

Lesson 6: Adding and Subtracting Mixed Numbers with Like Denominators

Outcome

Add and subtract mixed numbers with like denominators.

Teaching Aids

Blackboard, chalk.

Teaching for Understanding

Briefly review the two operations (+, -) with mixed numbers with the same denominators. Do these with the children on the blackboard.

1. $4\frac{5}{8} + 5\frac{2}{8} =$ **($9\frac{7}{8}$)**
2. $5\frac{5}{6} - 3\frac{3}{6} =$ **($2\frac{2}{6} = 2\frac{1}{3}$)**

Group Work

Put the children into two teams.
One from each team stands and faces the back of the classroom.

Write either an addition or a subtraction of mixed numbers with like denominators on the blackboard. Then give a signal for the children to run to the board and work out the answer.

The first one to get the answer correct, gains a point for his/her team.
Repeat the game until everyone in the teams has had a turn.

Individual Application

Work out these additions.

1. $1\frac{5}{6} + 4\frac{3}{6}$ **($5\frac{8}{6} = 6\frac{2}{6} = 6\frac{1}{3}$)**
2. $2\frac{4}{5} + 3\frac{1}{5}$ **($5\frac{5}{5} = 6$)**
3. $4\frac{3}{7} + 2\frac{2}{7}$ **($6\frac{5}{7}$)**
4. $3\frac{3}{8} + 1\frac{4}{8}$ **($4\frac{7}{8}$)**
5. $4\frac{4}{9} + 1\frac{3}{9}$ **($5\frac{7}{9}$)**
6. $8\frac{3}{5} - 4\frac{1}{5}$ **($4\frac{2}{5}$)**
7. $5\frac{3}{4} - 1\frac{1}{4}$ **($4\frac{2}{4} = 4\frac{1}{2}$)**
8. $3\frac{4}{7} - 2\frac{1}{7}$ **($1\frac{3}{7}$)**
9. $6\frac{4}{8} - 3\frac{2}{8}$ **($3\frac{2}{8} = 3\frac{1}{4}$)**
10. $5\frac{7}{9} - 2\frac{6}{9}$ **($3\frac{1}{9}$)**

Additional Exercise

Put either (-) or (+) in the box.

1. $6\frac{4}{10}\ \square\ 2\frac{3}{10} = 8\frac{7}{10}$ **(+)**
2. $6\frac{4}{10}\ \square\ 2\frac{3}{10} = 4\frac{1}{10}$ **(-)**
3. $3\frac{1}{4}\ \square\ 1\frac{2}{4} = 4\frac{3}{4}$ **(+)**
4. $5\frac{3}{4}\quad 2\frac{1}{4}\ \square\ 3\frac{2}{4}$ **(-)**
5. $6\frac{5}{8}\quad 4\frac{3}{8}\ \square\ \frac{2}{8}$ **(-)**

Lesson 7: Multiplying Proper Fractions

Outcome

Multiply fractions

Teaching Aids

Blackboard, chalk

Teaching for Understanding

Demonstrate how to multiply fractions to the children on the blackboard.
For example:

1. $\frac{2}{3} \times \frac{5}{4} = \frac{10}{12} = \frac{5}{6}$

   Answer = $\frac{5}{6}$

2. $\frac{1}{5} \times \frac{3}{4} = \frac{3}{20}$

Group Work

In groups of five, the children work out the following.

1. $\frac{1}{3} \times \frac{1}{4} =$ **($\frac{1}{12}$)**
2. $\frac{2}{5} \times \frac{5}{6} =$ **($\frac{10}{30} = \frac{1}{3}$)**
3. $\frac{3}{4} \times \frac{4}{3} =$ **($\frac{12}{12}$ = 1)**
4. $\frac{1}{5} \times \frac{5}{8} =$ **($\frac{5}{40} = \frac{1}{8}$)**
5. $\frac{3}{5} \times \frac{4}{6} =$ **($\frac{12}{30} = \frac{2}{5}$)**

Visit each group and help where necessary.
Mark each group's work.

Individual Application

Find the product.

1. $\frac{4}{10} \times \frac{2}{5} =$ **($\frac{8}{50} = \frac{4}{25}$)**
2. $\frac{6}{13} \times \frac{1}{4} =$ **($\frac{6}{52} = \frac{3}{26}$)**
3. $\frac{5}{6} \times \frac{6}{9} =$ **($\frac{30}{54} = \frac{5}{9}$)**
4. $\frac{4}{6} \times \frac{3}{5} =$ **($\frac{12}{30} = \frac{2}{5}$)**
5. $\frac{7}{8} \times \frac{2}{3} =$ **($\frac{14}{24} = \frac{7}{12}$)**
6. $\frac{1}{6} \times \frac{3}{7} =$ **($\frac{3}{42} = \frac{1}{14}$)**
7. $\frac{2}{3} \times \frac{4}{5} =$ **($\frac{8}{15}$)**
8. $\frac{6}{8} \times \frac{2}{6} =$ **($\frac{12}{48} = \frac{1}{4}$)**
9. $\frac{4}{12} \times \frac{3}{4} =$ **($\frac{12}{48} = \frac{1}{4}$)**
10. $\frac{1}{10} \times \frac{5}{8} =$ **($\frac{5}{80} = \frac{1}{16}$)**

Additional Exercise

Calculate the product.

1. $\frac{1}{10} \times \frac{4}{5}$ ($\frac{4}{50} = \frac{2}{25}$)
2. $\frac{5}{6} \times \frac{7}{8}$ ($\frac{35}{48}$)
3. $\frac{1}{5} \times \frac{3}{4}$ ($\frac{3}{20}$)
4. $\frac{4}{7} \times \frac{5}{15}$ ($\frac{20}{105} = \frac{4}{21}$)
5. $\frac{1}{7} \times \frac{6}{3}$ ($\frac{6}{21} = \frac{2}{7}$)
6. $\frac{4}{6} \times \frac{2}{7}$ ($\frac{8}{42} = \frac{4}{21}$)
7. $\frac{5}{8} \times \frac{3}{4}$ ($\frac{15}{32}$)
8. $\frac{9}{10} \times \frac{3}{5}$ ($\frac{27}{50}$)
9. $\frac{1}{2} \times \frac{6}{8}$ ($\frac{6}{16} = \frac{3}{8}$)
10. $\frac{4}{10} \times \frac{5}{8}$ ($\frac{20}{80} = \frac{2}{8} = \frac{1}{4}$)

Lesson 8: Dividing Fractions

Outcome

Divide fractions.

Teaching Aids

Blackboard, chalk.

Teaching for Understanding

Demonstrate how to divide fractions on the blackboard to the children.
For example:

1. $\frac{3}{4} \div \frac{6}{10} = \frac{3}{4} \times \frac{10}{6}$
   $= \frac{5}{4}$
   $= 1\frac{1}{4}$

2. $\frac{2}{5} \div \frac{7}{4} = \frac{2}{5} \times \frac{4}{7}$
   $= \frac{8}{35}$

Group Work

Put children into groups of six to solve these divisions.

1. $\frac{2}{3} \div \frac{3}{1} =$ **($\frac{2}{3} \times \frac{1}{3} = \frac{2}{9}$)**
2. $\frac{1}{2} \div \frac{1}{5} =$ **($\frac{1}{2} \times \frac{5}{1} = \frac{5}{2} = 2\frac{1}{2}$)**
3. $\frac{6}{8} \div \frac{2}{16} =$ **($\frac{6}{8} \times \frac{16}{2} = 6$)**
4. $\frac{7}{21} \div \frac{1}{3} =$ **($\frac{7}{21} \times \frac{3}{1} = \frac{21}{21} = 1$)**
5. $\frac{14}{15} \div \frac{7}{3} =$ **($\frac{14}{15} \times \frac{3}{7} = \frac{2}{5}$)**

Move around to make sure each group is doing the work correctly. Also check that all group members are contributing to the work.

Individual Application

Work out the quotient.

1. $\frac{1}{3} \div \frac{1}{3} =$ **($\frac{1}{3} \times \frac{3}{1} = 1$)**
2. $\frac{1}{2} \div \frac{3}{2} =$ **($\frac{1}{2} \times \frac{2}{3} = \frac{1}{3}$)**
3. $\frac{2}{4} \div \frac{3}{4} =$ **($\frac{2}{4} \times \frac{4}{3} = \frac{2}{3}$)**
4. $\frac{2}{3} \div \frac{4}{3} =$ **($\frac{2}{3} \times \frac{3}{4} = \frac{1}{2}$)**
5. $\frac{3}{5} \div \frac{1}{5} =$ **($\frac{3}{5} \times \frac{5}{1} = 3$)**
6. $\frac{3}{7} \div \frac{1}{7} =$ **($\frac{3}{7} \times \frac{7}{1} = 3$)**
7. $\frac{3}{5} \div \frac{6}{5} =$ **($\frac{3}{5} \times \frac{5}{6} = \frac{1}{2}$)**
8. $\frac{3}{4} \div \frac{5}{4} =$ **($\frac{3}{4} \times \frac{4}{5} = \frac{3}{5}$)**
9. $\frac{4}{8} \div \frac{3}{8} =$ **($\frac{4}{8} \times \frac{8}{3} = 1\frac{1}{3}$)**
10. $\frac{4}{9} \div \frac{2}{9} =$ **($\frac{4}{9} \times \frac{9}{2} = 2$)**

Additional Exercise

Work out the answers.

1. $7 \div \frac{14}{20} =$ **($\frac{7}{1} \times \frac{20}{14} = 10$)**
2. $8 \div \frac{4}{5} =$ **($\frac{8}{1} \times \frac{5}{4} = 10$)**
3. $5 \div \frac{5}{8} =$ **($\frac{5}{1} \times \frac{8}{5} = 8$)**
4. $6 \div \frac{3}{4} =$ **($\frac{6}{1} \times \frac{4}{3} = 8$)**
5. $9 \div \frac{3}{5} =$ **($\frac{9}{1} \times \frac{5}{3} = 15$)**

Lesson 9: Multiplying and Dividing Fractions

Outcome

Perform simple multiplication and division sums with fractions.

Teaching Aids

Blackboard, chalk.

Teaching for Understanding

Briefly review the two topics by allowing two volunteers to do these examples on the blackboard.

1. $\frac{4}{7} \times 3 = \frac{4}{7} \times \frac{3}{1}$
   $= \frac{12}{7}$
   $= 1\frac{5}{7}$

2. $\frac{2}{3} \div \frac{1}{3} = \frac{2}{3} \times \frac{3}{1}$
   $= \frac{6}{3}$
   $= 2$

Group Work

Repeat the game as in Lesson 6 but instead of addition and subtraction do multiplication and division.

Individual Application

Work out the following.

1. $\frac{3}{4} \div \frac{3}{2} =$ **$(\frac{3}{4} \times \frac{2}{3} = \frac{1}{2})$**
2. $\frac{2}{5} \div \frac{3}{5} =$ **$(\frac{2}{5} \times \frac{5}{3} = \frac{10}{15} = \frac{2}{3})$**
3. $\frac{2}{7} \div \frac{4}{7} =$ **$(\frac{2}{7} \times \frac{7}{4} = \frac{1}{2})$**
4. $\frac{5}{9} \div \frac{2}{3} =$ **$(\frac{5}{9} \times \frac{3}{2} = \frac{5}{6})$**
5. $\frac{3}{8} \div \frac{3}{4} =$ **$(\frac{3}{8} \times \frac{4}{3} = \frac{1}{2})$**
6. $\frac{2}{3} \times \frac{3}{3} =$ **$(\frac{2}{3} \times \frac{3}{3} = \frac{2}{3})$**
7. $\frac{3}{2} \times \frac{1}{2} =$ **$(\frac{3}{2} \times \frac{2}{1} = 3)$**
8. $\frac{2}{4} \times \frac{1}{4} =$ **$(\frac{2}{4} \times \frac{4}{1} = 2)$**
9. $\frac{5}{2} \times \frac{1}{2} =$ **$(\frac{5}{2} \times \frac{2}{1} = 5)$**
10. $\frac{3}{5} \times \frac{2}{5} =$ **$(\frac{3}{5} \times \frac{5}{2} = \frac{3}{2} = 1\frac{1}{2})$**

Additional Exercise

Calculate the following.

1. $\frac{3}{5} \times \frac{1}{5} =$ **$(\frac{3}{25})$**
2. $\frac{4}{3} \times \frac{2}{3} =$ **$(\frac{8}{9})$**
3. $\frac{3}{2} \times \frac{3}{2} =$ **$(\frac{9}{4} = 2\frac{1}{4})$**
4. $\frac{4}{3} \times 5 =$ **$(\frac{4}{3} \times \frac{5}{1} = \frac{20}{3} = 6\frac{2}{3})$**
5. $\frac{3}{5} \times 7 =$ **$(\frac{3}{5} \times \frac{7}{1} = \frac{21}{5} = 4\frac{1}{5})$**
6. $\frac{9}{7} \div \frac{3}{14} =$ **$(\frac{9}{7} \times \frac{14}{3} = 6)$**
7. $\frac{5}{3} \div \frac{15}{21} =$ **$(\frac{5}{3} \times \frac{21}{15} = \frac{35}{3} = 11\frac{2}{3})$**
8. $\frac{9}{20} \div \frac{7}{12} =$ **$(\frac{9}{20} \times \frac{12}{7} = \frac{27}{35})$**
9. $10 \div \frac{5}{6} =$ **$(\frac{10}{1} \times \frac{6}{5} = 12)$**
10. $12 \div \frac{6}{4} =$ **$(\frac{12}{1} \times \frac{4}{6} = \frac{8}{6} = 1\frac{1}{3})$**

Lesson 10: Assessment

Group Work

In groups of six, the children to work out the answers for the following.

1. $3\frac{1}{2} + 4\frac{2}{2} =$ **($7\frac{3}{2} = 8\frac{1}{2}$)**
2. $6\frac{3}{4} - 3\frac{1}{4} =$ **($3\frac{2}{4} = 3\frac{1}{2}$)**
3. $\frac{8}{20} \times \frac{2}{3} =$ **($\frac{8}{30} = \frac{4}{15}$)**
4. $\frac{8}{10} \div \frac{1}{2} =$ **($\frac{8}{10} \times \frac{2}{1} = \frac{8}{5} = 1\frac{3}{5}$)**
5. $\frac{3}{4} \div 5 =$ **($\frac{3}{4} \times \frac{1}{5} = \frac{3}{20}$)**

Correct each group's work.

Individual Application

1. Write the simplest equivalent fraction for each of the following.

a) $\frac{12}{24} =$ **($\frac{1}{2}$)**

b) $\frac{10}{40} =$ **($\frac{1}{4}$)**

c) $\frac{14}{21} =$ **($\frac{2}{3}$)**

d) $\frac{6}{18} =$ **($\frac{1}{3}$)**

e) $\frac{6}{36} =$ **($\frac{1}{6}$)**

2. Write these fractions as decimal fractions.

a) $\frac{3}{6} =$ **(0.5)**

b) $\frac{3}{5} =$ **(0.6)**

c) $\frac{1}{10} =$ **(0.1)**

d) $\frac{2}{8} =$ **(0.25)**

e) $\frac{3}{4} =$ **(0.75)**

3. Convert these fractions to percentages.

a) $\frac{2}{3} =$ **(66.6%)**

b) $\frac{4}{5} =$ **(80%)**

c) $\frac{3}{10} =$ **(30%)**

d) $\frac{3}{8} =$ **(37.5%)**

e) $\frac{1}{2} =$ **(50%)**

4. Change these decimals into fractions.

a) 0.3 = **($\frac{3}{10}$)**

b) 0.15 = **($\frac{15}{100} = \frac{3}{20}$)**

c) 0.8 = **($\frac{8}{10} = \frac{4}{5}$)**

d) 0.25 = **($\frac{25}{100} = \frac{1}{4}$)**

e) 0.07 = **($\frac{7}{100}$)**

5. Work out the following.

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

b) $7\frac{3}{5} + 2\frac{4}{5} =$ **($9\frac{7}{5} = 10\frac{2}{5}$)**

c) $4\frac{6}{8} - 2\frac{4}{8} =$ **($2\frac{2}{8} = 2\frac{1}{4}$)**

d) $9\frac{5}{6} - 7\frac{3}{6} =$ **($2\frac{2}{6} = 2\frac{1}{3}$)**

e) $\frac{7}{10} \times \frac{2}{4} =$ **($\frac{7}{20}$)**

f) $5 \times \frac{3}{10} =$ **($\frac{5}{1} \times \frac{3}{2} = \frac{1}{2} = 1\frac{1}{2}$)**

g) $4 \div \frac{1}{4} =$ **($\frac{4}{1} \times \frac{4}{1} = 16$)**

h) $\frac{5}{8} \div \frac{2}{5} =$ **($\frac{5}{8} \times \frac{5}{2} = \frac{25}{16} = 1\frac{9}{16}$)**

i) $\frac{3}{4} \div 3 =$ **($\frac{3}{4} \times \frac{1}{3} = \frac{1}{4}$)**

j) $\frac{6}{7} \times 7 =$ **($\frac{6}{7} \times \frac{7}{1} =6$)**

UNIT 26: SCALE DRAWING

Lesson 1: Finding Actual Lengths

Outcome

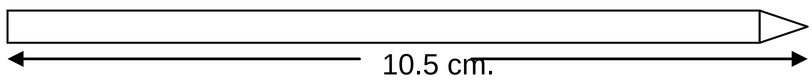
Measure the actual length of objects using a centimetre ruler.
Reproduce actual or required measurements.

Teaching Aids

Centimetre rulers, objects to be measured (rubber, pencil, pen, leaf)

Teaching for Understanding

Invite all the children to sit in front. Using a centimetre ruler, measure the length of a pencil. It is 10.5 cm. long; therefore, a pencil of 10.5 cm. long should be drawn like this.



Group Work

Put children into groups of five.
Provide each group with a centimetre ruler and objects to be measured like a rubber, a pencil, a pen and a leaf. Group members measure each object then draw pictures with the actual lengths.
Groups present their work.

Individual Application

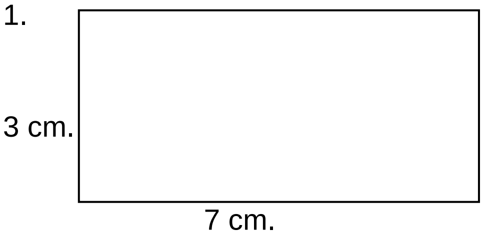
Draw pictures of the objects below with the measurements given. Use a ruler to check that the measurements are correct.

1. a bottle 5 cm. long.
2. a pencil 10 cm. long.
3. a spoon 15 cm. long.
4. a knife 12 cm. long.
5. a line $9\frac{1}{2}$ cm. long.

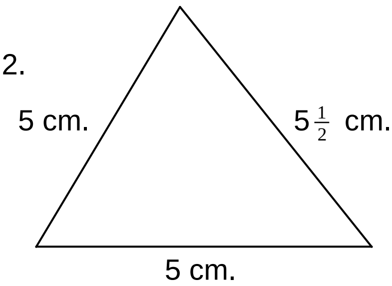
Additional Exercise

Draw the length of each side of the following shapes. Write the measurements.

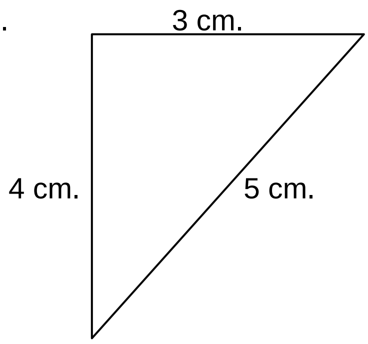
1.



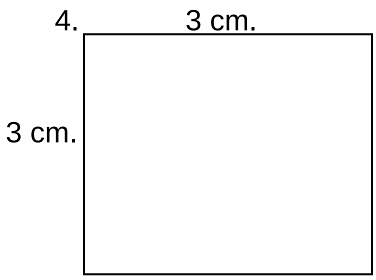
2.



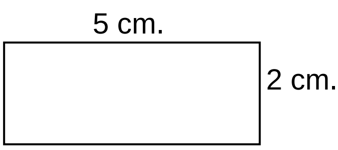
3.



4.



5.



Lesson 2: Using Scales

Outcome

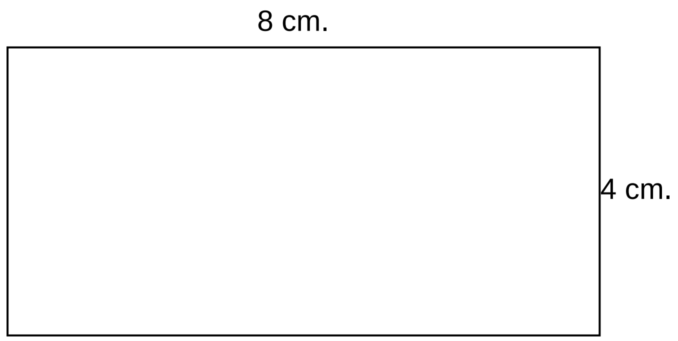
Make drawings using scales.

Teaching Aids

Centimetre rulers, blackboard, chalk

Teaching for Understanding

Say, Yesterday we drew pictures of objects with actual lengths. Can we draw the actual length of the table in our exercise book? (No) Why? (Because it is bigger than the page of an exercise book). That is right. Now we are going to use scaling using ratios so that we can draw bigger objects in an exercise book. For example: The scale used to draw this plan of a rectangular building is 1 cm. to represent 2 metres. Writing in a scale form, it will be: 1 cm. represents 2 m. (1 cm. rep. 2 m.)



What is the actual length of the building?
What is the actual breadth?

Answers 1:	Scaled-down length	= 8 cm.
	Actual length	= 8 x 2m.
		= 16 m.
2:	Scale-down breadth	= 4 cm.
	Actual breadth	= 4 x 2m.
		= 8m.

Group Work

In groups of five, children draw a scaled-down plan of the following using the scale 1cm. rep. 4 m.

1. a school library 24 metres long and 12 metres wide.
2. a table 12 metres long and 8 metres wide.

Provide each group with a sheet of paper and a ruler.
Visit each group and help.
A reporter from each group presents the group's work.

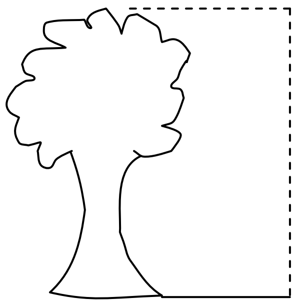
Individual Application

Using the scale of 1cm. rep. 3 m., draw rectangles representing the following.

1. a house 6 metres long and 3 metres wide.
2. a playing field 12 metres long and 9 metres wide.
3. *te mwaneaba* 27 metres long and 12 metres wide.

Additional Exercise

This tree is drawn to a scale of 5 mm. rep. 1 metre. What is the actual height of the tree?



4 cm. = 40 mm. ÷ 5

Answer = 8 metres

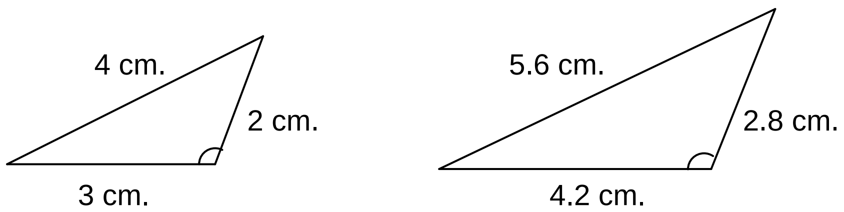
Lesson 3: Using Proportions

Outcome

Make scale drawings using proportions.

Teaching Aids

A chart with two similar triangles with proportional sides.



Teaching for Understanding

Put up a chart with two triangles drawn on it and discuss them with the children. Explain to the children what is meant by proportion. These two triangles are similar, the lengths of their sides are proportional. In the triangles, shown the constant multiplying factor is 1.4.

(3, 2, 4) x 1.4 = (4.2, 2.8, 5.6)

Another example of two sets of numbers that are proportional to one another is when one set is the constant and is multiplied to give the other, for example, (1, 2, 5, 7) and (3, 6, 15, 21) are in proportion, because the numbers in the second set are 3 times the numbers in the first.

Group Work

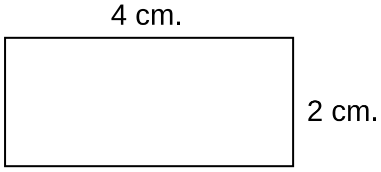
In groups of six, children construct two triangles with proportional length on a chart. Write the measurement of each side.
A reporter from each group presents the group's work.

Display end products.

Individual Application

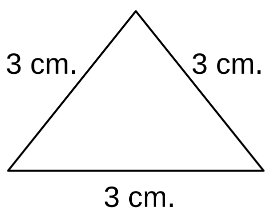
Using the constant multiplying factor of 3, construct one shape that is proportional to each of the following.

1.



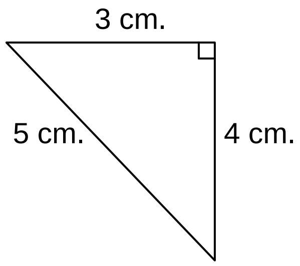
(12 cm. x 6 cm.)

2.



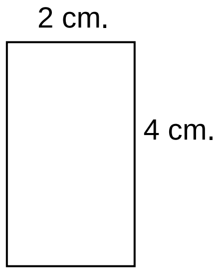
(9 cm. x 9 cm. x 9 cm.)

3.



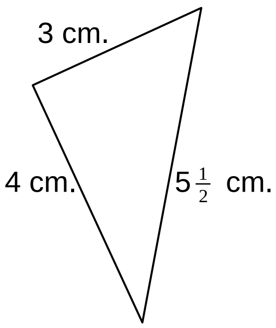
(9 cm. x 15 cm. x 12 cm.)

4.



(6 cm. x 12 cm.)

5.



(9 cm. x 12 cm. x 16 $\frac{1}{2}$ cm.)

Additional Exercise

1. Write two sets of numbers that are proportional.
2. Draw two triangles that are proportional.
3. Draw two rectangles that are proportional.

Lesson 4: Interpreting Information from a Scaled Diagram

Outcome

Interpret information from a scaled diagram.

Teaching Aids

Teaching for Understanding

Say to the children, In the last two lessons, we have learnt how to use scaled diagrams to show proportion. Today we are going to learn how to interpret information from a scaled diagram.

Write the information below on the board and solve the problem with the children.

The scale used to draw this plan of a playing field is 1cm. to represent 3m. What is the actual length of the field? What is the actual breadth?

8 cm.

3 cm.

From the information, it is clear that the length of the playing field has been scaled down. To find the actual length you have to multiply the scaled-down length by the scale. For example:

Scaled-down length = 8 cm.
Actual length = 8 x 3m.
= 24 metres.

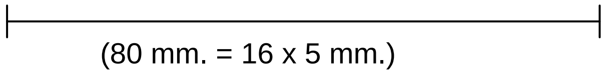
Scaled down breadth = 3 cm.
Actual breadth = 3 x 3 m.
= 9 m.

Therefore, the actual length of the playing field is 24 m. x 9 m.

Group Work

In groups of five, children work together to find the actual length of the following.

1. The scale used to represent the distance from Bauro's house (A) to Toto's house (B) is 5 mm. rep. 100 m.

A  B

(80 mm. = 16 x 5 mm.)

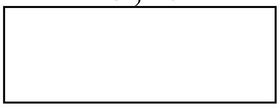
Measure the line then find out the following:

1. What is the actual distance in metres? **(16 x 100 = 1600 metres)**
2. What is the actual distance in kilometres? **(1.6 km.)**

Individual Application

Using the scale of 1cm. rep. 2 m., find the actual length of five classrooms represented by these plans.

1. $3\frac{1}{2}$ cm.



(2 x $3\frac{1}{2}$ = 7 metres)

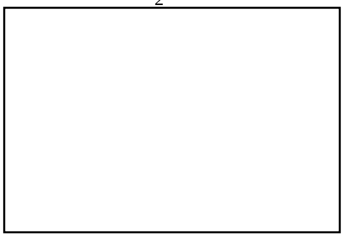
2. 3 cm.

(2 x 3 = 6 metres)

3. 5 cm.

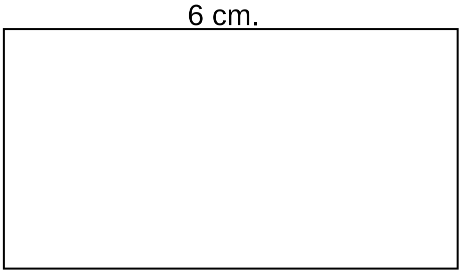
(2 x 5 = 10 metres)

4. $5\frac{1}{2}$ cm.



(2 x $5\frac{1}{2}$ = 11 metres)

5. 6 cm.



(2 x 6 = 12 metres)

Additional Exercise

The distance from Are's house to the school is 85 metres:

1. Using the scale of 1cm. rep. 5m draw a line representing that distance.

   (85 ÷ 5 = 17 cm.)

2. Draw another line representing the same distance using the scale of 1cm. rep. 10m.

   (85 ÷ 10 = 8.5 cm.)

Lesson 5: Assessment

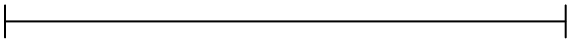
Group Work

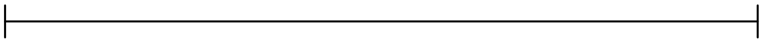
In groups of five, children draw a plan for a *mwaneaba* whose length is 22 metres and whose breadth is 15 metres using the scale of 1cm. rep. 2m.

(11 cm. x 7$\frac{1}{2}$ cm.)

Individual Application

1. Measure these lines and write answers in centimetres.

a)  **(7.5 cm.)**

b)  **(10 cm.)**

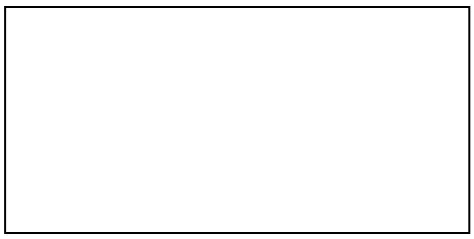
2. Using the constant multiplying factor of 3.2. Construct another rectangle that is proportional to this one.

a) 3 cm.

1.5 cm

(3 x 3.2 = 9.6)
(1.5 x 3.2 = 4.8)
(9.6 cm. x 4.8 cm.)

3. The scale used to draw this plan of a rectangular building is 1cm. to represent 3 metres. Measure the sides and find the actual length of sides.



(L = 6.5 cm. x 3 = 19.5 m.)

(B = 3 cm. x 3 = 9 m.)

(Answer = 19.5 m. x 9 m.)

4. The scale used for this plan is 1cm. to represent 5 metres.

Calculate: a) the actual length
b) the actual width of the building.

(L = 5 cm. x 5 = 25 metre)

(B = 2 cm. x 5 = 10 metre)

(Answer = 25 m. x 10 m.)

5. Using a scale of 1cm to represent 4 metres, draw a plan of a rectangular building whose length is 24 metres and width is 10 metres. **(6 cm. x 2$\frac{1}{2}$ cm.)**

UNIT 27: PROBABILITY

Lesson 1: Introduction to Probability

Outcome

Identify and define probability.
Carry out common probability experiments.
State the probability of common events.

Teaching Aids

Blackboard, chalk, a 20 cent coin

Teaching for Understanding

Define the word probability to the children by saying that probability is a branch of mathematics. If, in a toss of a coin, heads can be either on top or underneath, the probability that a head will occur in one trial is :

P = $\frac{1}{(1+1)}$ or $\frac{1}{2}$. The probability of an event ranges from 0 to 1. If the probability of an event occurring is 1, the event is certain. If the probability of an event occurring is 0, the event certainly will not occur.

When we speak of the 'probability' of an event, we are trying to evaluate the chance that it will occur.

For example: if in a toss …….
Then carry out one experimental activity on tossing a coin. Using a twenty cent coin, invite one child to toss the coin ten times. Another child writes the outcomes on the blackboard. The rest of the class and the teacher watch and help where necessary. The formula for calculating a probable outcome may be worded as follows :

$$\frac{\text{The total of possible outcomes in the defined subset}}{\text{The total of possible outcomes in the set}}$$

Children will, however, come to understand probability best through practical experiences, rather than the wording of the formula.

Group Work

Put children into four groups.
Provide each group with a different coin ($2, $1, 50¢, 20¢).
Toss the coin ten times and record the outcomes in a table.

Heads	Tails

Work out the probability of getting:
1. a tail
2. a head

A reporter from each group presents the group's work.

Individual Application

Using any coin available. Toss a coin ten times to complete the table below.

Possible Outcome Tossing a coin

Activity	Head	Tail
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		

Additional Exercise

Work out the probability that when you take one card from the pack it will be:

1. a king

Answer:
4 (the number of kings in the pack)
over:
52 (the number of cards in the pack)
Ans. $\mathbf{\frac{4}{32}}$

2. a spade

Answer: $\mathbf{\frac{13}{52}}$ **(the number of spades in a pack)**

Lesson 2: Experimental Probability

Outcome

Define experimental probability.

Carry out experimental activities on probability.

Teaching Aids

Teaching for Understanding

Explain what is meant by experimental probability, that is, approximate probability values are found by actually carrying out the experiment. For example, suppose we take two coins, toss both of them together forty times, and record the number of heads uppermost each time.

The result would appear in a table like this:

No. of heads uppermost	0	1	2
No. of times it occurred	7	21	12

From the table, the probability of 2 heads being uppermost in the same toss is $\frac{12}{40}$ or $\frac{3}{10}$. Explain clearly how the figures are obtained, then ask these questions:

1. What is the probability of 1 head being uppermost?
2. What is the probability of no heads being uppermost?

Group Work

Put children into groups of six.
Each group conducts a similar experiment and compares their results with the table above.

Groups present their work.

Individual Application

1. The table shows the results of a mental mathematics test in a class of 30 pupils.

Number correct	10	9	8	7	6
Number of pupils	5	11	9	4	1

a) Find the probability that if the teacher closes her eyes and chooses a pupil, she will select someone who has scored 10.

Answer : $\frac{5}{30}$, that is, 5 pupils with a score of 10 out of 30 pupils in the class.

b) Write down the probabilities that the teacher chooses pupils with the other scores.

Additional Exercise

1. Obtain a die with the numbers 1 to 6 marked on the faces. Roll the die 30 times and note down the number of times that each number appears on top.

Put your results in a table.

Score	1	2	3	4	5	6
Frequency						

2. Obtain a pack of playing cards. After shuffling the cards, ask a friend to pick any card from the pack. Do this 40 times. Keep a tally of the number of spades, clubs, diamonds and hearts drawn out and record them in a table.

Card	Spade	Club	Diamond	Heart
Frequency				

Based on your experiment, list the probabilities of selecting each of the different types of cards.

Lesson 3: Theoretical Probability

Outcome

Define theoretical probability.
Solve problems based on theoretical probability.

Teaching Aids

Teaching for Understanding

Good morning children! Yesterday we learnt about experimental probability. Today, we are going to look at theoretical probability. Theoretical probability is probability based on ideas and principles, rather than on practical experience.

For example 1: consider the toss of a single coin. There are only two possible outcomes, or results, a head or a tail. Either result is equally likely. Hence we say that the probability of a head is $\frac{1}{2}$ and the probability of a tail is also $\frac{1}{2}$.

Example 2: Rolling a die. In this case six different results may occur, and any one of the six numbers has an equal chance of showing up. Hence we say that the probability for any of these six numbers is $\frac{1}{6}$.

Group Work

In groups of five, work together to solve these problems.

1. Drawing a marble from a bag.
   The bag contains 3 red and 2 black marbles. There are 5 marbles altogether and any one of the five has an equal chance of being drawn.

a) What is the probability of selecting a red marble? **($\frac{3}{5}$)**

b) What is the probability of selecting a black marble? **($\frac{2}{5}$)**

Moves around marking each group's work.

Individual Application

1. A normal pack contains 52 cards. These consist of 13 spades, 13 clubs, 13 diamonds and 13 hearts.

a) Work out the probability of selecting a heart. **($\frac{13}{52} = \frac{1}{4}$)**

b) Work out the probability of selecting a diamond. **($\frac{13}{52} = \frac{1}{4}$)**

c) Work out the probability of selecting a club. **($\frac{13}{52} = \frac{1}{4}$)**

d) Work out the probability of selecting a spades. **($\frac{13}{52} = \frac{1}{4}$)**

2. A bag contains 5 black and 3 red marbles. If one is chosen from the bag, what is the probability that it is:

1. black? **($\frac{5}{8}$)**
2. red? **($\frac{3}{8}$)**

Additional Exercise

A bag contains 2 black, 3 red and 4 white marbles. One is selected from the bag. What is the probability that it is:

1.	black?	$\left(\frac{2}{9}\right)$	4.	not black?	$\left(\frac{7}{9}\right)$
2.	red?	$\left(\frac{3}{9}\right)$	5.	not red?	$\left(\frac{6}{9}\right)$
3.	white?	$\left(\frac{4}{9}\right)$	6.	not white?	$\left(\frac{5}{9}\right)$

Lesson 4: Experimental and Theoretical Probability

Outcome

Define experimental and theoretical probability.

Solve problems based on the two types of probability.

Teaching Aids

Teaching for Understanding

Briefly review the two types of probability by asking questions such as: Who can explain what is experimental probability? What is meant by theoretical probability? Then send children into groups for group work.

Group Work

In groups of five, children use a die with the numbers 1 to 6 marked on the faces. They roll the die 30 times and note down the number of times that each number appears on top. They put their results in a table.

Score	1	2	3	4	5	6
Frequency						

From this table, write the experimental probability of throwing each of the numbers 1 to 6 for this die.

Individual Application

Answer these questions.
One card is selected from a pack of playing cards.
What is the probability that it is:

1. a spade? **($\frac{13}{52}$ = $\frac{1}{4}$)**
2. a heart? **($\frac{1}{4}$)**
3. an ace? **($\frac{1}{4}$)**
4. a six? **($\frac{4}{52}$)**
5. the six of hearts? **($\frac{1}{52}$)**
6. a king? **($\frac{4}{52}$)**
7. a picture card? **($\frac{12}{52}$)**

Additional Exercise

In a box there are 20 pieces of cardboard, with the numbers 1 to 20 written on them. A person picks out one of these. What is the probability that it is:

1. the number 6? **($\frac{1}{20}$)**
2. the number 7? **($\frac{1}{20}$)**
3. an even number? **($\frac{1}{2}$)**
4. a number less than 5? **($\frac{4}{20}$ = $\frac{1}{5}$)**
5. a number less than 12? **($\frac{11}{20}$)**
6. a number greater than 12? **($\frac{8}{20}$ = $\frac{2}{5}$)**

Lesson 5: Assessment

Group Work

In groups of six children toss a coin 20 times. They record the results in a table as follows:

Possible Outcomes	
Heads	**Tails**

Work out the probability of getting:
1. a tail
2. a head

Mark each group's work.

Individual Application

1. Ten cards are numbered 1 to 10. If one card is drawn at random, what is the probability that the card will be:

a) card number 4? **($\frac{1}{10}$)**

b) a number greater than 4? **($\frac{6}{10} = \frac{3}{5}$)**

c) a number less than 4? **($\frac{3}{10}$)**

2. You have 3 red beads, 4 blue beads and 2 green beads in a bag. If you take out a bead without looking, what is the probability that it will be blue? **($\frac{4}{9}$)**

3. What is the probability that the sun rises in the west? **(0)**

4. Five red marbles and two yellow marbles are placed in a box.

a) How many marbles are in the box? **(7)**

b) How many are red? **(5)**

c) How many are yellow? **(2)**

d) What is the probability of picking a red marble? **($\frac{5}{7}$)**

e) What is the probability of picking a yellow marble? **($\frac{2}{7}$)**

UNIT 28: PERCENTAGES

Lesson 1: Changing Fractions into Percentages

Outcome

Change fractions into percentages.

Teaching Aids

Blackboard, chalk.

Teaching for Understanding

Today we will change fractions into percentages. Can anybody do one example on the blackboard? Demonstrate how to do it. For example:

$$\frac{4}{5} \longrightarrow \frac{4}{5} \times \frac{100}{1} = \frac{400}{5} = \begin{array}{r|l} & 80 \\ \hline 5 & 400 \\ & \underline{40} \end{array}$$

Answer = 80%

You may do another example if needed.

Group Work

Put children into groups of six.
Write these fractions as percentages, to one decimal place.

1.	$\frac{1}{2}$	**(50%)**	4.	$\frac{2}{3}$	**(66.7%)**
2.	$\frac{3}{10}$	**(30%)**	5.	$\frac{1}{4}$	**(25%)**
3.	$\frac{4}{12}$	**(33.3%)**			

Visit each group assisting where necessary.
Mark each group's work.

Individual Application

Change these fractions into percentages.

1.	$\frac{6}{10}$	**(60%)**	6.	$\frac{4}{20}$	**(20%)**
2.	$\frac{3}{7}$	**(42.85%)**	7.	$\frac{3}{4}$	**(75%)**
3.	$\frac{5}{8}$	**(62.5%)**	8.	$\frac{1}{6}$	**(16.66%)**
4.	$\frac{5}{6}$	**(83.33%)**	9.	$\frac{9}{10}$	**(90%)**
5.	$\frac{7}{10}$	**(70%)**	10.	$\frac{8}{20}$	**(40%)**

Additional Exercise

Write these as percentages, to two decimal places.

1.	$\frac{1}{10}$	**(10%)**	6.	$\frac{15}{20}$	**(75%)**

2.	$\frac{1}{7}$	**(14.28%)**	7.	$\frac{2}{6}$	**(33.33%)**
3.	$\frac{1}{8}$	**(12.5%)**	8.	$\frac{3}{5}$	**(60%)**
4.	$\frac{5}{8}$	**(62.5%)**	9.	$\frac{1}{20}$	**(5%)**
5.	$\frac{5}{7}$	**(71.43%)**	10.	$\frac{7}{8}$	**(87.5%)**

Lesson 2: Changing Percentages to Fractions

Outcome

Change percentages into fractions.

Teaching Aids

Blackboard, chalk

Teaching for Understanding

Ask, what did you do yesterday in Maths lesson? Change fractions to percentages. Good, today we will convert percentages to fractions.

For example: 2% $\longrightarrow \frac{2}{100}$. To do this is simple. Just put whatever number is written over 100. (20% $\longrightarrow \frac{2}{100}$, 51% $\longrightarrow \frac{51}{100}$).

Group Work

In two teams, children stand in a line. The first child from each team stands holding a piece of chalk. Call out any percentage and the two rush to the blackboard and write the called out percentage as a fraction.

(The teacher says, thirty per cent $\longrightarrow$ a child writes $\frac{30}{100}$).

Whoever gets the answer correct gains a point for his/her team. Repeat the game until everyone has had a turn.

Individual Application

Write these percentages as fractions.

1.	11%	($\frac{11}{100}$)	6.	58%	($\frac{58}{100} = \frac{29}{50}$)
2.	23%	($\frac{23}{100}$)	7.	69%	($\frac{69}{100}$)
3.	35%	($\frac{35}{100}$)	8.	72%	($\frac{72}{100} = \frac{18}{25}$)
4.	8%	($\frac{8}{100} = \frac{2}{25}$)	9.	80%	($\frac{80}{100} = \frac{4}{5}$)
5.	43%	($\frac{43}{100}$)	10.	98%	($\frac{98}{100} = \frac{49}{50}$)

Additional Exercise

Change these percentages into fractions.

1.	13%	($\frac{13}{100}$)	6.	54%	($\frac{54}{100} = \frac{27}{50}$)
2.	25%	($\frac{25}{100} = \frac{1}{4}$)	7.	63%	($\frac{63}{100}$)
3.	39%	($\frac{39}{100}$)	8.	77%	($\frac{77}{100}$)
4.	6%	($\frac{6}{100} = \frac{3}{50}$)	9.	86%	($\frac{86}{100} = \frac{43}{50}$)
5.	41%	($\frac{41}{100}$)	10.	91%	($\frac{91}{100}$)

Lesson 3: Changing Fractions into Percentages and Percentages to Fractions

Outcome

Convert fractions to percentages and vice versa.

Teaching Aids

Blackboard, chalk

Teaching for Understanding

In the last two lessons we learnt how to change fractions into percentages and percentages into fractions. Today we will do more work on the two topics. Demonstrate how to do it such as:

1. $\frac{1}{2} \longrightarrow \frac{1}{2} \times \frac{100}{1} = \frac{100}{2} = 50\%$

   $50\% \rightarrow \frac{50}{100} \longrightarrow \frac{1}{2}$

2. $\frac{20}{100} \longrightarrow \frac{20}{100} \times \frac{100}{1} = \frac{20}{1} = 20\%$

   $20\% \longrightarrow \frac{20}{100}$

Group Work

In groups of six, children to change these fractions into percentages and vice versa. Show working out as demonstrated above.

1. $\frac{3}{5}$ **(60%)**
2. $\frac{6}{10}$ **(60%)**
3. $\frac{12}{20}$ **(60%)**

The teacher visits each group assisting where necessary. Mark each group's work.

Individual Application

Change these fractions into percentages and vice versa. Show your working out.

1. $\frac{2}{5}$ **(40%)**
2. $\frac{4}{10}$ **(40%)**
3. $\frac{14}{20}$ **(70%)**
4. $\frac{5}{8}$ **(62.5%)**
5. $\frac{25}{50}$ **(50%)**

Additional Exercise

Turn these fractions into percentages and vice versa.

1. $\frac{1}{5}$ **(20%)**
2. $\frac{8}{10}$ **(80%)**
3. $\frac{5}{20}$ **(25%)**
4. $\frac{15}{20}$ **(75%)**
5. $\frac{6}{8}$ **(75%)**

Lesson 4: Changing Decimals to Percentages

Outcome

Change decimals to percentages.

Teaching Aids

Blackboard, chalk

Teaching for Understanding

Demonstrate how to convert decimals into percentages such as:

$.5 \longrightarrow \frac{5}{10} \times \frac{100}{1} = \frac{50}{1}$

$= 50\%$

To change a decimal into a percentage, first of all you have to change a decimal into a fraction then multiply by hundred to change it into a percent.

Invite a volunteer to do this on the blackboard.

$.45 \longrightarrow \frac{45}{100} \times \frac{100}{1} = \frac{45}{1}$

$= 45\%$

Group Work

In groups of five or six, children work together to change these decimals into percentages.

1.	0.75	**(75%)**	4.	0.2	**(20%)**
2.	0.8	**(80%)**	5.	0.6	**(60%)**
3.	0.25	**(25%)**			

Move around assisting where needed. A group reporter reports on the group's work.

Individual Application

Write these decimals as percentages. Show the working out.

1.	0.15	**(15%)**	4.	0.55	**(55%)**
2.	0.7	**(70%)**	5.	0.3	**(30%)**
3.	0.20	**(20%)**			

Additional Exercise

Write in percentages.

1.	0.4	**(40%)**	6.	0.42	**(42%)**
2.	0.9	**(90%)**	7.	0.50	**(50%)**
3.	0.40	**(40%)**	8.	0.32	**(32%)**
4.	0.22	**(22%)**	9.	0.02	**(2%)**
5.	0.35	**(35%)**	10.	0.08	**(8%)**

Lesson 5: Changing Percentages to Decimals

Outcome
Change percentages to decimals.

Teaching Aids
Blackboard, chalk

Teaching for Understanding
Demonstrate how to convert a percentage into a decimal.

For example: 15% → $\frac{15}{100}$ →

```
       .15
100 ) 150
      100
      500
      500
```

Answer = .15

Invite one child to convert 4% to a decimal. The rest of the class watches and helps where necessary.

Group Work
Put children into groups of five or six.
Children work together to convert these percentages to decimals as demonstrated above.

1. 5% **(0.05)**
2. 24% **(0.24)**
3. 35% **(0.35)**
4. 40% **(0.4)**
5. 55% **(0.55)**

Individual Application
Change these percentages to decimals by writing the missing figures in the boxes.

1. 70% → $\frac{\boxed{70}}{100}$ →

```
       .7
100 ) 700
      [700]
```

2. 30% → $\frac{30}{\boxed{100}}$ →

```
       .3
100 ) 300
      [300]
```

3. $\boxed{25}$ % → $\frac{25}{100}$ →

```
      [.25]
100 ) 250
      200
      500
      500
```

4. 4 % → $\boxed{}$ $\frac{4}{100}$ →

```
      [.04]
100 ) 400
```

400

5. 6% → $\boxed{\frac{6}{100}}$ →

$$\begin{array}{r} .06 \\ 100 \overline{)\ \boxed{\mathbf{600}}} \\ \underline{600} \end{array}$$

Additional Exercise

Change these percentages into decimals.

1.	42%	**(0.42)**	6.	60%	**(0.6)**
2.	8%	**(0.08)**	7.	66%	**(0.66)**
3.	12%	**(0.12)**	8.	2%	**(0.02)**
4.	84%	**(0.84)**	9.	9%	**(0.09)**
5.	90%	**(0.9)**	10.	19%	**(0.19)**

Lesson 6: Further Work on Changing Decimals to Percentages

Outcome

Change decimals to percentages.

Teaching Aids

Blackboard, chalk

Teaching for Understanding

Yesterday, we converted percentages to decimals. Today, we are going to do the other way round, that is, changing decimals to percentages. Then demonstrate how to do it.

$$0.5 \rightarrow \frac{5}{10} \times \frac{100}{1} = \frac{50}{1}$$

$$= 50\%$$

Point out clearly each step to be taken. Change the decimal into fraction then multiply by a hundred to make it a percentage. Allow two more children to do the following examples on the blackboard : 0.44 and .05.

Group Work

In their groups, children to work together to convert these decimals into percentages.

1. 0.04 **(4%)**
2. 0.70 **(70%)**
3. 0.88 **(88%)**
4. 0.23 **(23%)**
5. 0.6 **(60%)**

Visit each group and encourage group members to participate in the group work. Correct each group's work.

Individual Application

Fill in the boxes.

1. $0.02 \rightarrow \frac{2}{\boxed{100}} \times \frac{100}{1} = \frac{\boxed{2}}{1}$ $= 2\%$

2. $0.39 \rightarrow \frac{\boxed{39}}{100} \times \frac{100}{1} = \frac{39}{1}$ $= 39\%$

3. $\boxed{0.7} \rightarrow \frac{7}{\boxed{10}} \times \frac{100}{1} = \frac{70}{1}$ $= 70\%$

4. $0.80 \rightarrow \frac{\boxed{80}}{100} \times \frac{\boxed{100}}{1} = \frac{80}{1}$ $= 80\%$

5. $0.01 \rightarrow \frac{\boxed{1}}{\boxed{100}} \times \frac{100}{1} = \frac{1}{1}$ $= 1\%$

Additional Exercise

Write these decimals as percentages.

1. 0.11 **(11%)**
6. 0.51 **(51%)**

2.	0.09	**(9%)**	7.	0.06	**(6%)**
3.	0.3	**(30%)**	8.	0.44	**(44%)**
4.	0.78	**(78%)**	9.	0.1	**(10%)**
5.	0.60	**(60%)**	10.	0.20	**(20%)**

Lesson 7: Percentage of a Quantity

Outcome

Calculate a percentage of a quantity.

Teaching Aids

Blackboard, chalk.

Teaching for Understanding

In the last six lessons we have learnt how to changing fractions to percentages and vice versa and decimals to percentages and vice versa. Today, we are going to work out how to calculate a percentage of a quantity.

Example 1: 20% of 40 $\longrightarrow \frac{20}{100} \times \frac{40}{1} = \frac{8}{1}$

Example 2: 12% of \$64 $\longrightarrow \frac{12}{100} \times \frac{64}{1} = \frac{192}{25}$

= \$7.68

Group Work

In groups, work out the following.

1. 50% of \$84 **(\$42.00)**
2. 20% of \$84 **(\$16.80)**
3. 15% of \$84 **(\$12.60)**
4. 90% of \$84 **(\$75.60)**
5. 5% of \$84 **(\$4.20)**

Vist each group and assist. Correct each group's work.

Individual Application

Calculate the following.

1. 2% of 80 **(1.6)**
2. 52% of 50 **(26)**
3. 24% of 100 **(24)**
4. 65% of 25 **(16.25)**
5. 20% of 10 **(2)**

Additional Exercise

Work out the following.

1. 10% of 200 **(20)**
2. 56% of 250 **(140)**
3. 18% of 65 **(11.7)**
4. 32% of 75 **(20.8)**
5. 45% of 300 **(135)**
6. 6% of 125 **(7.5)**
7. 40% of 40 **(16)**
8. 70% of 45 **(31.5)**
9. 22% of 30 **(6.6)**
10. 77% of 10 **(7.7)**

Lesson 8: More Work on a Percentage of a Quantity

Outcome

Work out a percentage of a quantity with more confidence.

Teaching Aids

Blackboard, chalk

Teaching for Understanding

Briefly review yesterday's work by doing two examples on the blackboard such as:

1. 80% of 80
2. 65% of 30

Group Work

Divide children into two teams and let them sit in a line to play a 'calculation game'. The first child from each team to stand and face the back.

Write a problem on the board, such as: 20% of 400).

Give a signal for the two to run to the blackboard and work out the answer. The first one to get the answer correct will get a point for his/her team.

Individual Application

Work out these:

1. 4% of 40 **(1.6)**
2. 35% of 200 **(70)**
3. 69% of 100 **(69)**
4. 20% of 90 **(18)**
5. 2% of 50 **(1)**

Additional Exercise

Match a problem in A with the answer in B.

A	B
75% of 44	4.2
30% of 84	21
6% of 70	146
21% of 100	33
73% of 200	25.2

Lesson 9: Revision of Percentages

Outcome

Convert fractions to percentages and vice versa.
Convert decimals to percentages and vice versa.
Calculate a percentage of a quantity.

Teaching Aids

Blackboard, chalk

Teaching for Understanding

Briefly review how to convert fractions and decimals into percentages and how to calculate the percentage of quantities by doing some examples on the blackboard.

Then allow children to play a calculation game for 15 minutes.

Group Work

In two teams, children to play a calculation game as in Lesson 8. This time the calculation includes conversion of fractions and decimals to percentage and calculating the percentage of a quantity.

For example:
The teacher says, Write $\frac{3}{10}$ as a percentage .. or
Write .56 as a percentage .. or
Write 5% as a fraction .. or
Write 25% as a decimal .. or
Calculate 50% of 80.

The team with more points is the winner.

Individual Application

1. Write these fractions as percentages.

a) $\frac{1}{4}$ **(25%)** b) $\frac{25}{50}$ **(50%)** c) $\frac{3}{8}$ **(37.5%)**

2. Change these decimals into percentages.

a) 0.56 **(56%)** b) 0.35 **(35%)** c) 0.08 **(80%)**

3. Change these percentages into decimals.

a) 75% **(0.75)** b) 40% **(0.4)** c) 4% **(0.04)**

4. Calculate these.

a) 2% of 75 **(1.5)**

b) 72% of 80 **(57.6)**

c) 60% of 150 **(90)**

Additional Exercise

1. Write $\frac{4}{10}$ as percentage. **(40%)**

2. What is 0.25 as a percentage? **(25%)**

3. 35% as a fraction is _____.**($\frac{35}{100}$)**

4. 5% as decimal fraction is _____. **(0.05)**

5. Find:
   a. 5% of 15 **(0.75)**
   b. 21% of 76 **(15.96)**
   c. 34% of 90 **(30.6)**
   d. 77% of 85 **(65.45)**
   e. 65% of 50 **(32.5)**
   f. 83% of 350 **(290.5)**

Lesson 10: Assessment

Group Work

In groups of six, children work out the following.

1.	30% of $60	**($18)**	4.	61% of $150	**($91.50)**
2.	25% of $25	**($6.25)**	5.	92% of $100	**($92.00)**
3.	44% of $45	**($19.80)**			

Individual Application

1. Write these as percentages.

a)	$\frac{1}{6}$	**(16.66%)**	f)	0.8	**(80%)**
b)	$\frac{3}{10}$	**(30%)**	g)	0.07	**(7%)**
c)	$\frac{11}{25}$	**(44%)**	h)	0.47	**(47%)**
d)	$\frac{15}{30}$	**(50%)**	i)	0.30	**(30%)**
e)	$\frac{75}{100}$	**(75%)**	j)	0.22	**(22%)**

2. Change these into decimal fractions.

a)	74%	**(0.74)**	d)	40%	**(0.4)**
b)	9%	**(0.09)**	e)	27%	**(0.27)**
c)	11%	**(0.11)**			

3. Calculate.

a)	99% of 200	**(198)**	d)	84% of 65	**(54.6)**
b)	20% of 124	**(24.8)**	e)	71% of 80	**(56.8)**
c)	15% of 70	**(10.5)**			

UNIT 29: ANGLES

Lesson 1: Acute Angles

Outcome

Identify acute angles.
Draw acute angles.

Teaching Aids

Teaching for Understanding

When you were in Class 4, you learnt the types of angles. Can you name some? (acute, obtuse, right, etc). Good, today we will concentrate on acute angles. Can anybody explain what an acute angle is? An acute angle is an angle whose size is between 0° and 90°. Draw two acute angles on the blackboard (one bigger than the other) such as these:

Ask children which angle is bigger (children can answer this by looking at the two angles). Then ask, By how much is angle B is bigger than angle A? Can the children answer this? What is the problem? (They need a unit of measurement in order to answer). Children should be very familiar with protractors, so let them make protractors in their groups.

Group Work

In groups of six, children make a protractor out of cardboard.
Draw a straight line 10 cm. long on the cardboard.
Mark the middle of the line.
Take a compass and set it to 5 cm.
Place the point of a compass at the middle of the line and the pencil at one end of the line. Draw a semi-circle to other end of the line.
Cut along the line with a pair of scissors.
Use the picture of a protractor on the back of the text book to label your protractor.

Individual Application

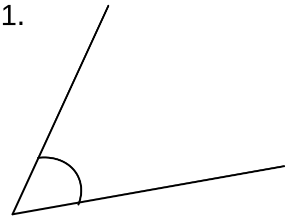
Construct these five acute angles.

1. 30°
2. 55°
3. 40°
4. 65°
5. 70°

Additional Exercise

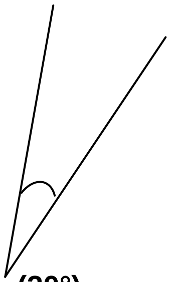
Measure these angles.

1.



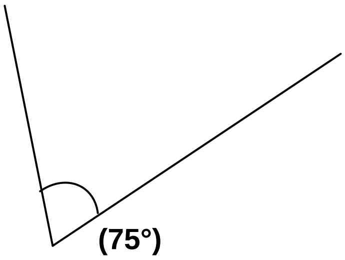
(60°)

2.



(20°)

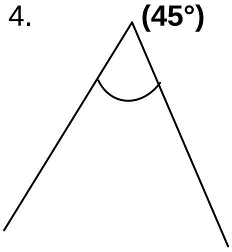
3.



(75°)

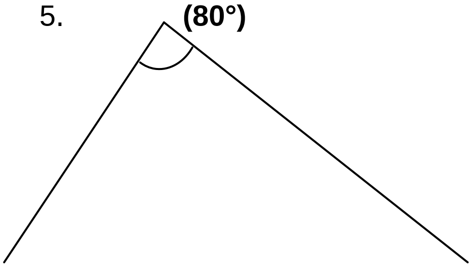
4.

(45°)



5.

(80°)



Lesson 2: Obtuse Angles

Outcome

Identify obtuse angles.
Construct and measure obtuse angles.

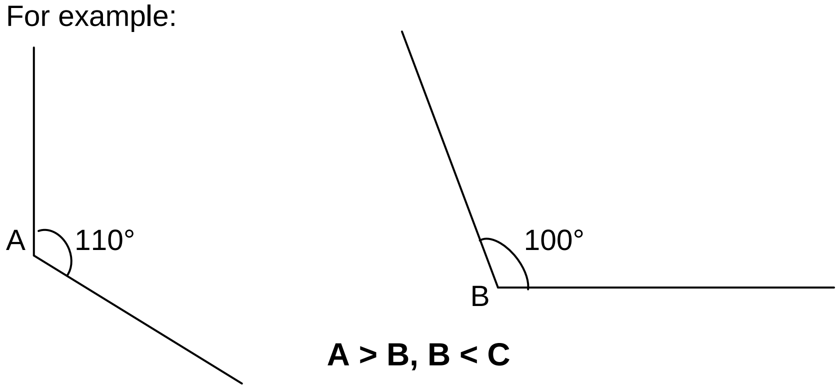
Teaching Aids

Protractors, blackboard and chalk.

Teaching for Understanding

Ask, What do we use for measuring angles? (a protractor). That's right. Yesterday you made protractors in your groups and I am sure you can use the protractor properly. Today, we will measure angles but concentrate on obtuse angles. Can anybody tell us what an obtuse angle is? An obtuse angle is an angle whose size is between 90° and 180°. Draw two obtuse angles on the blackboard. Invite two children to measure the two angles. Compare the two angles by using '>' (is greater than) and '<' (is less than).

For example:



A > B, B < C

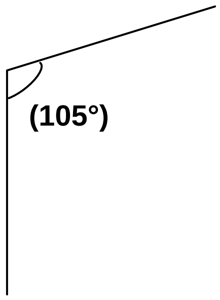
Group Work

Put the children in groups of six.
They construct any three obtuse angles.
Then they draw the angles using a protractor.
Remeasure the angles when marking group work.

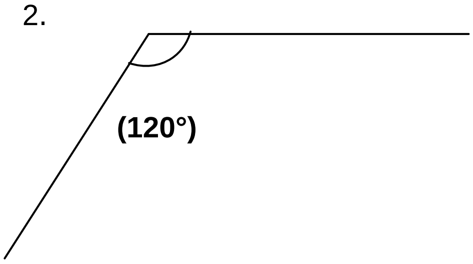
Individual Application

Measure these angles with a protractor.

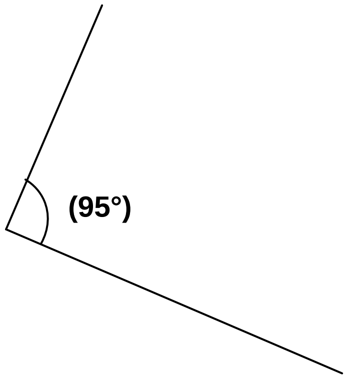
1.



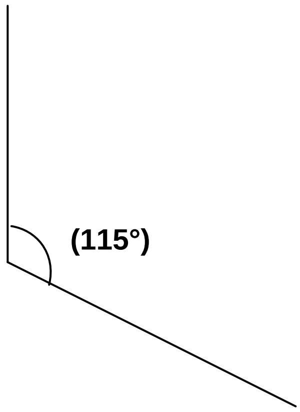
2.



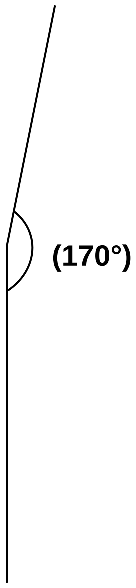
3.



4.



5.



Additional Exercise

Draw these obtuse angles.

1. 150°
2. 175°
3. 160°
4. 155°
5. 140°

Lesson 3: Straight Angles

Outcome

Identify a straight angle.
Identify objects with straight angles in the classroom.

Teaching Aids

Protractors, blackboard and chalk

Teaching for Understanding

Draw a straight angle on the board like this:

Ask, what do you call this angle? (straight angle).

Explain what a straight angle is. A straight angle is an angle with a straight line measuring 180°. Where there is a straight line, there is 180°. Draw a straight line on the blackboard and allow one child to prove it is 180°. The rest of the class watch and be ready to help.

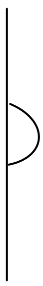
Group Work

In groups of six, children list down any ten objects in the classroom which have 180°.
A reporter from each group presents the group's findings.

Individual Application

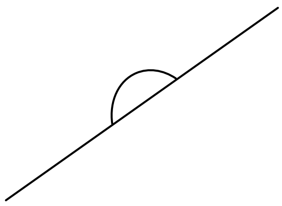
Measure these angles using a protractor.

1.

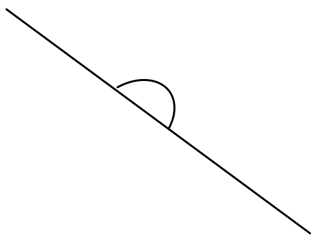


2.

3.



4.



(all 180°)

Additional Exercise

Write **True** or **False**.

1. There are two right angles in a straight angle. **(True)**
2. A straight angle is less than an obtuse angle. **(False)**
3. A straight angle equals half a circle. **(True)**
4. A straight angle is greater than an acute angle. **(True)**
5. A straight angle is always 180°. **(True)**

Lesson 4: Reflex Angles

Outcome

Identify a reflex angle.
Identify objects with reflex angles.
Draw reflex angles.

Teaching Aids

Protractors, objects in the classroom with reflex angles, blackboard and chalk

Teaching for Understanding

Now, you know what an obtuse, acute and a straight angle are? Can you explain what a reflex angle is? You have come across this type of angle in Class 4. A reflex angle is an angle between 180° and 360°. Invite a volunteer to come to the board and draw one reflex angle. The rest of the class may help.

Group Work

In groups of six, list five objects in the classroom which have reflex angles. A group reporter presents the group's findings.

Individual Application

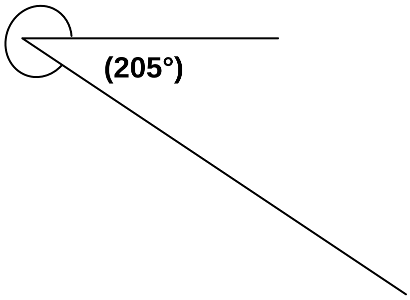
Draw these reflex angles using a protractor.

1. 185°
2. 275°
3. 300°
4. 345°
5. 310°

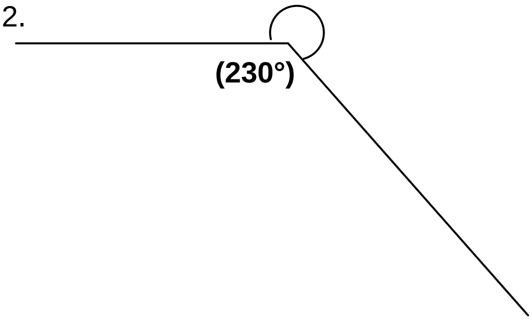
Additional Exercise

Measure these angles.

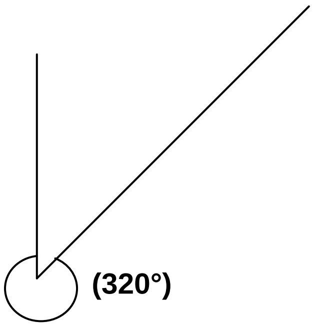
1.



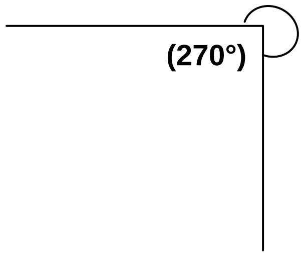
2.



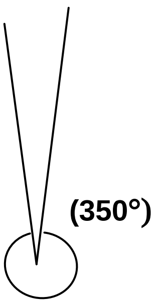
3.



4.



5.



Lesson 5: Obtuse and Acute Angles

Outcome

Identify the two angles, obtuse and acute.
Compare the two angles.

Teaching Aids

Protractors, blackboard and chalk

Teaching for Understanding

Briefly review the two angles (obtuse and acute) by allowing the children to define them or to draw them on the blackboard.

Group Work

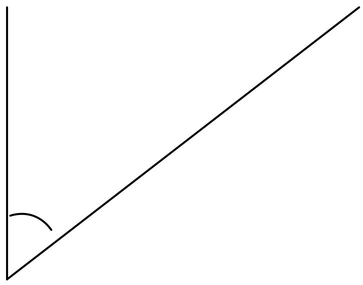
In groups of five, children draw two obtuse and two acute angles. They write the names and the angles beside each diagram.

Groups present their work.
Re-measure to check that the angles are correct.

Individual Application

Measure these angles. Write the name and the measurement of each angle.

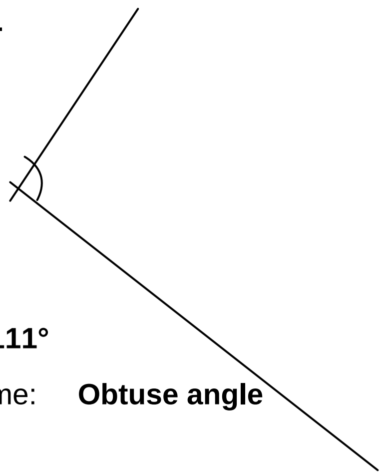
1.



Angle: **44°**

Name: **Acute angle**

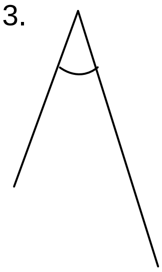
2.



Angle: **111°**

Name: **Obtuse angle**

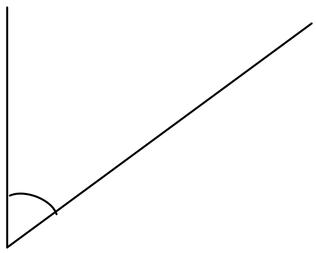
3.



Angle: **29°**

Name: **Acute angle**

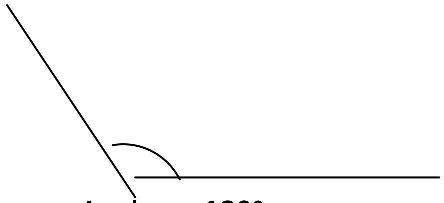
4.



Angle: **56°**

Name: **Acute angle**

5.



Angle: **130°**

Name: **Obtuse angle**

Additional Exercise

Write **True** or **False**.

1.	An obtuse angle is greater than an acute angle.	**(True)**
2.	An acute angle is less than an obtuse angle.	**(True)**
3.	An obtuse angle is between 0° and 90°.	**(False)**
4.	An obtuse angle is between 90° and 180°.	**(True)**
5.	An acute angle is between 0° and 90°.	**(True)**

Lesson 6: Straight and Reflex Angles

Outcome

Identify the two angles.
Compare the two angles.

Teaching Aids

Protractors, blackboard and chalk.

Teaching for Understanding

Briefly review the two types of angles (straight and reflex) by allowing the children to define or draw them on the blackboard.

Group Work

In groups of five, children draw two straight and reflex angles. Write the names of the angles beside each diagram.
A reporter presents the group's work.
Remeasure the angles when marking.

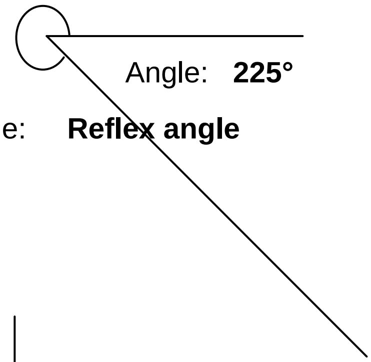
Individual Application

Measure these angles. Write the names and angles in the spaces provided.

1.

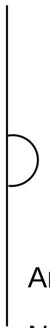

Angle: **180°**

Name: **Straight angle**

2.


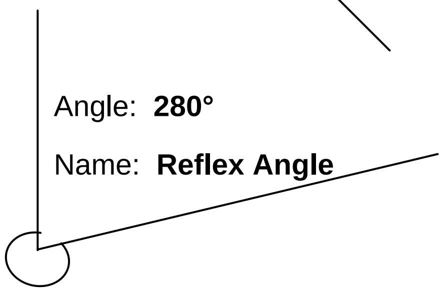
Angle: **225°**

Name: **Reflex angle**

3.


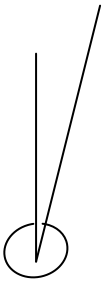
Angle: **180°**

Name: **Straight angle**

4.


Angle: **280°**

Name: **Reflex Angle**

5.


Angle: **350°**

Name: **Reflex angle**

Additional Exercise

Write **True** or **False**.

1. A straight angle is always 180°. **(True)**
2. A reflex angle is always 300°. **(False)**
3. A straight angle is less than a reflex angle. **(True)**
4. A reflex angle is between 180° and 360°. **(True)**
5. A straight angle is half a reflex angle. **(False)**

Lesson 7: Revision of the Four Kinds of Angles (Acute, Obtuse, Straight and Reflex)

Outcome

Identify, draw and compare the four types of angles.

Teaching Aids

Protractors, blackboard and chalk.

Teaching for Understanding

In the last six lessons, you have studied the four types of angles. Today we are going to revise them. Briefly go over each type with the children.

Group Work

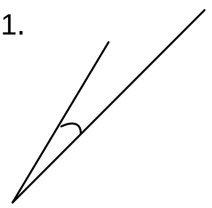
Put the children in two teams to play a ‘Look and Say’ game based on angles.

Of course, you are familiar with the game. Some changes are: Write the angle on the board and then give a signal for the two children to turn back. The first one to call out a correct name will get a point for his/her team. For example, you write 65°, the children call out ‘acute angle’.

Individual Application

Measure and name the following angles.

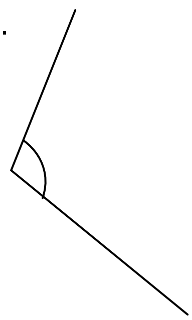
1.



Angle: **14°**

Name: **Acute angle**

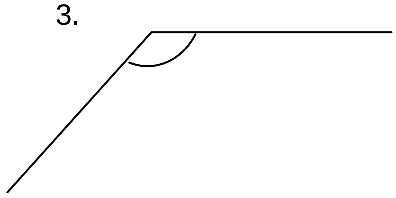
2.



Angle: **110°**

Name: **Obtuse angle**

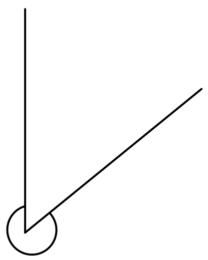
3.



Angle: **130°**

Name: **Obtuse angle**

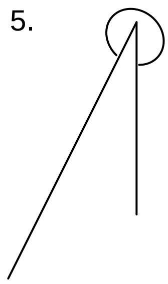
4.



Angle: **310°**

Name: **Reflex angle**

5.

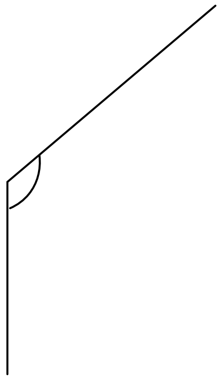


Angle: **333°**

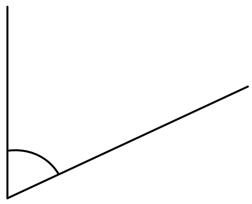
Name: **Reflex angle**

Additional Exercise

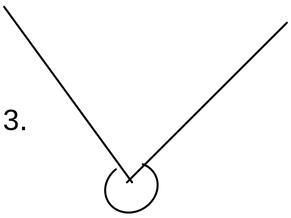
Match the diagrams with the sizes of the angles. Write the number of the angle with the letter of the correct answer.

1. 

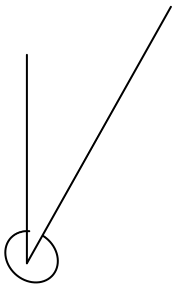
a) 280°

2. 

b) 330°

3. 

c) 130°

4. 

d) 180°

5. 

e) 65°

Answers : 1c, 2e, 3a, 4b, 5d.

Lesson 8: Estimating and Measuring Angles

Outcome

Estimate the angles.
Measure the angles.
Calculate the difference in angles.

Teaching Aids

Cut-out angles and protractors

Teaching for Understanding

Show one cut-out angle to the children. Ask them to estimate the angle. Record the estimation on the board. Invite one child to measure the angle and to write the measurement on the board. Together with the children, work out the difference between the two angles.

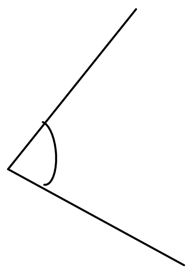
You may do one or two more examples if necessary.

Group Work

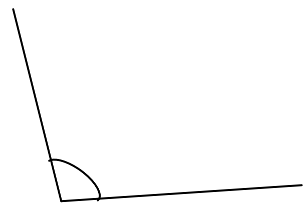
Put children in groups of five or six.

1. Each group estimates, then measures these angles.

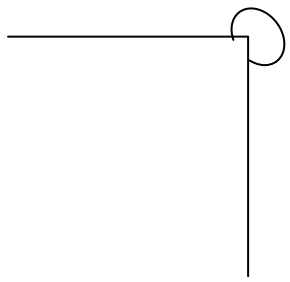
a)



b)



c)



2. Put the answers in a table like this:

Angle	**Estimation**	**Measurement**	**Difference**
a)		**80^{o}**	
b)		**100^{o}**	
c)		**90^{o}**	

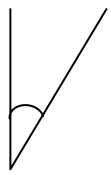
Individual Application

1. Fill in the table below by estimating then measuring the given angles. Calculate the difference.

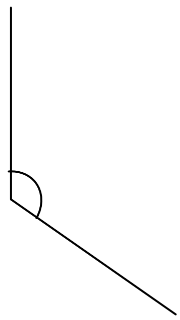
Angle	Estimation	Measurement	Difference
1.		**30^{o}**	
2.		**125^{o}**	
3.		**50^{o}**	

Given angles:

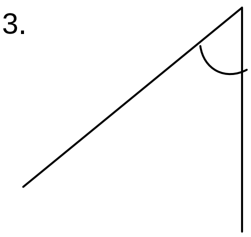
1.



2.



3.



Additional Exercise

Draw three angles of your own choice.
Estimate the angles first, then measure them and finally calculate the difference. Put your results in a table, as in Individual Application (above).

Lesson 9: More Practice in Estimating and Measuring Angles

Outcome

Estimate angles.
Measure angles.
Calculate the difference.

Teaching Aids

Teaching for Understanding

Briefly review the different kinds of angles by drawing the angles on the board for children to name, estimate then measure them. Make sure children are familiar with these names: acute, right, obtuse, straight and reflex angles.

Group Work

Put children in groups of five or six.
Each group draws 2 acute, 2 obtuse and 2 reflex angles on a chart.
A group member reports on the group's work to the class.

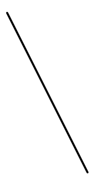
Individual Application

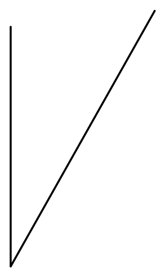
The chart produced during group work is needed here. Group members sit together to share the chart but work individually to complete the table below.

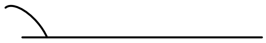
Type of angle	Estimation	Measurement	Difference

Additional Exercise

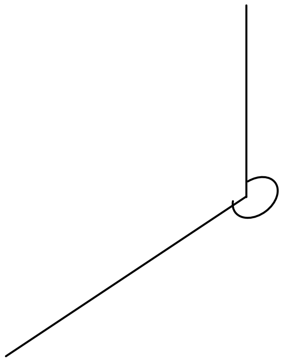
Name, estimate, measure then calculate the difference of these angles.

1. 

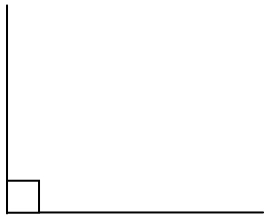
2. 



3.



4.



5.

Angle	**Estimation**	**Measurement**	**Difference**
1.		$\mathbf{115^{o}}$	
2.		$\mathbf{30^{o}}$	
3.		$\mathbf{235^{o}}$	
4.		$\mathbf{90^{o}}$	
5.		$\mathbf{180^{o}}$	

Lesson 10: Assessment

Group Work

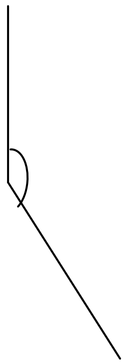
In their groups, children draw each of these angles. Write the names for each angle.

1. 40°
2. 100°
3. 180°
4. 180°
5. 285°

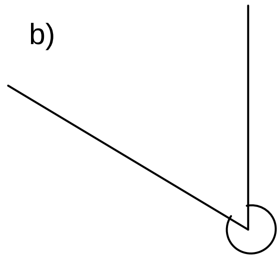
Individual Application

1. Name these angles.

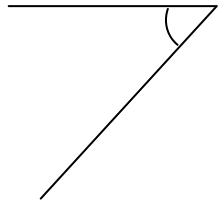
a)



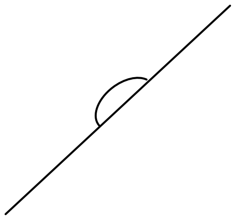
b)



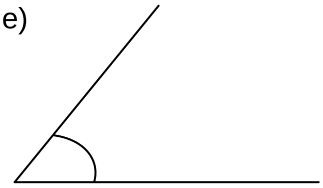
c)



d)



e)



2. Estimate, then measure the angles in Question 1. Calculate the difference. Record the answers in the table below.

Angle	Type of angle	Estimation	Measurement	Difference
a)		**150^{o}**		
b)		**300^{o}**		
c)		**50^{o}**		
d)		**180^{o}**		
e)		**50^{o}**		

UNIT 30: PERIMETER AND AREA

Lesson 1: Finding the Perimeter of a Square, Rectangle and a Triangle

Outcome

Find the perimeter of the square, rectangle and triangle.
Identify the formula.

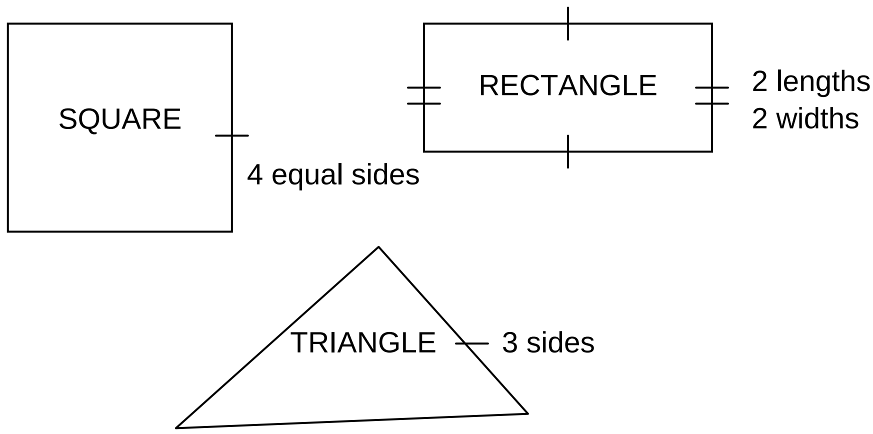
Teaching Aids

Objects that are square, rectangular and triangular
Drawings of these plane shapes
Ruler and pencils

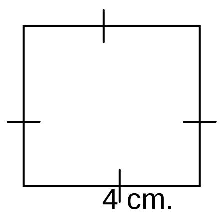
Teaching for Understanding

Have the children seated in front where they can see well. Put up objects that are in the form of a square, rectangle and triangle. Show the number of their sides.

eg:

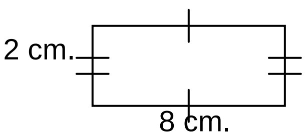


Show the children how to calculate the perimeter of each shape.



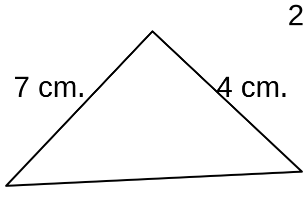
Formula:– Add all the lengths of the sides of the shape.
Square = all sides equal (4)

Perimeter = 4 cm. + 4 cm. + 4 cm. + 4 cm.
= 8 cm. + 8 cm.
= 16 cm.



Perimeter = 8 cm. + 2 cm. + 8 cm. + 2 cm.
= 10 cm. + 10 cm.
= 20 cm.

Another way → 2 L + 2 w
2 x 8 + 2 x 2
16 + 4 = 20 cm.



Perimeter = 4 cm. + 6 cm. + 7 cm.
= 10 cm. + 7 cm.

6 cm.

= 17 cm.

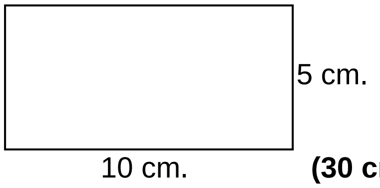
Group Work

Divide the children into three groups. Each group has to find different objects that are square, rectangular and triangular. Measure their sides, then calculate their perimeters on the charts. Display for other groups to see.

Individual Application

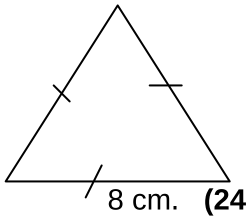
Calculate the perimeter of these shapes.

a)



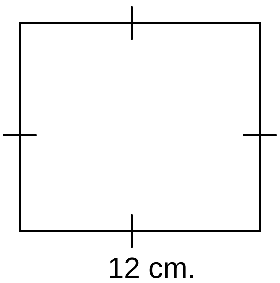
(30 cm.)

b)



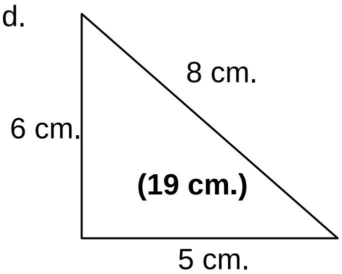
(24 cm.)

c)



(48 cm.)

d.



(19 cm.)

Additional Exercise

Solve these problems.

1. A rectangular garden has a length of 8 metres and a width of 6 metres. Calculate its perimeter. **(48 m.)**
2. A square tile measures 25 cm. by 25 cm. What is its perimeter? **(100 cm.)**
3. A pyramid has triangular faces. Calculate the perimeter of one face if its sides are 9 m. by 6 m. by 4.5 m. **(19.5 m.)**

Lesson 2: Finding the Perimeter of a Circle

Outcome

Identify the formula for finding a circumference of a circle.
Find the perimeter of a circle.
Clarify that perimeter is the same as circumference (in circle).
Calculate the perimeter using the formula - πD or 2πr.
Identify π = 3.14 or $\frac{22}{7} \longrightarrow \approx$ approximately.

Teaching Aids

Cylindrical objects such as cans
A chart showing the perimeter of a circle

Teaching for Understanding

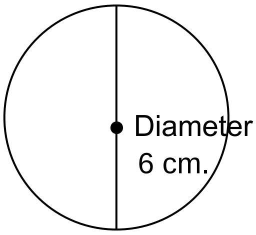
Let the children sit in front. Put up a chart with the perimeter of a circle drawn on it. Explain step by step how the perimeter is worked out. Tell them that another word we can use for the perimeter of a circle is **circumference**.

Show the formula - πD or 2πR.

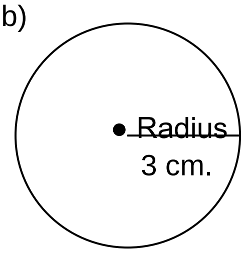
πD = π x Diameter

2πR = 2 x π x Radius

a)



b)



π has an approximated value of 3.14 or $\frac{22}{7}$.
D = Diameter
R = Radius

Calculation of the perimeter of the above circles.

a. Perimeter = πD
= 3.14 x 6 cm. (count figures)
= 18.84 cm. (after a decimal point)

b. Perimeter = 2πR
= 2 x 3.14 x 3 cm.
= 6.28 x 3
= 18.84 cm.

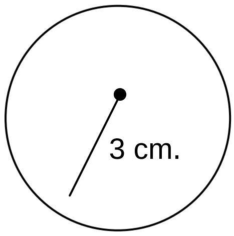
Group Work

Divide the children into two or more groups. They use cylindrical objects to draw circles on their charts. Then they measure the diameter or the radius. They help each other to calculate its perimeter (circumference). Display each group's work and check the calculations.

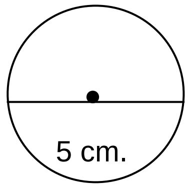
Individual Application

Work out the perimeter of these circles. Use πD or 2πR.

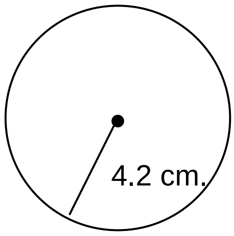
1.



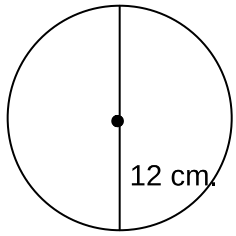
2.



3.



4.



Additional Exercise

Solve these problems. Use either πD or 2πR.

1. A circular tank has a diameter of 3.2 metres. Find its circumference. **(10.048 metres)**
2. A bicycle wheel has a radius of 35 cm. What is its circumference? **(219.8 cm.)**
3. A coffee bottle lid has a radius of 4 cm. Calculate its circumference. **(25.12 cm.)**

Lesson 3: More Work on Finding the Perimeter/Circumference of a Circle

Outcome

Calculate the circumference of a circle using $\pi = \frac{22}{7}$.
Operate the two formulae with confidence.

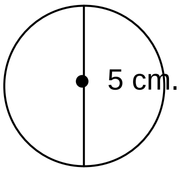
Teaching Aids

A chart showing the calculation of a perimeter of a circle using value of $\pi = \frac{22}{7}$.

Teaching for Understanding

Let the children sit in front. Do more examples on how to calculate the perimeter of a circle on the board.
Put up a chart showing the calculation of the perimeter of a circle with approximated values of π as $\frac{22}{7}$.

For example:



$C = \pi D$

$= \frac{22}{7} \times 5$ (Make 5 a fraction)

$= \frac{22}{7} \times \frac{5}{1}$ (Cancel where possible)

Multiply numerators / Multiply denominators $\longrightarrow \frac{22 x 5}{7 x 1} = \frac{110}{7}$ (divide numerator by denominator)

1. 110 $= 15\frac{5}{7}$ cm.

$$\begin{array}{r} 15 \\ 7\overline{)110} \\ -\ 7 \\ \hline 40 \\ 35 \\ \hline 5 \end{array}$$

Group Work

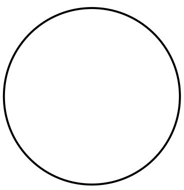
Divide the children into two groups. Collect 2 circular-faced objects and find their perimeter. Each child has to help in doing the calculation. Write out the calculation of the circumference step by step on a chart.

Display, for members of other groups to check the calculations.

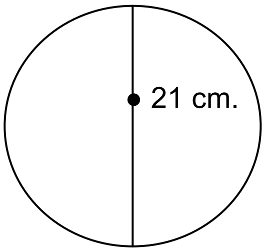
Individual Application

Calculate the circumference of these circles. Use $\pi = \frac{22}{7}$.

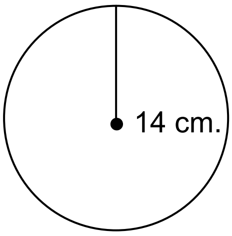
1.



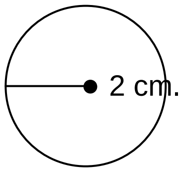
2.



3.



4.



Additional Exercise

Solve these problems. Use $\pi = \frac{22}{7}$.

1. A circle has a circumference of 24 cm. What is its diameter?

   (7.63 cm.)

2. A motorbike wheel has a perimeter of 88 cm. Use $\pi = \frac{22}{7}$ to calculate the radius. **(14 cm.)**

3. A circular face of a milk tin has a diameter of 12 cm. Use $\pi = \frac{22}{7}$ to calculate its circumference. **(37.71 cm.)**

Lesson 4: Finding the Area of a Square and a Rectangle

Outcome

Identify the formulae (L x B (w) or S x S = S^2).
Find the area of a square and a rectangle using the formula.

Teaching Aids

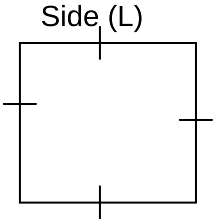
Calculated areas of a square and a rectangle on a chart (your own example)
Chart, rulers
Rectangular-faced objects and square-faced objects

Teaching for Understanding

The children sit in front where they can see all properly. Put up a chart with examples of areas of a square and rectangle. Go over the examples step by step for the children to see and follow.

eg: Area of a square (all sides equal).

Side (L)



4 cm.

Formula = Side x Side (S x S or S^2)
= 4 cm. x 4 cm.
= 16 cm^2

5 cm.

2 cm.

Formula = Length x Breadth (Width)
= L x B (W)
= 5 cm. x 2 cm.
= 10 cm^2

Group Work

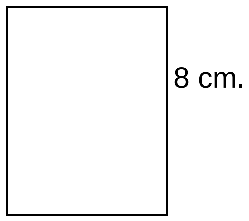
Divide the children into two groups. Each group is given a square-faced and a rectangular-faced object.
They work in groups helping to calculate step by step on a chart the areas of the objects.
Exchange the work for children in other groups to check.
Display.

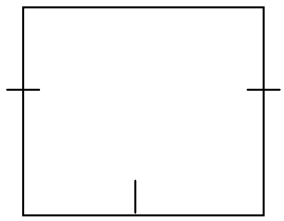
Individual Application

Compute the areas of these shapes.

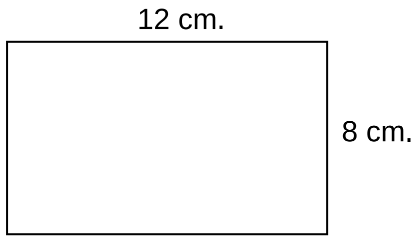
1. 5 cm.

2. 8 cm.

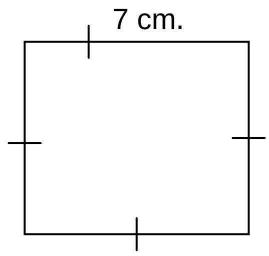




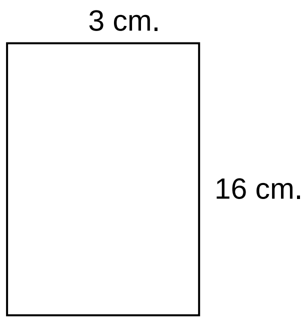
3.



4.



5.



Additional Exercise

Fill in the table below with the correct answers.

No.	L	B	Area
1.	6 cm.	9 cm.	___
2.	9 cm.	___	81 cm^2
3.	___	12 cm.	60 cm^2
4.	7 cm.	8 cm.	___
5.	4 cm.	___	72 cm^2
6.		11 cm.	132 cm^2

Lesson 5: More Work on Finding the Area of a Square and a Rectangle

Outcome

Calculate areas for rectangles and squares confidently.

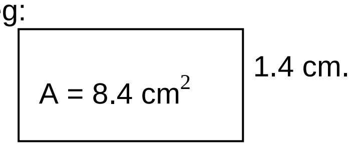
Teaching Aids

A chart of calculations with no answers
Examples of finding the area from Lesson 4
Charts, rulers etc. for group work

Teaching for Understanding

Invite the children to sit together in front while you explain and demonstrate how to calculate the area of the shapes mentioned above.
Go over the work from the previous lesson (Lesson 4) for children to understand better.
Do more example (s) for the children to see.
Do one example on calculating the missing length.

eg:



$A = L \times B$

$8.4 = 1.4 \times L$

$\frac{8.4}{1.4} = L$

$= 6$

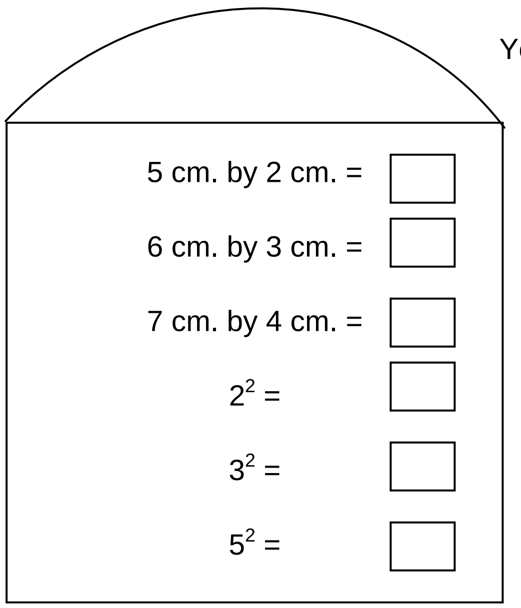
$L = 6$ cm.

Group Work

Divide the children into two groups, then make them sit in their teams. Have them play a “Look and Say Game” on calculating the areas of the above shapes (square and rectangle).

Make sure the values of lengths and breadths have been prepared on the chart.

For example:

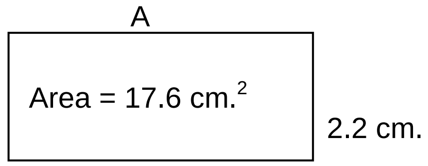


You can add more to the list.

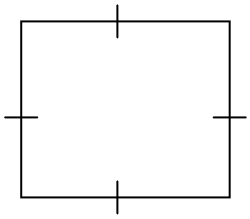
One child from each team will turn away from the blackboard. When the signal is given, these two children will face the front. You then point to any calculation on the chart. The first child to get the correct product should win a point for his/her group. Continue the game until everyone in the teams has had a turn. The team with more points is the winner.

Individual Application

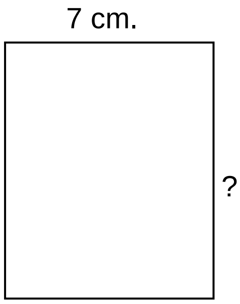
Find the missing length.

1.


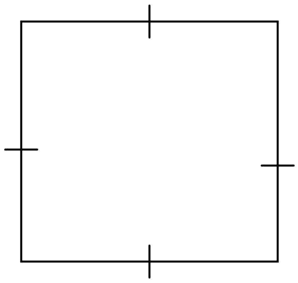
A = 17.6 cm.^{2}
L = ?
B = 2.2 cm.

2.


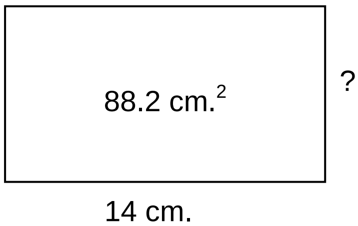
A = 36 cm.^{2}
S = ?

3.


Area = 105 cm.^{2}
B = 7 cm.
L = ?

4.


Area = 144 cm.^{2}
S = ?

5.


Area = 88.2 cm.^{2}
L = 14 cm.
B = ?

Additional Exercise

Circle the correct answer.

1.	3.2 cm. by 5 cm. =	a)	16.4cm.
		b)	16 cm^2
		c)	16 cm.
2.	4.5 cm. by 4 cm. =	a)	18 cm^2
		b)	9 cm^2
		c)	9 cm.
3.	2.7 cm. by 6 cm. =	a)	17.4 cm^2
		b)	16.2 cm.
		c)	16.2 cm^2
4.	8 cm. by 5.1 cm. =	a)	408 cm^2
		b)	40.8 cm.
		c)	40.8 cm^2
5.	9 cm. by 7.3 cm. =	a)	6.57 cm^2
		b)	65.7 cm^2
		c)	657 cm^2

Lesson 5: Finding the Area of a Triangle

Outcome

Calculate the area of a triangle
Use the formula: $\frac{1}{2}$ base x height = $\frac{1}{2}$ bh or $\frac{\text{base x height}}{2} = \frac{\text{bh}}{2}$
Identify the base and height of a triangle

Teaching Aids

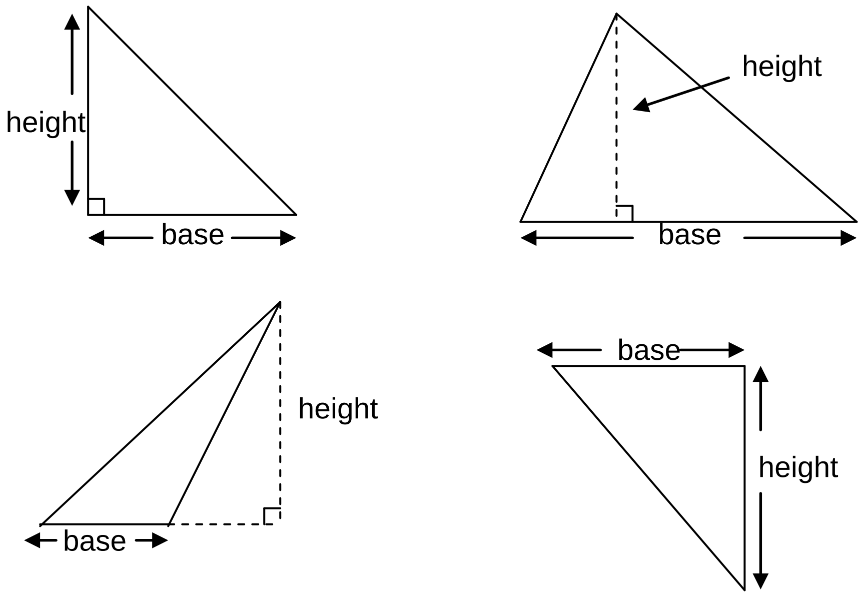
A chart of the calculated area of a triangle (for teacher's example).
Charts (for group work)
Rulers
Sketches of triangles

Teaching for Understanding

Children to sit together in front. Put up a chart with a triangle and samples of two calculations for the teacher to discuss in steps. Show all parts of a triangle used in the formula.

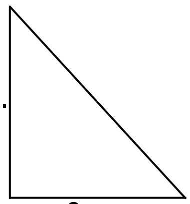
eg: Explain what is meant by (base and height).

1.



Use the formulae $\frac{1}{2}$ BH or $\frac{BH}{2}$.

1. Area of $\triangle$ = $\frac{1}{2}$ bh



$= \frac{1}{2} \times 6\text{ cm} \times 8\text{ cm}$

$= \frac{1}{2} \times \frac{6}{1} \times \frac{8}{1}$ (cancel where necessary)

$= \frac{1 \times 3 \times 8}{1 \times 1 \times 1} = \frac{24}{1} = 24\text{ cm}^2$

2. Area of $\triangle$ = $\frac{bh}{2}$

$= \frac{6\text{ cm} \times 8\text{ cm}}{2}$ (cancel)

$= \frac{24}{1} = 24\text{ cm}^2$

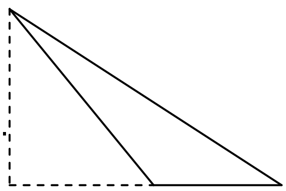
Group Work

Divide the children into two groups.
They copy the triangular shapes from your chart (above) onto their own chart.
They mark the base and height, then use the two formulae for finding the area of the triangle as in your examples.
They do the calculations step by step and write them down.
Make sure all group members are involved in the working out.
Display group work.

Individual Application

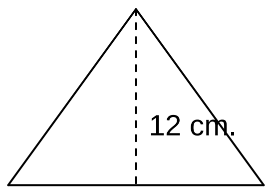
Calculate the area of these triangles using any formula preferred.

1.



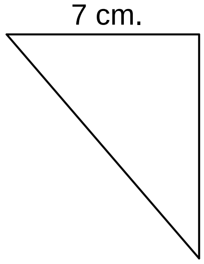
(15 cm^2)

2.



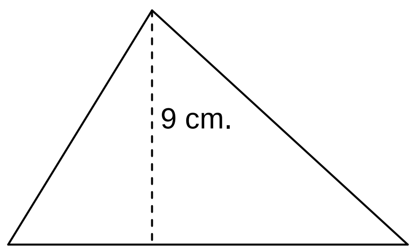
(60 cm^2)

3.



(35 cm^2)

4.



(72 cm^2)

Additional Exercise

Match each triangle to the correct answer.

A	B
8 cm. by 9 cm.	48 cm^2
12 cm. by 8 cm.	30 cm^2
6 cm. by 14 cm.	54 cm^2
4 cm. by 15 cm.	36 cm^2
9 cm. by 12 cm.	42 cm^2

Lesson 7: More Work on Finding the Area of a Triangle

Outcome

Calculate the area of a circle using both formula
Calculate missing lengths when areas are provided

Teaching Aids

Chart with the calculation of the area using both formulae (from Lesson 6)
Chart on calculating the missing base or height where the area has been provided

Teaching for Understanding

Let children sit together in front. See that they are really ready for another discussion on the missing height or base of a triangle. Put up the chart with the calculations for the area of the triangle using the two formulae.

Go over them step by step for the children to have a clearer understanding. Then put up another chart that will help them to find the missing base or height where the area is provided. Help them with the steps in calculating.

For example:
Use any formula

Area = 36 cm^2
Base = 8 cm $\longrightarrow$ A = $\frac{bh}{2}$

Find the height

do to both side
$$\left\{\begin{array}{lll} 2 \text{ x } 36 \text{ cm} = \frac{8h}{2} \text{ x } \frac{2}{1} & & \text{(Introduce equation)} \\ & & \text{(opposite of ÷ is x)} \\ \frac{72}{8} & = \frac{8h}{8} & \text{(opposite of x is ÷)} \\ & & \text{(cancel)} \\ 9 \text{ cm} & = h & \end{array}\right.$$

Try one more example (if necessary) for Formula $\frac{1}{2}$ bh.
Show all instructions needed for the children to see.

Group Work

Divide the children into two groups. Give each group an exercise to do on finding the missing base or height. Do it on a chart.

Each group member will help to work out the missing answer. They have to put in instructions that are needed in the calculation (step by step) as done in the teacher's example.

eg:

Area = 24 cm^2, Height = 8 cm, Base = ?

Formula $A = \frac{bh}{2}$

Equation $\longrightarrow$ $24 = \frac{b \times 8}{2}$ (Opposite of ÷ is x)

(do to both sides) $24 \times 2 = \frac{b \times 8}{2} \times \frac{2}{1}$ (cancel)

$48 = b \times 8$ (8b) (opposite of x is ÷)

(do to both sides) $\frac{48}{8} = \frac{b \times 8}{8}$ (cancel)

6 cm = b $\longrightarrow$ base = 6 cm

or $A = \frac{1}{2}bh$

$24 = \frac{1}{2}b \times 8$ (opposite of x is ÷)

(do to both side) $\frac{24}{8} = \frac{1}{2}b \times \frac{8}{8}$ (cancel)

$3 = \frac{1}{2}b$ (opposite of $\frac{1}{2}$ x $\frac{2}{1}$ (reciprocal))

$3 \times \frac{2}{1} = \frac{2}{1} \times \frac{1}{2}b$ $\longrightarrow$ (cancel)

$\frac{6}{1} = b$

6 cm = b base = 6 cm

Display work for other groups to check.

Individual Application

Calculate the missing height of these triangles

1. Area = 16 cm^2, base = 4 cm. height = ? **(8 cm.)**
2. Area = 20 cm^2, base = 8 cm. height = ? **(5 cm.)**
3. Area = 32 cm^2, base = 16 cm. height = ? **(4 cm.)**
4. Area = 54 cm^2, base = 12 cm. height = ? **(9 cm.)**

Additional Exercise

Solve these problems.

1. A triangular board has an area of $7\frac{1}{2}$ m^2 and a height of 5m., what is its base? **(3 m.)**

2. A garden in the form of a triangle has a base of 7m. and a height of 8m. Calculate its area. **(28 m^2)**

3. One side of the roof is triangular. Find its area when the base is 4m. and the height is 5m. **(10 m^2)**

4. A triangular field has an area of $48m^2$. Find the base when the height is 8m. **(12 m.)**

Lesson 8: Finding the Area of a Circle

Outcome

Identify the formula for finding the area of circle.
Calculate the area using the formula.

Teaching Aids

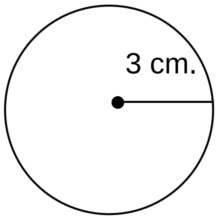
A chart with an example of the working out of the area (circle)
Chart, rulers, circular objects for group work

Teaching for Understanding

Let the children sit together in front. Put up the chart with an example on. Discuss the work and the formula to be used. Go over the example step by step.

eg:

1. When radius is given



Formula $\longrightarrow$ πr^2

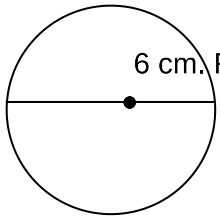
$A = \pi r^2$

$= 3.14 \times (3 \times 3)$

$= 3.14 \times 9$

$= \mathbf{28.26\ cm^2}$

2. When diameter is given.



D = 6 cm
R = (half of d)
R = $\frac{6}{2}$
= 3 cm

$A = \pi r^2$

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

$= \frac{22}{7} \times \frac{9}{1} = \frac{22 \times 9}{7 \times 1}$

$= \frac{198}{7}$

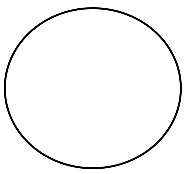
$= \mathbf{28\frac{2}{7}\ cm^2}$

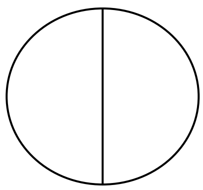
Group Work

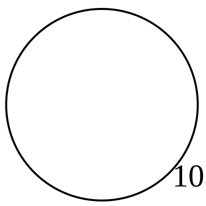
Divide the class into two groups. Give them any circular object and a chart and rulers. The will use the circular object to draw a circles on a chart. They measure the radius or diameter and write the steps in calculating the area of the circle. Then display work for members of other groups to check.

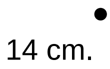
Individual Application

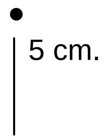
Calculate the area of these circles. (Use $\pi = \frac{22}{7}$)

1. 

2. 

3. 





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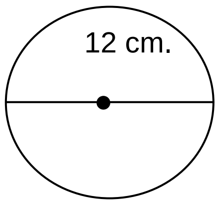

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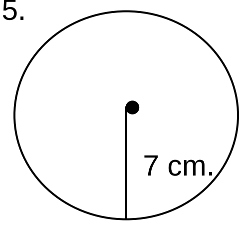


Additional Exercise

Solve these problems. Use $\pi = \frac{22}{7}$

1. A milk tin has a circular base. It has a radius of 7 cm. What is its area?
2. The top of a kerosene drum has a diameter of 56 cm. What is its area?
3. The circular base of a tank has a radius of 2m. Calculate its area.

Lesson 9: More Work on Finding the Area of the Circle

Outcome

Calculate the area using the three forms of π

Teaching Aids

As in Lesson 8

A chart with squared figures on (for group work)

Teaching for Understanding

Children to sit together in front. Put up a chart used in Lesson 8 for more discussion, in order to get a clear understanding on the calculation. Put up another example to tackle using any value of π such as $\frac{22}{7}$, 3.14, 3.1 or 3.

eg: Find the area of a circle of radius 2 cm.

Use $\pi = 3.1$	Use $\pi = 3$
$A = \pi r^2 \rightarrow (r \times r)$	$A = \pi r^2$
$= 3.1 \times (2^2)$	$= 3 \times (2^2)$
$= 3.1 \times 4$	$= 3 \times 4$
= **12.4 cm^2**	= **12 cm^2**

Group Work

Divide the class into two groups. Have them play a "Look and Say" game on figures that are squared already prepared on the chart. Each child turns away from the board/chart then turns back whenever the signal is given. The one who gives the answer first will get a mark for his/her team. The team which has more marks is the winner.

Individual Application

Calculate the area of these circles. Use $\pi = 3.1$

1. r = 5 cm **(77.5 cm^2)**
2. r = 6 cm **(111.6 cm^2)**
3. d = 8 cm **(49.6 cm^2)**
4. d = 14 cm **(151.9 cm^2)**
5. r = 9 cm **(251.1 cm^2)**

Additional Exercise

Write True or False beside each statement.

1. A circle with an area of 12.56 cm^2 has a radius of 2 cm. (Use π = 3.14)
2. The formula for finding the area of a circle is $2\pi r^2$.
3. A circle with a diameter of 14 cm has an area of 308 cm^2.
4. r^2 means r + r.
5. The value of π is not exact, but approximated.

Lesson 10: Assessment

Group Work

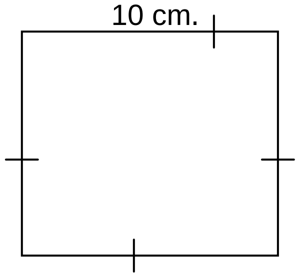
Divide the children into two groups. Each group has to find any triangular-faced object in the classroom.

They will help each other in finding the area using the two formulae they have been given. Make sure that all of the group members participate in the work.

Individual Application

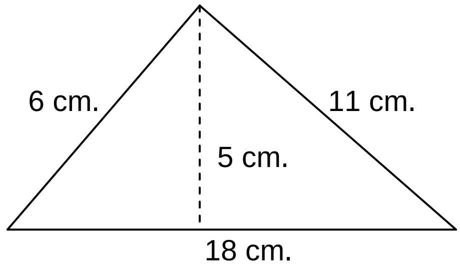
1. Calculate the perimeter of the shapes below. Use the formulae you have studied in previous lessons.

a.



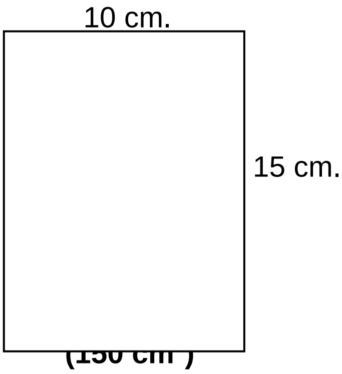
(100 cm^2)

b.



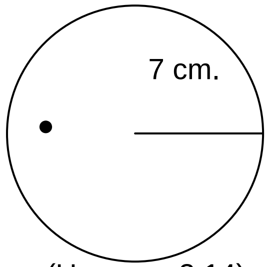
(45 cm^2)

3.



(150 cm^2)

4.



(Use π = 3.14)

(153.86 cm^2)

2. Calculate the missing length of these shapes. Use the method from previous lessons.

a. Rectangle: A = 84 cm^2
b = 7 cm
L = ?

(12 cm)

b. Square: A = 144 cm^2
S = ?

(12 cm)

c. Rectangle: A = 73.6 cm^2
b = 8 cm
L = ?

(9.2 cm)

d. Square: A = 169 cm^2
S = ?

(13 cm)

3. Solve these problems.

1. A rectangular field has a length of 24 m. and a width of 18 m. What is its area? **(432 m^2)**
2. A triangular banana plantation has a base of 15 m and a height of 12 m. What is its area? **(90 m^2)**
3. A square board has sides of 14 cm. Calculate its area. **(196 cm^2)**

4. The table top has an area of 6 m^2. Find its length if its breadth is 2 m. **(L = 3 m.)**

4. Find the area of these triangles.

1. B = 8 cm. **(24 cm^2)**
   H = 6 cm.

2. B = 9 cm. **(31.5 cm^2)**
   H = 7 cm.

3. B = 12 cm. **(54 cm^2)**
   H = 9 cm.

4. B = 13 cm. **(65 cm^2)**
   H = 10 cm.

5. Calculate the area of these circles. Use π = 3.1

a) R = 4 cm. **(49.6 cm^2)**
b) D = 10 cm. **(77.5 cm^2)**
c) R = 9 cm. **(251.1 cm^2)**
d) D = 20 cm. **(310 cm^2)**

2. Match the measurements in column A with the area in column B.

A	B
12 cm. by 9 cm.	169 cm^2
b = 10 cm., h = 14 cm.	314 cm^2
13^2	108 cm^2
π = 3.14, R = 10 cm.	104 cm^2
b = 13 cm., h = 16 cm.	70 cm^2