Supplementary Study Pack for Underperforming Schools

MATHEMATICS
Class 6

March 2021

NOT FOR SALE

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TEACHERS' GUIDE

Dear Teacher,

This piece of work is prepared by the Teaching Service Commission (TSC) for primary school pupils of class 6. The notes are useful for pupils who will be attempting the National Primary School Examination (NPSE) and the aim is to improve learning achievement for weak or underperforming schools at the NPSE nationwide.

As a mathematics teacher, you already know the subject therefore your lesson must be approached from a child centered perspective.

Your lesson is expected to be interesting and allow pupils to learn by:

- Carrying out the calculations themselves
- Drawing group items, collecting and constructing

By doing this, please make use of local concrete materials which the pupils are familiar with and can conveniently handle and manipulate with. The materials may include counters, fruits, stones, vanguards (papers), markers/crayons, empty tins/cans, charts, bottle tops etc.

In the teacher's explanations, demonstrations or calculations, please use simple language to effectively communicate with the pupils.

TABLE OF CONTENTS

UNIT 1 NUMBERS AND NUMERATION
(35 minutes)

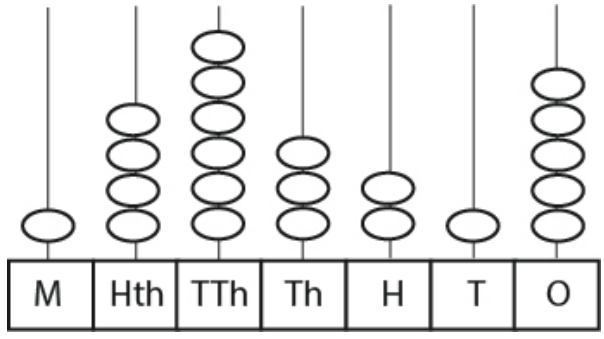
LEARNING OUTCOME:

By the end of the lesson the pupils will be able to write the value of a digit on number.

TEACHER'S GUIDE

Teacher to write down the place value table on the board for pupils to see.

Example 1. THE ABACUS SYSTEM

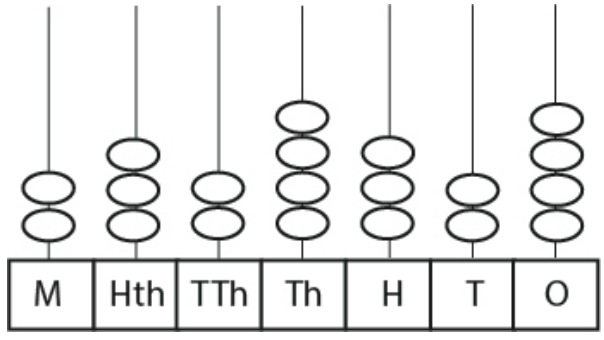


This abacus has seven place values.

What are they?

1 million + 400 thousand + 60 thousand + 3 thousand + 2 hundred + 10 + 5
1,000,000 + 400,000 + 60,000 + 3,000 + 200 + 10 + 5

Example 2.



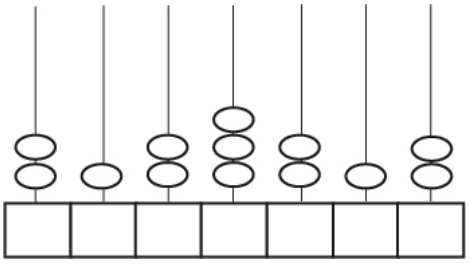
This abacus has seven place values.

What are they?

2,324,324
2 million, 324 thousand, 3 hundred and 24
2 million, 3 hundred thousand, 2 ten – thousands
4 thousand, 3 hundred, 2 tens, 4 ones.

EXERCISE: Write the numbers which each abacus shows.

1.



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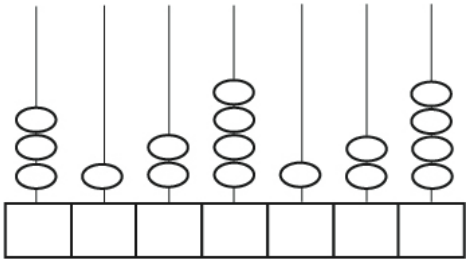

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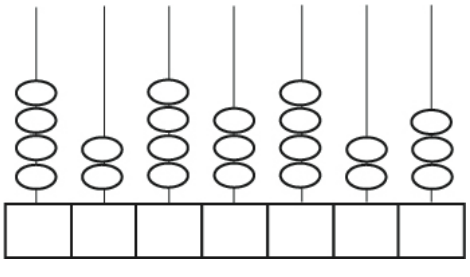


What is the value of the digit circled in each of the following numbers?

(4.) 3 (6) 1 4 7 0 5 **(5.)** (8) 5 4 1 7 0 5

Write the following numbers in figures

(6.) Six Million
(7) Sixteen Million and nine
8) Three hundred and fifty two million
(9) Four Hundred Million
(10) Thirty two million, two hundred and five thousand, two hundred and forty-nine.

UNIT 2 EVEN, ODD AND PRIME NUMBERS,
(35 minutes)

LEARNING OUTCOME:

By the end of the lesson the pupils will be able to understand the properties of numbers.

TEACHER'S GUIDE

Teacher to explain the properties of numbers clearly and then give appropriate examples.

PUPIL'S GUIDE

Pupils must ensure to copy all examples in their exercise books and do more independent practice.

EVEN NUMBERS These are numbers that can be divided by 2 without a remainder for example, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, and so on.

ODD NUMBERS Numbers that cannot be divided by 2. for example, 1, 3, 5, 7, 9, 11, 13, etc. A whole number which is not exactly divisible by 2 is called an odd number.

PRIME NUMBERS: these are numbers with just two factors that is one and the number itself for example., 2, 3, 5, 7, 11, 13, 17, 23, 29, 31, 37, 41, 43, 47, 53, 59, and so on.

EXERCISE 1

1. Write O for Odd or E for Even for each of these numbers
   (a.) 15 (b.) 21 (c.) 176 (d.) (d.) 811 (e) 884

2. Circle the prime numbers in this diagram.

61	62	63	64	65	66
67	68	69	70	71	72
73	74	75	76	77	78
79	80	81	82	83	84

HIGHEST COMMON FACTOR AND LOWEST COMMON MULTIPLE (HCF AND LCM)

FACTORS

Factors are numbers that can divide into other numbers without a remainder.

Factors of 6 are 1, 2, 3, 6 (all these numbers can divide into 6 without a remainder)
factors of 12 are 1, 2, 3, 4, and 12

Multiples

Multiples are the answers in the times tables of a number.
Multiples of 2 are 2,4,6,8,10,12,…
Multiples of 3 are 3,6,9,12, …
Multiples of 10 are 10, 20, 30, 40, …

LCM

From the above multiples of 2 and 3, the common multiple between them is 6 and 12.
Since 6 is smaller than 12, then the LCM of 2 and 3 = 6

HCF – The largest (biggest) common divisor of two or more numbers without a remainder.

Another example: LCM of 10, 15 and 20 go into 60

10 goes into 60 ten times

15 goes into 60 four times

20 goes into 60 three times

You can find the **lowest common multiple (LCM)** of two numbers by listing the first few multiples of each number.

Find the LCM of 10 and 15.

Multiples of 10: 10, 20, (30), 40, 50, 60

Multiples of 15: 15, (30), 45, 60, 75, 90

Another simple way to find LCM is to write the number as a product of its prime factors.

Example 1: Find the LCM of 60 and 45

Solution

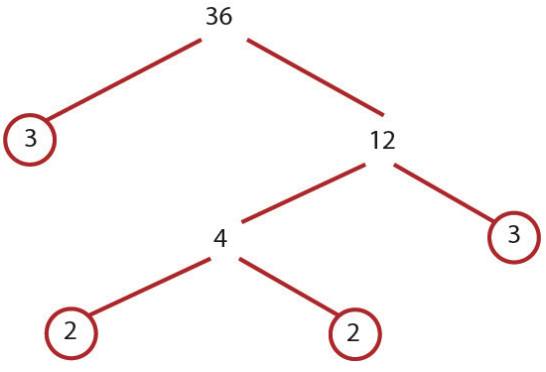
List the prime factors of each number first.

60 = 2 x 2 x 3 x 5 45 = 3 x 3 x 5

60 = 2 x 2 x ~~3 x 5~~. Therefore, the LCM of 60 and **45 = 3 x 5 = 15**
45 = 3 x ~~3 x 5~~

PRIME FACTORISATION – Breaking a number in to the product of its prime factors

Prime Factorisation



$36 = 2 \times 2 \times 3 \times 3$

$= 2^2 \times 3^2$

HCF - The highest common factor (HCF) is the largest or greatest factor common number that can divide in to two or more given numbers. For example, the HCF of 4, 6 and 8 is 2

$4 = 2. \times 2$

$6 = 3 \times 2$

$8 = 4 \times 2$

Here, the highest common factor of 4, 6 and 8 is 2

Example 2

Find the Highest Common Factor of 25, 35 and 45

Solution 1: Given, three numbers as 25, 35 and 45

We know,

$25 = 5 \times 5$

$35 = 5 \times 7$

$45 = 5 \times 9$

we can say 5 is the only common factor for all the three numbers.
Therefore, 5 is the HCF of 25, 35 and 45.

EXERCISE 2

Find the HCFs of these pairs of numbers

(1.) 8 and 24 (2) 18 and 45 (3) 72 and 90

(4) 15 and 45 (5) 20 and 55 (6) 56 and 48

(7) 42 and 98

EXERCISE 3

Find the LCMs of these groups of numbers

(1.) 3 and 9 (2.) 2, 3 and 4 (3.) 2, 5 and 10

(4.) 8, 16 and 20 (5.) 10, 30, 100

UNIT 3 APPROXIMATIONS
(35 minutes)

LEARNING OUTCOME:

By the end of the lesson the pupils will be able to write a number to the nearest 10,100 or 1000 and carry out simple rounding of numbers.

TEACHER'S GUIDE

To explain rounding of numbers carefully for weaker pupil's to understand. Tell the pupils to copy examples in their exercise books.

PUPIL'S GUIDE

Pupils must remember that multiplying by 10 increases the number by 1 digit and multiplying by 100, increases the number by 2 digits.

Approximation is an estimate of a number or an amount that is almost correct.

Example 1 Write these numbers to the **nearest ten**.

19 to the nearest ten is 20

23 to the nearest ten is 20

29 to the nearest ten is 30

64 to the nearest ten is 60

41 to the nearest ten is 40

65 to the nearest ten is 70

92 to the nearest ten is 90

EXERCISE 1 Write these numbers to the nearest ten.

1. 25 2. 74 3. 83 4. 95 5. 88 6. 46 7. 37 8. 46 9. 86 10. 433

Example 2. Write these numbers to the nearest hundred

650 to the nearest hundred is 700

450 to the nearest hundred is 500

297 to the nearest hundred is 300

198 to the nearest hundred is 200

340 to the nearest hundred is 300

423 to the nearest hundred is 400

EXERCISE 2 Write these numbers to the nearest hundred.

(1.) 750 (2.) 297 (3.) 452 (4.) 232 (5.) 186

(6.) 444 (7.) 333 (8.) 688 (9.) 873 (10.) 335

To write a number to nearest thousand (1000)

Example 2 Write these numbers to the nearest thousand.

7250 to the nearest thousand is 7000

6712 to the nearest thousand is 7000

3400 to the nearest thousand is 3000

2300 to the nearest thousand is 2000

3500 to the nearest thousand is 4000

2345 to the nearest thousand is 2000

EXERCISE 3 Write these numbers to the nearest thousands.

(1.) 4400 (2.) 1500 (3.) 3340 (4.) 2134 (5.) 1500

(6.) 4450 (7.) 4772 (8.) 5568 (9.) 6147 (10.) 6445

UNIT 4 FRACTIONS (35 minutes)

LEARNING OUTCOME:

By the end of the lesson the pupils will be able to solve problems involving fractions.

A fraction is a part taken from a whole.

The top number is called the numerator, while the bottom number is called the denominator.

For example in the fraction $\frac{3}{4}$, the top number 3 is the numerator and the bottom number 4 is the denominator

Fractions can be thought of as another way of seeing division. If you have one whole pizza and two people want to share it equally, they will divide it into two halves

There are three types of fractions, namely:

1. **Proper fraction**: has its numerator smaller than its denominator.

   Examples: $\frac{2}{3}, \frac{1}{2}, \frac{3}{4}, \frac{5}{6}, \frac{9}{10}, \frac{11}{13}, \frac{30}{40}, \frac{15}{16}, \frac{8}{9}$ etc.

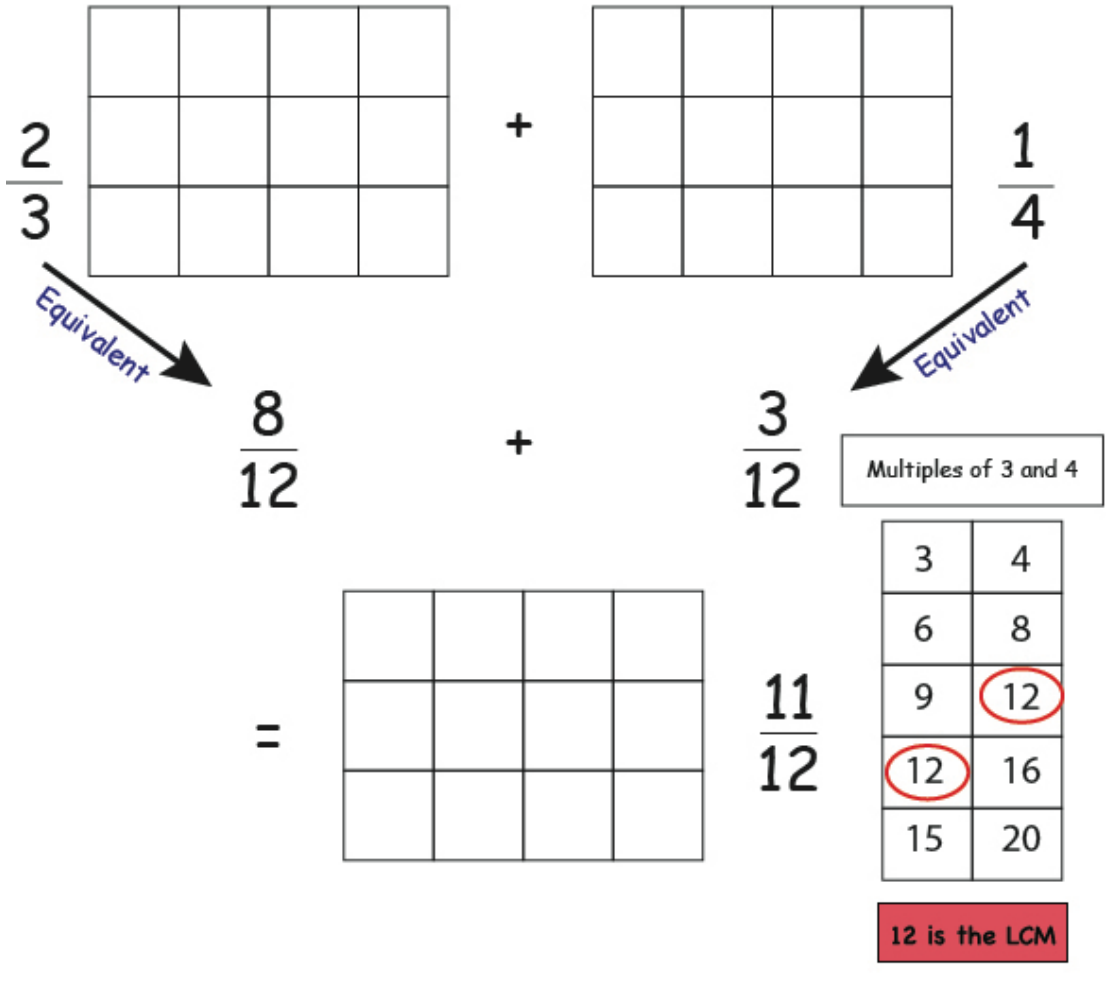
2. Improper fraction has its numerator greater than its denominator.

   Examples: $\frac{5}{4}, \frac{7}{3}, \frac{9}{5}, \frac{4}{3}, \frac{6}{5}, \frac{10}{9}, \frac{15}{8}, \frac{13}{11}, \frac{40}{30}, \frac{6}{2}$ etc.

3. Mixed fraction consists of a whole number and a fraction.

   Examples: $2\frac{3}{4}, 3\frac{1}{10}, 1\frac{3}{4}, 2\frac{2}{5}, 3\frac{1}{6}, 6\frac{10}{11}, 3\frac{1}{2}, 3\frac{1}{4}, 5\frac{4}{7}, 1\frac{2}{3}, 7\frac{2}{3}, 10\frac{11}{12}$

Addition of Fractions



Example 1 Add $1\frac{12}{3} + \frac{1}{2}$

Solution

Step 1: change the mixed number to an improper fraction $\frac{5}{3} + \frac{1}{2}$ (Note: $3 \times 1 = 3, 3 + 2 = 5$)

Step 2: rewrite the fractions over a common denominator (here, 6) $\frac{10}{6} + \frac{3}{6}$

Step 3: Add the numerators. $\frac{13}{6}$

Step 4: Write the fraction in the simplest form. $2\frac{1}{6}$

Multiplication of Fractions

Change any whole number or mixed numbers into improper fractions. Multiply the numerators then multiply the dominators. Then write your answer in its simplest form.

Example 2 Multiply $2\frac{2}{3} \times \frac{1}{2}$

Solution

Step 1: Change the mixed number to an improper fraction $\frac{8}{3} \times \frac{1}{2}$

Step 2: Multiply the numerators first and then the denominators $\frac{8}{3} \times \frac{1}{2} = \frac{8}{6} = 1\frac{2}{6}$

Step 3: Write the fraction in its simplest from = $1\frac{1}{3}$

EXERCISE 1

Simplify the Following

1. $\frac{2}{5} + \frac{2}{10}$
2. $\frac{3}{10} + \frac{3}{5}$
3. $\frac{2}{8} + \frac{2}{4}$
4. $\frac{1}{6} + \frac{9}{18}$
5. $2\frac{2}{4} + \frac{3}{4}$
6. $3\frac{5}{7} + \frac{4}{7}$

UNIT 5 DECIMALS
(35 minutes)

LEARNING OUTCOME:

By the end of the lesson the pupils will be able to apply rounding decimals to solve problems.

TEACHER'S GUIDE

Teachers to ensure the use of column method for both addition, subtraction and multiplication.

A decimal is another form of fraction; it is written after points or decimal markers. 3.1426.284, 610 and so on. Note that all figures after the decimal point are pronounced one by one. E.g., 9.745 is pronounced a as "nine point seven four five" and not nine point seven hundred and forty five.

Decimal Places

In order to determine the number of decimal places contained in a figure, we count the number of digits after the decimal point. Zeros after the decimal are counted if found in – between non-zero digits. The last zero in a decimal number is not counted. Decimal place is shortened to d.p.

Example 1

(a.) 0.00630427
= 0.0063043 to 7 d. p
= 0.006304 to 6 d. p
= 0.00630 to 5 d. p
= 0.0063 to 4 d. p
= 0.006 to 3 d. p

(b.) 15.300649
= 15.30065 to 5 d. p
= 15.3006 to 4 d. p
= 15.301 to 3 d. p

EXERCISE 1

Round the following to one decimal place.

a. 17.12 b. 18.63 c. 7.07 d. 0.35 e. 0.89 f. 0.98
g. 22.456 h. 55.04

Example 2

Write the following fraction as decimals.

1. $\frac{2}{5} = 0.4$ 2. $\frac{3}{10} = 0.3$ 3. $\frac{4}{10} = 0.4$ 4. $\frac{1}{2} = 0.5$ 5. $\frac{7}{10} = 0.7$

EXERCISE 2.

1. $\frac{6}{10}$ 2. $\frac{5}{10}$ 3. $\frac{33}{10}$ 4. $\frac{75}{100}$ 5. $\frac{7}{100}$ 6. $\frac{1}{5}$ 7. $\frac{56}{100}$ 8. $\frac{2}{10}$ 9. $\frac{5}{10}$ 10. $\frac{6}{60}$

Addition of Decimals

The arrangements here must be in columns, the decimal points aligned with one another.

Example 1 the following numbers

(a.) Add up 3, 42, 4.761, 3.04, 6.3, 11.304

Solution

3.420
4.761
3.040
6.300
11.304
28 .825

EXERCISE 3 Find the sum of the following numbers

(1.) 2.6 + 5.3 (2.) 4.8 + 3.4 (3.) 5.6 + 3.8 (4.) 3.8 + 2.8

(5.) 8.53 + 2.48 (6.) 1.63 + 3.49 (7.) 3.440 + 5.025 + 1.256

(8.) 26.601 + 53.349 + 75.292 (9.) 10.605 + 37.413 + 13.576

(10.) 4.5 + 9.6

UNIT 6 ADDITION AND SUBTRACTION
(35 minutes)

LEARNING OUTCOME:

By the end of the lesson the pupils will be able to apply addition and subtraction of whole numbers and decimals to solve money problems.

TEACHER'S GUIDE

Teachers to ensure the use of column method for both addition and subtraction.

Adding 2-digit numbers

Example 1

Add 26 + 41

Solution

Step 1: Arrange the numbers vertically so that the tens place digits, and ones place digits are lined up which means one number should be written above the other number. Draw a line under the bottom number.

$$\begin{array}{r} 26 \\ +\,41 \\ \hline \end{array}$$

Step 2: Add the ones' place digits (6 + 1 = 7)

Step 3: Then add the tens' place digits (2 + 4 = 6)

$$\begin{array}{r} 26 \\ +\,41 \\ \hline 67 \end{array}$$ Hence 26 + 41 = 67

Example 2 Add 53 + 32

Solution

Step 1: Arrange the numbers vertically so that the tens' place digits and ones' place digits are lined up which means one number should be written above the other number. Draw a line under the bottom number.

$$\begin{array}{r} 53 \\ +32 \\ \hline \end{array}$$

Step 2: Add first the ones' place digits (3 + 2 = 5)

$$\begin{array}{r} 53 \\ +32 \\ \hline 5 \end{array}$$

Step 3: Then add the tens' place digits (5 + 3 = 8)

$$\begin{array}{r} 53 \\ +32 \\ \hline 85 \end{array}$$ Hence 53 + 32 = 85

Addition of 3-digit numbers

Example 3 Add 354 + 616

Solution

Step 1: Arrange the numbers vertically so that the tens place digits, ones' place digits and the hundred place digits are lined up which means one number should be written above the other . Draw a line below the number at the bottom

$$\begin{array}{r} 354 \\ +\,616 \\ \hline \end{array}$$

Step 2: Add first the ones' place digits (4 + 6 = 10) write down the zero (0) and carry the one (1) to the next place value.

$$\begin{array}{r} 354 \\ +\,616 \\ \hline 970 \end{array}$$ Hence 354 + 616 = 970

EXERCISE 1 Add the following numbers.

(1.) 36 + 21 (2.) 21 + 17 (3.) 44 + 52 (4.) 27 + 32 (5.) 50 + 90

(6.) 321 + 273 (7.) 720 + 498 (8.) 987 + 235 (9.) 118 + 527

(10.) 207 + 498

Subtraction of one-digit numbers

In subtracting 1-digit number we will subtract or minus two one-digit number and find the difference between them.

In arithmetic, this is written as: 6 – 2 = 4

Subtracting two-digit numbers

Subtracting 2-digit numbers we will subtract or minus a two-digit number from another two-digit number. To find the difference between the two numbers we need to use the column method where numbers are written vertically.
Subtract 41 from 63

Example 4

Solution
Step 1: First arrange the numbers vertically so that the tens' place digit and ones' place digits and lined up which means one number should be written above the other number. Draw a line under the bottom number.

```
 6 3
- 4 1
```

Step 2: Subtract the digits in the ones place. Subtract (3 – 1 = 2). Place 2 in the ones column as shown.

```
 6 3
- 4 1
   2
```

Step 3: Subtract the digits in the tens place. Subtract (6 – 4 = 2). Place 2 in the tens column as shown.

```
 6 3
- 4 1
 2 2
```

Hence the difference of 63 – 41 is 22

EXERCISE 2

Subtract the following numbers

1. 17 – 12
2. 25 – 11
3. 39 – 13
4. 48 – 20
5. 56 – 14
6. 88 – 22
7. 98 – 15
8. 9 – 2
9. 8 – 4
10. 6 – 2
11. 7 – 5
12. 8 – 6
13. 6 – 3

15 9 – 3

15. 4 – 2

UNIT 7 MULTIPLICATION AND DIVISION
(35 minutes)

LEARNING OUTCOME:

By the end of the lesson the pupils will be able to multiply and divide whole numbers of decimals to solve problems.

TEACHER'S GUIDE

Teachers to ensure the use of column method of multiplication.

To multiply a number by 10, means the number increases by 1 digit. To do this, you move the digits of the number one place to the left and fill the vacant place with 0 (zero).

7 x 10 = 70 65 x 10 = 650

To multiply a number by 100, the number increases by 2 digits. To do this, move the digits of the number two places to the left and fill the vacant places with 0s (zeros).

8 x 100 = 800 37 x 100 = 3700

EXERCISE 1

Multiply the following numbers by 10 .

1. a. 6 b. 35 c. 49 d. 56 e. 78
2. a. 36 b. 48 c. 53 d. 69 e. 76
3. a. 306 b. 428 c. 730 d. 856 e. 978

Example 1

Multiply 3216 by 45.

Solution

$$\begin{array}{rll} & 3216 & \\ \times & 45 & \\ \hline & 16080 & (3216 \times 5) \\ & 128640 & (3216 \times 40) \\ \hline & 144720 & \end{array}$$

3216 x 45 = 144 720

NOTE:

The most important thing to remember when multiplying is that you must multiply all of the digits in the top number by all of the digits in the bottom number.

Example 2

(1) 123 x 3

Solution

3 x 3 = 9

2 x 3 = 6

1 x 3 = 3

Answer: 123 x 3 = 369

EXERCISE 2

Multiply the following numbers

1. 98 x 6 2. 86 x 14 3. 77 x 59 4. 1321 x 5 5. 4023 x 3

Division:

Dividing a number by 10, means the number moves one place to the right.

73 ÷ 10 = 7.3

When dividing a number by 100, the digits of the number move two places to the right.

834 ÷ 100 = 8.34

Example 3

1. 73 ÷ 10 = ☐

834 ÷ 100 = ☐

Solution

$$10\overline{)73.0}$$

7.3

70 (7 x 10)

30

30 (3 x 10)

00

2. 834 ÷ 100 = ☐

$$100\overline{)834.000}$$

8.34

800 (8 x 10)

340

300 (3 x 100)

400

400 (4 x 100)

000

3. Divide 578 by 34.

$$
\begin{array}{rl}
 & 17 \\
34\overline{)578} & (34 \times 10) \\
\underline{340} & \\
238 & \\
\underline{238} & (34 \times 7) \\
000 &
\end{array}
$$

EXERCISE 3

Divide the following numbers

1. $67 \div 10$
2. $85 \div 10$
3. $70 \div 10$
4. $58 \div 10$
5. $467 \div 10$
6. $684 \div 100$
7. $752 \div 100$
8. $4800 \div 30$
9. $960 \div 60$
10. $5400 \div 300$

UNIT 8 FRACTIONS
(35 minutes)

LEARNING OUTCOME:

By the end of the lesson the pupils will be able to carry out addition and subtraction of fractions to solve problems.

TEACHER'S GUIDE

Teacher to ensure that LCM is thoroughly explained and allow pupils to work independently.

To divide a number by a fraction, multiply the number by the reciprocal of the fraction, this means you have to flip over the second fraction that is, turn the second fraction upside down.(Reciprocate).

Example 1

1. $\frac{6}{7} \div \frac{5}{9} = \frac{6}{7} \times \frac{9}{5} = \frac{54}{35} = 1\frac{19}{35}$

2. $\frac{1}{6} \div \frac{1}{8} = \frac{1}{3} \times \frac{4}{1} = \frac{4}{3} = 1\frac{1}{3}$

3 $\frac{1}{12} \div \frac{1}{3} = \frac{1}{12} \times \frac{3}{1} = \frac{1}{4}$

4. $\frac{4}{5} \div \frac{3}{7} = \frac{4}{5} \times \frac{7}{3} = \frac{28}{15} = 1\frac{13}{15}$

EXERCISE

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

UNIT 9 DECIMALS
(35 minutes)

LEARNING OUTCOME:

By the end of the lesson the pupils will be able to apply addition and subtraction of decimals to solve money problems.

TEACHER'S GUIDE

Teachers to ensure the use of column method for both addition and subtraction.

NOTE:

Decimal numbers can be subtracted in the same way as we subtract whole numbers.

Examples

1. $\begin{array}{r} 9.3 \\ -\,4.2 \\ \hline 5.1 \end{array}$

2. $\begin{array}{r} 5.6 \\ -\,3.8 \\ \hline 1.8 \end{array}$

3. $\begin{array}{r} 9.8 \\ 4.3 \\ \hline 5.5 \end{array}$

4. $\begin{array}{r} 6.2 \\ 4.2 \\ \hline 2.0 \end{array}$

5. $\begin{array}{r} 6.68 \\ -\,2.76 \\ \hline 2.92 \end{array}$

EXERCISE

1. 6. 4 – 3.1 **2.** 3. 8 – 1.9 **3.** 4. 0 + 2.3 **4.** 6. 99 + 0.13 **5.** 5. 380 – 3.254

UNIT 10 AREA AND PERIMETERS
(35 minutes)

LEARNING OUTCOME:

By the end of the lesson the pupils will be able to calculate the area of any 2D shapes.

TEACHER'S GUIDE

Teachers to ensure pupils copy shapes in their exercise books and to remind pupils about the properties of certain 2D shapes.

Area: area of a shape inside a given shape.
Area is calculated by multiplying the length of a shape by its width.

Example 1 Find the areas of the shapes below.

a.

b.

Solution

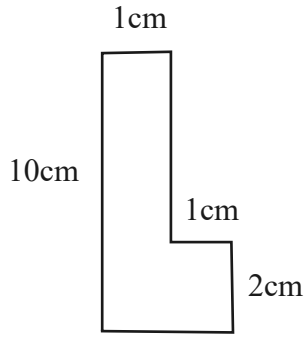
a. A = Length x width
= 4 x 3
= 12cm^2

b. Area = L x B
= 6 x 4
= 24cm^2

Compound shape – a shape made by putting together two or more shapes.

Example 2

Find the area of the compound shape below



Remember to split the shape into two small rectangles and find the area of each.

Solution

A = L x B

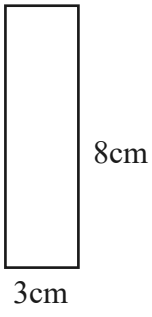
= 10 x 1 + 2 x 1

= 10cm^2 + 2 cm^2 = 12 cm^2 (Remember to split the shape in two parts)

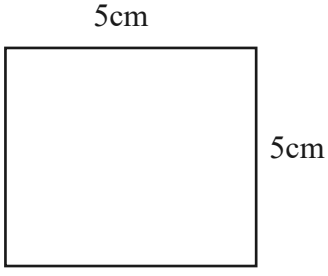
EXERCISE 1

Find the area of the following shapes

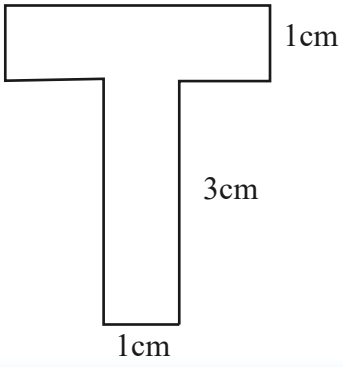
a.



b.



c.

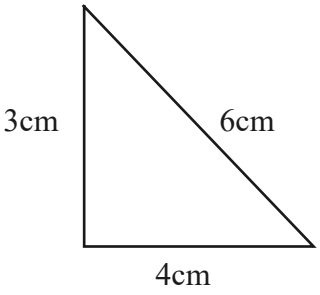


PERIMETERS

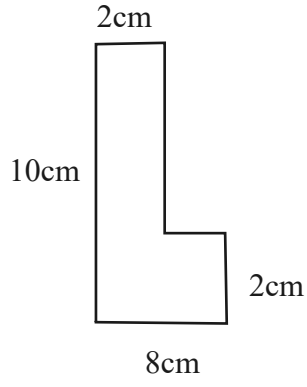
Perimeters is the distance round a shape. It is calculated by adding all the dimensions of the sides of the shape.

Example 3 Find the perimeter of the following shapes.

a.



b.

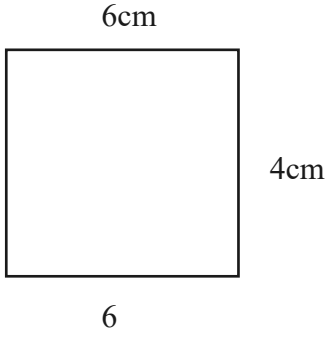


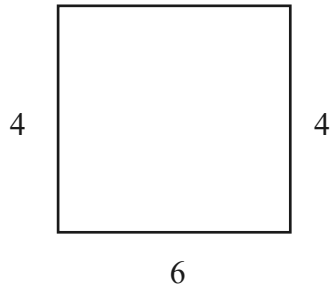
Solution

a. $P = 3 + 4 + 6$
$= 13cm$

b. $P = 10 + 2 + 8 + 6 + 2 + 8$
$= 36cm$

c.



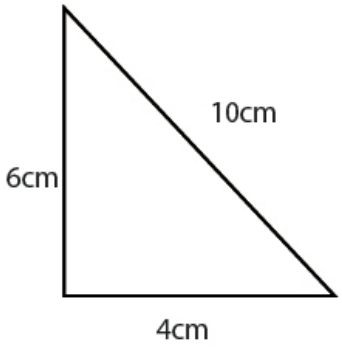


c. $P = 6 + 6 + 4 + 4$
$= 20cm$

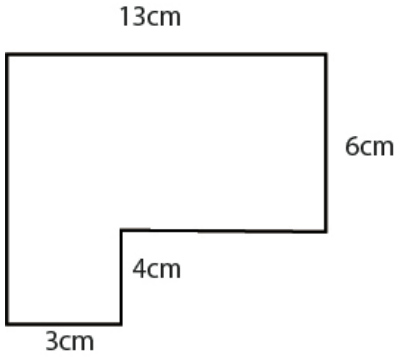
EXERCISE 2

Find the perimeters of the following shapes

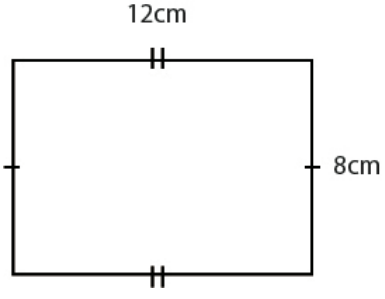
a.



b.



c.



UNIT 11 TIME AND SPEED
(35 minutes)

LEARNING OUTCOME:

By the end of the lesson the pupils will be able to calculate speed, time and distance.

SPEED

SPEED is a measure of the rate of change of distance with respect to time, it is calculated as distance travelled divided by the time taken. Speed is measured in kilometre per hour (km/h).

Distance is how far you have travelled which is measured in metres (m) or kilometres (km).

Time is referring to how long someone has travelled. It is measured in hours (h)

$\text{Speed} = \frac{\text{distance}}{\text{time}}$ $\text{Time} = \frac{\text{distance}}{\text{speed}}$ Distance = speed x time

In mathematics, speed is measured as the distance covered/travelled per unit time.

AVERAGE SPEED

Units Of Measurement Of Speed

Distance is covered in kilometres and time is in hours, then the unit of measurement of speed is 'km' per 'hour' or km/hr. If the distance is in metres and time is in minutes, then speed is 'm' per 'min' or m/min.

For example, the speed of the car is 150 kilometres per hour (150 km/h).

Example 1

A truck covers a distance of 224 km between WATERLOO and KAMASONDO in 4 hours. Find its average speed.

Solution

Average Speed = Total distance covered/Total time taken

= 224 km/4 hours

= 56 km/hr.

Example 2

Find the speed and average speed of a train, which leaves BUNBUNA at 6 p.m. and reaches LUNGI next day at 7 a.m. The distance between the two places is 220 km and the total time for stoppage is 1 hour between these two places.

Solution

Total time taken = 7 p.m. to 7 a.m. = 12 hours

Time for stoppage = 1 hour

Actual time taken = 12 hours – 1 hour = 11 hour

Speed = Total distance covered/Total time taken

= 220 km/11 hours

= 20 km/hr.

Example 3

The speed of train is 108 km/h. Find its speed in meters per second.

Solution

1km = 1000m

Therefore 108 km = 108 x 1000 =108,000 m

1 hr. = 60 min

1 min = 60 sec

Therefore, 1 hr. = 60 x 60 = 3600 sec

Speed = Distance/Time = 108,000/3600 = 30 m/sec

Example 4

A bus travels at a speed 50 m/s. Find its speed in km/h.

Solution

Distance travelled by bus in 1 sec = 50 m

Distance travelled by bus in 1 hr = 50 x 3600 m (1hr = 3600 sec)

1m = 1/1000km

Speed = 50 x 3600/1000 = 180 km/hr.

When distance and speed are given in the question, we measure time in the following way.

Example 5

How much time will be taken to cover a distance of 100 km at a speed of 10 km per hour?

Solution

10 km is covered in 1hr.

1 km is covered in $\frac{1}{10}$ hrs.

100 km is covered in $\frac{1}{10} \times 100 = 10$ hr

Example 6

A car covers a distance of 150 km at a speed of 50 km/hour. Find the time taken to cover this distance.

Solution

$$\text{Time} = \frac{\text{distance}}{\text{speed}}$$

$$\text{Time} = \frac{150 \text{ km}}{50 \text{ km/hr}}$$

Time taken = 3 hr.

Example 7

A motor cyclist covers a distance of 20 km at a speed of 10km per hour. Calculate the time taken to cover this distance.

Solution

Speed = 10 km/hr

Distance covered = 20 km

$$\text{Time} = \frac{\text{distance}}{\text{speed}} = \frac{20}{10} \text{ hr} = 2 \text{ hours}$$

Example 8

A boy runs at a speed of 20 m per minute. How much time will be taken to cover a distance of 1km?

Solution

20 m is covered in 1 min

1 m is covered in $\frac{1}{20}$ min

1000 m (i.e. 1km) is covered in $\frac{1}{20} \times 1000 = 50$ min

Past NPSE QUESTIONS

1. A man walked for 8 hours from Freetown to Waterloo. He started the journey at 10pm on Sunday. When did he arrive home? (NPSE 2010)

2. A lorry travels a total distance of 450km in 2½hours. What is the average speed of the lorry? (NPSE 2010)

3. A car travelling at an average speed of 90 km/hr. covered a certain distance in 4 hours. Find the distance covered by the car.

UNIT 12 POLYGONS
(35 minutes)

LEARNING OUTCOME:

By the end of the lesson the pupils will be able to calculate the missing angle inside a polygon.

TEACHER'S GUIDE

Teachers to give enough time for pupils to copy names of polygons and the total angles in the polygon.

Definition of Polygon - A polygon is any shape with 3 or more sides.

Types of Polygons

Triangle - A shape with 3 sides

Quadrilateral polygon – A shape with 4 sides

Pentagon polygon – A shape with 5 sides

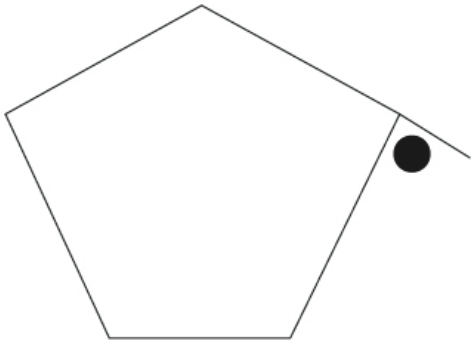
Hexagon – 6-sided shape

Heptagon – 7-sided shape

Octagon – 8 sided shape

Name of polygon	Number of sides	Number of triangles	Angle sum in a polygon	Angle sum inside the shape
Triangle	3	1	180	180
Quadrilateral	4	2	180 x2	360
Pentagon	5	3	180 x 3	540
Hexagon	6	4	180 x4	720
Heptagon	7	5	180 x5	900
Octagon	8	6	180 x 6	1080

Angle sum in a polygon = number of sides times number of triangles.



Exterior angle of pentagon

● = 360 / 5 = 72°

Interior angle of pentagon

= 180 – 72 = 108° Why?

Because exterior plus interior angles add up to 180^0

UNIT 13 RATIO AND PROPORTIONS
(35 minutes)

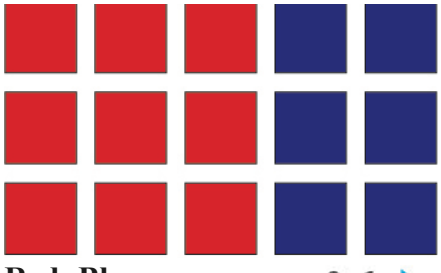
LEARNING OUTCOME:

By the end of the lesson the pupils will be able to work out ratios and understand proportions.

Ratio and Proportion means sharing or comparing two or more quantities. It can be thought of as an unfair sharing or unequal sharing of an amount.

The ratio of people who chose red to blue is 3:2.

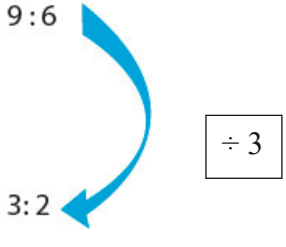
It could be that we just had 3 red people and 2 blue. The above statement would be true!



Red: Blue

If we had 9 red and 6 blue, then it's still the case that for each 3 red, there are 2 blue.

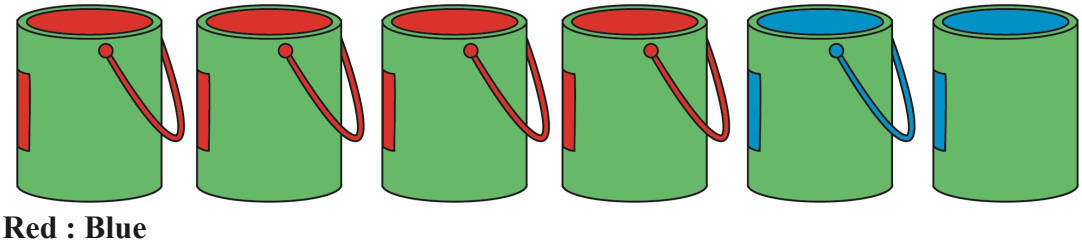
So 9: 6=3:2 (Note: 9 ÷ 3 = 2 and 6 ÷ 3 =2)



Example 1

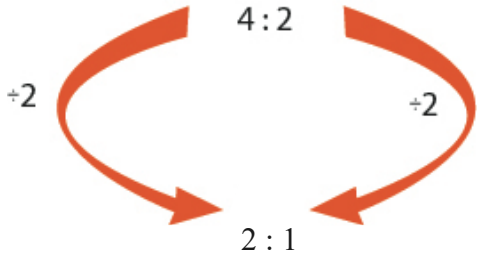
Osman bought six litres of paint, four were red and two were blue.

Write the ratio of the number of red tins to the number of blue tins in its simplest form



Red : Blue

Solution



Example 2

1. There are 20 girls and 15 boys in a class.
   (a) What is the ratio of number of girls to the number boys?
   (b) What is the ratio of number of girls to the total number of students in the class?

Solutions

Given

Number of girls = 20 girls

Number of boys = 15 boys

a. The ratio:

Girls : Boys

Example 3

Determine if the following are in proportion.

(a) 15, 45, 40, 120
(b) 33, 121, 9, 96
(c) 24, 28, 36, 48

Solutions

(a) 15, 45, 40, 120

$\frac{15}{45} = \frac{1}{3}$

$\frac{40}{120} = \frac{1}{3}$

Hence, 15: 45 = 40:120

∴ These are in a proportion

(b) 33, 121, 9, 96

$\frac{33}{121} = \frac{3}{11}$

$\frac{9}{96} = \frac{3}{32}$

Hence $\frac{3}{11} \neq \frac{3}{32}$

∴ These are not in a proportion

(c) 24, 28, 36, 48
24 / 28 = 6 / 7
36 / 48 = 3 / 4
Hence, 24: 28 ≠ 36:48
∴ These are not in a proportion

Example 4

Write True (T) or False (F) against each of the following statements:

(a) 16: 24: 20: 30
(b) 21: 6: 35: 10
(c) 12: 18: 28: 12

Solutions

(a) 16: 24: 20: 30
16 / 24 = 2 / 3
20 / 30 = 2 / 3
Hence, 16: 24 = 20: 30
Therefore True

(b) 21: 6: 35: 10
21 / 6 = 7 / 2
35 / 10 = 7 / 2
Hence, 21: 6 = 35: 10
Therefore True

(c) 12: 18: 28: 12
12 / 18 = 2 / 3
28 / 12 = 7 / 3
Hence, 12: 18 ≠ 28:12
Therefore False

Example 5

Are the following statements true?

(a) 40 persons: 200 persons = Le15: Le 75
(b) 7.5 Litres: 15 Litres = 5 kg: 10 kg
(c) 99 kg: 45 kg = Le 44: Le 20

Solutions

(a) 40 persons: 200 persons = Le 15: Le 75
40 / 200 = 1 / 5
15 / 75 = 1 / 5
Hence, True

(b) 7.5 Litres: 15 Litres = 5 kg: 10 kg
7.5 / 15 = 1 / 2
5 / 10 = 1 / 2
Hence, True

c) 99 kg: 45 kg = Le 44: Le20
99 / 45 = 11 / 5
44 / 20 = 11 / 5
Hence, True

Example 6

Determine if the following ratios form a proportion. Also, write the middle terms and extreme terms where the ratios form a proportion.

(a) 25 cm: 1 m and Le 40: Le 160
(b) 39 Litres: 65 Litres and 6 bottles: 10 bottles
(c) 2 kg: 80 kg and 25g: 625 g

Solutions

(a) 25 cm: 1 m and Le 40: Le 160
25 cm = 25 / 100 m
= 0.25 m
0.25 / 1 = 1 / 4
40 / 160 = 1 / 4
Yes, these are in a proportion
Middle terms are 1 m, Le 40 and extreme terms are 25 cm, Le 160

(b) 39 Litres:65 Litres and 6 bottles: 10 bottles
39 / 65 = 3 /5
6 / 10 = 3 / 5
Yes, these are in a proportion
Middle terms are 65 Litres, 6 bottles and extreme terms are 39 litres, 10 bottles

(c) 2 kg: 80 kg and 25 g: 625 g
2 / 80 = 1 / 40
25 / 625 = 1 / 25
No, these are not in a proportion

Example 7

If the cost of 7 m of cloth is Le 1470, find the cost of 5 m of cloth.

Solutions

Given
Cost of 7 m cloth = Le1470
Cost of 1 m cloth = 1470 / 7
= Le210
So, cost of 5 cloth = 210 × 5 = 1050
∴ Cost of 5 m cloth is Le1050

Example 8

Adamma earns Le 3000 in 10 days. How much will she earn in 30 days?

Solutions

Money earned by Adamma in 10 days = Le3000
Money earned in one day by her = 3000 / 10
= Le300
So, money earned by her in 30 days = 300 × 30
= Le 9000

Example 9

If it has rained 276 mm in the last 3 days, how many cm of rain will fall in one full week (7 days)? Assume that the rain continues to fall at the same rate.

Solutions

Measure of rain in 3 days = 276 mm
Measure of rain in one day = 276 /3
= 92 mm
So, measure of rain in one week i.e. 7 days = 92 × 7
= 644 mm
= 644 / 10
= 64.4 cm

Example 10

Cost of 5 kg of wheat is Le 91.50.

(a) What will be the cost of 8 kg of wheat?
(b) What quantity of wheat can be purchased with Le 183?

Solutions

(a) Cost of 5 kg wheat = Le 91.50.
Cost of 1 kg wheat = 91.50 / 5
= Le18.3
So, cost of 8 kg wheat = 18.3 × 8
= Le146.40

(b) Wheat purchased with Le 91.50 = 5 kg
Wheat purchased with Le 1 = 5 / 91.50 kg
So, wheat purchased with Le 183 = (5 / 91.50) × 183
= 10 kg

Example 11

The temperature dropped 15 degree Celsius in the last 30 days. If the rate of temperature drop remains the same, how many degrees will the temperature drop in the next ten days?

Solutions

Temperature drops in 30 days = 15^0 C
Temperature drops in 1 day = 15 / 30
= $(1 / 2)^0$ C
So, temperature drop in next 10 days = (1 / 2) × 10
= 5^0 C
∴ The temperature drop in the next 10 days will be 5^0 C

Example 12

Mariatu pays Le 15000 as rent for 3 months. How much does she have to pay for a whole year, if the rent per month remains same?

Solutions

Rent paid by Mariatu in 3 months = Le15000
Rent for 1 month = 15000 / 3
= Le5000
So, rent for 12 months that is 1 year = 5000 × 12
= Le 60,000
∴ Rent paid by Mariatu in 1 year is Le 60,000

Example 13

Cost of 4 dozen bananas is Le180. How many bananas can be purchased for Le 90?

Solutions

Number of bananas bought with Le180 = 4 dozens
= 4 × 12
= 48 bananas
Number of bananas bought with Le 1 = 48 / 180
So, number of bananas bought with Le 90 = (48 / 180) × 90
= 24 bananas
∴ 24 bananas can be purchased with Le 90

Example 14

The weight of 72 books is 9 kg. What is the weight of 40 such books?

Solutions

Weight of 72 books = 9 kg
Weight of 1 book = 9 / 72
= 1 / 8 kg
So, weight of 40 books = (1 / 8) × 40
= 5 kg
∴ Weight of 40 books is 5 kg

Example 15

A truck requires 108 litres of diesel to cover a distance of 594 km. How much diesel will be required by the truck to cover a distance of 1650 km?

Solutions:

Diesel required for 594 km = 108 litres
Diesel required for 1 km = 108 / 594
= 2 / 11 Littre
So, diesel required for 1650 km = (2 / 11) × 1650
= 300 Litres
∴ Diesel required by the truck to cover a distance of 1650 km is 300 litres

Example 16

Akim purchases 10 pens for Le 150 and Tejan buys 7 pens for Le 84. Can you say who got the pens cheaper?

Solutions:

Pens purchased by Akim in Le 150 = 10 pens
Cost of 1 pen = 150 / 10
= Le15
Pens purchased by Tejan in Le 84 = 7 pens
Cost of 1 pen = 84 / 7
= Le 12
∴ Pens purchased by Tejan are cheaper than Akim

Example 17

Mariatu made 42 runs in 6 overs and Adama made 63 runs in 7 overs. Who made more runs per over?

Solutions:

Runs made by Mariatu in 6 overs = 42
Runs made by Mariatu in 1 over = 42 / 6
= 7
Runs made by Adamma in 7 overs = 63
Runs made by Adamma in 1 over = 63 / 7
= 9
∴ Adamma scored more runs than Mariatu.

Past question NPSE

1. Express the ratio 450:900 in its simplest form. (NPSE 2012)
2. A school has 600 boys and 250 girls. What is the ratio of girls to boys? (NPSE 2013

UNIT 14 PERCENTAGES
(35 minutes)

LEARNING OUTCOME:

By the end of the lesson the pupils will be able to solve problems involving percentages.

TEACHER'S GUIDE

Teachers to ensure they teach pupils how to calculate percentages of numbers. Basic problems on percentage will help students to get the basic concept to solve any percentage.

PUPIL'S GUIDE

You should write down all examples in your exercise books.

Example 1

1. What is 30 % of 80?

Solution

30 % of 80
$= 30/100 \times 80$
$= (30 \times 80)/100$
$= 2400/100$
$= 24$

Example 2

In a class of 50 students, 40 % are girls. Find the number of girls and number of boys in the class.

Solution:

Number of girls in the class = 40 % of 50
$= 40/100 \times 50$
$= 2000/100$
$= 20$

Number of boys in the

class = Total number of students in the class - Number of girls
= 50 – 20
= 30

Example 3

Ron scored 344 marks out of 400 marks and his elder brother Ben scored 582 marks out of 600 marks. Who scored percentage is better?

Solution

Percentage of marks scored by Ron = (344/400 × 100) %
= (34400/400) %
= (344/4) %
= 86 %

Percentage of marks scored by Ben = (582/600 × 100) %
= (58200/600) %
= (582/6) %
= 97 %

Hence, Ben had a better score because he has a higher percentage.

CHANGE PERCENTAGE INTO FRACTION

How to convert a percentage into fraction?

We will follow the following steps for converting a percentage into a fraction:

Step I: Obtain the given percentage. Let it be x %.

Step II: Remove the percentage sign (%) and then divide the number by 100.

Therefore, x % = x/100

Step III: Reduce the fraction obtained to its lowest terms as required.

1. Express each of the following percentages into fraction in lowest terms:

(i) 16 % = 16/100 = 4/25

(ii) 48 % = 48/100 = 12/25

(iii) 5 % = 5/100 = 1/20

(iv) 25 % = 25/100 = 1/4

(v) 115 % = 115/100 = 23/20

(vi) 1 % = 1/100

2. Convert 27 per cent to fraction.

27 % = 27/100

3. Convert each of the following percentages as fractions in the lowest form:

(i) 24 % = 24/100 = 6/25
(ii) 62 % = 62/100 = 31/50
(iii) 30 % = 30/100 = 3/10
(iv) 75 % = 75/100 = ¾
(v) 10 % = 10/100 = 1/10

4. Convert each of the decimal percentages as fractions in the lowest form:

(i) 3.5 % = 35/10 % = 35/10 × 1/100 = 7/100
(ii) 0.5 % = 5/10 % = 5/10 × 1/100 = 1/200
(iii) 30.2% = 302/10 % = 302/10 × 1/100 = 302/1000 = 151/500
(iv) 0.4 % = 4/10 % = 4/10 × 1/100 = 4/1000 = 1/250
(v) 0.375 % = 375/1000 % = 375/1000 × 1/100 = 375/100000 = 3/800

Change mix fraction to improper fraction

5. Convert each of the fraction percentages as fractions in the lowest form:

(i) 3 2/5 % = 17/5 % = 17/5 × 1/100 = 17/500 (5 x3 = 15, 15 + 2 = 17)
(ii) 162/3 % = 50/3 % = 50/3 × 1/100 = 50/300 = 1/6 (3 x 16 = 48, 48 + 2 = 50)
(iii) 2¾ % = 11/4 % = 11/4 × 1/100 = 11/400 (4 x 2 =8, 8 + 3 = 11)

Percentage into Ratio

How to convert a given percentage into ratio?

We will follow the following steps for converting a percentage into a ratio:

Step I: Obtain the percentage.
Step II: Convert the given percentage into fraction by dividing it by 100 and removing percentage symbol (%).
Step III: Reduce the fraction obtained in step II in the simplest form.
Step IV: Write the fraction obtained in step III as a ratio.

1. Express each of the following percentages as ratios in the simplest form:

(i) 46 % = 46/100 = 23/50 = 23: 50
(ii) 20 % = 20/100 = 1/5 = 1: 5
(iii) 125 % = 125/100 = 5/4 = 5: 4

2. Express each of the following fraction percentages into ratio in lowest term:

(i) 3/4 % = 3/4 × 1/100 = 3/400 = 3: 400
(ii) 62/3 % = 20/3 % = 20/3 × 1/100 = 20/300 = 1: 15
(iii) 62/5 % = 32/5 % = 32/5 × 1/100 = 32/500 = 8/125 = 8: 125

3. Express each of the following decimal percentages as ratios in the simplest form:

(i) 16.5 % = 165/10 % = 165/10 × 1/100 = 165/1000 = 33/200 = 33: 200
(ii) 0.4 % = 4/10 % = 4/10 × 1/100 = 4/1000 = 1/250 = 1: 250
(iii) 2.5 % = 25/10 % = 25/10 × 1/100 = 25/1000 = 1/40 = 1: 40

PERCENTAGE INTO DECIMAL

To change a percentage to decimal, divide the given percent by 100, because a percentage is always taken out of 100. So, 75% is written as 75/100 = 75 ÷ 100 = 0.75

To divide a number by 100, move the decimal point 2 places to the left of the number. (**As the number reduces by 2 digits**).

276 ÷ 100 =2.767, 49.5 ÷ 100 = 0. 495

How to convert a given percentage into decimal?

We will follow the following steps for converting a percentage into a decimal:
Step I: Obtain the percentage which is to be converted into decimal
Step II: Remove the percentage sign (%) and divide it by 100.
Step III: Express the fraction in the decimal form
Remember: Remove % sign and move the decimal two places to the left.

1. Express each of the following percentages as decimals:

(i) 23 % = 231 ÷ 100 = 0.23

(ii) 16 % = 16 ÷ 100 = 0.16

(iii) 47 % = 47 ÷ 100 = 0.47

Note: Shift the decimal 2 places to the left.

2. Express each of the following decimal percentages as decimals:

(i) 1.75 % = 1.75/100 = (1.75 × 100)/(100 × 100) = 175/10000 = 0.0175

(ii) 7.5 % = 7.5/100 = (7.5 × 10)/(100 × 10) = 75/1000 = 0.075

(iii) 31.5 % = 31.5/100 = (31.5 × 10)/(100 × 10) = 315/1000 = 0.315

3. Express each of the following fraction percentages as decimals:

(i) 4/5 % = 0.8 % = 0.8/100 = (0.8 × 10)/ (100 × 10) = 8/1000 = 0.008

(ii) 9/20 % = 0.45 % = 0.45/100 = (0.45 × 100)/ (100 × 100) = 45/10000 = 0.0045

(iii) 1/80 % = 0.0125 % = 0.0125/100 = (0.0125 × 10000)/ (100 × 10000)
= 125/1000000 = 0.000125

Questions and Answers on Percentage into Decimal:

I. Convert the following percentages to decimals:

(i) 5%

(ii) 13%

(iii) 20%

Answers:

(i) 0.05

(ii) 0.13

(iii) 0.2

HOW TO SOLVE WORD PROBLEMS ON PERCENTAGES

1. In an election, candidate A got 75% of the total valid votes. If 15% of the total votes were declared invalid and the total numbers of votes is 560000, find the number of valid votes polled in favour of candidate A.

Solution:

Total number of invalid votes = 15 % of 560000 = 15/100 × 560000

= 8400000/100

= 84000

Total number of valid votes 560000 – 84000 = 476000

Percentage of votes polled in favour of candidate A = 75 %

Therefore, the number of valid votes polled in favour of candidate A = 75 % of 476000

= 75/100 × 476000

= 35700000/100

= 357000

2. A shopkeeper bought 600 oranges and 400 bananas. He found 15% of oranges and 8% of bananas were rotten. Find the percentage of fruits in good condition.

Solution:

Total number of fruits shopkeeper bought = 600 + 400 = 1000

Number of rotten oranges = 15% of 600

= 15/100 × 600

= 9000/100

= 90

Number of rotten bananas = 8% of 400

= 8/100 × 400

= 3200/100

= 32

Therefore, total number of rotten fruits = 90 + 32 = 122

Therefore, number of fruits in good condition = 1000 - 122 = 878

Therefore, Percentage of fruits in good condition = (878/1000 × 100) %

= (87800/1000) %

= 87.8%

3. Aaron had Le 2100 left after spending 30 % of the money he took for shopping. How much money did he take along with him?

Solution:

Let the money he took for shopping be m.

Money, he spent = 30 % of m

= 30/100 × m

= 3/10 m

Money left with him = m – 3/10 m = (10m – 3m)/10 = 7m/10

But money left with him = Le 2100

Therefore 7m/10 = Le2100

m = Le 2100 × 10/7

m = Le 21000/7

m = Le 3000

Therefore, the money he took for shopping is Le 3000.

Percentage of an amount

How to find percentage of an amount:
Follow the following steps for finding percent of a quantity:

Step I: Obtain the given number

Step II: Multiply the number by the required percentage i.e.,

x % of a = x/100 × a

Solved examples to find the percent of a number:

1. Find 17 % of $ 1700

Solution:

17 % of $ 1700

= 17/100 × 1700

= $289

2. Find 10 % of 900

Solution:

10 % of 900

= 10/100 × 900

= 90

3. Find 25/8 % of 160.

Solution:

25/8 % of 160

= (25/8)/100 × 160

= 25/800 × 160

= 4000/800

= 5

4. Find the number if 35 % of it is 280 km.

Solution:

Let the required number be m.

Then 35 % of m = 280

⇒ 35/100 × m = 280

⇒ m = 280 × 100/35

⇒ m = 28000/35

⇒ m = 800

Therefore, 35 % of 800 km is 280 k

Increase Percentage

How to find the increase percentage?

It can easily be understood if it is expressed as percent. We will follow the following steps to convert the increase into percent.

Step I: First find the increase in value.

Step II: Divide it by the original quantity.

Step III: Multiply the fraction by 100 and put percent sign (%).

Formula for finding the increase % is Increase in value/Original value × 100 %.

Note: Increase percent is calculated on the original value.

For example:

If the price of milk increases from \$4 per litre to \$5.40 per litre.

Increase in price = \$5.40 - \$4 = \$1.40

and increase % = Increase in price/Original price × 100 %

= 1.40/4 × 100 %

= 140/4 %

= 35 %

We will apply the concept of solving some real-life problems by using the formula for finding the increase percent.

Solved examples:

1. The price of rice is increased from \$10 to \$12.50 per kg. Find the percentage increase in price.

Solution:

Price of rice before = \$10

Price of rice now = \$12.50

Increase in price = current price – original price

= \$12.50 - \$10

= \$2.50

Therefore, percentage increase in price = Increase in price/Original price × 100 %

= 2.50/10 × 100 %

= 250/10 %

= 25 %

Thus, increase in price= 25 %

2. The population in a small town increases from 20,000 to 21,250 in one year. Find the percentage increase in population.

Solution:

Population in a small-town last year = 20,000

Population in a small town after one year = 21,250

Increase in population = 21250 - 20000 = 1250

Therefore, percentage increase in population = Increase in population last year population × 100 %

= 1,250/2,0000 × 100 %

= 1,25,000/20000 %

= 25/4 %

= 6.25%

Thus, the increase in population is 6.25%

3. Find the increase value if 150 is increased by 30 %.

Solution:

Increase = 30 % of 150

= 30/100 × 150

= 4,500/100

= 45

Therefore, increase value = 150 + 45 = 195

(google search)

PAST QUESTION NPSE

1. Express 3/10 as a percentage (2013)

2. A chicken laid 25 eggs. If 13 of the eggs hatched were hens and 12 were cocks, what percentage of the eggs hatched were cocks? (2015)

3. The price of petrol increases from Le10,000 to Le12,000 per gallon. What was the percentage increase in price of petrol?

UNIT 15 MULTIPLYING AND DIVIDING BY 10, 100 AND 1000

(35 minutes)

LEARNING OUTCOME:

By the end of the lesson the pupils will be able to apply multiplication and division to solve money problems.

TEACHER'S GUIDE

Teachers to ensure the use of column method for both addition and subtraction
This is a reasoning aspect of the curriculum which helps children practice specific question types. The objective is to identify the value of each digit in numbers given to three decimal places and multiply and divide numbers by 10,100, and 1000 giving answers up to three decimal places.

Dividing by 10, 100 and 1000

To divide any number by 10,100, or 1000, always move the decimal point to the left:

Divide by 10 – move the decimal point 1 place to the left.

$23 \div 10 = 2.3$, $47.4 \div 10 = 4.73$

Divide by 100 – move the decimal point 2 places to the left
$764 \div 100 = 7.64$, 76.4 100 = 0.764

Divide by 1000 – move the decimal point 3 places to the left.
$3476 \div 1000 = 3.476$, $347.6 \div 1000 = 0.3476$

UNIT 16 MULTIPLYING AND DIVIDING DECIMALS
(35 minutes)

LEARNING OUTCOMES:

By the end of the lesson the pupils will be able to:

- Multiply two or more decimals.
- Multiply a decimal by a power of 10.
- Divide by a decimal.
- Divide a decimal by a power of 10.
- Solve application problems that require decimal multiplication or division.

TEACHER'S GUIDE

Teachers to ensure pupils know that when you multiply whole numbers by 10, 100 or 1000, the number increases by 1, 2 or 3 digits respectively.

INTRODUCTION

Multiplying Decimals by 10, 100 and 1000

Multiplying decimals is the same as multiplying whole numbers except for the placement of the decimal point in the answer.

- To multiply a whole number or decimal by 10, move the decimal 1 place to the right as the number increases by 1 digit.
- To multiply 100, move the decimal point 2 places to the right
- To multiply by 1000, move the decimal point 3 places to the right as the number increases by 3 digits.

Example 4. 469 x 10 = 44.69 (2) 4 .469 x 100 = 446.9 (3) 4. 469 x 1000 = 4469.0

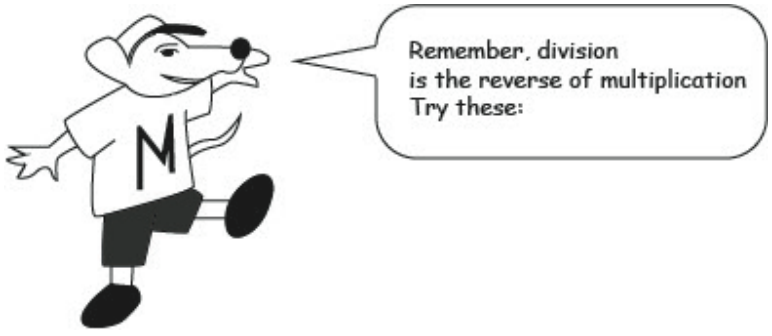
Example		
Problem	31.05 ÷ 10 = ?	
	31.05 ÷ 10 = ?	10 has one zero.
	31.05 ÷ 10 = 3.105	Move the decimal point one place to the left in the dividend; this is the quotient.
Answer	31.05 ÷ 10 = 3.105	

SOLVING PROBLEMS BY MULTIPLYING OR DIVIDING DECIMALS

Now let's return to the two problems from the beginning of this section. You know how to multiply and divide with decimals now. Let's put that knowledge to the test.

Example		
Problem	A couple eats dinner at a Japanese steakhouse. The bill for the meal totals $58.32—which includes a tax of $4.64. To calculate the tip, they double the tax. How much tip should the couple leave?	
	4.64 x 2	Set up a multiplication problem.
	4.64 x 2 928	Multiply.
	4.64 x 2 9.28	Count the number of decimal places in the two factors and place the decimal point accordingly.
Answer	The couple should leave a tip of $9.28.	

Divide by 10 and 100



1. 40 ÷ 10 = ☐
2. 900 ÷ 100 = ☐
3. 100 ÷ 10 = ☐
4. 500 ÷ 100 = ☐

5. $60 \div 10 =$	6. $700 \div 100 =$
7. $20 \div 10 =$	8. $100 \div 100 =$
9. $30 \div 10 =$	10. $800 \div 100 =$
11. $80 \div 10 =$	12. $200 \div 100 =$
13. $50 \div 10 =$	14. $300 \div 100 =$

UNIT 17 VOLUME AND CAPACITY
(35 minutes)

LEARNING OUTCOME:

By the end of the lesson the pupils will be able to calculate the volumes of a cube or cuboids.

TEACHER'S GUIDE

Teachers to make pupils aware that multiplying 3 lengths gives volume.

PUPIL'S GUIDE

To copy examples in exercise books and be able to recall the process of finding the volume of cube, cuboid and cylinder.

WHAT IS VOLUME?

Volume is the amount of space a container or object occupies. Volume is the space occupied by a tank, for example, the amount of water in a tank.

The most common unit of volume is cubic centimetre (cm^3).

One cubic centimetre will hold one millilitre of fluid or another substance.

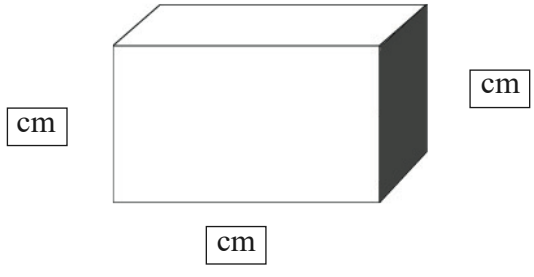
1000 cm^3 will hold one thousand millilitres of fluid or another substance.

1000mL = 1000cm^3

Remember that 1000ml = 1L, so 1L = 1000cm^3

Volume is commonly measured in cubic units, such as cm^3.

Volume of Cuboid = multiply all the 3 lengths

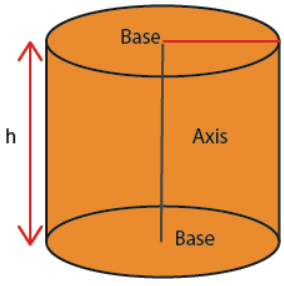


Volume of a cuboid or rectangular prism

= length × width × height

= cm × cm × cm

= cm^3



Volume of the cylinder

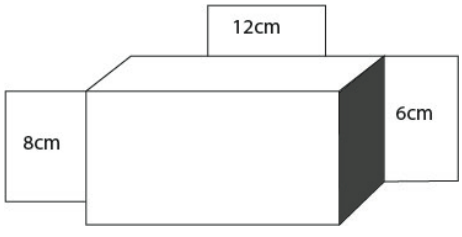
V = $\pi \times r^2 \times h$ (area of the base (circle) x height)

= $\pi \times cm^2 \times cm$

= cm^3

Examples

1. **Calculate the volume of the box**



(a) How much space does the box take up?

Solution

Volume = L × W × H

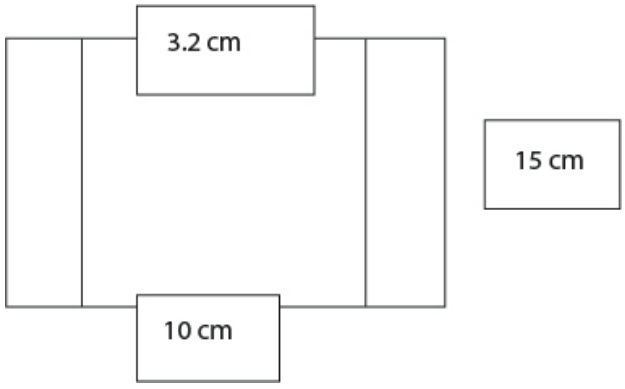
= 12 × 8 × 6

= $576cm^3$

Therefore the volume of the box is $576cm^3$

2. Calculate the volume of a book that has a length of 10cm, a width of 3.2cm and a height of 15cm

Solution



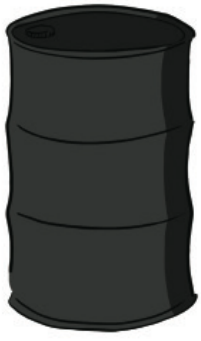
Volume = L × W × H

= 10 × 3.2 × 15

= 480cm^3

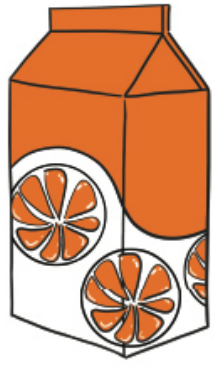
CAPACITY

Capacity is the amount substance containers can hold. The oil, juice drink and gasoline containers are just a few examples of objects that illustrate capacity.



OIL

GASOLINE CONTAINER



JUICE

Capacity is measured in the S I. base unit called litres (L). The most common units for capacity are litre (L) and Millilitre (ml)

1000L = 1 kilolitre (KL)

100L = 1 hectolitre (hl)

10L = 1 decalitre (daL)
1L = 1 litre (L)
1/10L = 1 decilitre (dL)
1/100L = 1 centilitre (cL)
1/1000L = 1 millilitre (mL)

Examples

1. How many mL does 10L represent?
   ANSWER = 10X1000 = 10000 ml

2. How many L does 4000 m L represent?
   ANSWER = 4000÷1000 = 4L

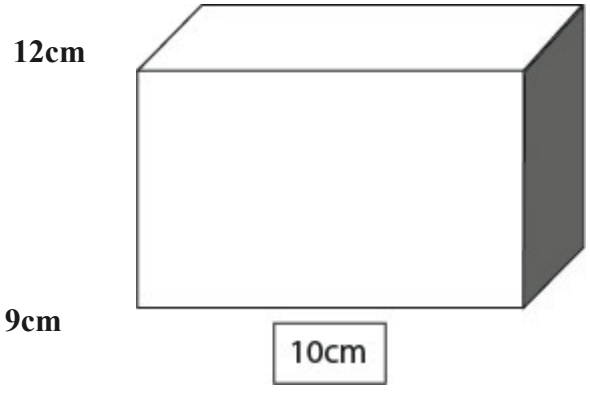
3. How many ml does 7.4L represent?
   Answer =7.4 × 1000 = 7400ml

   Do you see how capacity and volume are similar?

   The number stays the same, but the units change.
   (google search)

PAST QUESTION NPSE

1. Calculate the volume of the box below.



UNIT 18 ANGLES
(35 minutes)

LEARNING OUTCOME:

By the end of the lesson the pupils will be able to use properties of angles to solve problems.

TEACHER'S GUIDE

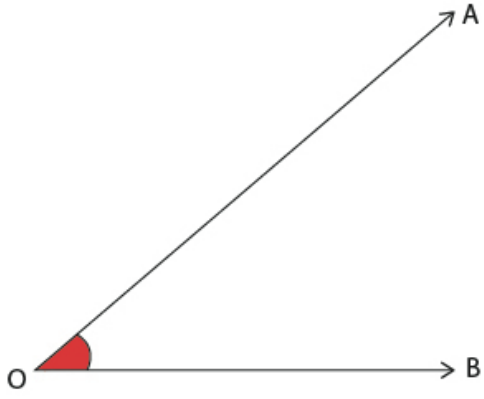
Teacher to ensure that key words are explained carefully for pupils to understand. To show that angles on a straight line and angles in a triangle add up to 180

PUPIL'S GUIDE

You would need to copy all examples in your exercise books. Copy all shapes in your books making sure that you use a pencil, ruler and protractor.

What is an Angle?
An angle is formed when two lines meet.

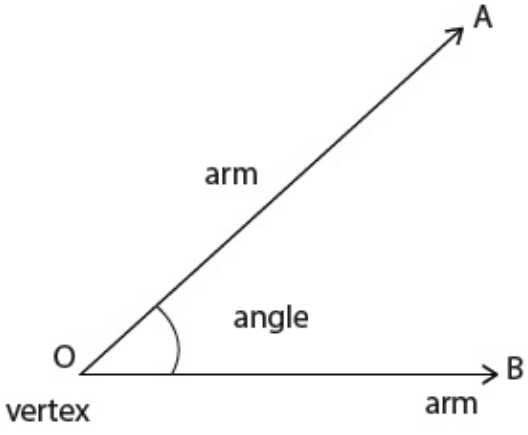
An angle is represented by the symbol ∠. Here, the angle below is ∠AOB.



Parts of an Angle:

Arms: The two rays joining to form an angle are called arms of an angle. Here, OA and OB are the arms of the ∠AOB.

Vertex: The common end point at which the two lines meet to form an angle is called the vertex. Here, the point O is the vertex of ∠AOB.



We can find angles in various things around us, such as in a pair of scissors, a hockey stick, a chair.

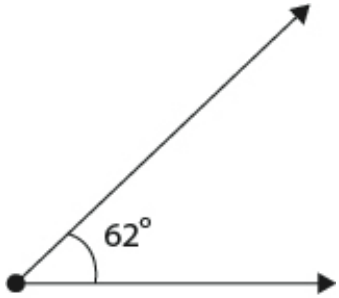
Angles around us

(GOOGLE SEARCH)

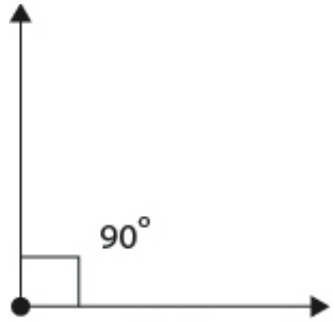
Type of Angles

Angles can be classified on the basis of their measurements as:

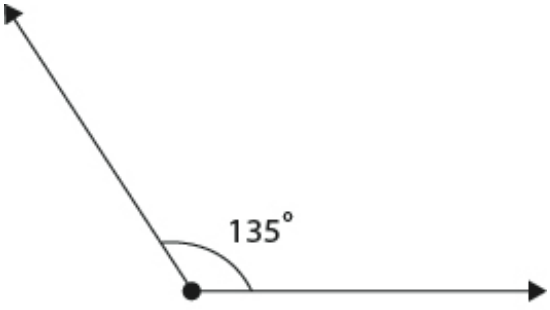
Acute Angles	**Right Angles**	**Obtuse Angles**
Straight Angles	**Reflex Angles**	**Full turn**



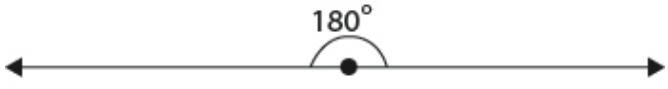
Acute angle



Right angle

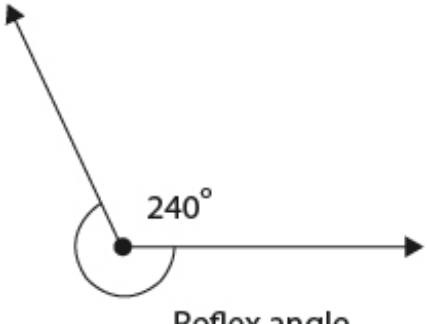


Obtuse angle



Straight angle

Complete angle

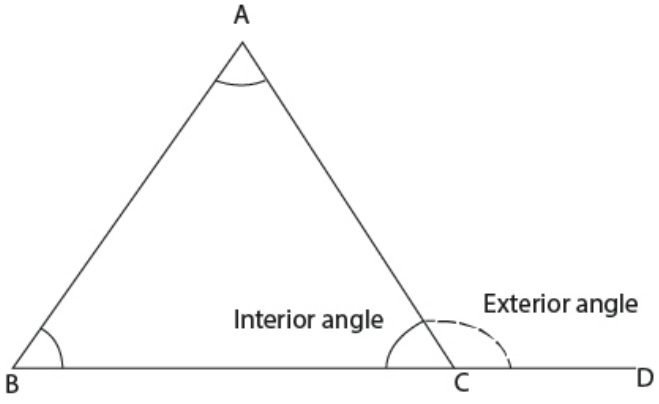


Reflex angle

Interior Angles

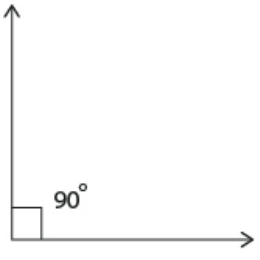
Interior Angles are the angles formed inside a shape.
Here, ∠ABC, ∠BCA and ∠CAB are interior angles.

Exterior angles Exterior angles are the angles formed outside between any side of a shape, and a line extended from the adjoining side. Here, ∠ACD is an exterior angle.



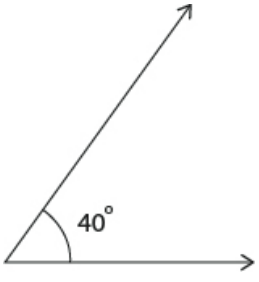
What Are Right Angles?

A **right angle** is an angle measuring **90** degrees. Two lines that meet at a right angle are said to be perpendicular



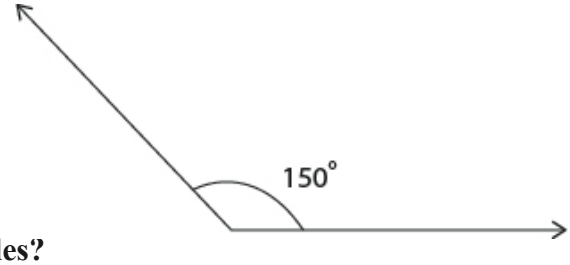
What Are Acute Angles?

An **acute angle** is an angle measuring between **0** and **90** degrees.



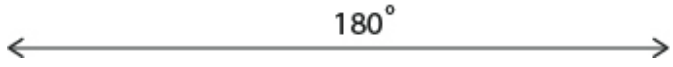
What Are Obtuse Angles?

An **obtuse angle** that is more than 90° but less than180° (**Angle measuring between** 90 **and** 180 **degrees**).

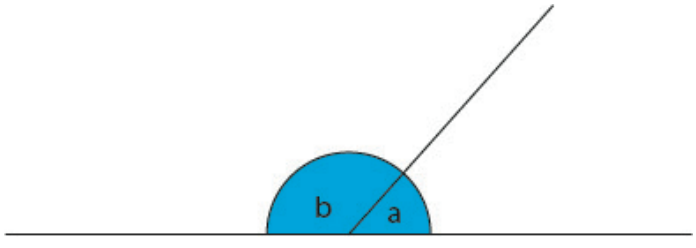


What Are Straight Angles?

A **straight line**: **Angles** on a straight line add up to **180⁰** (**180** degrees).

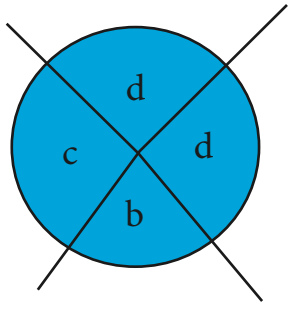


ANGLES ON A STRAIGHT LINE



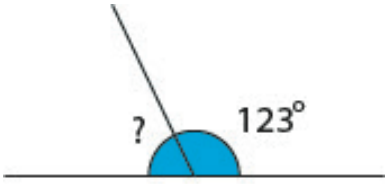
Angles on a straight line add up to 180°
Angles a + b = 180° (All angles on straight line add up to 180⁰)

ANGLES AROUND A POINT



Angles at a point add to 360°
Angle a + b + c + d = 360⁰

FIND THE MISSING ANGLES



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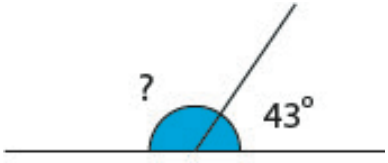

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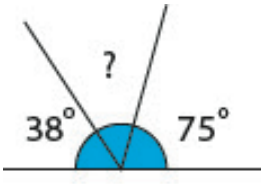

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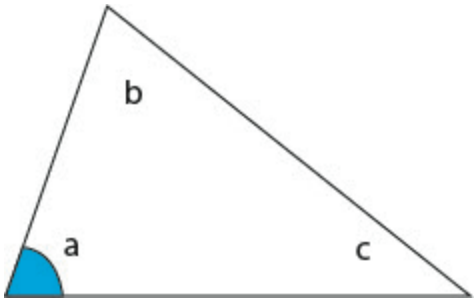
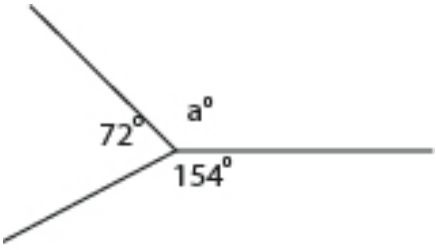
ANGLES IN A TRIANGLE



Angles in a triangle add up to 180°
Angles a + b + c = 180°

1.



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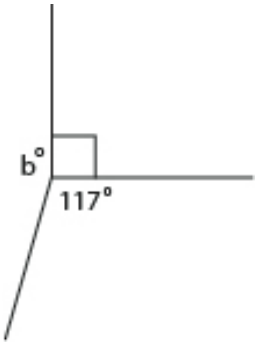

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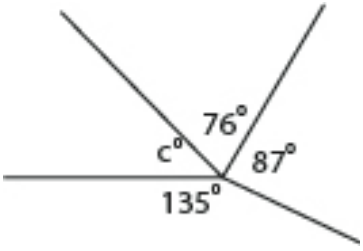
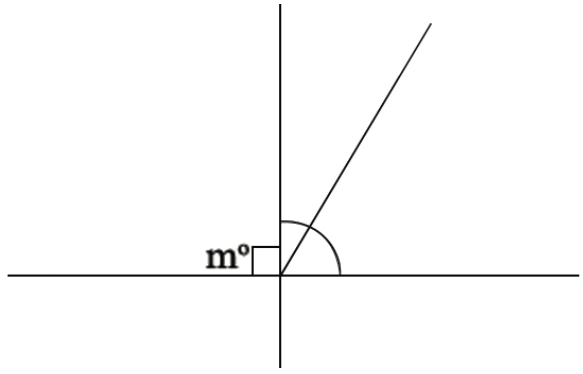


EeEe

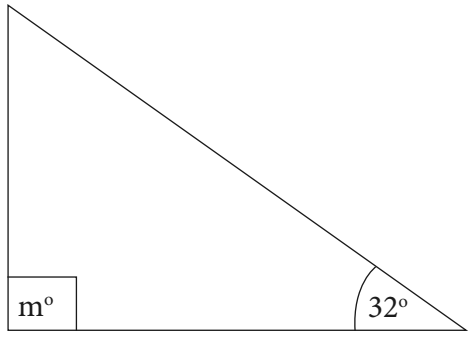
PAST QUESTION

1. **Find the value of the angle marked m° in figure 1 below (2011)**

(a)



(b)



UNIT 19 WEIGHT
(35 minutes)

LEARNING OUTCOME:

By the end of the lesson the pupils will be able to convert from one unit of measurement to another unit.

TEACHER'S GUIDE

To ensure pupil's understand the metric units for measuring mass and weight.

PUPIL'S GUIDE

To copy all equivalents units of measurement for weight and mass in your exercise books.

Weight is the measure of how heavy an object is. Weight is measured in standard customary units.

The mass of an object is the amount of material it contains. Mass is measured in standard metric units.

When you are on the surface of the earth, the difference between mass and weight is not important. But if you measure something on another planet, mass will be the same as it is on earth — but its weight will be different. (Weight depends on gravity, and gravity is different on other planets! This is why when you're floating in space, you're weightless. You still have mass, though.

Metric Units

The **gram** and **kilogram** are two units used to measure mass in the metric system.

From the gram, we get the rest of the metric units using the standard metric prefixes.

1000 grams (g) = 1 kilogram (kg)

1000 kg = 1 tonne

A paper clip has a mass of about 11 grams.

Imperial Units

The system for measuring weight (not mass) in the customary system is based on ounce, pound, and ton. The basic unit of weight is a pound (lb).

1 pound (1b) = 16 ounces (oz) 1 ton (T) = 2,000 pounds 1 pound (1b) = 16 ounces (oz) 1 ton (T) = 2,000 pounds.

An ounce is the smallest unit of weight. A strawberry has a weight of about 11 ounces.

WEIGHT

The weight of an object is the measure of the heaviness of the object. You can use a kilogram to express your weight. But there can be other units for measuring weights.

What if you want to express the weight of lighter objects? In such cases, gram is used to measure it. A gram is the lighter unit. Generally, these units are written as follows.

- A kilogram is 'Kg '
- Gram is 'gm '
- 1 kg = 1000 g
- 1 gm = 1000 mg (milligram)

A weighing scale is used to measure the weight of an object. Suppose you want to measure the weight of a watermelon. How will you do that?

You can use a weighing scale for measuring the watermelon. Take a weighing scale and keep known weights on one side of the pan while the object to be measured on the other pan. Suppose you keep 1 kg on the pan and a watermelon on the other side of the pan and if both the pan weights equal, then the weight of the watermelon is 1 kg.

Suppose your mother asks you to buy 1 kg of potatoes. You see that the vendor keeps two 500 gm weights on the balance. But you want to buy 1 kg of potatoes. But do you know 500g + 500g = 1000g which is equal to 1 kg. So yes, the shopkeeper is absolutely right. Double 500g makes 1000 g.

Solved Examples for You

Question 1: Weight of one balloon is 3g and of one string is 4g. Then what is the combined weight of 3 balloons and 6 strings?

A. 9g
B. 24g
C. 33g
D. 41

3g x 3 + 4g x 6
= 9g + 24g
= 33g

Solution: C is the correct option. The weight of 3 balloons and 6 strings is 33g.

Question. How to can one calculate weight?

Answer. The weight of an object refers to as the force of gravity that is acting on the object. Weight is calculated as mass times the acceleration of gravity, w = mg. The SI unit of weight is the newton.

Question. In simple words, explain weight?

Answer. In simple words, the weight of an object refers to the measure of force that is imposed on this object due to the local gravitational field. Furthermore, objects which have the same mass in the same gravitational field, also have the same weight.

Question. Explain the difference between mass and weight?
Answer. Mass refers to a measurement of the amount of matter that is possessed by something. Weight refers to the measurement of the pull of gravity that is acting on an object.

Question. How can one convert mass to weight?

Answer. To calculate the weight of an object in N, one must multiply its mass by 9.8 N. (Google search)

PAST QUESTIONS NPSE

1. A bottle weighs 30.7 grams when empty and 60.8 grams when filled the palm oil. What is the weight of the palm oil in the bottle?
2. How many kilograms (kg) are there in 3.5 tonnes of rice? (1 tonnes =1,000kg) (NPSE 2016

UNIT 20 TRIANGLES AND QUADRILATERALS
(35 minutes)

LEARNING OUTCOME:

By the end of the lesson the pupils will be able to know the different types of quadrilaterals and their properties.

TEACHER'S GUIDE

Teachers to correctly draw the different types of quadrilaterals and ensure pupils copy them into their exercise books. Emphasise the difference between a rectangle and a square.

PUPIL'S GUIDE

You should use a pencil and ruler to draw all your shapes

A triangle is a 3-sided shape or polygon with 3 sides. A polygon is a shape with three or more sides.

Quadrilateral

A quadrilateral is a shape with 4 sides, examples are square, rectangle, kite, trapezium, parallelogram and rhombus.

Type of Triangles

Primarily there are six types of triangles, namely:

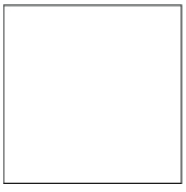
- **Acute Angled Triangle**: This is a triangle in which all the angles are smaller than 90°.
- **Right Angled Triangle**: It is a triangle with one angle 90°.
- **Scalene**: all the lengths of the three sides and angles are different.
- **Equilateral** : all the three sides and angles are the same (equal).
- **Isosceles triangle**: 2 sides and 2 angles are equal.
- **Obtuse Angled Triangle:** one of the angles is more than 90°

Quadrilateral Types & Properties

We can define quadrilateral as a Polygon that has four sides.

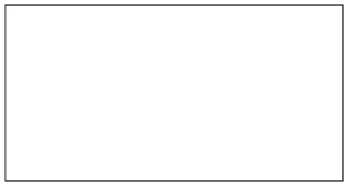
Geometric Properties of Quadrilaterals

a) Square



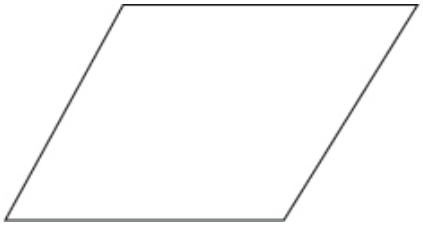
- Opposite sides are parallel, with all sides being equal
- Each of the angles is 90°
- A square has four lines of symmetry
- The order of rotational symmetry is 4
- The diagonals bisect each other at 90° or right angles

b) Rectangle



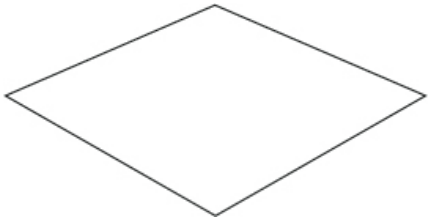
- The opposite sides are parallel and equal
- All the angles in a rectangle ere 90°
- 2 lines of symmetry
- A rectangle has a rotational symmetry of 2

c) Parallelogram



- The opposite sides are parallel and equal
- A parallelogram has equal opposite angles
- There are no symmetry lines
- Rotational symmetry order is 2

d) Kite

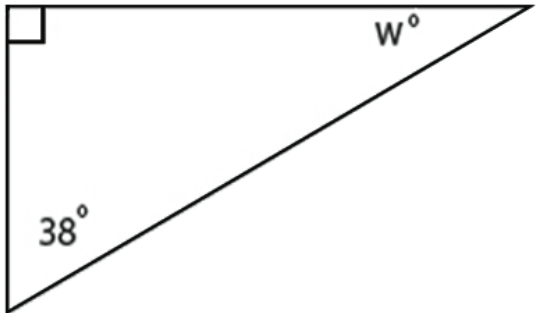


- A kite has a single line of symmetry
- The diagonals intersect at 90° or right angles

PAST QUESTIONS NPSE

1. A triangle which has all its sides and angles equal is called ---------- (2017)

2. The figure below shows a right-angled triangle. Find the marked w.



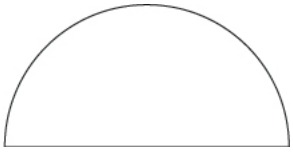
UNIT 21 CIRCLES
(35 minutes)

LEARNING OUTCOME:

By the end of the lesson the pupils will be able to work out the radius and diameter of a circle.

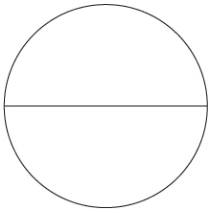
Use a pair of compasses to draw a circle of any radius on a piece of paper. Cut the circle from the sheet.

Fold the circle into equal parts. What faction of the whole is the shape you now have? Does it look like this?



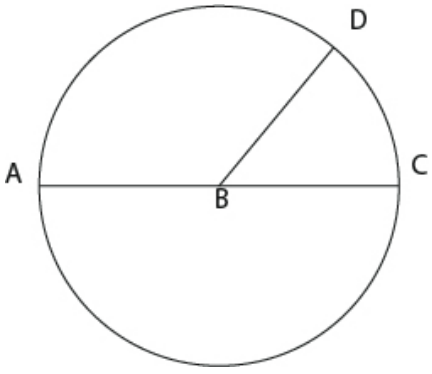
The shape is a semi-circle.
A semi-circle is half of a circle

Unfold the paper. Draw a line to make the fold.



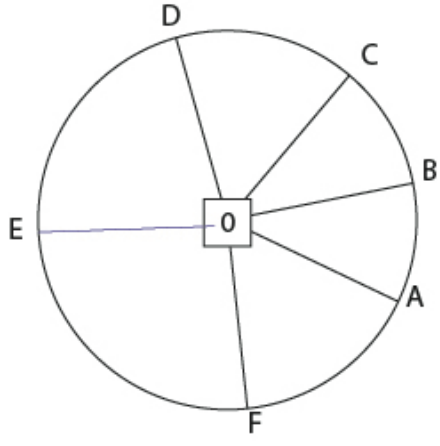
The line is a diameter

A diameter of a circle passes through the centre of the circle
A diameter divides a circle into two equal halves.



B is the centre of the circle
AC = Diameter
AB = Radius
BD = Radius
BC = Radius

Exercise 1



The point o is the centre of the circle:

1) a) Name the different radius
   b) Name two different diameters
   c) Measure A0
   d) Without measuring write down what the length of B0 must be
   e) Without measuring write down what the length EC must be
   f) Measure EC
   g) What is the length of FD

2) Assuming the distance from FO is 6cm. if an ant walks from C to 0 to E back to 0, then to point A, what distance does it walk?

3) Name ten items you know that are circular in shape

4) Which of the following are circles and which are non-circular in shape?

   a) A door b) A football c) Book d) Pot cover (e) Coin f) window
   g) orange h) A ring

UNIT 22 GRAPHS
(35 minutes)

LEARNING OUTCOME:

By the end of the lesson the pupils will be able to represent data on graphs.

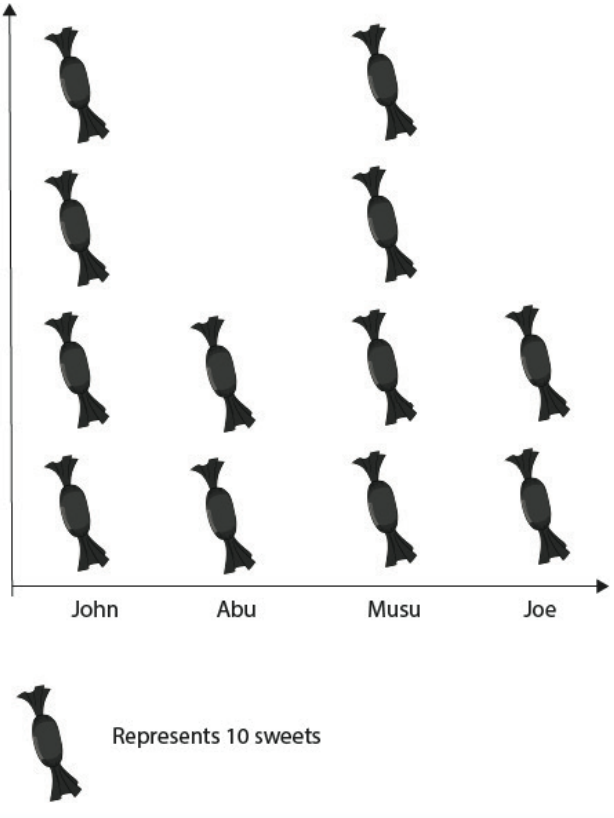
TEACHER'S GUIDE

Teachers to guide pupils on how to draw simple graphs.

1)
2)
3)
4)

PICTOGRAMS: Information can be in pictures and we can read such information from those pictures. The information can be read using the key or scale for the pictogram

Example 1



Now answer these questions

a) How many sweet did Abu eat?
b) Who has (i) The least number of sweets (ii) The largest number of sweets?
c) Who ate half the number of John?
d) What can you say about Abu and Joe?
e) Who ate many sweets?

Solution

Example 2: The pictogram below shows the number of pupils who passed Maths, Science and English.

Subjects	**Maths**	**Science**	**English**
Pupils who passed	ΔΔ∠	ΔΔΔΔΔ	ΔΔΔΔΔ∠

Key, Δ represent 20 pupils; ∠ represent 10 pupils

a) How many students passed Maths?
b) How many students passed Science?
c) How many students passed English?
d) How many students passed Maths and English?
e) How many students passed the three subjects?

Solution

Exercise 1

1. The number of pupils who passed English, Maths, Science and Art are as follows:

Subject	English	Maths	Science	Art
No. of Pupils	4	5	1	5

Represent the information in a pictogram

2. The table below shows the number of cars bought by a car dealer in 4 months of the year.

Months	**March**	**April**	**May**	**June**
No. of cars	24	36	48	30

Represent this in a pictogram

3. The table shows exports of some goods from Sierra Leone to foreign countries

Product	**Groundnuts**	**Palm oil**	**Cassava**	**Coffee**
Kg	420, 000,000	240, 000,000	610, 000,000	140, 000,000

Represent the information in a pictogram

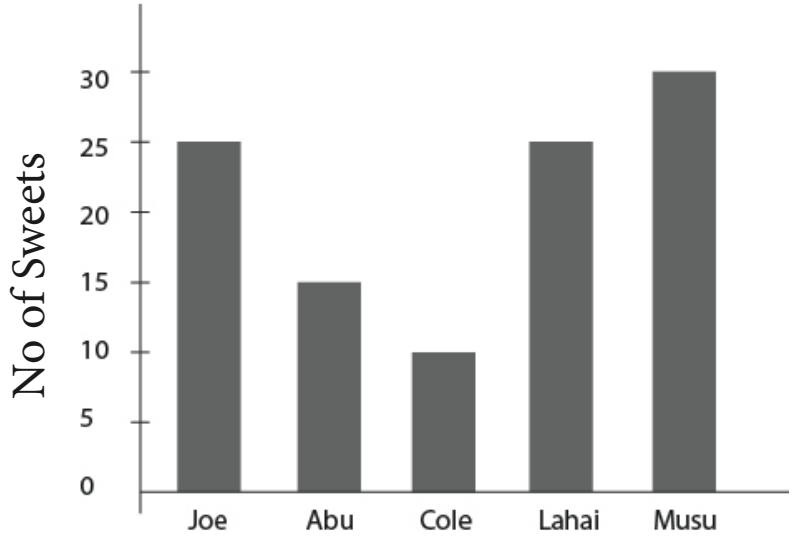
BAR GRAPHS

A bar graph is another way of representing information pictorially. We use rectangular bars, blocks, or columns for the numbers. The bars are of the same width and the gaps between them are also the same. A bar graph can be vertical (column) or horizontal

Example 3: The table below shows the number of sweet eaten by five pupils

Pupils	**Joe**	**Abu**	**Cole**	**Lahai**	**Musu**
No of Sweets	25	15	10	25	30

Solution



Example 4: In an examination, Mary's scores are tabulated as follows:

Subject	**Maths**	**Science**	**English**	**Health Science**	**General Science**	**Art**
Marks	95	60	90	75	85	45

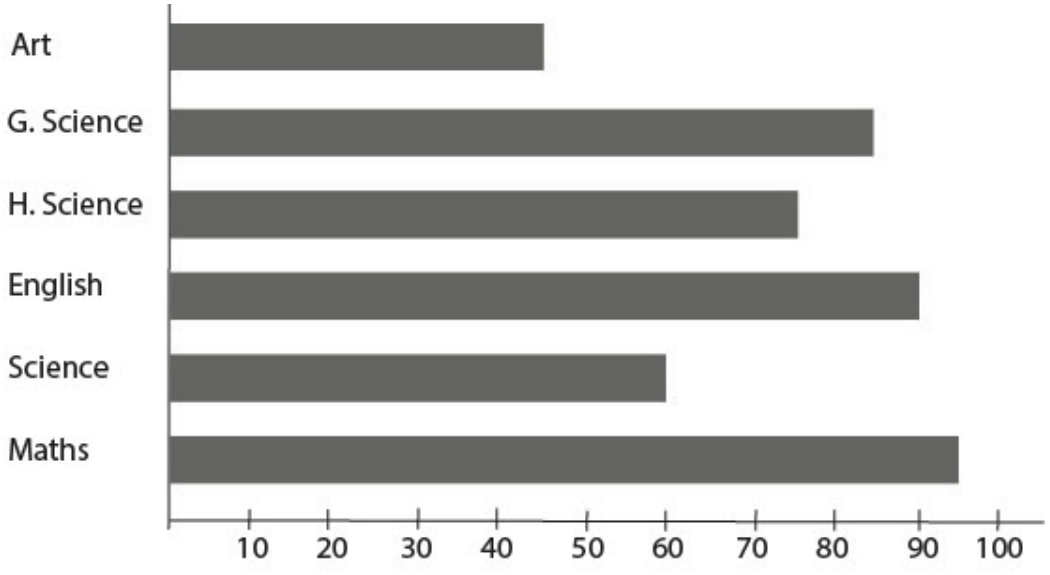
a) Represent this data in a bar graph.

b) In which subject did Mary score highest?

c) What was her lowest score?

d) Out of Health Science and General Science, in which one did she perform better? By how many marks?

a)



b) Mary scored highest in Maths; 95

c) Mary scored lowest in Art; 45

d) She performed better in General Science than in Health science by 10 marks.

Exercises 2

1) The table below shows the number of births recorded in a town in the last five months in a given year.

Month	**August**	**September**	**October**	**November**	**December**
Birth	4	5	7	6	5

a) Draw a vertical (column) bar graph for the data.

b) Which month was the highest birth recorded?

c) Which month was the lowest birth recorded?

d) How many more births were November than in August?

2) The table shows the number of students playing four (4) different games

Games	**Basketball**	**Football**	**Lawn Tennis**	**Bad Minton**
Students	12	100	50	70

a) Represent the information in a bar chart

b) How many students play the two most popular games?

c) Which game has more than three times as many players as Lawn – Tennis

3) The following table shows the number of books sold by a bookshop in 6 days of the week.

Days	**Monday**	**Tuesday**	**Wednesday**	**Thursday**	**Friday**	**Saturday**
No. of Books	12	18	12	24	30	24

1) Represent this data in a vertical bar graph.
2) In which days were the sales twice that of Monday?
3) Find the total number of books sold within the 6 days
4) On what day was the greatest number of books sold?
5) On what days were the least number of books sold?
6) Find the difference between the number of books sold on Tuesday and Friday

4) A student obtained marks in 6 subjects he studies in school as follows:

Subjects	**A**	**B**	**C**	**D**	**E**	**F**
Scores	60	85	45	70	70	40

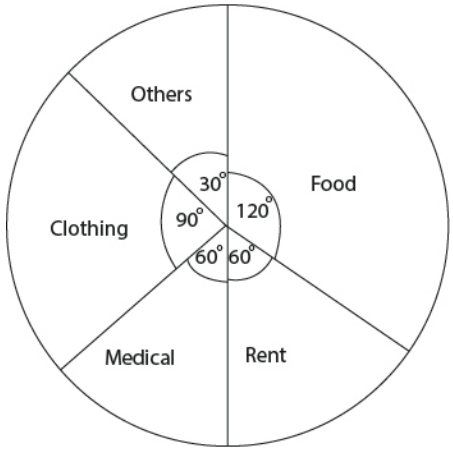
a) Draw a horizontal bar graph to show this data.
b) If the pass mark is 50, how many subjects did he pass and how many did he fail?
c) If the highest mark is 100, how many marks did he lose with his lowest score?
d) In which subject did he score two-fifths of the total marks?
e) In how many subjects did he score less than 60?

PIE CHART/CIRCLE GRAPHS

This is a circular diagram divided into sectors by radical lines so that the area of each sector is equal to the size of the figure represented.

The total information is taken to be equal to 360^0 and a portion of this total is used to represent each type of information.

Example 5



This graph shows how a teacher spends his monthly salary. The salary per month is Le 180,000. Use this graph to answer the following questions.

1) How many different items are shown on the graph?
a) 12 b) 5 c) 4 d) 1 e) 10

2) On which item does the teacher spend most of her salary?
a) Rent b) Food c) Medical bills d) Others e) Clothing

3) What fraction of the salary is spent on food?
a) ¼ b) 4/4 c) ⅓ d) ¾ e) 1/5

4) What can you say about the expenditure on rent and medical bills?
a) The rent is higher
b) Both amounts are the same
c) The medical bills are higher
d) Both amounts together are more than the amount spent on food
e) Both amounts together are equal to the amount spent on clothing

5) Which fraction of the salary is spent on clothing:
a) ¼ b) ⅓ c) 3/3 d) 2/3 e) ½

6) How much is spent on the following?
a) Food b) Rent c) Medical bills d) clothing e) others

UNIT 23 COMMERCE – PROFIT AND LOSS
(70 minutes)

LEARNING OUTCOME:

By the end of the lesson the pupils will be able to understand how to solve problems with profit and loss.

TEACHERS GUIDE

Teacher to ensure students understand the key concepts of profit and loss. Examples must be carefully explained for pupils to understand and apply the concepts. Allow pupil's to copy examples in their exercise books.

PUPIL'S GUIDE

You must copy examples in your exercise books. Remember that profit is made when you sell the item for more than the amount you bought it.

Profit: When the selling price is more than the cost price, you make a profit.

∴ Profit = selling price (SP) – cost price (CP)

Profit = SP – CP

Loss: When the selling price is less than the cost price, you make a loss.

Loss = cost price – selling price

Loss = CP – SP

Example 1 Find the profit if a chair bought at Le 25,000 is sold at Le 28,000

Solution: Profit = SP – CP

Where SP = Le 28,000
CP = Le 25,000

Profit = Le 28000 – Le 25000 = Le 3000

Example 2 Find the profit or loss when an article bought at Le 9000 is sold at Le 8200

Solution : CP = Le 9,000

SP = Le 82,000

The cost price is greater than the selling price, so there is a loss

Loss = CP – SP = Le 9000 – Le 8200

Le 800

Exercise 1

1) Find the profit or loss in the following deals:

	Cost price (CP)	Selling Price (SP)
a)	Le 60,000	Le 55,000
b)	Le 120,000	Le 90,000
c)	Le 68,000	Le 72,000
d)	Le 55,000	Le 70,000

2) John bought 4 packets of pencils at Le 5000 for each packet. If he sold all of them for Le 25,000. How much did he gain or lose?
3) My uncle bought a bicycle at Le 250,000 and spent Le 50,000 to repair it. If he sold it at Le 300,000. What was his profit?
4) Mr. Jones sold 12 dozen eggs at Le 35,000 per dozen to a trader, one dozen of the eggs were rotten and the rest were sold at Le 40,000 per dozen. How much did the trader gain or lose?

Percentage Profit or Loss

Example 3

Find the percentage profit or loss when a book bought at Le 6,000 is sold at Le 1,000

Solution: Cost Price = Le 6,000

Selling Price = Le 1,000

Profit = SP = CP = Le 1,000 – Le 6,000 = Le 4,000

$$\text{Profit Percentage} = \frac{\text{profit}}{\text{CP}} \times \frac{100}{1} = \frac{4000}{6000} \times \frac{100}{1} = \frac{400}{6} = 66.6\%$$

Example 4

A popo bag cost Le 200,000 and was sold at Le 180,000. What is the percentage profit or loss?

CP = Le 200,000 SP = LE 180,000

Loss = CP – SP = Le 200,000 – Le 180,000

= Le 20,000

$$\therefore \text{Percentage Loss} = \frac{\text{Loss}}{\text{CP}} \times \frac{100}{1} = \frac{20,000}{200000} \times \frac{100}{1} = 10\%$$

Exercise 2

1. Find the percentage profit or loss in the following deals:

	Cost Price (CP)	**Selling Price (SP)**
a)	Le 180,000	Le 160,000
b)	Le 900	Le 550

2. A radio costs me Le 180,000 and I sold it at Le 200, 000. What was my percentage profit?
3. Musu bought bananas at Le 1600 a dozen and sold them at le 300 each. What profit did she make?

POSTAL RATES

The following are inland rates for posting letters, post cards and parcels

Letters within Sierra Leone

Up to 5g = Le 300
50g to 200g = Le 600

Post Cards within Sierra Leone

Le 300

Parcels within Sierra Leone

Up to 100kg = Le 2,000
Less than 1000kg = Le 1000

Exercise 3

1. How much would it cost to post the following within Sierra Leone.
   a) 4 letters each weighing 150g
   b) 10 post cards
   c) 2 letters each weighing 180g
   d) 1 letter weighing 75g and parcel weighing 100kg

   If $1 = Le 350
2. Change the following amounts in Leones

   a) $25 b) $50 c) $100 d) $20

3. Change the following amounts to dollars
   a) Le 100 b) 150 c) 1500 d) 520
   b) A radio costs $75. What is the cost in Leones?

UNIT 24 METHODS IN COMPUTATIONS
(35 minutes)

LEARNING OUTCOME:

By the end of the lesson the pupils will be able to develop the basic skills with the four number operations.

TEACHER'S GUIDE

Teacher to carefully explain the concepts of dividing by 2, 5 and multilying a number by 10 or 100.

MULTIPLICATION SKILLS - INVESTIGATIONS

1. a) Multiply these numbers by 5. 32, 456, 312.5, 648.23
   b) Multiply each number in question 1a by 10, then divide the result by 2
   Are the answers to question 1a and 1b the same?
   Why are the answers the same?
   Give a quick method for multiplying by 5
2. a) Multiply these numbers by 50: 156, 231.7, 648.23
   b) Multiply each number in question 2a by 100 and then divide the result by 2.
   Are the answers to question 2a and 2b the same?
   Why are they the same?
   Which of the methods for multiplying by 50 in 2a and 2b is shorter?
3. a) Multiply these number by 25: 78, 402, 534, 63.12
   b) Multiply the numbers in question 3a by 100. By what number must you divide so that your answers are the same as those for question 3a?

NOTE

- To multiply by 5, multiply by 10 and divide by 2 because $5 = \frac{10}{2} = 10 \div 2$
- To multiply by 50, multiply by 100 and divide by 2, because $50 = \frac{100}{2} = 100 \div 2$
- To multiply by 25, multiply 100 and divide by 4 because $25 = \frac{100}{4} \div 4$

Exercise 1

1. Multiply these numbers by 5;
   97, 253, 432,
2. Multiply these numbers by 25
   325, 42.6, 3824, 327
3. a) Work out 37 x 102 (b) Calculate 37 x 100 + 37 x 2

   are the answers to (a) and (b) the same? why are they the same?

DIVISION SKILLS -INVESTIGATIONS

1. a) Divide the following by 2
      32, 41, 53, 64, 806, 301, 760, 108
   b) List the numbers in 1a. which are divisible by 2 without a remainder.
      List the digits in the ones place of the numbers listed for question 1b. How can you describe the numbers are exactly divisible by 2?
2. a) Divide the following numbers by 5
      21, 35, 150, 263, 4205, 3470
   b) List the numbers in 2a. that are exactly divisible by 5
      Listed for question 2b. How can you describe numbers that are exactly divisible by 5
3. List 12 multiples of 10
   If a number is divisible by 10, what is the digit in the ones place?

NOTE

- When a number is divisible by 2, the digit in the ones place is 0, 2, 4, 6, or 8
- When a number is divisible by 5, the digit in the ones place is 0 or 5
- When a number is divisible by 10, the digit in the ones place is 0.
- When a number is divisible by 3, the sum of its digits is a multiple of 3.

Example: $267 \div 3 = 89$

$\therefore 2 + 6 + 7 = 15$ and 15 is a multiple of 3

Divide

a) $993 \div 3$ (b) $525 \div 3$ (c) 867 (d) 372 (e) 5202 (f) 372

Also note that any whole number is exactly divisible by:

- 2 if its last digit is even or 0
- 3 if the sum of its digits is divisible by 3
- 4 if its last two digits from a number divisible by 4
- 5 if its last digit is 5 or 0
- 6 if its last digit is even and the sum of its digits is divisible by 3
- 8 if its three digits form a number divisible by 8
- 9 if the sum of its digits is divisible by 9
- 10 if the last digit is 0

Note:

- Any number multiplied by 10 is '0' added to that number
- Any number multiplied by 100 is '00' added to that number

UNIT 25 ROMAN NUMBERS
(35 minutes)

LEARNING OUTCOME:

By the end of the lesson the pupils will be able to understand the use of Roman and Arabic numbers.

TEACHER'S GUIDE

Teacher to explain the symbols and allow students to copy and understand the symbols and their representations.

PUPIL'S GUIDE

You would need to participate in the lesson by asking questions so that you would get a better understanding of Roman numerals.

ROMAN NUMBERS

These are Roman and Arabic numbers from 1 to 100

1 I	2 II	3 III	4 IV	5 V	6 VI	7 VI	8 VIII	9 IX	10 X
11 XI	12 XII	13 XIII	14 XIV	15 XV	16 XVI	17 XVII	18 XVIII	19 XIX	20 XX
21 XXI	22 XXII	23 XXIII	24 XXIV	25 XXV	26 XXVI	27 XXVII	28 XXVIII	29 XXIX	30 XXX
31 XXXI	32 XXXII	33 XXXIII	34 XXXIV	35 XXXV	36 XXXVI	37 XXXVII	38 XXXVIII	39 XXXIX	40 XL
41 XLI	42 XLII	43 XLIII	44 XLIV	45 XLV	46 XLVI	47 XLVII	48 XLVIII	49 XLIX	50 L

51 LI	52 LII	53 LIII	54 LIV	55 LV	56 LVI	57 LVII	58 LVIII	59 LIX	60 LX
60 LXI	61 LXII	63 LXIII	64 LXIV	65 LXV	66 LXVI	67 LXVII	68 LXVIII	69 LXIX	70 LXX
71 LXXI	72 LXXII	73 LXXIII	74 LXXIV	75 LXXV	76 LXXVI	77 LXXVII	78 LXXVIII	79 LXXIX	80 LXXX
81 LXXI	82 LXXXII	83 LXXXIII	84 LXXXIV	85 LXXXV	86 LXXXVI	87 LXXXVII	88 LXXXVIII	89 LXXXIX	90 XC
91 XCI	92 XCII	93 XCIII	94 XCIV	95 XCIV	96 XCVI	97 IXCV	98 XCVIII	99 XCLX	100 C

Exercise:

1. Write the Arabic numbers for these Roman numbers.

   a) CL b) LV c) CXC d) XLV e) DCC

2. Write the Roman numbers for these Arabic numbers.

   a) 50 b) 90 c) 40 d) 110 e) 500

3. Which is the largest Roman number in the table?

   a) How many symbols does it have?

   b) How many symbols does it Arabic equivalent have?

UNIT 26 TEMPERATURE
(35 minutes)

LEARNING OUTCOME:

By the end of the lesson the pupils will be able to use the thermometer to measure the temperature of their friends in class.

Temperature: Is the measurement of how hot or cold a body, substance or, place is. A thermometer is the instrument used to measure temperature.

The thermometer is used to measure the body temperature in hospitals/clinics is called a CLINICAL THERMOMETER.

Temperature is measured in degree (^{O}C and ^{O}F) i.e., degree Celsius (^{O}C) and degree (^{O}F) Fahrenheit (^{O}F) .

a) The normal body temperature of human beings is 97^{O}F to 99^{O}F or 36^{O}c to 37^{O}c
b) Water boils at 212^{O}F or 100^{O}C
c) What turns to ice at 100^{O}F or ^{O}C

NOTE: Teachers are advised to obtain/borrow a thermometer for illustrations.

Exercise / Activities

1) Measure the temperature of different liquids in class that is, hot water, pump water, ice water.
2) Take the body temperature of the pupils in class and record the various readings and compare the results.
3) Record the various readings and find the mean temperature of the students
4) Take the temperature of few students in the classroom. Ask them to go on the field for about 10 minutes in the sun and take their temperature again. Compare these results.
5) Ice water is hotter than pump water (True / false)
6) The normal body temperature can be 97^{O}F to 99^{0}For 36^{O}c to 37^{O}c which of these are below normal body temperature and which are above?
   a) 93.4^{O}F b) 90^{O}F c) 98^{O}F d) 85.2^{O}F e) 99.5^{O}F
   f) 35^{O}C g) 40^{O}C h) 37.2^{O}C i) 39.2^{O}C j) 36.8^{O}C
7) Take the temperature some students in the mouth (under the tongue) and armpit and note if there is any difference.

UNIT 27 MEAN, MODE AND MEDIAN
(35 minutes)

LEARNING OUTCOME:

By the end of the lesson the pupils will be able to calculate the mean, mode and median for a set of given data.

MODE: Mode is the most common number from a given set of numbers (Data).

Look at these numbers, 6, 9, 1, 4, 9, 9, 5

'9' occurs most often. The mode is 9. The mode of a set of numbers is the number that occurs or appears more often than the other as '9' above.

Example 1 Find the mode of 1, 4, 8, 5, 5, 9, 5

Solution 5 is the mode because '5' occurs more than the other numbers

Example 2 Find the mode of the following sets of numbers 2, 1, 2, 3, 1, 6, 2, 1

Solution 1 occurs three time
2 occurs three times
1 and 2 are the modes and are therefore called Bimodal

Exercise 1

1. Find the mode from the following sets of numbers:

   a) 5, 7, 6, 5, 4, 8 b) 20, 17, 19, 4, 4, 21 c) 1, 2, 9, 10, 3, 2

   b) 12, 25, 8, 30, 25, 15

2. The scores in an exam of a pupil are 60%, 90%, 65%, 60%, 75% and 70%. Find the mode.

3. The rainfall in a period of time were recorded as follows: 76cm, 88cm, 70cm and 88cm. Find the mode of the rainfall.

MEDIAN: Here is a set of numbers: 4, 3, 5, 6, 7, 1, 9

Write these numbers in order i.e. The smallest first 1, 3, 4, 5, 6, 7, 9

Five (5) is the middle number. The median therefore is 5.

In these set of numbers: 7, 8, 3, 1, 2, 5, 6, 9

Write the numbers in order from the smallest to the largest.

1, 2, 3, 5, 6, 7, 8, 9

The median is between 5 and 6. The median therefore is (5 + 6)/2 = 5½

Exercise 2 Find the median of the following sets of numbers:

i) 6, 8, 7, 2, 4, 6, 2 ii) 8, 10, 11, 16, 9, 8 iii) 30, 20, 40, 50, 20, 60

iv) 1, 2, 3, 1, 4, 5, 6 v) 3, 1, 2, 5, 4, 7, 9 vi) 13, 11, 12, 15, 17, 19

vii) 13, 11, 12, 15, 14, 17, 19, 20

THE MEAN

The mean of a set of numbers is the average of the numbers that is, the sum of the numbers divided by the number of items

Example 3 Find the mean of the following set of numbers 4, 5, 8, 3

$$\text{Mean} = \frac{4 + 5 + 8 + 3}{4} = \frac{20}{4} = 5$$

Example 4 The ages of five boys in a class are 10yrs, 9yrs, 8yrs. Find the mean age of the boys

.

$$\textbf{Mean} = \frac{10\text{yrs} + 9\text{yrs} + 10\text{yrs} + 8\text{yrs} + 8\text{yrs}}{5}$$

$$= \frac{10 + 9 + 10 + 8 + 8}{5} = \frac{45}{5} = \textbf{9years}$$

Example 5 Momoh scored the following grades in his subjects, maths 60%, English 50%, verbal aptitude 80%, quantitative aptitude. 70%, general paper 60%. Find the mean score.

$$\text{Mean} = \frac{60\% + 50\% + 80\% + 70\% + 60\%}{5} = \frac{320}{5}$$

$$= 64\%$$

Exercise 3

1. Find the mean of the following numbers.

   a) 10, 6, 7, 5, 4, 8, 9

   b) 100, 70, 80, 60, 50

   c) 25, 30, 40, 36, 55, 60, 80

   d) 14, 13, 12, 20, 12, 16

2. Look at the table

Number	Frequency
2	5
3	6
5	2
7	3
9	8

(a) Find the mean number
(b) Find the mode or modal number

UNIT 28 RATES AND SIMPLE INTEREST
(35 minutes)

LEARNING OUTCOME:

By the end of the lesson the pupils will be able to solve problems involving rates and simple interest.

TEACHER'S GUIDE

Teachers to ensure that the process of calculating rates and interest are understood by pupils and they can apply them.

INTEREST: The interest is the payment given for saving money. It can be the price paid for borrowing money. When interest is calculated on the basic sum of money saved or borrowed, it is called simple interest.

The money used for the investment is called the principal. The percentage return is called the rate percent. The time is the period in year to work the interest.

Therefore, simple interest $I = P \times T \times R$

Where P = Principal

R = The annual return of interest (given as percentage)

T = Time for which the money is saved or borrowed

$$I = \frac{P \times T \times R}{100}; \quad P = \frac{I \times 100}{T \times R}; \quad T = \frac{I \times 100}{P \times R} \quad R = \frac{I \times 100}{P \times T}$$

Example 1 Find the simple interest on Le 300 for 3yrs at 4%

Solution

$I = \frac{P \times T \times R}{100}$ = where P = Le 300, R = 4%

T = 3yrs

$$\therefore\ I = \frac{\text{Le } 300 \times 4 \times 3\text{yrs}}{100} = \frac{300 \times 4 \times 3}{100}$$

$$= I = \frac{3 \times 4 \times 3}{1} = \text{Le } 36$$

Example 2: At what rate% will Le375 yield an interest of Le75 in 5yrs?

$$R = I = \frac{100 \times 75}{375 \times 5} = 4\%$$

Example 3: In how many years will N420 gain an interest of N 84 at 4%

$$T = I = \frac{100 \times I}{P \times R}$$ = where P = N420, R = 4% and I = N 84

$$\therefore T = I = \frac{100 \times 84}{420 \times 4} = 5 \text{ years}$$

Example 4: What principal will gain Le75 in 5years at 5%?

$$P = \frac{100 \times I}{R \times T};$$

Where: I = Le 75
T = 5 yrs
R = 5%

$$\therefore P = I = \frac{100 \times \text{Le } 75}{5\text{yrs} \times 5} = I = \frac{100 \times 75}{5 \times 5} = \text{Le}300$$

Example 5: How much simple interest will a depositor receive on Le450, for 7yrs at 14% per annum?

$$I = \frac{P \times T \times R}{100}$$

Where: P = Le450
T = 7yrs
R = 14%

$$\therefore I = \frac{450 \times 7 \times 14}{100} = \text{Le } 441$$

Exercise

1. Find the simple interest on Le420 for 5yrs at 10% per annum
   a) Le 215 b) 210 c) Le200 d) Le310

2) Find the simple interest on Le 680 at 6% for 1yrs
   a) Le16 b) Le40,80 c) Le14 d) Le68

3) What is the simple interest on Le160 at 2½% for 4yrs?
   a) Le20 b) Le10 c) Le 15 d) Le16

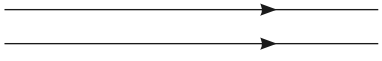
4) Find the simple interest on N750 for 6yrs at 3% per annum
   a) N130 b) N135 c) N75 d) N136

5) Find the simple interest on Le 401.25 for 1yrs at 3½% per annum
   a) Le 14 b) Le 105 c) Le107 d) Le 106
   a) 30% b) 25% c) 6 % d) 5%

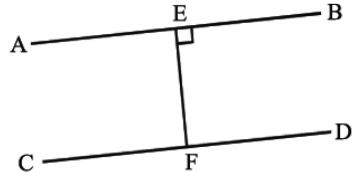
UNIT 29 PARALLELS AND PERPENDICULARS
(35 minutes)

LEARNING OUTCOME:

By the end of the lesson the pupils will be able to understand the difference between angles and parallel lines and use the properties to solve problems.



These lines are parallel

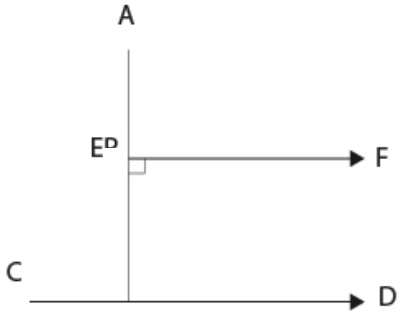


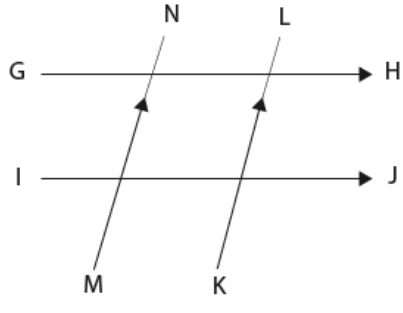
AB is perpendicular to EF

and CD perpendicular to EF

Note: Two lines drawn are parallel if they never meet
Two lines are perpendicular if they meet at exactly 90°

Exercise 1





Using the diagrams above

Write parallel or perpendicular in each space

AB is _____ to CD

a) EF is _____ to CD

b) EF is _____ to AB

c) GH is _____ to IJ

2. Write true or false for the following statements
   a) AB is parallel to EF
   b) EF is parallel to BD

3. Draw two straight lines AB and CD of any length so that two lines are parallel

UNIT 30 GAMES AND PUZZLES
(35 minutes)

LEARNING OUTCOME:

By the end of the lesson the pupils will be able to develop more skills in working with numbers.

TEACHER'S GUIDE

Teachers would need to support pupils through the process of completing a puzzle. Pupils must be given support to in order to understand key rules so that they would be able to complete puzzles.

STUDENT GUIDE

You would need to revise your times in order to be more confident in solving puzzles/problems.

A puzzle is a game, problem or toy that tests a person's knowledge. In a puzzle, the solver is expected to put pieces together in a logical way, in order to arrive at the correct or fun solution of the puzzle.

There are different genres of puzzles, such as crossword puzzles, word-search puzzles, number puzzles, relational puzzles, and logic puzzles.

Puzzles are often created to be a form of entertainment, but they can also arise from serious mathematical or logical problems. In such cases, their solution may be a significant contribution to mathematical research.

Copy and complete the puzzles

In magic squares, the sum of any line across, down or diagonal is always the same

1. a) Sum = 34

9		12	6
	2		3
5		8	
4	14	1	

b) Sum =

32	7		6
10		16	
	28		30
18			12

2. Each letter stands for a number. Find the number for each letter.

a)
$$\begin{array}{r} A\,9\,5 \\ +\,4\,7\,8 \\ \hline 8\,7\,1 \end{array}$$

b)
$$\begin{array}{r} 3\,N\,5 \\ +\,5\,9\,\,2 \\ \hline 9\,6\,N \end{array}$$

c)
$$\begin{array}{r} 9\,3\,k \\ +\,4\,P\,7 \\ \hline 1\,R\,2\,2 \end{array}$$

d)
$$\begin{array}{r} J\,9\,0\,\,5 \\ 3\,8\,D\,M \\ +\,5\,7\,3\,M \\ \hline 14\,J\,M\,9 \end{array}$$

e)
$$\begin{array}{r} T\,P\,6\,5\,5 \\ 7\,5\,0\,3 \\ +\,S\,P\,7\,5\,4 \\ \hline 13\,4\,9\,5\,6 \end{array}$$

ANSWERS

UNIT 1

Exercise

Q1. 2, 123, 212 **Q2.** 3, 14, 124 **Q3.** 4, 243, 423 **Q4.** 600,000

Q5. 8,000,000 **Q6.** 6,000,000 **Q7.** 6,000,009 **Q8.** 352,000,000

Q9. 400,000,000 **Q10.** 32,252,249

UNIT 2

Exercise 1

Q1. a) o b) o c) e d) o e) e

Q2. 61, 67, 71, 79, 83

Exercise 2

Q1. 9 **Q2**. 12 **3Q**. 10 **Q4,** 80

Q5. 300 **Q6.** 12 **Q7.** 72 **Q8.** 24

UNIT 3

Exercise 1

Q1. 30 **Q2.** 70 **Q3.** 80 **Q4.** 100 **Q5.** 90 **Q6.** 50 **Q7.** 40 **Q8.** 90 **Q9.** 30

Exercise 2

Q1. 800 **Q2.** 300 **Q3.** 500 **Q4.** 200 **Q5.** 200 **Q6.** 400

Q7. 300 **Q8.** 700 **Q9.** 900 **Q10.** 300

UNIT 4

Q1. 3/5 **Q2.** 9/10 **Q3.** ¾ **Q4.** 2/9 **Q5.** 13/4 **Q6**. 30/7

UNIT 5

Exercise 1

a). 17.1 b). 18.6 c). 7.1 d). 0.4 e). 0.9 f) 1.0

g). 22.5 h). 55.0

Exercise 2

1) 0.6 2) 0.5 3) 3.3 4) 0.75 5) 0.07 6) 0.2

7) 0.56 8) 0.2 9) 0.5 10) 0.6

UNIT 7

Exercise 2

1). 588 2) 1204 3) 4543 4) 6605 5) 12069

Exercise 3

Q1. 6.7 2) 8.5 3) 7.0 4) 5.8 5) 46.7 6) 6.84 7) 7.52 8) 160 9) 16 10) 18

UNIT 8

Exercise 2

Q1. 2 2/3 2) 4/3 3) 18/7 4) 28/15 5) 7/2 6) 32/5

UNIT 9

Exercise

1). 3.3 2) 1.9 3) 1.7 4) 6.86 5) 2.126

UNIT 10

Exercise 1

a). 24cm^2 b) 25cm^2 c) 13cm^2

Exercise 2

a). 12cm^2 b) 90cm^2 c) 96cm^2

UNIT 11

Exercise

1). 6 am 2) 180 km/hr 3) 360 km

UNIT 13

1) 1: 12 2) 12: 5

UNIT 14

NPSE PAST QUESTIONS

1). 30% 2) 48% 3) 20%

UNIT 15

Q1. 4 **Q2.** 9 **Q3.** 10 **Q4.** 5 **Q5.** 6 **Q6.** 7 **Q7.** 2 **Q8.** 1 **Q9.** 3 **Q10.** 8

UNIT 18

1). 124 2) 153 3) 72^0

NPSE

Q1. M = 55^0 Q2 m = 58^0

UNIT 19

1). 29.3g 2) 3,500kg

UNIT 20

Q1. Equilateral triangle **Q2**. 520

UNIT 23

1a). Loss= Le5,000 b) Loss = Le30,000 c) Profit = Le4,000 d) Le 15,000

Q2. Le5,000 profit 3) No profit 4) Le 20,000 profit

Exercise 2

1a) 11.1% loss b) 38.9% loss

2). Profit = 11.1% 3) 125%

Exercise 3

1a) Le 2,400 b) Le 3,000 c) Le 1,200 d) Le 2,600

Q2a) Le 8750 b) Le 175000 c) Le35,000 d) Le 7,000

Q3a) $28.57 b) $42.86 c) $428.57 d) $148.57

Q3). Le 26,250

UNIT 24

Exercise 1

Q4 485, 1265, 2160 **Q5**) 8125, 1065, 95600, 8175

Q6a) 3774 b) 3774[The answers are the same because the number on the unit column before multiplying is the same (2)].

UNIT 27

Exercise 1

1a) 5 b)4 c) 2 d) 25
2). 60 3) No mode (0) 4 i) 100 4 ii) 3

Exercise 2

1a). 7 1b) 72 1c) 46.3 1d) 14.5

Q2a Mode = 9 2b) Mean = 5

Exercise 3

a) mean number = 5.5 b) mode = 9

UNIT 28

Exercise 1

1). Le 210 2) Le 40.80 3) Le 1,600 4) 135 5) 14

UNIT 29

1). AB is perpendicular to CD b) EF parallel to CD c) EF perpendicular to AB
c) GH parallel to IJ

Q2a) False b) True

Q3. A ⟶ B

C ⟶ D