#CREATIVE PRINTERS

FORMAT OF LESSON NOTES (Theme based)

SUBJECT: ______________________ CLASS: ______ TERM:______YEAR:_________

Them e	Topic/The me&Class	achable unit / deliverable lesson
SETS	**Set Concepts**	**LESSON 1**
		Identifying finite and infinite sets **Finite sets** are sets whose number of elements can be determined. **Infinite sets** are sets whose number of elements cannot be determined. **Examples of finite and infinite sets.** 1. Set A = {all vowel letters} A = {a , e , i , o , u} A is a finite set. Set A is finite set because its number of elements can be determined. 2. B = {all prime numbers} B = (2 , 3 , 5 , 7 , 11 , 13 , 17 , 19 , …………………} Set B is an infinite set. Set B is an infinite set because its number of elements cannot be determined. **Activity;** State whether the sets below are finite of infinite sets. 1. K = {all factors of 24} 2. M = {odd numbers less than 12} 3. P = {all even numbers} 4. X = {all multiples of 7} 5. Y = { all multiple of 16 between 40 and 100}
Sets	Set concepts	**Lesson 2** **Forming subsets from finite sets.** **A subset** is any set got from the given set. **An empty set** is a subset of every set. **Any given set** is a subset of itself. **Examples;** 1. Form subsets from set A given that A = { } **Solution** Subset { } 2. List all the subsets that can be formed from a set of all prime numbers less than 7.

		solution The given set is {2 , 3 , 5} **Subsets** { } , {2} , {3} , {5} , {2 , 3} , {2 , 5} , {3 , 5} , {2 , 3 , 5} **Activity:** 1. Given that V = {7, 9}. List all the subsets that can be formed from set V. 2. If set M is a set of all composite numbers less than 4. List all the subsets that can be obtained from set M. 3. Given that L = {0, 2 , 4}. Form all the subsets from set L. 4. X = {all factors of 9}. List all the subsets that can be formed from set X. 5. D = {a , b , c , d}. List all the subsets that can be obtained from set D. 6. If K = {all prime numbers less than 3}. List all the subsets from set K. 7. A = {all even numbers between 0 and 9}. List all the subsets that can be formed from set from set A.
Sets	**Set concepts**	**Lesson 3** **Forming proper and improper subsets.** **Proper subsets** are smaller sets got from the given set. **The given set** (mother set) is not a proper subset. **Improper subsets** refer to the given set. **Examples;** 1. List all the proper subsets from set A, if A = {0, 2}. **Proper subsets.** { } , {0} , {2} **NOTE:** {0 , 2} as an example of an improper subset. 2. Given that N = {a , e , i} a) List all the proper subsets from set N. **Proper subsets.** { } , {a} , {e} , {i} , {a,e} , {a , i} , {e , i} **NOTE:** {a , e , i} is an example of an improper subset. b) List all improper subsets from set N. **Improper subsets** { } , {a} , {e} , {i} , {a,e} , {a , i} , {e , i}, {a , e , i}. **Activity;** 1. M = {c, u, p}. List all the proper subsets from set M. 2. List all the proper subsets in set V if V = {6 , 8} 3. Given that Y = {first 3 square numbers} a) List all the elements of set Y.

b) Form all the proper subsets from set Y.
c) List all the improper subsets from set Y.
4. List all proper subsets that can be formed from a set of the first four whole numbers.

Sets	**Set Concepts**	**Lesson 4**

Lesson 4

Finding the number of subsets

Deriving the formula of finding the number of subsets.

-Any set with elements has number of subsets that can be expressed in powers of two.

Number of elements	**Subsets**
0	1
1	2
2	4
3	8
4	16
5	32

For example considering a set with 5 elements, to get the number of subsets, you will use 2^5 which can be obtained from the steps below.

2	32
2	16
2	8
2	4
2	2
	1

$\mathbf{2^5}$

- When the number of subsets is expressed in powers of two, the index is equivalent to the number of elements in a given set.

Hence, number of subsets = $\mathbf{2^n}$

Where **n** stands for the number of elements.

Examples

1. Find the number of subsets in a set below.

A = {a , e , i , o , u , d}

Number of subsets = 2^n

$= 2^6$

$= 2 \times 2 \times 2 \times 2 \times 2 \times 2$

$= \mathbf{64}$

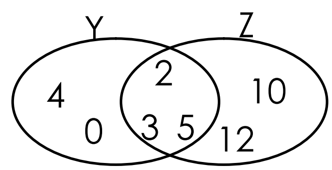
2. If n (K) = 7, find the number of subsets in set K.

Solution

$$\begin{aligned} \text{Number of subsets} &= 2^n \\ &= 2^7 \\ &= 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \\ &= 128 \end{aligned}$$

Activity

1. Find the number of subsets in set P with 5 elements.
2. Use the Venn diagram below to answer the questions that follow.



   a) How many subsets can be formed from members in Z∩Y.
   b) Find the number of subsets that can be formed from set Z.
   c) How many subsets cab be got from set Y-Z?

3. If set L has one element, how many subsets can be got from set L?

Lesson 5

Proper subsets

- Proper subsets has less number of elements as compared to its mother set.
- Subtract 1 from the number of subsets to obtain the proper subsets.

Thus

Proper subsets = $2^n - 1$

examples

Number of proper subsets= $2^n - 1$

$= 2^7 - 1$

$= (2x2x2x2x2x2x2) - 1$

$=128 - 1$

$=127$

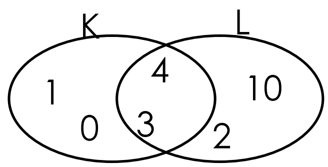
2. If M = {g, o, a, t}. Find the number of proper subsets that can be obtained from set M.

$$\begin{aligned}\text{Number of proper subsets} &= 2^n - 1\\ &= 2^4 - 1\\ &= (2 \times 2 \times 2 \times 2) - 1\\ &= 16 - 1\\ &= 15\end{aligned}$$

Activity

1. Given set K = {All prime numbers less than 11}, Calculate the number of proper subsets in set K.

2. Use the Venn diagram below to answer the questions that follow.



a) How many proper subsets can be formed from members in K∩L?

b) Calculate the number of proper subsets that can be formed from members in K U L.

3. Find the number of proper subsets that can be got from set Y, if Y = {40, 50, 60, 70, 80}.

4. If n (Z) = 3, how many proper subsets can be got from set Z?

Lesson 6

Finding the number of elements when given the number of Subsets and proper subsets

Example 1

-State the formula for finding number of subsets or proper subsets as may be required in the question.

- Substitute the unknown number of subsets with the value given.
- Or substitute the unknown number of subsets with the value given and simplify.
- Express the number in powers of two.
- Power numbers of the same base have their powers (exponents) the same

Example

1. Set Y has 16 subsets, how many elements are in set Y?

   2^n = number of subsets.

   $2n = 16$

   Factorize 16 and express it in powers of 2

2	16
2	8
2	4
2	2
	1

$2^n = 2^4$

$n = 4$

Example 2

How many elements are in a set of 31 proper subsets?

$2^n - 1 \quad = \text{Number of proper subsets}$

$2^n - 1 \quad = 31$

$2^n - 1 + 1 = 31 + 1$

$2^n \quad = 32$

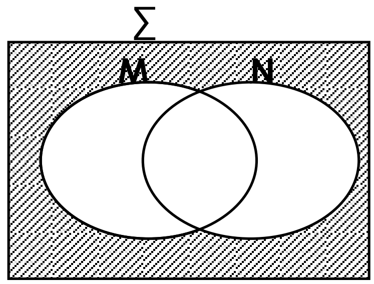
2	32
2	16
2	8
2	4
2	2
	1

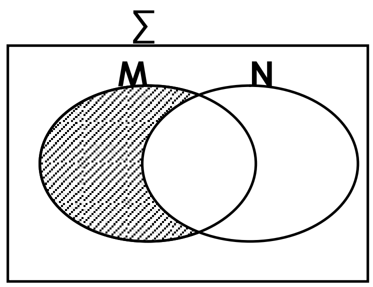
$2^n = 2^5$

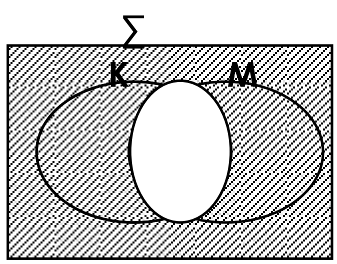
$n = 5$

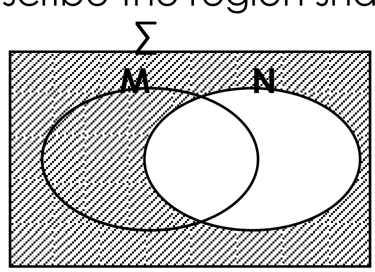
<u>Activity</u>

1. Calculate the number of elements in a set with 128 subsets
2. Odongo listed 7 proper subsets from set K, how many elements were in set K.
3. Given that set M has 256 subsets, find the number of elements in set M.
4. If set N has the following proper subsets, list down all the elements of set N: { } , {1} , {2} , {3}, {2,3} , {1,2} , {1,2,3} , {1, 3}
5. Given that set P has 15 proper subsets, find n (P).

<table>
<tr>
<td>Sets</td>
<td>Set Concepts</td>
<td>
Lesson 7
Regions on a two event Venn diagram.
- Identify the required region.
- Describe the shaded regions.
- Shade the given region in the question.
Examples
1. Shade the region of (MUN)'


2. Shade the region of M only (M – N)


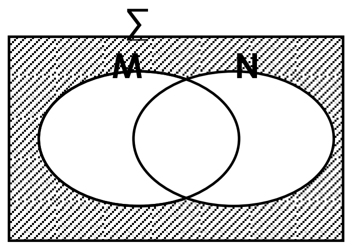
3. Describe the shaded regions in the Venn diagram below;


$(M \cap K)'$
4. Given the Venn diagram below
describe the region shaded below.


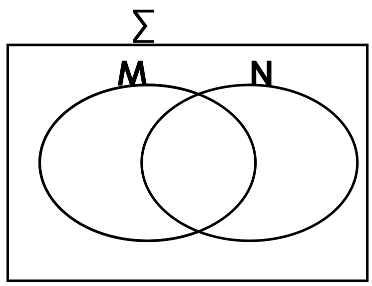
N'
</td>
</tr>
</table>

Activity

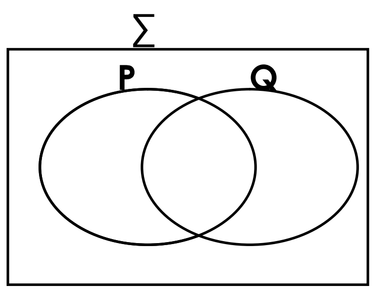
1. What region of the Venn diagram is unshaded below;



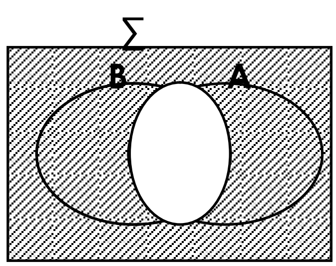
2. Shade the region of N – M on the Venn diagram.



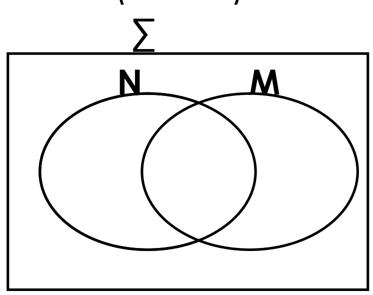
3.Shade (P - Q)’ in the Venn diagram below:



4. Describe the unshaded region in the Venn diagram below:



5. Shade n(M ∩ N)’ in the Venn diagram below:



Sets	**Set Concepts**	

Lesson 8

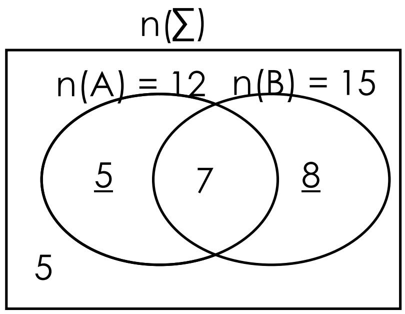
Representing information on a Venn diagram

- Identify the regions on the Venn diagram.
- Fill the Venn diagram correctly using the information.

Example

1. Given that n(A) = 12, n(B) = 15, n(A∩B) = 7 and n(AUB)ᴵ = 5

a) Complete the Venn diagram below;



n(A) only
12 – 7 = 5

n(B) only
15 – 7 = 8

b) Find n(∑)

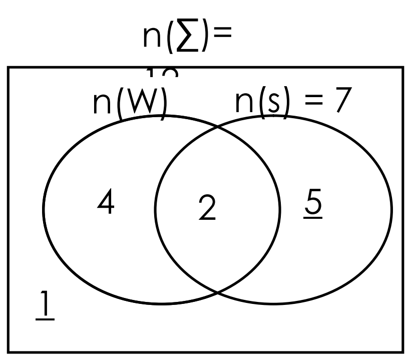
n(∑) = 5 + 7 + 8 + 5

12 + 13

n(∑) = 25

2. In a group of 12 members , 4 members take water (W) only, 7 members take soda (S), 2 members take soda and water and some take other drinks;

Complete the Venn diagram below;



N(WUS)ᴵ
12 – (4 + 2 + 5)
12 – 11
1

n(S) only
7 – 2 = 5

<u>**Activity**</u>

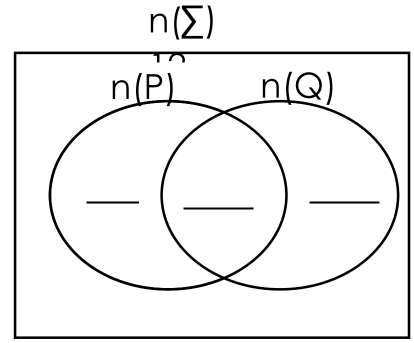
1. If set P = {All composite numbers less than 16}

Q = {1 , 3, 5 , 7 , 9 , 11 , 13 , 15}

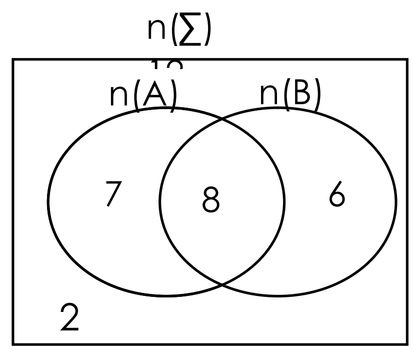
a) List down the members of set P.

b) Find n(P) and n(∑)

<table>
<tr>
<td></td>
<td></td>
<td>
c) Use the information above to complete the Venn diagram below;

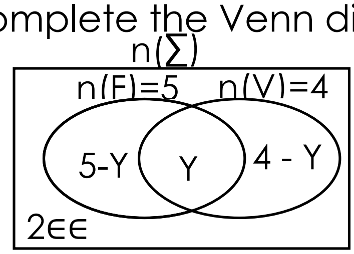


2.Study the Venn diagram below carefully and use it to answer the questions that follow:



(a)Find n(∑)

(b)Find n(A)’
(c)Find n(B – A)’
</td>
</tr>
<tr>
<td>Sets</td>
<td>Set concepts</td>
<td>
Lesson 9
Solving problems involving Venn diagram (Use of the number of elements in the universal set).
- Identify the regions of a Venn diagram given and values given
- Fills the Venn diagram with the information given.
- Forms an equation from the Venn diagram.
- Solve the equation formed.
1. In a class of 8 boys, 5 play football (F), 4 play volley (V), Y play both games while 2 play other games.
a) Complete the Venn diagram below.



</td>
</tr>
</table>

b) Find the value of Y in the diagram.

$5 - Y + Y + 4 - Y + 2 = 8$

$5 + 4 + 2 - Y = 8$

$11 - Y = 8$

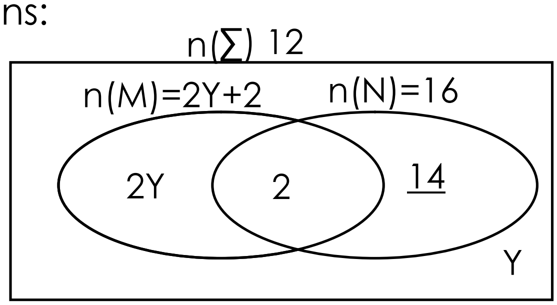
$11 - 11 - Y = 8 - 11$

$-Y = -3$

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

$Y = 3$

2. Use the Venn diagram below to answer the following questions:



a) Complete the Venn diagram above.

n(N) only

$16 - 2 = 14$

b) Find the value of y.

$2Y + 2 + 14 + Y = 31$

$2Y + Y + 2 + 14 = 31$

$3Y + 16 = 31$

$3Y + 16 - 16 = 31 - 16$

$\frac{3Y}{3} = \frac{15}{3}$

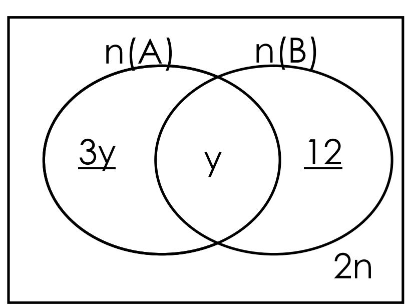
$Y = 5$

c) Find $n(M \cap N)^{I}$

d) Calculate the number of elements in the universal set.

2. In a village of 40 members, 20 members take Fanta (F), 12 members take pepsi (P) only, 3y take Fanta (F) only, 2n take other drinks while only Y members take both Fanta and Pepsi

a) Represent the information on the Venn diagram.



b) Find the value of y and n.

$$3y + y = 20$$
$$4y = 20$$
$$\frac{4y}{4} = \frac{20}{4}$$
$$y = 5$$

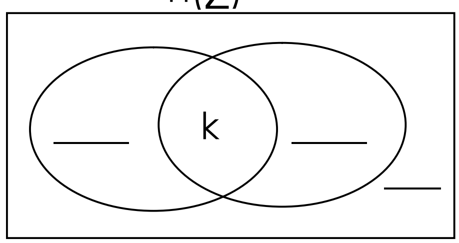
$$20 + 12 + 2n = 40$$
$$32 + 2n = 40$$
$$32 - 32 + 2n = 40 - 32$$
$$\frac{2n}{2} = \frac{8}{2}$$
$$n = 4$$

Activity:

1. In a class of 44, 27 pupils like matooke (M), 22 like Rice (R), 2 don't like any of the two while some pupils like both Matooke and Rice.

a) Use the above information to complete the Venn diagram below.

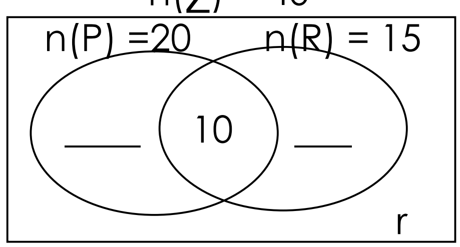
n(∑) =



b) Find the value of k.

2. Study the Venn diagram below and complete it correctly.

n(∑) = 40



b) Find the value of r.

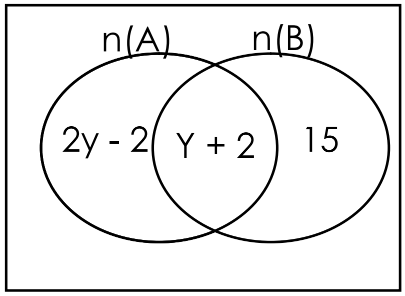
Lesson 10

Using parts of a Venn diagram to form and solve equations.

- Define all the different parts / regions in the Venn diagram.
- Identify the data / values in the phrases of the question with the regions of the Venn diagram.
- Fill in the Venn diagram and identify the region with full information that can form an equation.
- Use the phrases of comparison given to form the equation.
- Solve the equation.

Examples;

1. Given the Venn diagram below, n(A) = n(B) only.



3y

a) Find the value of y.

2y – 2 + y + 2 = 15

2y + y + 2 – 2 = 15

3y = 15

3 3

y = 5

b) Find n(A) only.

(2 x y) – 2

(2 x 5) – 2

10 – 2

8

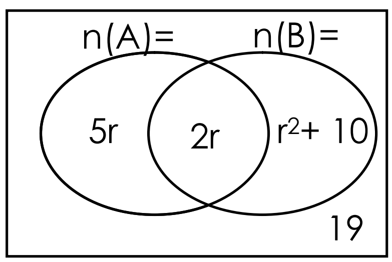
c) How many members take other drinks?

n(FUP)^{I} = 2n

2 x 4 = 8 members

Activity

1. Given the Venn diagram below, use it to answer the questions that follow.

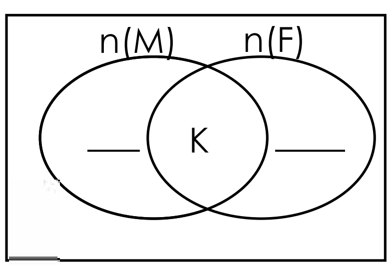


a) If n(B)only = n(AUB)^{I}, find the value of r.

b) Find n(∑)

2. In Masafu hospital 20 patients have malaria (M), 15 patients have fractures (F) only while p of them had both malaria and fractures.

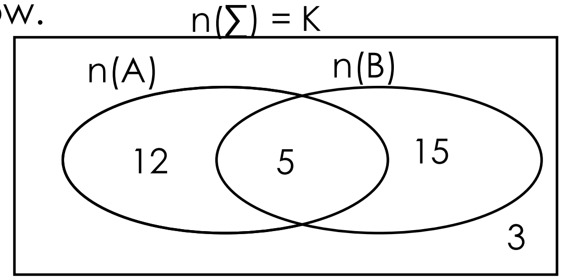
a) Represent the information on the Venn diagram.



a) If $\frac{1}{5}$ of the fracture patients (F) only have fractures (F) and malaria, find the value of K.

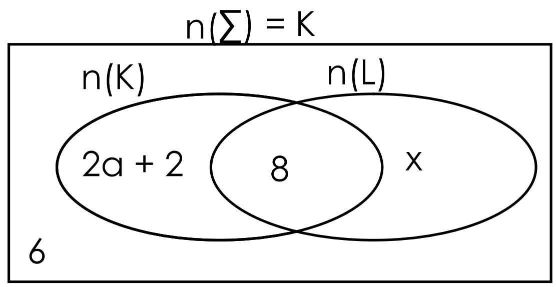
b) How many patients are in Masafu hospital.

<table>
<tr>
<td>Sets</td>
<td>Set concepts</td>
<td>
Lesson 11
Probability of simple events.
- Probability is a likeness of an event to happen. (chance)
- For the coin, the two sides make the total chances (sample space)
- Tail and head make the sample space.
- When the coins increase the sample space also increases.
- One coin has a sample space of 2 (H,T)
- Two coins have a sample space of 4.
- Probability is expressed as a fraction.
Examples;
1. If a coin is tossed once, What is the probability of a head appearing on top?
<table><tr><td>H</td><td>T</td></tr></table>
Probability
n(D) , desired chances
n(E) , sample space
$\frac{1}{2}$
2. John tossed two coins at once, what was the probability of having a tail on top for both coins.
<table>
<tr><td></td><td>H</td><td>T</td></tr>
<tr><td>H</td><td>HH</td><td>HT</td></tr>
<tr><td>T</td><td>TH</td><td>TT</td></tr>
</table>
Probability
n(D) D – stands for desired chances
n(E) E – Total events
$\frac{1}{4}$
Probability on a dice
- A dice has 6 faces numbered from 1 to 6
- Each face has a chance to appear on top when tossed.
- These faces have different kinds of numbers thus odd, even , square , prime , composite and others.
1. Onyango tossed a dice once, what is the probability that a prime number will appear on top.
<table>
<tr><td><u>Sample space</u></td><td><u>Desired chances</u></td><td><u>Probability</u></td></tr>
<tr><td>{1 , 2 , 3 , 4 , 5 , 6}
n(E) = 6</td><td>{2 , 3 , 5}
n(D) = 3</td><td>$\frac{n(D)}{n(E)}$
$\frac{3}{6}$</td></tr>
</table>
</td>
</tr>
</table>

		2. If a dice is tossed once what is the probability that a sum of 2 and 3 will appear on top? **<u>Sample space</u>** **<u>Desired chances</u>** **<u>Probability</u>** {1 ,2 , 3 , 4 , 5 , 6} <u>2 + 3 = 5n(D)</u> n(E) = 6 5 n(E) n(D) = 1 $\frac{1}{6}$ **Activity;** 1. Peter tossed two coins at once, what is the probability that Head tail will appear on top on both coins. 2. A teacher asked his learner to toss a dice once, what is the probability that a composite number appear on top. 3. A dice was tossed once. Find the probability that; a) A prime number will appear on top. b) A number less than 5 will appear on top. c) An odd number will appear on top.
Sets	**Set concept**	**Lesson 12** **Probability from two event Venn diagram.** - n(E) is the sample space n(E) - Identify the region asked in the questions. - Find the elements in the region. - Express the number as a fraction of the total number of elements in the universal set. **Examples;** 1. Use the Venn diagram below to answer the questions that follow. n(∑) = K  a) Find the value of K. K = 12 + 5 + 15 + 3 K = 35 b) Find the probability of picking an elephant from set B only. n(D) = 15 n(E) = 35 **Probability** $\frac{n(D)}{n(E)} \Big\vert \frac{15}{35}$

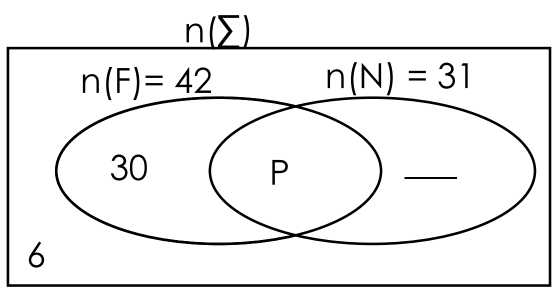
Activity:

1. Study the Venn diagram below carefully:



a) Find the value of a.
b) Find the value of x if n(∑) = 49
c) Find the probability of picking a member that is under $n(K)^{I}$

2. In a class, 42 pupils enjoy football (F), 31 enjoy netball (N), P enjoy both Football and netball while 3 enjoy neither football nor netball.
a) Use the above information to complete the Venn diagram below.



a) Find the value of P.
b) What is the probability of picking a pupil who does not like football?

FORMAT OF LESSON NOTES (Theme Based)

Name: ______________________________ **Index No.** ________________

SUBJECT: MTC CLASS: P.7 TERM __________ YEAR: 2023

<table>
<tr><td></td><td></td><td>Lesson 1</td></tr>
<tr><td>Numeracy</td><td>Whole numbers</td><td>Forming numbers using the given digits
When forming the largest number, arrange the digits in descending order
When forming the smallest number, arrange the digits in ascending order.
If (o) in included in the given digits, it takes the second position in the smallest number.
Example
a) Use 4, 8, 0 and 2 to form the largest and smallest 4 – digit numbers
Largest number = 8420
Smallest number = 2048
b) Find the difference of the largest and smallest 4 digit numbers formed.
Difference = largest number – smallest number
8420
-2048
6372
Activity
1. Given the digits 3,0,7 and 1
a) Form the largest and smallest number
b) Workout the sum of the values of 7 & 1 in the largest number formed.
2. Given the digits 3 , 7 , 8 , 0.
Find the sum of all 4 – digit numbers that can be formed using the above digits.</td></tr>
<tr><td></td><td></td><td>Lesson 2</td></tr>
<tr><td></td><td></td><td>Reading and writing figures in words
Use a place value chart to identify the place value of each digit
Digits in place values of tens and ones are read together while digits in hundreds are read as independent digits.
Example
Write 19058832 in words
<table><tr><td colspan="3">Million</td><td colspan="3">Thousand</td><td colspan="3">Unit</td></tr><tr><td>H</td><td>T</td><td>O</td><td>H</td><td>T</td><td>O</td><td>H</td><td>T</td><td>O</td></tr><tr><td></td><td>1</td><td>9</td><td>0</td><td>5</td><td>8</td><td>8</td><td>3</td><td>2</td></tr></table>
Nineteen million, fifty eight thousand, eight hundred thirty two</td></tr>
</table>

		Activity 1. Write 4973006 in words. 2. Kato with drew a cheque with shs.101, 101,101 in words. Write the amount o money on the cheque in words. 3. Write 36649795 in words form
		Lesson 3
		Writing word form of numbers in figures Separate the number in millions and record in figures then thousands and lastly in figures Find the sum of all numbers Example Write forty nine million, six hundred seventy eight thousand seven hundred eleven in figures. Forty nine million 49.000.000 Six hundred seventy eight thousand 678.000 Seven hundred + 700 Eleven 11 49.678.711 Write the following in figures 1. six million, six hundred six thousand six hundred six 2. forty nine thousand sixty one 3. Four hundred twenty five thousand, eight hundred fourteen 4. Twenty six million, seven thousand, ninety four
		Lesson 4
		Reading and writing Roman numeral up to MM. The roman system uses only eight digits in form of letters. These include I, V, X, L, C, D & M All roman numerals are written in capital letters Some roman numerals are obtained by repeating the roman symbol twice or thrice e.g. XX, II, CCC Some roman numerals are obtained by subtracting e.g. 5 - 1= 4 10 – 1 = 9 50 – 10 = 40 V - I = IV, X – I = IX L - X = XL NB: when a letter of a small value comes before a letter of of a bigger value, it shows subtraction Expand the numeral value form and then write the roman symbols Write 494 in roman numerals 494 = 400 + 90 + 4 494 = CD + XL + IV 494 = CD X LIV

		ACTIVITY Write the following in roman numerals 1. 94 2. 945 3. 2020 4. 2049
		Lesson 5
		Expressing roman numerals as Hindu Arabic numerals When a letter of a smaller value comes before a letter of a bigger value, we do not separate the letters. They move together Example 1. Express XLV as Hindu Arabic Numeral XLV = XL + V XLV = XL + V XLV = 40 + 5 XLV = 45 2. Write MCD XLIV in words First change the numeral in Hindu Arabic numeral in words MCD XLIV = M + CD + XL + IV 1000 + 400 + 40 + 4 1444 One thousand four hundred forty four Activity Write the following in Hindu Arabic numerals 1. MMXXI 2. CCCLXXXIII 3. CDXLIX 4. MMCMXCIV
		Lesson 6
		Changing from non decimal bases to the decimal base Non decimal bases are bases which are not base ten Example

Base	Name	Digit used
2	Binary	0, 1
3	Ternary	0,1,2
4	Quaternary	0,1,2,3
5	Quinary	0,1,2,3,4
6	Senary	0,1,2,3,4,5
7	Septanary	0,1,2,3,4,5,6
8	Octal	0,1,2,3,4,5,6,7
9	Nonary	0,1,2,3,4,5,6,7,8
10	Decimal /unit	0,1,2,3,4,5,6,7,8,9

	/denary	

When changing from non decimal base to the decimal base, we expand and place values or powers and then find the sum of the multiples

Change 1011 two to decimal base

1 0 1 1 two

Ones 1 x 1 = 1

Two 1 x 2 = 2

Two twos – o x 2 x 2 = 0

Two two twos 0 x 1 x 2 x 2 = 8

8 + 0 + 2 + 1

13 ten

Method 2

1	0	1	1
2^3	2^2	2^1	2^0

Two

$(1x2^3)$ + $(0x2^2)$ + $(1x2^1)$ + $(1x2^0)$

(1x2x2x2) + (0x2x2) + (1x2) +)1x1)

8 + 0 + 2 + 1

13ten

Activity

1. Change 1101two to decimal base
2. Express 213 four to decimal base
3. write 314 five into denary base
4. Which bridging base number is equivalent to 427 eight
5. convert 1001 two into the standard base

Lesson 7

Changing from decimal base to the non decimal base

When changing from the decimal base into the non decimal base,

We divide the given number by the required base and write the remainders which we take to be our answers

Examples

Change 27 ten to binary base

2	27	1
2	13	1
2	6	0
2	3	1
2	1	1
	0	

27ten = 11011two

Activity

1. Change 9ten to binary base
2. Express 33ten as a base five number
3. Write 72ten into base 6
4. Convert 45ten into base two

Lesson 8

Finding expanded numbers in bases

When finding an expanded number in bases

Finding simplify the powers and get the products

Find the sum of all products (values) in base ten

Then change the sum obtained into the base used in expanding by dividing

Example

What number has been expanded to

$(2x5^2) + (1x5^1) + (0x5^0)$?

(2x5x5) + (1x5) + (0x1)

50 + 5 + 0

55 ten - change to base five

5	55	0
5	11	1
5	2	2
	1	

210 five

Activity

Find the numbers that have been expanded below.

1. $(1x2^3) + (0x2^2) + (1x2^0)$
2. $(3x4^2) + (2x4^1) + (3x4^0)$

Lesson 9

Changing from none decimal bases to other decimal bases

First convert the given number into base ten by expanding and simplifying

Then change the answer obtained into the required base by dividing

Examples

Change 103 four into base five

1 0 3 four

Ones 3 x 1 = 3

Fours 0 x 4 = 0

Four 1 x 44 = 16

16 + 0 + 3 = 19ten

5	19	4
5	3	3
	1	

Activity
1. change 213five to base six
2. Write 1110 two into base three
3. Express 316 seven to octal base
4. Write 303four into base seven

Lesson ten

Adding numbers into non-decimal bases
When adding bases, if the sum is equal or more than the base, we divide the sum by the base and we write the remainder as the answer and re-group the quotient

Example

```
Add;  1101two   2 ÷2= 1 r 0
      +111two    2 ÷2 = 1r0
       10100      3÷2 = 1r0
```

Activity
1. workout 312five +144five
2. Add 111two + 11 two
3. Find the sum of 11011two and 1111two
4. Add 413six + 102four (give your answer in base eight)

Lesson 11

Subtraction of numbers in non decimal bases
When subtracting a bigger value from a smaller value, we regroup one(1) from the next place value and what we have regrouped (one) is equal to the base used

Example

```
1.subtract   001two      (2+0) – 1
              111two
              0010two

2. Subtract   110two     (2+0) – 1
               11two
               11two
```

Activity
Subtract the following
1. 100six – 34six
2. 1101two – 111two
3. 1010two – 1111two

Lesson 12

Multiplication of base two numbers
When multiplying numbers in bases, if the product is equal or more than the base, divide it by the base and write the

		remainder as the answer and regroup the quotient to the next place value Examples 1. workout 101 two X11 two +101 010 1111two 3. Multiply; 213five x 14five 213five x I4five 1412 12÷5 = 2 r 2 + 213 6 ÷ 5 = 1r1 4042five 9÷5 = 1r4 5÷5 =1 r 1 Activity Multiply the following a) 143fivex24five b) 1111two x 111two c) 101two x 101two

Equations involving bases
Expand the given numbers using the given bases
Simplify and collect like terms
Examples

1. If 44p = 35nine, find the value of P

4	4
P'	po

3	5
9'	9^0

(4xp') + (4xp0) = (3x9') + (5x9^0)
(4xp) + (4x1) = (3x9) + (5x1
4p + 4 = 27 + 5
4p + 4 = 32
4p + 4 – 4 = 32 – 4
$\frac{4p}{4} = \frac{28}{4}$
P = 7
P = base seven

2. If 203n = 83nine

2	0	3
n^2	n'	n^o

8	3
9^1	9^0

($2xn^2$) + ($0xn^1$) + ($3xn^o$) = ($8x9^1$) + ($3x9^0$)
$2n^2$ + (oxn) + (3x1) = (8x9)
$2n^2$ + 3 – 3 = 72 + 3
$2n^2$ + 3 – 3 = 75- 3
$\frac{2n^2}{2} = \frac{72}{2}$

$\sqrt{n2} = \sqrt{36}$

n = 6
n is bases six

Activity
Find the value of the known letters in the numerals below
23m = 21five
105y = 60nine
X^2 = 44eight
42five = 24_n

FORMAT OF LESSON NOTES (THEME BASED)

SUBJECT: MTC **CLASS: P.7** **TERM: _________** **YEAR: 2023**

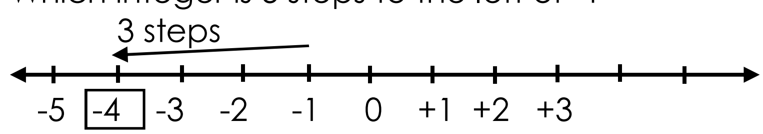
THEME	TOPIC/ THEME CLASS	TEACHABLE UNIT / DELIVERABLE LESSON
NUMERACY	INTEGERS	**LESSON 21**

<u>Application of integers on a number line</u>

- Integers on a number increase towards the right.
- The integers or the right is greater than the one on its left
- An arrow pointing to left represents a negative integers while the one pointing to the right represents a positive integer.
- A step on a numberline is between two consecutive integers on a numberline.

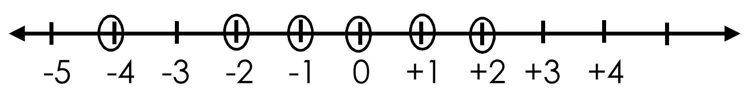
Example

1. Which integer is 3 steps to the left of -1



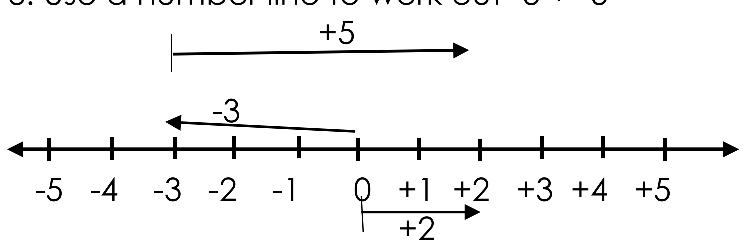
-4

2. Arrange -4, 0, 1, -2, +2 and -1 in ascending order.



-4, -2, -1, 0, +1, +2,

3. Use a number line to work out -3 + $^{+}5$



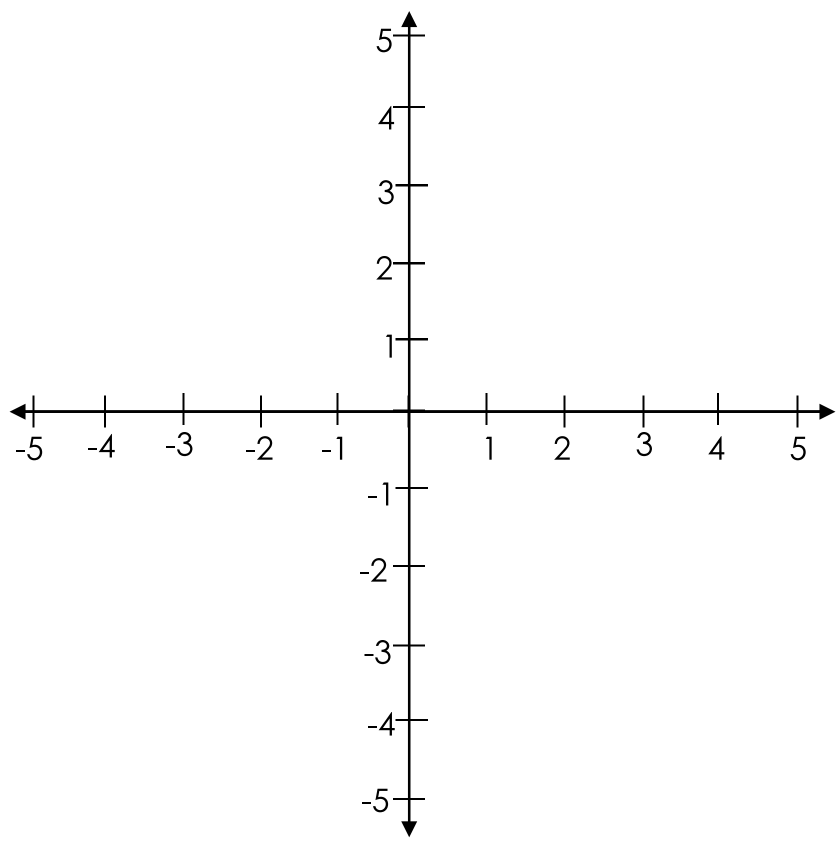
-3 + $^{+}5$ = +2

Activity;

1. Which integer is 4 steps to the right of -2.
2. Arrange 0, -1, +3, -4 and +2 in descending order
3. Workout +4 + -2 using a number line.
4. Martin made 3 strides from -4 backwards. At what integer is he now?

NUMERACY	INTEGERS	**LESSON 22** Application of integers in daily life on money, temperature and activities. -Note the words used in daily life that represent positive and negative Negative>> Debts, earlier in terms of time, moving backwards, stepdown, temperature fall etc Positive >> Gain, later, forward movements, steps up, temperature rise etc - Identify the words in the questions in relation to integers. - Define the operational sign to be used by the help of the identified words in the phrases. **Examples** 1. Musana had a debt of sh. 15,000 from each of his four friends. If he paid sh. 40,000, how much debt did he remain with? Total debts Sh 15,000 x 4 _Sh. 60,000 Paid off Sh +40,000 Musana remained with a debt of sh -60,000 + (sh. +40,000) -sh. 20,000 He remained with a debt of sh. 20,000 2. The temperature of water in the fridge was -2°C. This temperature dropped by 4°C on turning on the fridge. What is the new temperatures of the water? New temperature. -2°C – (+4oC) -2°C – 4oC - 6°C **Activity;** 1. The temperature at the top of the mountain was -10°c. At night the temperature fell by 20°c. What was the new temperature at the top of the mountain? 2. During fishing John dropped a hook in a pond 5m deep. If he then raised it 9m high. How many metres was the hook above the water level? 3. Martin reached the bus park 15 minutes earlier than the bus. If the bus reached 20 minutes later, for how long did he wait at the bus park?

NUMERACY	INTEGERS	**LESSON 23** <u>Application of integers on age</u> -To find the age of a person, when alive, subtract the year of birth from the current year. - If the person is dead, subtract the year of birth from the year of death. -BC stands for a negative and AD stands for Positive ie Year 17 BC is -17 and year 35 AD Example. A lady was born in 17BC and died in 35AD How old was she when she died? 17BC = -17 35 AD = + 35 Age = + 35 –(-17) = + 35 + 17 = 52 She was 52 years old 2. A man died at the age of 75 years. If he died in 30AD. Find his year of Birth. 30AD = 30 Year of birth = year of death – age = 30 – 75 = -45 -45 = 45BC **<u>Activity;</u>** 1. An Arab was born in 47BC and died in 13BC. How old was he when he died? 2. Opio died in 45AD at the age of 50 years. In which year was he born? 3. A lady who was born in 15BC died at an age of 45 years. In which year did she die? 4. Musombi went to America in 20BC and returned in 5AD. For how long was he in America? 5. Napunyi got married in 15BC and separated in 8AD. How long was she in marriage?

NUMERACY	INTEGERS	**LESSON 25** <u>Graphs of ordered pairs (coordinate graph)</u> - A coordinate graph is a set of 2 number lines that run perpendicular to one another. - These lines are called axes. - The horizontal number line is the x-axis and the vertical is the y-axis. - The two axes intersect where each of them are equal to zero and this intersection point is called origin. -Draw two number lines intersecting of 90° and the intersecting point (point of origin) is zero for the two number lines. - From the point of origin towards the right and upwards are positive integers. -From the point of origin towards the left and down wards are negative integers. **Examples** Draw a 5 by 5 coordinate graph 

		Activity; Draw a well labelled 4 by 4 coordinate graph and show; i) x – axis ii) y – axis iii) point of origin
		Lesson 24 <u>Application of integers on marks.</u> Identify the marks awarded for the numbers passed, or failed. Numbers failed will be indicated with negative integers since they are subtracted. Numbers passed will be indicated with positive integers since they are added. Define the quality required with unknown and form equation. Solve the equation as may be required. **Example** 1. In a test of 20 questions, 3 marks are awarded for every correct answer and a mark is deducted for every wrong answer given. a) How many marks will a candidate who fails 5 questions get? No. of marks from correct responses (3 x 15) = 45 No. of marks from wrong responses (-1 x 5) = -5 Total marks 45 + (-5) 45 – 5 40 b) If Joan scored 28 marks, how many numbers did she fail? Let the number of questions failed be y.

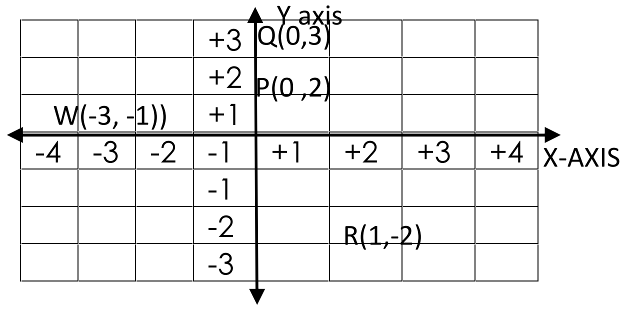
Questions		**Marks**
failed	f	-1(f)
passed	20 – f	3 (20 – f)
Total	20	28

		-1(f) + 3(20 – f) = 28 -f + 60 – 3f = 28 -f – 3f + 60 = 28 -4f + 60 – 60 = 28 – 60 -4f = -32 $+\left(\frac{\cancel{-4}f}{\cancel{-4}}\right) = +\left(\frac{\cancel{-32}^{8}}{\cancel{-4}_{1}}\right)$ f = 8 **Activity;** 1. In a test of 30 questions 5 marks are awarded for every correct answer and 3 marks deducted for every wrong answer. a) How many marks did a pupil who passed 25 questions get? b) Find the total number of questions a candidate who scored 70 marks pass. 2. During an interview of 20 questions, 3 marks are awarded for every correct answer and a mark deducted for every wrong answer. Find the number of questions Peter failed if he got 52 marks.
NUMERACY	INTEGERS	**LESSON 26** <u>Drawing co-ordinate graphs and plotting co-ordinates</u> -Coordinates are written in the order (x, y) so when plotting, locate the first integer on the x-axis and the second on the y-axis. Where the two lines intersect is the point required. Mark it and name it with its co-ordinates. - In order to locate accurately draw more intersecting to trace the point needed.

<table>
<tr>
<td></td>
<td></td>
<td>

Example

Draw a 6 x 6 grid coordinate graph and plot p(0,2) Q(0,3) , R(1, -2) W(-3, -1)



<u>**Activity;**</u>

Draw a co-ordinate graph of 8 by 8 and on it plot A(-1, +4), B(4,0), C(0,0), D(+2, +3)

</td>
</tr>
<tr>
<td>NUMERACY</td>
<td>INTEGERS</td>
<td>

LESSON 27

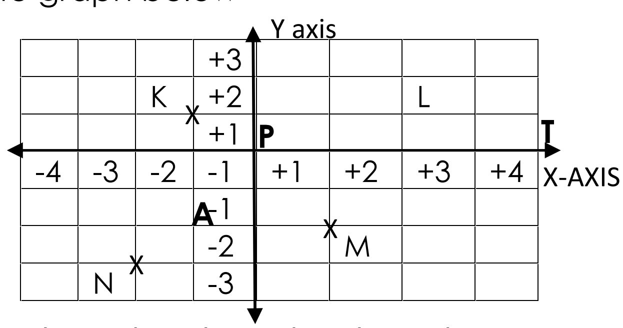
<u>Interpreting the co-ordinates on a grid.</u>

-Identify the required point on the graph.

- Order of co-ordinates is (x, y) so from the point, check the integrates on x-axis then from the point, check the integer on the y-axis.

Example

Write the coordinates of the points on the co-ordinate graph below



N(-3 , -3) B(0 , +2) T(+3 , 0)

Activity;

1. K ____________
2. L _____________
3. M ______________
4. P ______________
5. A _____________

</td>
</tr>
</table>

<table>
<tr>
<td>NUMERACY</td>
<td>INTEGERS</td>
<td>

LESSON 28

<u>Plotting co-ordinates on the grid, joining points, naming figures and finding the area</u>

-Plot the given co-ordinates on a graph, name the points with the co-ordinates.

- Join the points plotted in the order given to form a figure.

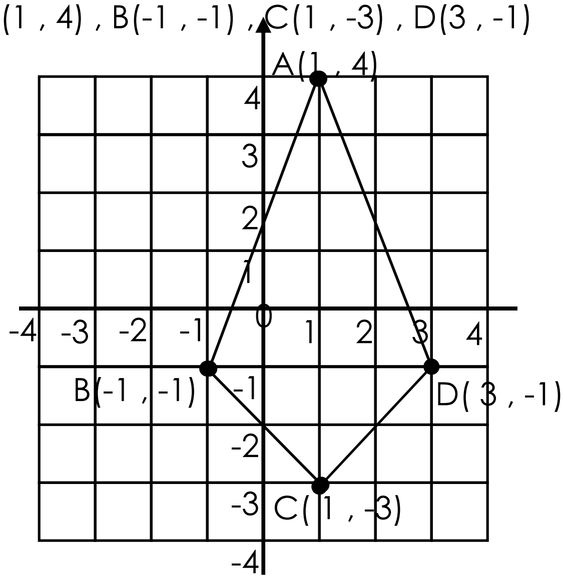
-Identify the lengths of the sides required to find the area of the particular figure by counting the number of square units along. Eg if ti is a rectangle, count the number of square units along the length and width

-Apply the formula for area of that figure to find its area in square units.

Examples;

Draw a 4 by 4 co-ordinate graph and plot the following points.

A(1 , 4) , B(-1 , -1) , C(1 , -3) , D(3 , -1)



b) Join A to B, B to C, C to D and D to A.

c) Name the figure formed.

Kite

d) Work out the area of the figure if 1 square unit = 1cm²

$A = \frac{1}{2} \times d_1 \times d_2$

$A = \frac{1}{\cancel{2}} \times \cancel{4}^{2} \times 6)cm2$

$A = 12cm^2$

Activity;

1. Draw a 4 by 4 co-ordinate graph and plot the following points P(-1, +2), Q(-1, -3) , R(+3, -3)

</td>
</tr>
</table>

<table>
<tr><td></td><td></td><td>B) Join point P to Q, Q to R and R to P
C) Name the figure formed and find its area in square units.</td></tr>
<tr><td>NUMERACY</td><td>INTEGERS</td><td>

LESSON 29
<u>Using equations of line to fill a table.</u>
-Given a table of x and y values, and the equation for the relationship between values, we find the missing values by substituting the given value in the equation.
- Solve the equation to get the remaining value of co-ordinates
- You can now pair the values in the order (x,y)
Examples;
Given that y = x+2, complete the table below and form pairs of co0ordinates

<table>
<tr><td>x</td><td>-4</td><td>-3</td><td><u>C</u></td><td>-1</td><td>0</td><td>+1</td><td>+2</td></tr>
<tr><td>y</td><td><u>a</u></td><td><u>b</u></td><td>0</td><td><u>d</u></td><td><u>e</u></td><td><u>g</u></td><td><u>h</u></td></tr>
</table>

i)a) y = x+ 2
Y = -4 + 2
<u>a = -2</u>
x + 2 – 2 = 0 - 2

ii) c) y = x + 2
0 = x + 2
x + 2 = 0
x = -2
x = -2

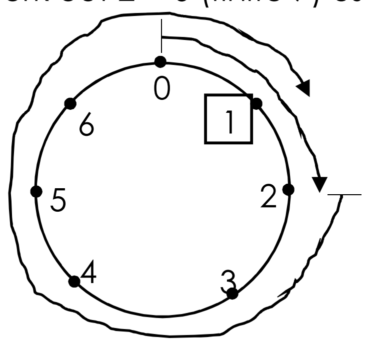
Activity;
ii) b ________________
iii) d________________
iv) e _______________
v) g________________
Given the equation;
x = y – 3, complete the table below correctly.

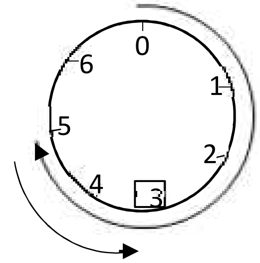
<table>
<tr><td>x</td><td>2</td><td>___</td><td>___</td><td>-2</td></tr>
<tr><td>y</td><td>___</td><td>-1</td><td>0</td><td>___</td></tr>
</table>

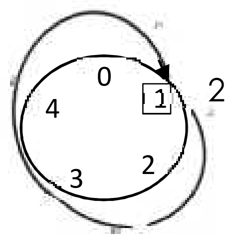
</td></tr>
<tr><td>NUMERACY</td><td>INTEGERS</td><td>

LESSON 30
<u>Addition in modulation system</u>
- Identify the digits applied in each finite system
- All the numbers written in a given finite should be less than the finite.
- When adding numbers, the sum must not be equal or greater than the finite.
- If the sum is equal or greater than the finite, divide it by the finite and write the remainder.

</td></tr>
</table>

		Examples 1. Add: 6 + 5 = ______ (finite 7) 6 + 5 = 11 11÷ 7 = 1 rem 4 (infinite 7) 6 + 5 = 4 (infinite 7) 2. Work out: 3 + 3 (finite 5) $\frac{6}{5}$ = 1 r1 1 (finite 5) **Method II** Using a dial When using a dial there is clockwise movement of arrows for positive numbers. 3. Work out 2 + 6 (finite 7) using a dial.  : 2 + 6 = 1 (finite 7) **Activity;** Work out the following 1. 3 + 2 = -- (finite 5) 2. l + 2+3 = --(finite 7) 3. 4 + 3 = -- (finite 5) 4. 0 + 1 = -- (finite 5) 5. 3 + 2 + 6 (finite 10) 6. Work out 3 + 4 (mode) using a dial.
NUMERACY	INTEGERS	**LESSON 31** Subtraction in finite system -Subtraction while using a dial involves anti-clock wise movement for negative numbers and clockwise movement for positive numbers. - When subtracting a bigger number from a smaller number, first add the finite to the first number until the subtraction doesn’t give a negative result

		<u>Example</u> 1. Work out: 5 – 2 = --(finite 7) using a dial  5 – 2 = 3 (finite 7) 2. Subtract 4 – 6 = -- (finite 7) (4 +7) – 6 = -- (finite 7) 11 – 6 = 5 4 – 6 = 5 (finite 7) **Activity;** 1. Work out using a dial a) 3 – 5 = -- (finite 7) b) 2 – 3 = -- (finite 5) 2. Workout without using a dial 3 – 6 = --(finite 7) 3. Subtract 4 – 1 (mod 5)
NUMERACY	INTEGERS	**LESSON 32** <u>Multiplication in finite system</u> - Multiply the given number correctly. If the product is equal to or greater than the finite, divide the product and write the remainder as your answer. **Example** 1. Work out 4(3x2) = --(finite 5) 4 (6) = --(finite 5) 4 x 6 = 24 24 ÷ 5 = 4 rem 4 4(3x 2) = 4 (finite 5) 2. Using a dial, the first digit represents the number of step to make and the second digit represents the

		value in each step. Example Multiply 2 by 3 (finite 5)  2 x 3 = 1 (finite 4) **Activity;** 1. Multiply using a dial. a) 2 x 4 = --(finite 7) b) 4 x 5 = --(finite 7) 2. Work out $2^2 \times 3^2$ = --(finite 9) 3. Work out 2 x 3 x 2 (mod 4) 4. Multiply 3 x 4 (finite 6) using a clock face.
NUMERACY	INTEGERS	**LESSON 33** <u>Application of infinite in finding the days of the week</u> -There are 7 days in a week hence apply finite 7 -Identify the digits in finite 7 that represent each day of the week. - Finding the days to come, add the given number of days to the present day. -Finding a past day, subtract the given number of days from the present day Example 1. If today is Tuesday, what day of the week will it be 4 days to come? Sun mon Tue Wed Thu Fri Sat 0 1 2 3 4 5 6 Day + Days Tue + 40 = --(finite 7) 2 + 40 = --(finite 7) $\frac{42}{7}$ = 6 rem 0 Tue = 40 = 0(finite7) The day will be a Sunday. 2. Yesterday was Friday, what day was it 72 days ago from today.

		Day – Days (finite 7) Saturday – 72 (finite 7) 6 - 72 (finite 7) $\frac{72}{7}$ - 10 r 1 6 - 2 (finite 7) 4(finite 7) The day was Thursday. **Activity;** 1. What day of the week will it be 27 days from now if today is Sunday? 2. Today is Wednesday. What day of the week was it 62 days ago? 3. Today Sunday workers are paid their salary. What day of the week will their next pay be if it comes after every 30 days? 4. Paul visited his uncle 4 days ago. If today is Monday, on which day of the week did he visit the uncle? 5. Today is Sunday and it is exactly 83 days since Uganda was locked down. What day of the week was Uganda locked down?
		LESSON 34 More application of finite system in finding days of the week. - Identify the total number of days in the given months. - Find the total number of days. - Work out the difference or sum following the rules of finite seven. **Example** 1. Today is Sunday 21st June. What day of the week will it be on 3rd August of the same year. **Month** **No. of days.** June…………………(30 – 21) = 9 July …………………. 31 August……………… 3 Total………………… 43 days Day + Days (finite) 0 + 43 (finite 7)

		$\frac{43}{7} = 6 \text{ r } 1$ 1 (finite 7) The day will be Monday. 2. If today is Friday 19th June. What day of the week was it on 26th April of the same year? Month No. of days June……………………….. 19 May ……………………….. 31 April ……………………….. (30 – 28) = 2 Total……………………….. 52 Day – Days (finite 7) 5 - 52 (finite 7) $\frac{52}{7} = 7 \text{ r } 3$ 5 – 3 (finite 7) 2 (finite 7) The day was Tuesday. **Activity;** 1. Given that today is Monday 22nd June. What day of the week will it be on 10th August of the same year? 2. If today is Thursday 7th May. What day of the week was it on 20th March of the same year? 3. Yesterday was Monday 6th April what day of the week from today will it be on 21st June of the same year. 4. Today is 31st July. What day of the week will it be on 23rd September of the same year?
NUMERACY	INTEGERS	**LESSON 35** <u>Application of finite in months of the year</u> - Identify the digits in finite 12 that represent each month of the year. Jan Feb Mar Apr May Jun July Aug Sept Oct Nov Dec 1 2 3 4 5 6 7 8 9 10 11 12 -Finding months to come, add the given number of months to the given month and work out in finite 12 -Finding passed month, subtract the give number of months from the given month and work out in finite 12 Example It is June now, Which month of the year was it 346

		months ago? June – 346 = --(finite 12) 6 - (346÷12) = --(finite 12) 6 - (28 rem 10) = --(finite 12) 6 – 10 = --(finite 12) (6 + 12) -10 = --(finite 12) 18 – 10 = --(finite 12) The month was August 2. Nekesa's baby was born 1 ½ years ago. If it's may now in which month of the year was the baby born? 1 year has 12 months $1\frac{1}{2}$ years has (12 x $\frac{3}{2}$) months <u>18 months</u>. 5 – 8 = ___ (finite 12) 5 – (18 ÷ 12) = ___ (finite 12) 5 – (1 rem 6) = ___ (finite 12) 5 – 6 = ___ (finite 12) (5 + 12) – 6 = ___ (finite 12) 17 - 6 = 11 (finite 12) <u>November</u> **Activity;** 1. James was born 124 months ago. In which month was he born if it's March now? 2. Tabitha will come back from Europe after 200 months If it's May now, in which month will she come back? 3. Kamau is expecting to visit his Uncle after $2\frac{1}{4}$ years from now 12th July. In which month of the year will Kamau reach the Uncle's place? 4. Mpiima built his house 215 months ago, if he made the first repair in February. In which month of the year did he build the house? 5. We are in May now which month of the year will it be after 4 months.
NUMERACY	INTEGERS	**LESSON 36** <u>Application of finite in hours of the day</u> -Time in 12 hour clock is in finite 12 or modulation 12 - When you divide a sum that is greater or equal to12, An odd quotient changes am to pm and pm to am fort the time ahead.

		-An even quotient maintains am as am and pm as pm for the time ahead. -When finding the time that's in the past, you subtract the given number of hours from the given time. - Each time you add the first finite to the given time, the units change ie am –pm and pm –am Example 1. It is 11:00am now. What time of the day will it be after 9 hours? 11 + 9 = --(finite 12) 20÷12 = 1 rem 8 11+ 9 = 8(finite 12) The time will be 8:00pm 2. A plane left Europe 17 hours ago. If it arrived in Uganda at 1:30 am At what time did it leave Europe? 1 – 17 = --(finite 12) (1+12)- 17= --(finite 12)pm (13+12) -17=--(finite 12) am 25 -17 = 8 1 – 17 = 8 (finite 12) It Left Europe at 8:30 am Task 1. A lorry left Mbarara at 9:00 pm and arrived in Kampala 14 hours later. At what time did it arrive in Kampala? 2. It is 5:30 pm now, what time was it 40 hours ago? 3. John will take only 20 hours to reach Dubai. If he leaves Uganda at 13:00 hours at what time will he reach? 4. The patient wgo spent 29 hours in the hospital was discharged at 11:15 a.m. At what time was the patient admitted? 5. It is 11:00 pm, what time will it be after 18 hours.
NUMERACY	INTEGERS	**LESSON 37** <u>Application of more than one finite</u> -Remainders are used in infinite system to represent a value that is either equal or greater than the give finite. -You can get all the numbers that are represented by the given remainder by repeatedly adding the given finite. -When given different remainders, find the equivalent

		numbers of all the remainders and identify the least common one Example 1. What is the least number of cows such that when divided by 4, 3 remains, when divide by 8, 7 cows remain? 3(finite 4) = 3, 7, 11, 15, 19, 23, 27, 31, 35…. 7(finite 8) = 7, 15, 23, 31, 39 … Common numbers = 15, 23, 31 The least number of cows is 15. 2. Find the least number of mangoes when shared by 8 people, 3 remain and when shared by 7 people 5 remain. 1 (finite 9) = 10 , 19 , 28 , … 3 (finite 8) = 1 , 19 , 27 , … 5 (finite 7) = 12 , 19 , 26 , … 19 people **Activity;** 1. A teacher put pens in groups of 9 and 7 pens remain. When he puts in groups of 8, 4 pens remain. When he put them in groups of 3, only one pen remained. How many pens did the teacher have? 2. Acheng had visitors to seat. When she sat them in 8's, 1 person remained, when she sat them in 10's, three people were left and when she sat them in7's, five people remained. Find the number of visitors Acheng had.
NUMERACY	INTEGERS	**LESSON 37** <u>Solving equations involving addition and subtraction in finite system</u>. -Identify the operation involved - Solve equations with addition by subtracting while collecting like terms - Solve the equations with subtraction by adding while collecting like terms. **Example;** Solve for y Y + 4 = 3 (mod 5) Y + 4 -4 = 3-4 (mod 5)

		Y = (5+3) -4 (mod 5 Y = 8-4 (mod 5) Y = 4 (mod 5) 2. Solve; P – 3 = 4(mod 6) P – 3 + 3 = 4 + 3 (mod 6) P = 7 (modd 6) P = $\frac{7}{6}$ = 1 r 1 P = 1 (mod 6) <u>Task</u> Solve the following equations a) m + 5 = 4 (finite 7) b) x + 3 = 2 (finite 5) c) k – 4 = 5 (finite 7) d) t + 3 = 2(finite 5) e) y – 4 = 1 (finite 6)
NUMERACY	INTEGERS	**LESSON 39** <u>Solving equations involving division</u> -Solve equations involving subtraction by adding while collecting like terms - Solve equations involving addition by subtracting while collecting. -In a case where you are meant to carry out division, make sure the number being divided is exactly divisible by the divisor. -If the number is not exactly divisible, add the finite to it until it is divisible by the coefficient of the unknown. Example Solve. 2(2y-1) = 4 (finite 5) 4y -2 = 4 (finite 5) 4y-2 +2 = 4 +2 (finite 5) 4y = 6 (finite 5) 4y/4 = 6/4 (finite 5) Y = 4(finite 5) 2. Solve: 3k + 3 = 1(mod 5) 3k + 3 - 3 = 1 – 3 (mod 5) 3k = 1 + 5 – 3(mod 5) 3k = 6 – 3 (mod 5)

<table>
<tr><td></td><td></td><td>$3k = 3 \pmod 5$
$\frac{\cancel{3}k}{\cancel{3}} = \frac{\cancel{3}}{\cancel{3}} \pmod 5$
$k = 1 \pmod 5$

Activity;
Solve the following equations
1. $3x - 4 = 6$(finite 8)
2. $2x - 4 = 2$ (finite 5)
3. $5(x-1) = 4$ (mod 6)
4. $3y + 3 = 2$(finite 5)
5. $5(x - 1) = 4$ (mod 6)</td></tr>
<tr><td>NUMERACY</td><td>INTEGERS</td><td>LESSON 40
<u>Solving equations involving fractions</u>
-When solving equations with fractions, first remove the denominator by the multiplying each term by the L.C.D.
-Collect like terms and solve the equation
Example
Solve for P
$\frac{1}{2}P + 7 = 2$ (finite 9)
L.C.D = 2
$\cancel{2} \times \frac{1}{\cancel{2}}p + 7 \times 2 = 2 \times 2$ (finite 9)
$P + 14 = 4$ (finite 9)
$P + 14 - 14 = 4 - 14$ (finite 9)
$P = (4 + 9 + 9) - 14$(finite 9)
$P = 22 - 14$(finite 9)
$P = 8$ (finite 9)

2. Solve: $\frac{2}{3}n - 1 = 2 \pmod 7$
L.C.D = 3
$\cancel{3} \times \frac{2}{\cancel{3}}n - 1\times3 = 2\times3 \pmod 7$</td></tr>
</table>

		$2n - 3 = 6 \pmod 7$ $2n - 3 + 3 = 6 + 3 \pmod 7$ $2n = 9 \pmod 7$ $2n = 9 \pmod 7 = 16, 23, \ldots\ldots$ $\frac{\cancel{2}^{1}n}{\cancel{2}_{1}} = \frac{\cancel{16}^{8}}{\cancel{2}_{1}} \pmod 7$ $n = 8 \pmod 7$ $n = \frac{8}{7} = 1\ r1$ $n = 1 \pmod 7$ **Activity;** Solve the following equations 1. $\frac{1}{2}P = 6$ (finite 7) 2. $\frac{x}{6} - 3 = 8$ (finite 12) 3. $\frac{1}{6}x - 7 = 0$ (finite 7) 4. $\frac{2}{5}y + 1 = 1 \pmod 7$ 5. $\frac{1}{4}m + 4 = 2$ (finite 10)

Name: ______________________________________**Index No.**____________________

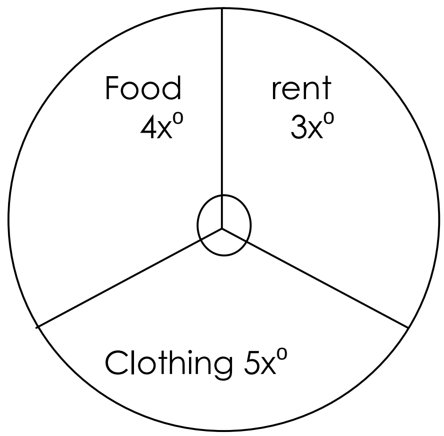
SUBJECT: MTC **CLASS: P.7** **TERM** __________ **YEAR: 2022**

		Lesson 1
INTERPRETATION OF DATA & GRAPHS	**DATA HANDLING**	**Application of pie- chart using degrees in sectors**

- Identify the sectors in the pie-chart given.
- Relate the quantity given to its sector.
- Define the total quantity by an unknown.
- Find the missing angle by forming an equation and equating it to 360^o.

Examples;

1. The pie chart represents Opio's expenditure for his monthly salary.



a) Find the value of x

$4x^o + 5x^o + 3x^o = 360^o$

$12x^o = 360^o$

$\frac{\cancel{12}x^o}{\cancel{12}^o} = \frac{\cancel{360}^o}{\cancel{12}^o}$

$X = 30$

b) If he spends shs. 180.000 on rent, How much money does Opio earn monthly?

Rent:

$3x^o = 3x30^o$

90^o

Let the total amount be k

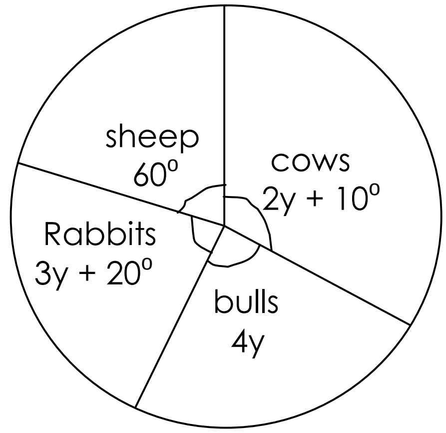
$\frac{\cancel{90}^o}{\cancel{360}^o} \times k$ = shs. 180000

$\cancel{4} \times \frac{K}{\cancel{4}}$ = sh. 180000 x 4

K = 720000

2. The piechart below shows the number of animals on Mr. Kiiwa's

farm



a) Find the value of y.

$3y + 20^o + 2y + 10^o + 4y + 60^o = 360^o$

$3y + 2y + 4y + 20^o + 10^o + 60^o = 360^o$

$9y + 90^o = 360^o$

$9y + 90^o - 90^o = 360^o - 90^o$

$\frac{{}^{1}\cancel{9}y}{{}_{1}\cancel{9}} = \frac{\cancel{270^o}^{30}}{\cancel{9}_{1}}$

$y = 30^o$

b) If there are 30 balls, how many animals are in the farm?

<u>Degrees for bulls</u>.

(4 x 30)o

120o

<u>Number of animals</u>

let the number of animals be k.

$\frac{120^o}{360^o} \times K = 30$

$\frac{12K}{36} = 30$

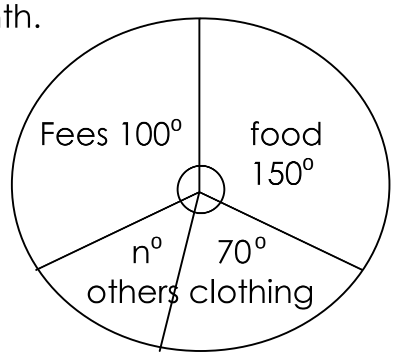
$\frac{12K}{\cancel{36}} \times \cancel{36} = 30 \times 36$

$\frac{\cancel{12}K^{1}}{\cancel{12}_{1}} = \frac{30 \times \cancel{36}^{3}}{\cancel{12}_{1}}$

K = 90 animals

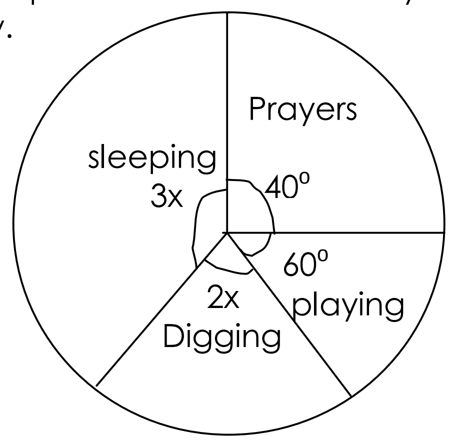
Activity

1. The pie chart below shows how a man spends his shs. 240000 per month.



a) Find the value of n
b) Find how much he spends on food.
c) How much does he spend on food than clothing?

2. Mivule spends his time of the day as shown on the pie chart below.



a) Find the value of x.
b) If he takes 4 hours playing, how many hours are occupied by Mivule's activities of the day?

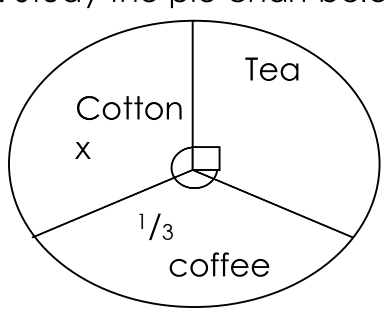
Lesson 2

Application of pie charts using fractions in sectors.

- Identify the sectors on the pie chart
- Find the missing sector by subtracting the sum of the given fractions from a whole.
- Relate the given quantity to its sector.
- Form an equation and solve.

Note;
Angles at the centre of the pie chart add up to 360°

Examples;
1. Study the pie chart below and answer questions that follow.



a) Find the fraction for cotton

Tea: $\frac{\cancel{90^\circ}^{1}}{\cancel{360^\circ}_{4}} = \frac{1}{4}$

$X = 1 - (\frac{1}{4} + \frac{1}{3})$

$X = 1 - (\frac{3+4}{12})$

$X = 1 - \frac{7}{12}$

$X = \frac{12}{12} - \frac{7}{12}$

$X = \frac{5}{12}$

b) If 1200 tonnes of coffee was exported, how many tonnes were exported altogether.

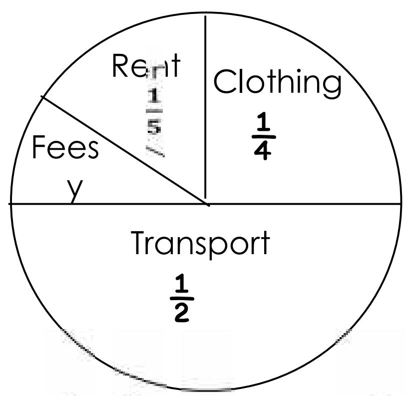
Let the total be x

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

$\frac{X}{\cancel{3}} \times \cancel{3} = 1200 \times 3$ tonnes

X = 3600 tonnes

2. The pie chart below shows how Lillian spends her money.



a) Find the fraction represented by letter y.

$y = 1 - (\frac{1}{5} + \frac{1}{2} + \frac{1}{4})$

$y = 1 - (\frac{4+10+5}{20})$

$y = 1 - \frac{19}{20}$

$y = \frac{20}{20} - \frac{19}{20}$

$y = \frac{20-19}{20}$

$y = \frac{1}{20}$

b) If she spends sh. 32000 on rent, how much money does she use on all sectors?

Let the total amount be k

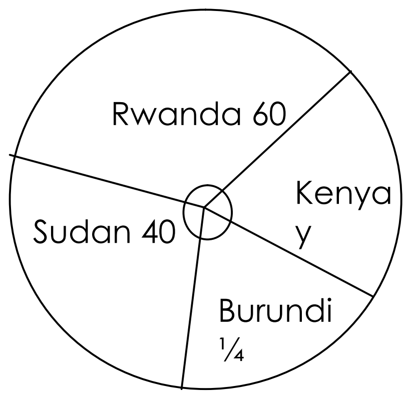
$\frac{1}{5} \times k = \text{sh. } 32000$

$\frac{k}{\cancel{5}_1} \times \cancel{5}^1 = \text{sh. } 32000 \times 5$

K = sh. 160,000

Activity

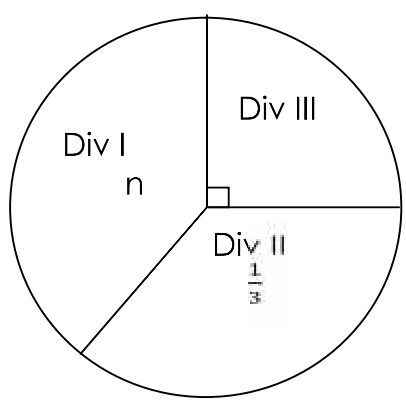
1. Study the pie chart below and answer the questions that follow.



a) Find the fraction y

b) If 5100 kg of sugar are exported to Kenya. Find the total amount of sugar which was exported to all countries.

2. The pie chart below shows different grades got in PLE in a school of 360 candidates.



a) Find the value of n in degrees.

b) How many more pupils got Division two than division three?

c) Express the number of pupils that got Division I as a percentage.

Lesson 3

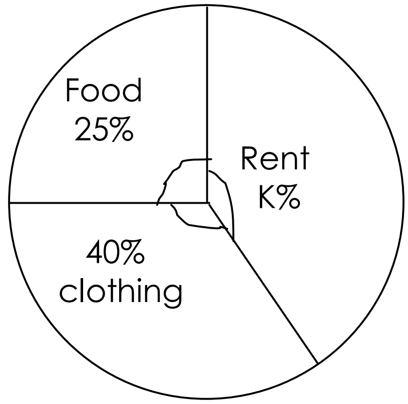
Application of pie-charts with percentages.

- Identify the sectors in the pie-chart and their measurements.
- For the missing measure of a sector, form an equation and equate to 100%.
- To find the total quantity for the whole pie-chart; Define the

total quantity by unknown.
- Relate the given quantity to its sector and form an equation. Solve the equation.

Example;

1. Study the pie-chart below and answer the questions that follow;



a) Find the value of K.

$K\% + 25 + 40\% = 100\%$

$K\% + 65\% = 100\%$

$\frac{K\cancel{\%}}{1\cancel{\%}} = \frac{35\cancel{\%}}{1\cancel{\%}}$

$K = 35$

b) If John spends sh. 75000 for food as shown on the pie-chart above, how much money does he earn.

Let the total earning be b.

$\frac{25}{100} \times b = \text{sh. } 75000$

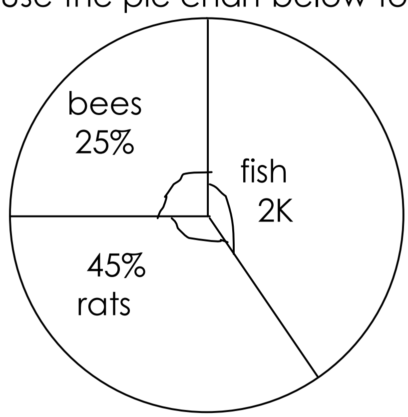
$\frac{25}{\cancel{100}} \times \cancel{100} = \text{sh. } 75000 \times 100$

$\frac{\cancel{25}b}{\cancel{25}_1} = \frac{\text{sh. } \cancel{7500000}^{300000}}{\cancel{25}_1}$

$b = \text{sh. } 300000$

Activity;

1. Use the pie chart below to answer the questions below;

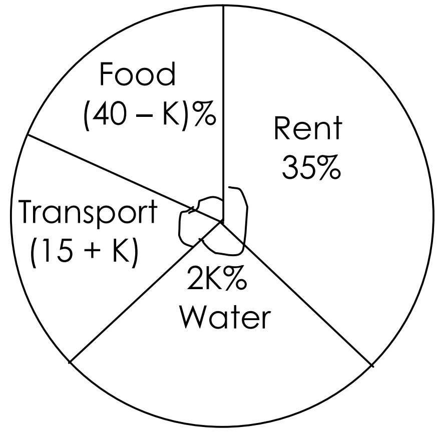


a) Find the value of K.

b) The pie chart shows the use of Mr. Okudei's land for rearing different animal;

i) If he use 15 m2 to rear fish, find the size of his land in m^2.

2. The pie-chart below shows how Vicky spends her salary.



a) Find the value of K.
b) By how many more degrees does she spend on Rent than Water?
c) If she spends sh. 70000 on food, how much is the salary?

Lesson 4

Construction of pie chart

- ✓ It is also called a circle graph
- ✓ Any information should be converted to degrees
- ✓ All the angles should add up to 360

Example

Amos has 4 cows, 6 goats, 3 sheep and 7 rabbits on his farm. Show the distribution of animals on Amos' farm on a circle graph of radius 4cm.

Steps

- Find the total number of animals.

Total

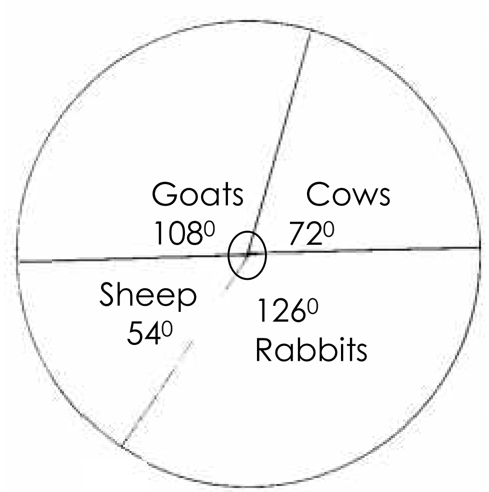
4+6+3+7 = 20 animals

- Convert the numbers of animals into portions in form of degrees

Cows	**Goats**	**Sheep**	**Rabbits**
$\frac{4}{\underset{1}{\cancel{20}}} \times \overset{18}{\cancel{360}}{}^0$	$\frac{6}{\underset{1}{\cancel{20}}} \times \overset{18}{\cancel{360}}{}^0$	$\frac{3}{\underset{1}{\cancel{20}}} \times \overset{18}{\cancel{360}}{}^0$	$\frac{7}{\underset{1}{\cancel{20}}} \times \overset{18}{\cancel{360}}{}^0$
72^0	108^0	54^0	126^0

- Draw a circle of the given radius = 4cm
- Identify the scale on the protractor
- Measure the first angle using the radius as the baseline

The line that makes the first angle becomes the next base line for the next angle using the same scale and in the same direction to produce the pie chart as below.



Activity

1. John uses $\frac{1}{3}$ of his land for growing casava, $\frac{1}{4}$ of it for growing maize, $\frac{1}{6}$ for beans and the rest for growing millet.
Construct a pie chart of radius 3.5cm to the show the above information.

2. The P.L.E results of a certain primary school in 2019 were as follow:
30 candidates scored division one
110 candidates scored division two
10 candidates scored division four
50 candidates scored division three
Using a circle graph of radius 4cm show the above results.

Lesson 5

Range and median

- Range is the difference between the highest and lowest data.
- Identify the lowest value and subtract from the highest value.

Range =HL – L

- Median is the highest data found in the middle after re-arranging in ascending or descending order.
- When two values remain in the middle (even data), we find their average as the median.

Example;

1. Given 2,0,-1,4 and -8

a) Find the range
Range = H –L
Range = 4 – (-8)
Range 4 + 8
Range = 12

b) Workout the median

$^-8$, $^-1$, 0, 2, 4

Median = 0

2. The table below shows the height of seedlings in a nursery bed.

Height	30cm	25cm	10cm	35cm
Number of seedlings	2	1	3	4

a) Find the range of the heights.
Range = H – L
(35 – 10)cm
25cm

b) Calculate the median in the height.
10 , 10 , 10 , 25 , 30 , 30 , 35 , 35 , 35 , 35

Median $= \frac{30 + 30}{2}$

$\frac{60}{2}$

Median = 30cm

Activity

1. Emongot scored the following marks in a series of tests:
20 , 30 , 70 , 80 , 40 , 90
a) find the range
b) Workout the median
2. Given the data below: -2 , 4 , 0 , 1 , -1 and 5.
a) Calculate the range of the data.
b) Find their median.
3. **Use the table below to answer the questions that follow.**

Marks	45	30	50	60
No. of pupils	2	1	2	3

a) Calculate the range of the numbers.
b) Find their median.

Lesson 6

Mode and modal frequency.
- Mode is the data that appears several times.
- Modal frequency is the times the mode appears.
- Identify the data that using the modal frequency
- Identify the data that appears several times
- Identify the mode using the modal frequency.
- State the mode.

Example;

		1. Scovia scored the following marks in a series of tests 40, 70, 90, 70, 60, 70, 40, 70 a) Find the modal mark. <table><tr><td>Data</td><td>40</td><td>60</td><td>70</td><td>Frequency</td></tr><tr><td>2</td><td>1</td><td>4</td><td>1</td><td></td></tr></table> a) Find the modal mark 70 marks b) Workout the modal frequency 4 times 4 times **Example 2** Job wrote integers on the chalkboard as shown: -1 , +1 , 0 , -5 , -1 , +5 , -1 , +1 , 0 , -5 a) Find the mode of the integers wrote. <table><tr><td>**Integer**</td><td>-1</td><td>+1</td><td>0</td><td>-5</td><td>+5</td></tr><tr><td>**Frequency**</td><td>3</td><td>2</td><td>2</td><td>2</td><td>1</td></tr></table>Mode = -1 b) What was his modal frequency? 3 **Activity** 1.Given 1, -9, 0, 2 , and -9 a)Find the mode b) State the modal frequency. 2. Kipopo scored the following marks in a series of tests. 30,60,80,60,70,40 and 60 a)Find the modal mark b)What is the modal frequency ?
		Lesson 7
		Mean (Average) Mean is the sum of data divide by the number of data. - Identify the data and frequency of each data - Get the total of data depending on their frequencies. - Get the total of frequencies Average = sum of data Number of data **Example;** 1. Study the frequency table below and answer the questions that follow. <table><tr><td>Age in year</td><td>9</td><td>11</td><td>12</td><td>13</td><td>18</td></tr><tr><td>No. of children</td><td>2</td><td>1</td><td>4</td><td>1</td><td>1</td></tr></table>1. Workout the mean age of the children Mean = sum of data No. of data

Mean = (9x2) + (11x1) + (12x4) + (13x1) + (18x1)
2 + 1 + 4 + 1 + 1

Mean = $\frac{108}{9}$

Mean = 12

2. The table below shows the marks scored by a number of pupils.

Mark	40	52	28	42	60
Frequency	2	1	2	1	4

a) Calculate the mean of the marks.

Mean = $\frac{\text{sum}}{\text{No. of items}}$

Mean = $\frac{(40 \times 2) + (52 \times 1) + (28 \times 2) + (42 \times 1) + (60 \times 4)}{10}$

$\frac{80 + 52 + 56 + 42 + 240}{10}$

Mean = $\frac{47\cancel{0}}{1\cancel{0}}$

Mean = 47

Activity;

1.Eic scored the following marks as follows;
80, 90, 60, 20, 70 and 80

a) Find the range

b) What is the mean?

2.Given : -6, 3, -2, 4 and 0
Find the average

3. The table below shows the weight of different number of players. Use it to answer the questions that follow.

Weight	45kg	66kg	72kg	78kg
No. of players	2	4	1	3

a) Calculate the mean of their weights.

b) What is the modal weight of the players?

Lesson 8

Application of mean

- Identifying the data given and their mean.
- State the formula and substitute the given data
- Solve the equation

Example 1

The mean of 3 – x , x , 2x-1 and 2x + 12 is 2x – 1, find the value ofx.

Mean = $\frac{\text{sum}}{}$

Number of items

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

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

$$2x - 1 = \frac{4 + 4x}{4}$$

$$(2x - 1) \times 4 = \left(\frac{4 + 4x}{\cancel{4}}\right) \times \cancel{4}$$

$$8x - 4x - 4x = 4 + 4x - 4x$$

$$\frac{\cancel{4}x}{\cancel{4}} = \frac{\cancel{4}}{\cancel{4}}$$

$$x = 1$$

2. The table below shows the number of children with their marks.

Marks	20	50	60	P	80
Number of pupils	3	2	1	2	2

a) Find the value of P if the mean of the marks is 52.

$$\text{Mean} = \frac{\text{sum}}{\text{Number of items}}$$

$$52 = \frac{(20 \times 3) + (50 \times 2) + (60 \times 1) + (P \times 2) + (80 \times 2)}{10}$$

$$52 = \frac{60 + 100 + 60 + 2P + 160}{10}$$

$$52 = \frac{(380 + 2P)}{\cancel{10}} \times \cancel{10}$$

$$52 \times 10$$

$$520 = 380 + 2P$$

$$520 - 380 = 380 - 380 + 2P$$

$$\frac{\cancel{140}^{70}}{\cancel{2}_1} = \frac{^1\cancel{2}P}{\cancel{2}_1}$$

$$70 = P$$

$$P = 70$$

Activity;

1. The average of $4x - 2$, $2x - 2$, $3x$, $x - 5$ and 10 is $5x - 2$, find the value ofx.
2. Given that the mean of 11 , 48 , n , and 18 is 22. Find the value of n.
3. The table below shows the questions that follow, use it to answer the questions that follow.

Marks	4	5	k	8	3	1
No. of children	2	1	2	3	1	2

a) If the average number of books borrowed is 6, find the value of K.

Lesson 9

Application of median, mode and range

- Define the given measure in the given question.
- State its formula and substitute.

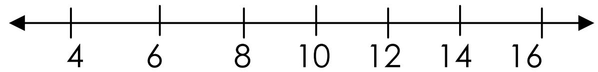
- Solve
- Identify the type of number given for median
- Arrange them

Examples

1. The range of two numbers is 8. If the smallest number is -2, find the bigger number.

H-L = Range
H- (-2) = 8
H + 2 – 2 = 8 – 2
H = 6

2. The median of 7 consecutive even number is 10, find the numbers.



4 , 6 , 8 , 10 , 12 , 14 , 16

Activity;

1. The range of two numbers is -4. If the larger number is 4. Find the smaller number.
2. The median of five consecutive integers is -6. Find the integers.
3. The median of four consecutive numbers is 4. Find the numbers.
4. The range of the given data is 7, find the value of a if a is the lowest number;

2 , -1 , 3 , 0 , 1 , a

Lesson 10

Probability of events on occasions
dice

Probability of an outcome (event) is a measure of how likely that outcome is
A measure of 0(zero) means it is impossible.
One means it is certain (known)
P( ) pr ( ) is the symbol for probability of outcome named in brackets

$$P(\ ) = \frac{n(E)}{N(S)}$$

1. There are 10 green and 7 red apples in a bucket. Find the probability of picking at random a red apple.

$$P(Red) = \frac{n\ (E)}{N(S)}$$

$$N(Red) = \frac{7}{17}$$

2. Bosco was asked to write some montths of the year, what is the probability that he wrote months beginning with letter 'J'?

J , F , M , A , M , J , J , A , S , O , N , D

$$P(J) = \frac{n(E)}{n(S)}$$

$$\frac{3}{12}$$

Activity

1. There are 25 ppls in a class and 12 are boys. What is the probability of choosing a girl at random to become a class prefect?
2. A bucket had 10 red pens, and 5 blue pens.
   a) What is the probability of picking a black pen at random?
3. If Martin wrote all vowel letters on small papers and folded, what is the probability of picking letter U?
4. Job will visit his uncle next week, what is the probability that he will visit on a day that begins with letter 'T'?

Lesson 10

Application of probability of events on coins and dice.

A coin, has two faces on every face has a chance when it is tossed ie. Sample space = 2.

When you toss two coins, the sample space increases to 4.

The table shows the two coins tossed.

	H	T
H	HH	HT
T	TH	TT

For a die there are 6 faces numbered from 1 to 6 and every face has a chance to appear on top i.i. sample space = 6

When two dice are tosses once the sample space increases to 36.

1st die

	1	2	3	4	5	6
1	1 , 1	1 , 2	1 , 3	1 , 4	1 , 5	1 , 6
2	2 , 1	2 , 2	2 , 3	2 , 4	2 , 5	2 , 6
3	3 , 1	3 , 2	3 , 3	3 , 4	3 , 5	3 , 6
4	4 , 1	4 , 2	4 , 3	4 , 4	4 , 5	4 , 6
5	5 , 1	5 , 2	5 , 3	5 , 4	5 , 5	5 , 6
6	6 , 1	6 , 2	6 , 3	6 , 4	6 , 5	6 , 6

Examples;

1. John tosses a die once, what is the probability of head showing up?

   $P(H) = \frac{n(E)}{n(S)}$

   $P(H) = \frac{1}{2}$

2. On tossing two coins, what was the probability of having head on top for both coins?

   $P(H , H) = \frac{n(E)}{n(S)}$

   $P (H , H) = \frac{1}{4}$

3. If a die is tossed once, what is the probability of having an even number on top.

		1 , 2 , 3 , 4 , 5 , 6 n(S) = 6 2 , 4 , 6 n(E) = 3 P(Even) = $\frac{n(E)}{n(S)}$ $\frac{3}{6}$ **Activity;** 1. What is the probability of having a tail on top if a die is tossed once? 2. Omollo tossed two coins at once, what is the probability of tail on one and head on the other coin appearing on top. 3. What is the probability of prime number appearing on top if a die is tossed once? 4. Taabu tossed two dice at once. a) What is the probability that odd numbers appeared on each die? b) Find the probability of having an even number on one die and odd number on the other die appearing on top.

FORMAT OF LESSON NOTES (Theme Based) 2023

Name: ________________________________ **Index No.** __________________

SUBJECT: MTC **CLASS:** P.7 **TERM** __________ **YEAR:** 2023

Lesson 1

Application of fractions involving remainders on addition and subtraction.

- Identify the given fractions and find their sum.
- Subtract the sum form a whole.
- Relate the given quantity to its fraction.
- Define the required quantity with an unknown and form an equation.

1) Jane, Sarah and Joan contributed money to start company. Jane paid $\frac{3}{10}$ of the cost and sarah contributed $\frac{5}{10}$ of the cost.

a) What fraction did Joan contribute?

<u>Fractions for Jane and Sarah.</u>

$\frac{5}{10} + \frac{3}{10} = \frac{5+3}{10}$

$\frac{8}{10}$

<u>Fractions for Joan</u>

$1 - \frac{8}{10}$

$\frac{10}{10} + \frac{8}{10}$

$\frac{10-8}{10}$

$\frac{\cancel{2}1}{\cancel{10}1}$

$\frac{1}{5}$

b) If Joan contributed shs. 30.000. What is the heir total contribution?

Let their total contribution be k

$\frac{(1)}{5}$ of k = 30.000

$\frac{(k)}{\cancel{5}} \times \cancel{5}$ = shs 30.000 x 5

K = shs. 150.000

2. Okudei read $\frac{1}{3}$ of his book on Monday, $\frac{1}{4}$ on Tuesday, $\frac{1}{12}$ on Wednesday and the rest on Thursday.

a) What fraction did Okudei read on Thursday?

$\frac{1}{3} + \frac{1}{4} + \frac{1}{12} = \frac{4+3+1}{12}$

$\frac{8}{12}$

b) Fraction read on Thursday

		$1 - \frac{8}{12} = \frac{12}{12} - \frac{8}{12}$ $\frac{12-8}{12}$ $\frac{4}{12}$ $\frac{1}{3}$ **Activity;** 1. Oketa, Opero and Okia shared sweets, Okota got $\frac{1}{5}$ of the sweets and Okia got $\frac{1}{4}$ of the sweets. a) What fraction did Opero get? b) If Okia got 40 sweets, find the total number of sweets they share? 2. Angella, Betty, Sandra and Vicky contributed $\frac{1}{4}, \frac{1}{3}, \frac{1}{6}$ of the money and the rest by Vicky respectively. a) Find the fraction contributed by Vicky. b) Calculate the amount of money contributed by the four people if Sandra paid sh. 18000. c) How much more money did Betty contribute than Angella.
		Lesson 2
		<u>Application of fractions involving remainders with multiplication.</u> • Subtract the given fraction the whole to obtain the remainder. • Multiply the fraction in the phrase of remainder by the remainder. • Add the answer to the existing fraction to obtain the total fraction. • Subtract the answer above from the whole. • Relate the quantity given to its fraction. • Define the required quantity with unknown and form the equation. 1. Abdul spent $\frac{1}{3}$ of his money on books and $\frac{1}{6}$ of the remainders on transport. a) What fractions of his money was left? Remainder: $1 - \frac{1}{3} = \frac{3}{3} - \frac{1}{3}$, $\frac{3-1}{3}$, $\frac{2}{3}$ Fraction for transport: $\frac{1}{6} \times \frac{2}{3}$, $\frac{1}{9}$ Left: $1 - (\frac{1}{3} + \frac{1}{9})$, $1 - (\frac{3+1}{9})$, $1 - \frac{4}{9}$, $\frac{9}{9} - \frac{4}{9}$, $\frac{9-4}{9}$, $\frac{5}{9}$ b) If he was left with sh. 15000, how much did he have at first.

Let the total amount be P.

$\frac{5}{9} \times P = sh.\ 15000$

$\frac{5P}{\cancel{9}} \times \cancel{9} = sh.\ 15000 \times 9$

$\frac{{}^{1}\cancel{5}P}{\cancel{5}_{1}} = \frac{sh.\overset{3000}{\cancel{15000}} \times 9}{\cancel{5}_{1}}$

$P = sh.\ 27000$

2. Sarah ate $\frac{1}{4}$ of her cake in the morning, $\frac{2}{3}$ of the remainder in the afternoon and the rest in the evening.

a) Find the fraction of the cake she ate in the evening.

Remainder	Afternoon	Fraction eaten in the Evening
$1 - \frac{1}{4}$ $\frac{4}{4} - \frac{1}{4}$ $\frac{4-1}{4}$ $\frac{3}{4}$	$\frac{2}{3} \times \frac{3}{4} = \frac{\cancel{6}^{1}}{\cancel{12}_{2}}$ $\frac{1}{2}$	$1 - (\frac{1}{4} + \frac{1}{2})$ $1 - (\frac{1+2}{4})$ $\frac{4}{4} - \frac{3}{4}$ $\frac{4-3}{4}$

b) If she ate 20g in the afternoon, find the total weight of the cake Sarah had.

Let the total weight be n.

$\frac{1}{2} \times n = 20g$

$\frac{n}{\cancel{2}} \times \cancel{2} = 20g \times 2$

$n = 40g$

Activity;

1. Ssemuju spends $\frac{1}{4}$ of his salary on clothing and $\frac{1}{2}$ of the remainder on food. The rest on fees.

a) What fraction does he spend on fees?

b) If he spends shs. 2400000 on fees. How much money does he earn monthly?

2. A , B and C contested for elections in their village. A got $\frac{2}{5}$ of the votes, B got $\frac{1}{2}$ of the remaining votes and C got the rest of the votes.

a) Find the fraction of the votes got by B.

b) What fraction of the votes did C get?

c) How many people voted if A got 120 votes?

d) How many more votes did A get than B?

Lesson 3

Application of fractions involving taps

-Find the fraction of each tank filled in a minute(reciprocal of the time taken)

- When all taps are filling, add the fractions obtained above.

-Convert the fractions filled by both taps in a minute by

		dividing a whole by the answer. -When there is a tap emptying/drawing, subtract its fraction from the others filling and change the answer to time by dividing by a whole or given fraction. **Examples** 1. Tap Q can fill the tank in 6 minutes and Tap R can fill the tank in 3 minutes. How long will both taps take to fill the tank if they are opened at the same time? **In I minute** $\frac{1}{6}$ of tank (tap Q) $\frac{1}{3}$ of tank (tap R) In 1 minute both taps $\frac{1}{3}+\frac{1}{6}=\frac{1+2}{6}$ $\frac{3}{6}$ $\frac{1}{2}$ **time taken to fill the tank** $1 \div \frac{1}{2}$ $1 \times \frac{2}{1}$ 2 minutes 2. Two taps are connected to the tank where tap A takes 2 hours to fill the tank and tap B takes 3 hours to fill the same tank. How long will it take to fill the tank if both taps are open? In 1 hour Tap A fills $\frac{1}{2}$ of the tank Tap B empties $\frac{1}{3}$ of the tank Both taps in 1 hour $\frac{1}{2}-\frac{1}{3}=\frac{3-2}{6}$ $\frac{1}{6}$ Time taken to fill the tank by both taps $1 \div \frac{1}{6}$ $\frac{1}{1} \times \frac{6}{1}$ 6 hours **Activity;** 1. Tap K can fill the tank in 4 minutes and tap L can fill the same tank in in 5 minutes. How long will both taps take to fill the same tank if opened at the same time? 2. Three taps were connected to the tank. Tap one takes 3 minutes to fill, tap two takes 4 minutes to fill the same tank while tap three takes only a minute to fill the tank. a) For how long will the three taps stay open to fill the tank if opened at ago? b) Find the time taken for tap one and tap two to fill the tank if opened at ago? c) How much time will be taken by tap one and three to fill the tank if opened at the same time? 3. Tap A takes 2 minutes to fill a container while tap B takes 4 minutes to draw the water from the same container. How long will the two taps take to fill the container if opened at

		the same time?
		Lesson 4
Numeracy	Fraction	Application of fractions involving different quantities. • Identify the fractions given with the related quantity. • When quantity is added, subtract the original fraction from the current (new) fraction. • When quantity is removed / reduced, subtract the current / new fraction from the original. • Define the required quantity with unknown and form an equation to find what is required. **Examples;** 1. A tank was $\frac{1}{5}$ full of water. When 40 liters were added, the tank becomes $\frac{1}{4}$ full of water. How many liters of water does the tank hold when full? Fraction added $\frac{1}{4} - \frac{1}{5} = \frac{5-4}{20}$ $\frac{1}{20}$ Let the capacity of the tank when full be k. $\frac{1}{20}$ x k = 40 liters $\frac{K \times \cancel{20}}{\cancel{20}} = (40 \times 20)$ K = 800 liters. b) How many litres can it hold if it is a tenth full of water. A tenth full $\frac{1}{1\cancel{0}} \times 80\cancel{0}L$ 80L 2. A tank is $\frac{2}{3}$ of full of fuel. When 60 liters were drawn, the tank becomes $\frac{1}{4}$, the tank becomes a $\frac{1}{4}$ full. a) Calculate the capacity of the tank. Fraction drawn. $\frac{2}{3} - \frac{1}{4} = \frac{8-3}{12}$ $\frac{5}{12}$ Let the capacity be P $\frac{5}{12}$ x P = 60L $\frac{5P}{\cancel{12}} \times \cancel{12} = 60L \times 12$ $\frac{{}^{1}\cancel{5}P}{\cancel{5}_{1}} = \frac{\cancel{60} \times 12}{\cancel{5}_{1}}$ P = 144 litres b) Find the amount of fuel that can take $\frac{1}{2}$ of the tank.

$\frac{1}{2} \times 144$ litres

$\frac{144}{2}$ litres

72 litres

Activities;

1. A sack was $\frac{1}{4}$ full of sugar, when 20kg were added it became $\frac{13}{20}$ full of sugar.

a) How many kilograms of sugar can it hold when it is full of sugar?

b) Calculate the quantity in grammes that it can hold when it is a third full of sugar.

2. Moses added 5 litres of water to a jerrycan that was $\frac{1}{2}$ full of water and it became $\frac{3}{4}$ full of water.

(a) Calculate the capacity of the jerrycan when it is full of water.

(b) Find the amount of water that was in the jerrycan before Moses added the water.

3. After drawing 200litres of water from a tank that was $\frac{5}{7}$full, it became $\frac{4}{7}$ full.

Find the amount of water that the tank can hold when half full.

Lesson 5

<u>Application of fractions involving quantities with multiplication and subtraction.</u>

- Multiply the related fractions to obtain the drawn/used part.
- Subtract the answer from the original fraction in the container.
- Relate the fraction obtained to the quantity in the questions.
- Define the required quantity with unknown and form an equation.

Examples

1. A tank was $\frac{5}{6}$ full of water, when $\frac{1}{5}$ of it was drawn. 2000 litres remained.

a) What fraction of the water remained in the tank?

Fraction removed

$\frac{5}{6} \times \frac{1}{5} = \frac{5 \times 1}{6 \times 5}$

$\frac{1}{6}$

Remainder

$\frac{5}{6} - \frac{1}{6} = \frac{5-1}{6}$

$\frac{4}{6}$

$\frac{2}{3}$

b) Find the capacity of the tank when full of water.

Let the capacity be r.

		$\frac{2}{3} \times r = 2000L$ $\frac{2r}{3} \times 3 = 2000L \times 3$ $2r = 6000L$ $\frac{2r}{2} = \frac{\cancel{6000}^{3000}}{\cancel{2}_1}$ $r = 3000L$ c) How many litres of water can it hold when $\frac{1}{4}$ full of water? $(\frac{1}{4} \times 3000)L$ $\frac{\cancel{3000}^{750}}{\cancel{4}_1}L$ 750 litres **Activity:** 1. A bucket is $\frac{4}{9}$ full of water. When $\frac{1}{3}$ of it is drawn 16 litres remain in the bucket. a) What fraction of the water was drawn? b) Calculate the amount of water that can be held in the bucket when it is $\frac{1}{2}$ full. 2. A sack was $\frac{7}{8}$ full of flour. When $\frac{1}{3}$ of it was removed 210kg remained. a) Find the fraction that remained. b) How many kilograms does a sack hold when it is full of flour? c) Find the amount of flour that a sack can hold when it is $\frac{1}{5}$ full.
		Lesson 6
Numeracy	Fraction	Changing common fractions to recurring and non-recurring decimals Recurring decimal has non terminating digits that is they keep on repeating. Non-recurring decimals has terminating digits that is digits do not keep on repeating. To change to decimals, divide the numerator by the denominator using long division method. **Examples;** 1. Express 5/6 as a decimal 2. Change 2/3 into a decimal

0.666
3 2
0x3 = -0
20

0.0625
8) 5
0x8= -0
50
6x8 = – 48
20
-16
40
5 x 8 = - 40
00

$\frac{5}{8} = 0.625$

Change the following fractions to decimals

a) $\frac{1}{3}$ b) $\frac{2}{3}$ c) $\frac{1}{8}$ d) $\frac{5}{11}$ e) $\frac{4}{10}$

LESSON 7

<u>Changing decimals to common fractions.</u>

- Change the given decimal to a common fraction.
- Reduce the common fraction to the lowest terms.

Examples;

1. Express 0.75 as a common fraction in its lowest terms.

$0.75 = \frac{75}{100}$

$= \frac{{}^{3}\cancel{75}}{\cancel{100}_{4}}$

$0.75 = \frac{3}{4}$

2. Express 0.125 as vulgar fraction in its lowest terms.

$0.125 = \frac{125}{1000}$

$= \frac{\cancel{125}^{\cancel{25}^{1}}}{\cancel{1000}_{\cancel{200}\,8}}$

Vulgar fraction means common fraction

$0.125 = \frac{1}{8}$

<u>Activity;</u>

1. Express 0.36 as a common fraction
2. Change 0.9 as a common fraction.
3. Change 0.81 as a common fraction.
4. Convert 0.18 as a common fraction
5. Write o.45 as a vulgar fraction in the simplest form.

Lesson 8

<table>
<tr>
<td>Numeracy</td>
<td>Fraction</td>
<td>
<u>Changing recurring decimals to common fractions</u>
Define the common fraction with an unknown and form an equation.
Reduce the final fraction to the lowest terms.
Examples;
1. Express 0.3636 . . . as a common fraction

Let the common fraction be n
n = 0.3636 . . .(i)
nx100 = 0.3636 . . .x100
100n = 36.3636 . . .(ii)
100n = 36.3636
- n = - 0.3636
99n = 36.0000
$\frac{\cancel{99}n}{99} = \frac{\cancel{36}^{4}}{\cancel{99}_{11}}$
n = $\frac{4}{11}$

2. Express 0.1222 . . . as a common fraction.
Let common fraction be K.
K = 0.1222 . . . (i)
10 x K = 0.1222 . . . x 10
10K = 1.222 . . . (ii)
10K x 10 = 1.222 . . . x 10
100K = 12.222 . . . (iii)
(iii) – (ii)
100K = 12.222 . . .
- 10K = 1.222 . . .
90K = 11.000
$\frac{\cancel{90}K}{\cancel{90}} = \frac{11}{90}$
K = $\frac{11}{90}$
Note: Recurring decimal can be represented with a bar line drawn on top of the recurring digits or with dots.
- Three dots can also be written after the recurring number to shoe that it is recurring.
Activities;

1. Express 0.166 . . .as a ration of number
2. Change 0.444 . . .as a common fraction
3. Change 0.5454 . . .as a common fraction
4. Write $0.\overline{123}$ as a common fraction
</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Lesson 9</td>
</tr>
<tr>
<td></td>
<td></td>
<td>
<u>Rounding off decimals to the nearest whole number, tenth, hundredth.</u>
✓ In rounding off, we have round up digits and round down digits.
✓ Round up digits include 5 ,6 , 7 , 8 , 9
</td>
</tr>
</table>

		✓ Round down digits include; 0 , 1 , 2 , 3 , 4. ✓ When rounding off; • Identify place values of digits • Identify the digit in the required place value. • The digit on the right of the required place value is either rounded up or rounded down. **Examples** Round off 39.98 to the nearest whole number. T O Tth Hth 3 9 . 9 8 Required place value. 1 x 1 = 1 3 9 + 1 4 0 39.98 $\simeq$ 40 2. Correct 99.899 to two decimal places. T O Tth Hth THth 9 9 . 8 9 9 Required place value $1 \times \frac{1}{100} = \frac{1}{100}$ 0.01 99.89 + 0.01 99.90 99.899 $\simeq$ 99.90 **Activity;** 1. Round off 17.492 to the nearest ones. 2. Correct 0.657 to the nearest tenth. 3. Round off 64.437 to two decimal places. 4. Correct 7.9895 to 1 decimal place.
		<u>Lesson 10</u>
Numeracy	Fraction	<u>Rounding off decimals to the nearest thousandths and ten thousandth]</u> -Identify place values of the given digits. -Identify the required place value. -Round off as required. **Examples** 1. Round off 416.98654 to the nearest ten thousandth. H T O Tth Hth THth TTHth HTHth 4 1 6 . 9 8 6 5 4 Required place value $0 \times \frac{1}{10000} = 0$ 416.9865

<table>
<tr><td></td><td></td><td>+0.0000
416.9865
416.98654 $\simeq$ 416.9865

2. Correct 25.8905 to the nearest thousandth
T O Tth Hth THth TTHth
2 5 . 8 9 0 5
Required place value
$1 \times \frac{1}{1000} = \frac{1}{1000}$
0.001
25.890
+ 0.001
25.891

When rounding off decimals, drop all the digits after the digit in the required place value on the right.

25.8905 $\simeq$ 25.891
Activity;
1. Round off 0.999989 to the nearest ten thousandth.
2. Round off 37.284328 to the nearest ten thousandth.
3. Correct 4.2563 to 3 decimal places.
4. Round off 20.49498 to the nearest thousandth.
5. Round off 19.67784 to 4 decimal places.</td></tr>
<tr><td></td><td></td><td>Lesson 11</td></tr>
<tr><td>Numeracy</td><td>Fraction</td><td>Application of direct proportion
• Under direct proportion, one quantity increases and leads to the increase of the related quantity.
• Form a leading statement with the given values.
• Divide the values in the above statement to obtain the equivalency of one unit.
• Multiply the unit (answer) by the quantity given in the question.
Examples
1. 3 books cost sh. 6000, find the cost of 8 similar books.
3 books cost sh. 6000
1 book costs sh. $\frac{6000}{3}$
1 book costs sh. 2000
8 books cost sh. 2000 x 8
<u>8 books cost sh. 16000</u>

Avoid use of equal signs in proportions.

2. Omondi's car takes 4 hours to cover a distance of 440</td></tr>
</table>

		kilometres at a steady speed. a) How many kilometres can it cover in $1\frac{1}{2}$ hours at the same speed? In 4 hours it covers 440km In 1 hour it covers $\frac{440}{4}$ km In 1 hour it covers 110km In $1\frac{1}{2}$ hours it covers 110km x $1\frac{1}{2}$ $^{55}\cancel{110}$km x $\frac{3}{\cancel{2}_1}$ 55km x 3 165km b) If a car uses 7 litres to cover 84km, find the amount of money Omondi will pay to cover 60km when a litre of petrol costs sh. 3800. Litres needed 84km needs 7 litres 1 km needs $\frac{7}{84}$ L 60km needs $(\frac{\cancel{7}^{1}}{\cancel{84}_{\cancel{12}_{1}}} \times \cancel{60}^{5})$ L 5 litres Amount of money 1 litre costs sh. 3800 5 litres cost sh. 3800 x 5 Sh. 19000 **Activity;** 1. Musa bought 7 text books at sh. 3600 from a shop. How much more money will Henry pay for 21 similar text books. 2. Acar uses 6 litres of petrol to travel 30km. a) How many litres are required to cover 45km. b) If Peter used 15 litres of fuel, how many km would he cover? 3. A driver using a speed of 45km/hr requires 15 litres to cover a journey in 3 hours. How many litres of will it require to cover a journey of 63km at the same speed?
		Lesson 12
Numeracy	Fraction	<u>Application of indirect (inverse) proportions</u> ➢ Under inverse proportion, one quantity increases and leads to the decrease of the related quantity and the vice versa in decrease. ➢ Form a leading statement with the related quantities ➢ Multiply the values in the statement to obtain the equivalency of 1 unit. ➢ Divide the answer above by the quantity asked in the questions. **Examples**

		1. 4 boys take 9 days to construct a house. In how many days will 3 boys finish that work at the same rate? 4 boys take 9 days 1 boy takes (9 x 4) days 3 boys take $\frac{9 \times 4}{3}$ days $\frac{\cancel{36}^{12}}{\cancel{3}_{1}}$ days <u>12 days</u> 2. A group of 4 girls dug a garden for 5 hours. How many more girls are needed to do the same work in 2 hours? 5 hours need 4 girls. 1 hour needs 4 girls 2 hours need $\frac{4 \times 5}{2}$ girls 10 girls <u>More girls</u> 10 – 4 = 6 more girls **Activity;** 1. 8 builders can take 10 days to construct a house. In how many days will 5 builders take to construct the same house? 2. Peter, Moses, Henry and Robert took 6 hours slashing the compound. How many more hours would only Henry take to do the same work at the same working rate. 3. 20 workers were hired to construct a house in 15 days. If 8 workers did not turn up how many more days did the workers who turned up take to complete the work? 4. It takes 9 men 4 weeks to complete as piece of work. How many days will 7 men working at the same rate to complete the same work? 5. Tom and Allen can dig a garden in 3 days. How long will 3 girls take to dig the garden at the same working rate?
		Lesson 13
Numeracy	Fraction	<u>Application of percentage parts.</u> Find the missing percentage part. Subtract the given percentage part from the total percentage to get the missing percentage. Relate the percentage part to the its quantity Multiply the percentage part by the total quantity. **<u>Examples</u>** 1. A school has 800 pupils, 45 % are girls and the rest are boys How many girls are in the school? ($\frac{45}{\cancel{100}} \times 8\cancel{00}$) girls

(45x8)
360 girls
(b) Find the percentage of boys.
100% - 45%
55%
(c) Find the number of boys in a school.

$$\begin{array}{r} 800 \\ \underline{-360} \\ \underline{440} \end{array}$$ boys

2. Paul, Peter and Petra contributed money to start a business. Peter contributed 40%, Paul contributed 10% more than Peter and Petra contributed the rest.
How much money was contributed by Petra if they all contributed sh. 600000?

Paul's percentage
40% + 10%
= 50%

Petra's percentage
100% - (50% + 40%)
100% - 90%
10%

Petra's share
10% of sh. 600,000
$\frac{1\cancel{0}}{1\cancel{00}} \times$ sh. $600,00\cancel{0}$
Sh. 60,000

Activity
1. Nancy earns shs.1200000. She spends 75 % and saves the rest.
a) How much money does she spend?
b) How much does she save?
2. John spent 35% of his salary on rent, 20% on fees and saved the rest.
a) What percentage of his salary did he save?
b) If his salary was sh. 400,000, find how much he spent on rent?
c) How much more did he save than paying fees?

Lesson 14

Numeracy | Fraction

Application of percentage parts
- Identify the given percentage parts.
- Apply percentages to find quantities.
- Define the required quantity with the unknown.
- Relate the percentage to its quantity and form an equation.

Examples;
1. In a class, 15% of the pupils in a class were absent. If only 51 pupils were present, find the total number of pupils in the class.

Absent	Present	Total
15%	100-15 = 85%	100%

Let the total number be y

$\frac{85}{100} \times y = 51$

$\frac{\cancel{85}^{17}}{\cancel{100}_{20}} \times y = 51$

$\frac{17}{20} \times y = 51$

$\frac{17y}{\cancel{20}_{1}} \times \cancel{20}^{1} = 51 \times 20$

$17y = 51 \times 20$

$\frac{\cancel{17}^{1}y}{\cancel{17}_{1}} = \frac{\cancel{51}^{3} \times 20}{\cancel{17}_{1}}$

$y = 60$ pupils

2. After covering 30% of his journey Sam still had 140km to cover. How long was his journey?
   Percentage not covered.
   100% - 30% = 70%
   Let the total distance be y.
   70% of y = 140km
   $\cancel{100} \times \frac{70y}{\cancel{100}} = 140km \times 100$
   $\frac{70y}{70} = \frac{\cancel{140}^{2}km \times 100}{\cancel{70}}$
   $y = 200km$

Questions;

1. In a club, 20% of the members are females and the rest are males.
a) What percentage are males?
b) How many members are in the club if there are 80 males in the club.
2. On Ogubi's farm, 20% of the animals are sheep, 10% are cows, there are twice as many goats as cows and the rest are rabbits.
a) What is the percentage of goats on the farm?
b) Express the percentage of rabbits as a fraction.
c) If there are 22 sheep on the farm, how many animals are on the farm?

Lesson 15

<u>Application of percentages involving remainders</u>.

- ✓ Identify the given percentages.
- ✓ Find the sum of the percentages.
- ✓ Multiply the percentages where required.
- ✓ Subtract the product or sum to get the required percentage.
- ✓ Forman equation after defining the required quantity with

		unknown. **Examples** 1. A lady spends 30% of her pay on food, 40% of the remainder on fees and saves the rest. a) What percentage of her pay does she saves the rest? Food 30% Remainder 100% - 30% 70% Fees $\frac{40}{100}$ of $\frac{70}{100}$ $\frac{28}{100}$ 28% Food and Fees 30% + 28% 58% Savings 100% - 58% 42% OR Savings 70% - 28% 42% We can also subtract directly from the remainder to get the required fraction. b) If she saves sh. 420,000, workout her total pay. Let her total pay be p. 42% of P = sh. 420,000 $\frac{42}{100} \times P$ = sh. 420,000 $1\cancel{00} \times \frac{42P}{1\cancel{00}}$ = sh. 420,000 x 100 $\frac{\cancel{42}P}{\cancel{42}_1}$ = Sh. $\frac{\cancel{420,000}^{10\,000} \times 100}{\cancel{42}_1}$ P = sh. 1,000,000 OR. sh. 420,000 ÷ 42% sh. 420,000 ÷ $\frac{42}{100}$ sh. $\cancel{420,000}^{10\,000} \times \frac{100}{\cancel{42}_1}$ sh. 1,000,000 **Activity;** 1. The head teacher spends 50% of the money on feeding the learners, 50% of the remainder on scholastic materials and uses the rest to pay teachers. a) What percentage does the head teacher use to pay teachers? b) If he spends 500,000 on scholastic materials, workout the total amount of money the head teacher spends. 2. 70% of the pupils in the school are boarders and the rest are day scholars. 20% of the day scholars are boys and 30% of the boarders are girls. a) Find the percentage of boys in boarding. b) If there are 490 boys in boarding. i) Find the total number of children in the school. ii) How many girls are day scholars?
		Lesson 16
		<u>Increasing quantities using percentages.</u> • Add the given percentage to the total percentage. • Multiply the answer by the answer by the given quantity. OR • Directly multiply the given percentage by the quantity

<table>
<tr><td></td><td></td><td>
• Add the answer to the given quantity to obtain the new quantity.
Examples
1. Increase sh. 80000 by 20%
Method I
New percentage
100% + 20% = 120%
New quantity
$\frac{120}{100}$ x sh. 80000
<u>Sh. 96000</u>
Method II
Increase
$\frac{2\cancel{0}}{1\cancel{00}}$ x sh. 8000$\cancel{0}$
Sh. 16000
New quantity
Sh. (80000 + 16000)
<u>Sh. 96000</u>

<u>Decreasing quantities using percentages.</u>
• Subtract the given percentage
• Multiply the answer by the original quantity
OR
• Directly multiply the given percentage by the original quantity.
• Subtract the answer from the original quantity.
1) Job's salary of sh. 120,000 was reduced by 15% due to Covid pandemic effect. How much is Job's salary now.
Method I
New percentage
100% - 15%
85%
New quantity
$\frac{85}{100}$ x sh. 120000
85 x sh. 1200
Sh. 1200
<u>Sh. 102000</u>
Method II
Decrease
$\frac{15}{100}$ x sh. 120000
sh. 18000
New quantity
sh. (120000 – 18000)
<u>sh. 102000</u>

Activity;
1. Decrease sh. 150,000 by 10%
2. The number of children in Mulago hospital was 96 last year. If this number increased by 8%. Find the number of children in Mulago hospital now.
3. Increase 24 by $12\frac{1}{2}\%$.
4. The staff of VES was 450 in 2019 if this staff reduced by 5%. Calculate the number of VES staff.
5. Reduce 42 by 15%.
</td></tr>
<tr><td></td><td></td><td>Lesson 17</td></tr>
<tr><td>Numeracy</td><td>Fraction</td><td>
<u>Find the original number after the increase</u>.
• Identify the given quantity and percentage.
• Add the given percentage to 100%
• Define the original number with unknown and form an equation.
Example;
1. A trader sold a radio at shs.420.000 after increasing the
</td></tr>
</table>

original cost price by 20%. Find the original price of the radio.
Increase
100% + 20% = 120%
Let the original price be y
120% of y = sh. 420,000

$$100 \times \frac{120}{100}y = \text{sh. } 420{,}000 \times 100$$

$$\frac{\cancel{120}y}{\cancel{120}} = \text{sh. } \frac{\overset{70\,000}{\cancel{420{,}000}} \times \overset{5}{\cancel{100}}}{\underset{1}{\cancel{\underset{2}{\cancel{120}}}}}$$

$$y = \text{sh. } 350{,}000$$

2. Paul sold an article at sh. 660,000 which was 10% increase. Find the original price of the article.
100% + 10% = 110%
Let the original price be y

$$\frac{110}{100}y = \text{sh. } 660{,}000$$

$$10 \times \frac{11}{10}y = \text{sh. } 660{,}000$$

$$\frac{\cancel{11}y}{\cancel{11}} = \text{sh. } \frac{\overset{60{,}000}{\cancel{660{,}000}} \times 10}{\cancel{11}}$$

$$y = \text{sh. } 600{,}000$$

Finding the original number after decrease.

- Identify the given percentage increase.
- Subtract the percentage decrease from 100%.
- Form an equation by defining the required quantity with unknown.

Examples

1. A worker earned sh. 150,000 after reducing his original pay by 25%. What was his original pay?
100% - 25% = 75%
Let the original pay be n
75% of n = sh. 150,000

$$1\cancel{00} \times \frac{75n}{\cancel{100}} = \text{sh. } 150{,}000 \times 100$$

$$\frac{\cancel{75}n}{\cancel{75}} = \text{sh. } \frac{\overset{10\,000}{\cancel{150{,}000}} \times \overset{20}{\cancel{100}}}{\underset{1}{\cancel{\underset{15}{\cancel{75}}}}}$$

$$n = \text{sh. } 200{,}000$$

Activity;

1. After increasing the cost of an article by 30%, the trader sold it at sh. 63,000. Find the original cost of the article.
2. Joshua sold a refrigerator at sh. 800,000 after reducing the original cost by 60%. Find the original cost of the refrigerator.
3. Akiiki bought a dress from a shop keeper at sh. 22000 after

		the trader increasing its cost by 10%. Find the original cost of the dress. 4. A vendor sold 120 oranges after increasing the original cost by 40%. a) Find the original cost of the oranges. b) How much increase was on each orange?
		Lesson 18
Numeracy	Fraction	<u>Finding percentage increase of a decrease</u> Identifyi the quantities given; original from new quantity. Find the increase. Find the decrease Find the percentage increase or decrease Percentage increase = $\frac{\text{increase}}{\text{Original quantity}} \times 100$ Percentage decrease = $\frac{\text{decrease}}{\text{Original quantity}} \times 1010$ 1. A matron's salary was increased from shs. 150.000 to shs. 180.000. By what percentage was the salary increased? **Increase** shs 180.000 - shs150.000 Shs 30.000 percentage increase = $\left(\frac{\text{shs .}\cancel{30.000}}{\text{Shs. }\cancel{150.000}} \times \cancel{100}\right)$ = 20% 2. When sh. 20,000 is decreased by P% it become sh. 16,000. Find the value of P. **Decrease** Sh. 20,000 - Sh. 16,000 Sh. 4000 P% = $\frac{\overset{20}{\cancel{\text{sh. }4000}}}{\cancel{\text{Sh. }20,000}} \times \cancel{100}\%$ $\frac{P\cancel{\%}}{\cancel{\%}} = \frac{20\cancel{\%}}{\cancel{\%}}$ P = 20 **Activity;** 1. John's salary of sh. 200,000 was increased to sh. 250,000. Find the percentage increase. 2. The number of children increased by 200 to 1000 pupils. Calculate the percentage increase. 3. The number of animals on Victor's farm increased by 30

animals from 150. Find the percentage increase.
4. After increasing 3000 by K% it became 3150. Find the value of K.
5. When decreasing sh. 4000 by n% it became sh. 3500. Find the value of n.

Lesson 19

<u>Application of percentage profit and loss.</u>

- Identify the given price with the person who paid.
- Find the new percentage by subtracting the percentage loss from the total percentage.
- If it is a profit add the percentage profit to the total percentage.
- Define the B.P with an unknown and form an equation.

Examples

1. Nerima sold a radio to Nahone at a profit of 20% and later Nahone sold it to Nehumye at a loss of 5%. If Nehumye paid sh. 342000 for the radio;

a) How much money did Nahone pay for the radio?

New percentage

100% - 5% = 95%

BP of Nahome.

Let the BP be K

$$\frac{95}{100} \times K = \text{sh. } 342000$$

$$\frac{95K}{\cancel{100}} \times \cancel{100} = \text{sh. } 342000 \times 100$$

$$95K = \text{sh. } 34200000$$

$$\frac{\overset{1}{\cancel{95}}K}{{}_1\cancel{95}} = \text{sh. } \frac{\overset{\overset{36000}{\cancel{6840000}}}{\cancel{34200000}}}{\cancel{95}_{\cancel{19}_1}}$$

$$\underline{K = \text{sh. } 360000}$$

b) Calculate the amount of money that Nerima paid for the radio.

New percentage

100% + 20%

120%

B.P for Nerima

Let the B.P be P.

$$\frac{12\cancel{0}}{10\cancel{0}} \times P = \text{sh. } 360{,}000$$

$$\frac{12P}{1\cancel{0}} \times 1\cancel{0} = \text{sh. } 360{,}000 \times 10$$

$$\frac{\overset{1}{\cancel{12}}P}{\cancel{12}_1} = \text{sh. } \frac{\overset{300000}{\cancel{360{,}000}}}{\cancel{12}_1}$$

$$P = \text{sh. } 300{,}000$$

Nerima paid sh. 300000

Activity;

		1. Peter sold a goat to Ewalu at sh. 63000 making a loss of 10% and later Ewalu sold it to Okiror at a profit of 15%. a) How much money did Peter lose on the goat? b) Calculate the amount of money that Ewalu paid for the goat. 2. On selling a phone to Paul, Sekate made a loss of 10% and later Paul sold it to Lucy at a profit of 20%. a) If Lucy paid sh. 43200 for the phone. Find Sekate's buying price of the radio. b) How much money did Paul buy the phone?
		Lesson 20
		<u>Application of percentages on profit and loss.</u> ➢ Identify the buying price, percentage profit or less and selling price if given. ➢ Express the percentage profit or loss as a common fraction and multiply by the buying price. ➢ Find the quality sold or not sold by subtracting. **Examples;** 1. A man bought 3 trays of eggs at sh. 9000 each. Some eggs got broken and he sold the remaining eggs each at sh. 450 making a profit $33\frac{1}{3}\%$. a) How much profit did the man make? B.P = 3 x sh. 9000 Sh. 27000 Profit = $33\frac{1}{3}\%$ of sh 27000 Profit = $\frac{100\%}{3}$ of shs. 27000 $\frac{100}{3} \div \frac{100}{1}$ x sh. 27000 $\frac{1\cancel{00}}{\cancel{3}_1} \div \frac{1}{1\cancel{00}}$ x sh. $\overset{9000}{\cancel{27000}}$ Sh. 9000 b) How many eggs got spoilt? Total number of eggs = 3 × 30eggs 90eggs Selling price of eggs = sh 270000 + sh9000 Sh 36000 No. of eggs sold $\frac{\text{Sh. } \overset{\cancel{400}\ 80}{\cancel{36000}}}{\text{Sh. } \underset{\cancel{5}\ 1}{\cancel{450}}}$ 80 eggs Eggs that got spoilt (90 – 80) eggs 10 eggs 2. A shop keeper bought 5 dozens of books at sh. 120,000.

Some books were stolen and she sold the remaining books at sh. 1500 making a loss of 50%.

a) How much did she get after selling the books?

100% - 50% = 50%

$$\frac{5\cancel{0}}{10\cancel{0}} \times \text{sh. } 120,00\cancel{0}$$

Sh. 60,000

b) How many books did she sell?

$$\text{No. of books sold} = \frac{\text{sh. } \overset{\overset{40}{\cancel{200}}}{\cancel{60,000}}}{\text{Sh. } \underset{\underset{1}{\cancel{5}}}{\cancel{1500}}}$$

40 books

Activity;

1. A trader bought a tray of eggs at sh. 10,000 and some eggs got broken. If he sold the remaining eggs at sh. 500 each and made a 20% profit, find the number of eggs that got broke.
2. Maria bought 20 mangoes at sh. 1000 each. Some mangoes got spoilt and she sold the remaining mangoes at sh. 1500 each making 40% loss.
   a) How much was the loss.
   b) How many mangoes did she sell?

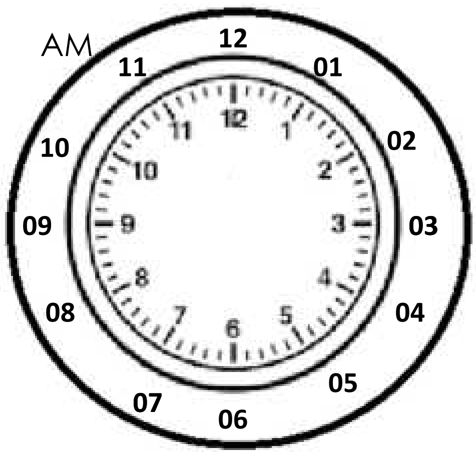
FORMAT OF LESSON NOTES (Theme Based)

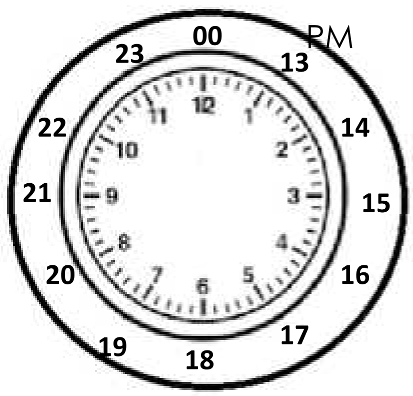
Name: ________________________________ **Index No.**________________

SUBJECT: **MTC** **CLASS: P.7** **TERM** __________ **YEAR: 2023**

		Lesson 1
		Telling and reading time in a 12 and 24 hour clock system

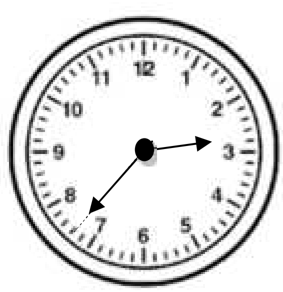
-Identifies both hour and minute arm.
-Tells time both 12 and 24 hour clock.
-Identifies correct unit to be used both in 12 and 24 hour clock system.



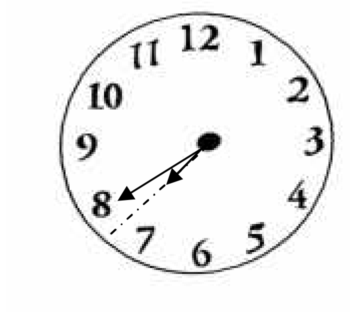
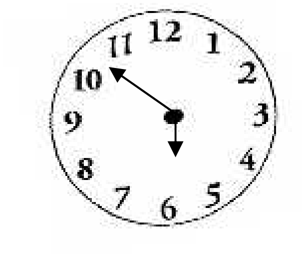
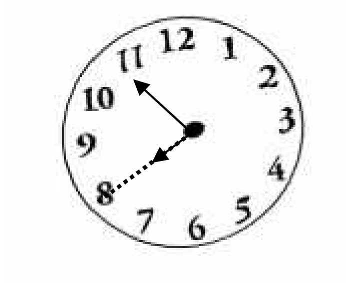
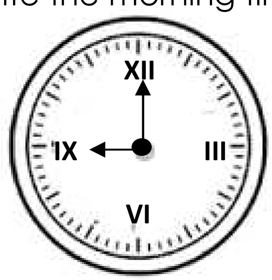
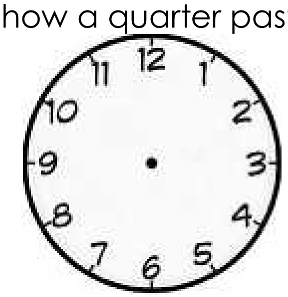


Examples

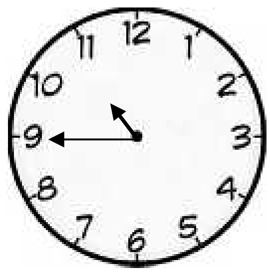
1.Tell the time shown on the clock face



Twenty three minutes to three.
Or
2:37 a.m. / 2:37p.m.

		2. Show 25 minutes to eight on the clock face below.  **Activity;** 1. What time is shown on the clock face  2. What afternoon time is shown on the clock face below?  3. Write the morning time shown on the clock face below.  4. Show a quarter past 8 on the clock face below. 

5. Write the morning time shown on the clock face below



Lesson 2

Converting from 12 hour clock system to 24 hour clock system.

-Add 0000 hours to a.m. hour tiime
-Add 1200 hours to p.m. hour time with the exception of mid-day time.
-When writing time in 24 hour clock system, the answer does not bear dots.
-Identify the right unit to be used in 24 hour clock system.

1.Convert 2:30am to 24 hour clock system.

Hr	**Min**	
2	30	
+00	00	
02	30	hours

2. Ababy started sleeping at 12:45 am. Express this in 24 hour clock system.

12 : 45am → 00 00 hr

Hr	Min	
00	00	
+ 00	45	
00	45	Hours

3. Express 12 : 24 p.m. in 24 hour clock time.

12 : 24 p.m. → 12 00 hrs

12	00	
00	24	
12	24	hours

4. Change 1: 35 p.m. to 24 hour clock time.

```
   1  35
+12  00
  13  35 hours
```

Converting 24 hour clock system

-Subtract 0000hr from given time when the time is less than 1200hrs.
-Subtract 1200hr from given time when the time is 1300 – 2359 hrs.
-Identify the correct units to be used.

Examples;

1. Change 0843 hrs to 12 hour clock system

```
  Hr   Min
  08    43
- 00    00
   8 : 43 a.m
```

2. Change 1314 hors to 12 hour clock system

```
   Hr     Min
   13     14
  -12     00
    1  : 14 p.m
```

3. Express 12 08 hours to 12 hour clock time.

$\boxed{12}$ 08 $\boxed{\text{hours}}$

$\boxed{12:00}$ $\boxed{\text{p.m.}}$

12 : 08 p.m.

4. A baby slept at 00 25 hours. Express the time the baby slept in 12 hour clock system.

$\boxed{00}$ 25 $\boxed{\text{hours}}$

$\boxed{12:00}$ $\boxed{\text{a.m.}}$

12:25a.m.

The baby slept at 12:25 a.m.

Activity

1. Express 1023hours to 12 hours clock system
2.The Mathematics test ended at1225hours.
   What time did the test end in 12 hour clock system?
3. Convert 1957 hours to 12 hour clock system
4. The aeroplane left the airport at 2340 hrs.
   Express the time the aeroplane left the airport in 12 hour clock System.
5. Convert 0013hours to 12 hour system.
6. Express 12:55p.m. in 24 hour clock time.
7. The English lessons started at 6:45a.m. Find the time lesson started in 24 hour clock time.
8.Convert 12:05 a.m. to 24 hour clock time.
9. Express 11:35p.m. in 24 hour clock time.
10. Change 10:10a.m. to 24 hour clock time.

Lesson 3

Identify points of time given

-Subtract starting time from ending time.

-Identify correct units to be used.

1.A party started at 1700 hours and ended at 10:30 p.m.. For how long did the party last?

Duration = ending time – starting time

-First change the time to 24 hour clock time.

$$\begin{array}{rr} \text{Hr} & \text{Min} \\ 10 & 30 \\ +12 & 00 \\ \hline 22 & 30 \text{ hours} \end{array}$$

$$\begin{array}{rr} \text{Hr} & \text{Min} \\ 22 & 30 \\ -17 & 00 \\ \hline 5 & 30 \\ \hline \end{array}$$

5 hours and 30 minutes

2. A baby started sleeping at 4:30 p.m. and woke up at 8:15 p.m. For how long did the baby sleep?

$$\begin{array}{rr} \text{Hr} & \text{Min} \\ {}^{7}\cancel{8} & \cancel{15}^{75} \\ -4 & 30 \\ \hline 3 & 45 \\ \hline \end{array}$$

$\boxed{60\text{min.} + 15\text{min.} = 75\text{min.}}$

$$\frac{\cancel{45}^{\cancel{9}\,3}}{\cancel{60}_{\cancel{12}\,4}}$$

$3\frac{3}{4}$ hours

Or

The baby slept for 3hours 45minutes.

3. A film show started at 10:45 p.m. and ended at 1:10a.m.
How long did the show take?

First find the time taken from p.m. to mid-night

12 : 00 midnight - 10 : 45 p.m.

$$\begin{array}{r} \scriptstyle 11 \quad 60 \\ \cancel{12} : \cancel{00} \\ -10 : 45 \\ \hline 1 : 15 \\ \hline \end{array}$$

$$\begin{array}{r} \text{Hrs} \ \ \text{min} \\ 1 : 10 \\ +1 : 15 \\ \hline 2 : 25 \\ \hline \end{array}$$

The film show took 2 hours 25 minutes.

4. The meeting started at 10:35 a.m. and ended at 12:20p.m.
How long was the meeting?

First find the time taken from a.m. to mid-day

12:00mid-day – 10:35a.m.

$$\begin{array}{r} \scriptstyle 11 \quad 60 \\ \cancel{12} : \cancel{00} \text{ mid-day} \\ -10 : 35 \\ \hline 1 : 25 \\ \hline \end{array}$$

$$\begin{array}{r} \text{Hrs min} \\ 1 : 25 \\ + \quad 20 \\ \hline 1 : 45 \\ \hline \end{array}$$

The meeting took 1 hour 45 minutes.

Activity

1. A science lesson started at 8:15 p.m and ended at 9:05p.m. How long was the lesson?
2. A bus started the journey at 9:20p.m. and reached its destination at 11:00 a.m.
For how long did it travel?
3. A football match started at 5:05pm ended at 6:50 pm. How many minutes did the match take?
3. A test started at 3:00 p.m. and ended at 4:30p.m. How many minutes did it take?
4. Okot left Kampala at 7:10 p.m. for Kigali and arrived in Kigali at 0800 hrs.
For how long did he travel?
5. A meeting started at 11:15a.m. and ended at 1:40p.m.
How long did the meeting take?

Lesson 4

Application time involving 12 and 24 hour clock time system

- Identify departure and arrival time in the statement (question)
- Identify the duration.
- Add duration to starting time to get ending time.
- Subtract duration from ending to get starting time.

-That is:

Ending time = starting time + duration

Starting time = ending time - duration

Example;

1.Okiror left home at 8:45am. And took $3\frac{1}{2}$ hours driving to soroti. At what time did he reach soroti?

Ending time = starting time + duration

Duration = $3\frac{1}{2}$ hours 1 hr = 60 min $\frac{1}{2}$ hr = ($\frac{1}{2}$ x60) = 30min 3 hr 30min	Hr Min 8 45am + 3 30 12 15 12 : 15 p.m	75 ÷ 60 = 1 rem 15

2. A meeting that lasted $3\frac{1}{3}$ hours ended at 0130hrs. At what time did the meeting start.

Starting time = ending time - duration

In this case first subtract the time after midnight to get back to midnight (12:00 midnight)

$3\frac{1}{3} - 1\frac{\cancel{30}^{1}}{\cancel{60}_{2}}$

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

$\frac{10}{3} - \frac{3}{2}$

$\frac{20-9}{6}$

$\frac{11}{6}$

$1\frac{5}{6}$

1hr = 60min

1 hr, $\frac{5}{\cancel{6}} \times \cancel{60}^{10}$min

1 hr, 50 min

$\begin{array}{r} \overset{11}{\cancel{12}} : \overset{60}{\cancel{00}} \\ -\ 1 : 50 \\ \hline 10 : 10 \end{array}$ p.m.

Activity

1.Ken arrived Mityana at 6:20p.m. after taking 2hours driving. At what time did he leave kampala?

2. A plane left Jomo Kenyatta airport at 4:45pm, If it took 50 min to reach Dar-alam airport. At what time did it reach?

3.A bus left Kome at 9:30am and took $4\frac{1}{3}$ hours to reach Jinja At what time did it arrive Jinja?

4. An examination that lasted 3 hours ended at 1:00pm. What what time did it start.

5. A meeting that started at 21 45 hours took 4 hours at what time did it end in 24 hour clock time?

6.A baby slept for $4\frac{1}{2}$ hours and woke up at 2:15a.m. At what time did the baby start sleeping?

Lessson 5

Class time table interpretation

-Identify time intervals on the time table

-Identify actvities on the timetable

The timetable below shows how lessons are conducted in P.4 class up to lunch time.

Day	**8:30 9:10**	**9:10 9:50**	**9:50 10:30**	**10:30 11:00**	**11:00 11:40**	**11:40 12:20**	**12:20 1:00**
MON	ENG	MTC	SCI	B	SST	MTC	ENG
TUE	MTC	SST	RE	R	ENG	SCI	SST
WED	SCI	MTC	SST	E	ENG	MTC	SCI
THUR	SST	SCI	NTC	A	ENG	SCI	MTC
FRI	MTC	ENG	SCI	K	SST	PE	SST

a) How many lessons are on the timetable?

<u>30 lesson</u>

b) Find the timetaken on each lesson.

$$\begin{array}{rr} \text{Hrs} & \text{min} \\ 8 & 70 \\ \cancel{9} & \cancel{10} \\ -\ 8 & 30 \\ \hline 0 & 40 \\ \hline \end{array}$$

40 minutes

Activity;

a) Calculate the total time taken for maths lessons on the timetable

b) At what time do the lessons begin each morning?

c) Which subjects are the most studied?

d) At time time is P.E taught.

e) If a teacher is paid sh. 5000 for each lesson taught, find the amount of money Peter the teacher of English will get in a week?

<u>BUS TIME TABLE</u>

- Identify time intervals on the time table
- Identify stations on the time table
- Identify the arrival and departure times.

Note: When finding the duration within one town, subtract arrival from departure.

- Duration from one town to another, subtract, subtract departure from arrival.

The time table below shows how a bus moved from Kamengo to Kampala. Study it carefully and answer the questions.

Station	**Arrival**	**Departure**
Kamengo	______________	9:20a.m.
Mpigi	9:47a.m.	10:02a.m.
Katende	10:15a.m.	10:25a.m.
Nsangi	10:40a.m.	10:48a.m.
Kampala	11:00a.m.	12:00noon

a)At what tme did the bus leave Katende?

<u>10:25 am.</u>

b) Calculate the time taken by the bus from kamengo to kampala.

Arrival – Departure

11:00a.m. – 9:17 a.m

$$\begin{array}{r} \overset{10}{\cancel{11}} : \overset{60}{\cancel{00}} \text{ a.m.} \\ \underline{9 : 20 \text{ a.m.}} \\ \underline{1 : 40} \end{array}$$

1 hour , 40 min

a) How many stopovers are there between kamengo and Nsangi?

b) How long does the bus take to travel from Nasngi to Kampala?

c) For how long did the bus stay at Mpigi.

d) If Kampala is 200km away from Kamengo. Work out the average speed for the whole journey.

Lesson 6

<u>Time tables of other activities of the day</u>

-Identify activities on the time table

-Identify time intervals on the timetable

Worktimetable

Activity	Time
Prayers	7:00 – 7:30am.
Washing	7:35 – 8:30am.
Sweeping	8:35 - 9:00am.
Reading	9:00 - 12:00noon

a) At what time did one start washing ?

7:35am.

b) For how long does one take in prayers?

7:30 a.m – 7:00 a.m.

$$\begin{array}{r} 7:30 \\ \underline{7:00} \\ \underline{0:30} \end{array}$$

30 minutes

Use the above timetable to answer the following questions
Activity;

a) calculate the time taken to sweep and read the books.
b) At what time did one end sweeping?
c) If John reads 3 pages of his novel in every 10 minutes, how many pages does he read per day.
d) How long does washing take?

Lesson 7

Reading flight timetables

-Identify stations on timetable
-Identify time intervals on the timetable

The timetable below shoes the flight time for Bombadya airways from Entebbe airport to different destinations.

Port	Departure	Arrival
Nairobi to Bujumbura	0420hrs	0530hrs
Bujumbura to Kigali	0840hrs	0910hrs
Kigali to Johannesburg	0950hrs	1530hrs
Johannesburg to London	1630hrs	0200hrs
London to Eentebbe	0600hrs	1600hrs

a) Change the arrival time of Kigali to 24 hour clock system
0910hr

$$\begin{array}{rr} Hr & min \\ 09 & 10 \\ \underline{-\ 00} & \underline{00} \\ \underline{9} & \underline{10} \end{array}$$

9:10a.m.

b) How long did the bombadya take in London?

$$\begin{array}{r} 06\ 00 \\ \underline{-\ 02\ 00} \\ \underline{8:00} \end{array}$$

8 hours

Activity;
Use the same flight table above to answer the following questions;
1. At what time does the Bombadya airways leave Kigali in 12 hour clock time.
2. How long does the Bombadya take to move from Bujumbura to London.
3. For how long did the Bombadya stay at Johanesberg.
4. Express arrival time in Bujumbura in 12 – hour clock time.
5. Find the time taken to travel from Nairobi to Bujumbura.

Lesson 8

More application of travel time table
The timetable below shows the Barnabas' journey from Luzira to Kalangala.

Port	Arrival	Departure	Fare (sh.)
Luzira	_______	0900hr	_______
Kome	1230hr	1300hr	Shs.3000
Bukeke	1545hr	1620hr	Shs. 4000
Buyange	1740hr	1800hr	Shs.3000
Bukala	1910hr	1940hr	Shs. 3500
Kalangala	2125hr	____	Shs. 4500

a) How much money does one need to reach Buyange from Luzira?

$$\begin{array}{r} \text{Shs. } 3000 \\ \text{Shs. } 4000 \\ + \ \text{shs. } 3000 \\ \hline \text{Shs. } 10000 \\ \hline \end{array}$$

b) Express the arrival time in Bubeke in 12 – hr clock system.

$$\begin{array}{r} 15\ \ 45 \\ -12\ \ 00 \\ \hline 3:45 \\ \hline \end{array}$$

3:45 p.m

Activity

Use the above time table to answer the following questions.
1. How much does one pay when one moves from Kome to Kalangala?
2. Find the time taken by Barnabas in Buyango.
3. Express the Arrival time in Kome in 12 – hour clock time.
4. If John moved with his 3 sons from Luzira to Buyango, find the total amount paid given that the sons paid half the charges.

Lesson 9

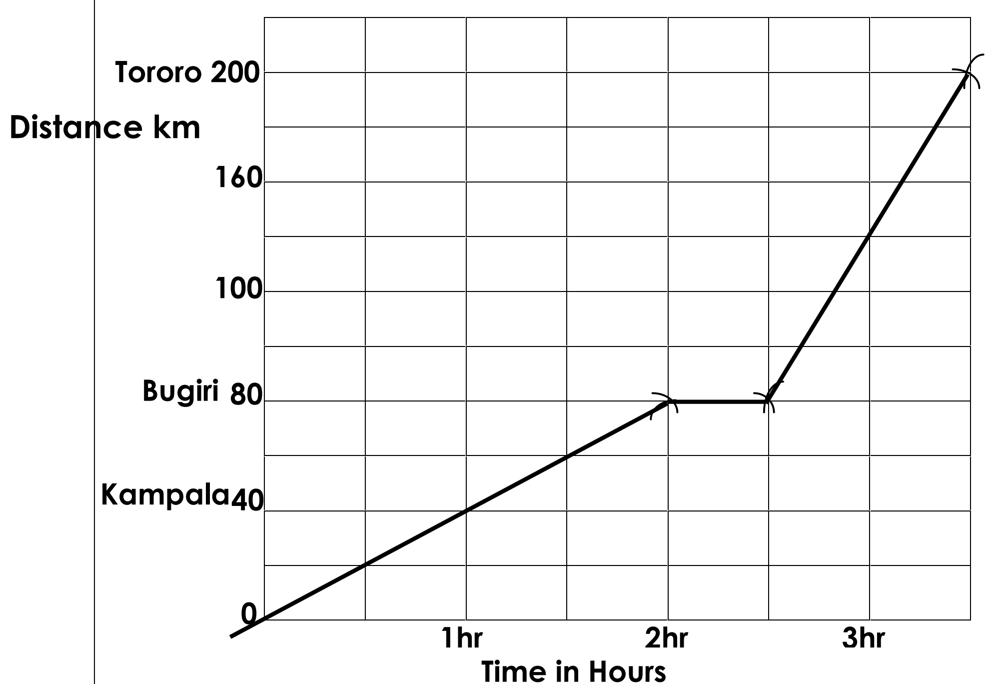
<u>Drawing travel graphs</u>

- Determine the scale on both vertical and horizontal axis
- Find the distances covered from the beginning to different towns.
- Find the time taken to cover the distances got above.
- Plot the distance against the time.

Examples

1. Okot travelled from town P to R as follows: For two hours from P to Q a distance of 80km and rested for 30minutes. From Q, he continued for another I hour to town R at a speed of 100km/hr.

a) Show Okot's movement on the graph below;



D = SX T

D = $\frac{100km}{I\ \cancel{hr}}$ x 2 $\cancel{hr}$

D = 200km

Scale

Verticle scale

2 squares to rep. 40km

I square rep. 20km

Horizontal scale

2 squares rep. 1hr

1 square rep. $\frac{1}{2}$ hr

b) What is the scale on the horintal axis?

1 square represents 30 minutes

c) For how long did he take to travel Kampala to Tororo?

$3\frac{1}{2}$ hours

c) How far is Bugiri from Tororo?

(200km – 80km)

120km

Activity;

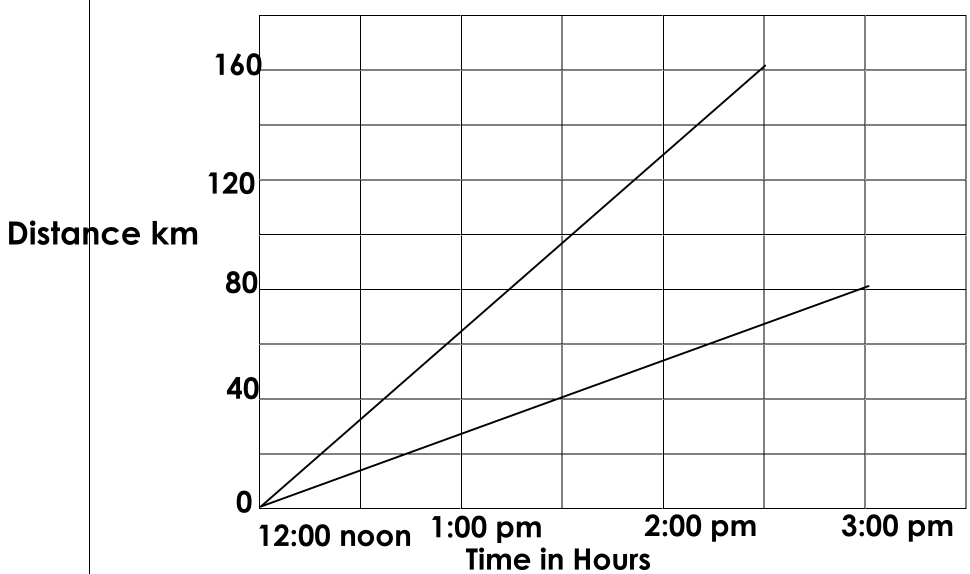
1. Town A and B are 90km apart. John left town A at 6:30 a.m. and moved at a steady speed of 30km/hr for $1\frac{1}{2}$ hrs before resting for 30 minutes. He then covered the remaining distance in 2 hours.

a) Show John's movement on the graph below.
b) At what time did he reach town B.
c) Work out John's average speed for the whole journey.

Lesson 10

Reading and interpreting travel graphs

- Determine the scale for the both vertical and horizontal axis
- Identify the related time and distance covered.



a) What is the scale on the vertical and horizontal axis?
b) How many kilometres had the train covered by 2:00 pm.
c) By what time will the train have covered 80km.
d) For how long does the bus travel than train?
e) Calculate the speed of the train.

End

FORMAT OF LESSON NOTES (THEME BASED)

SUBJECT: MTC **CLASS: P.7** **TERM: _________** **YEAR: 2023**

THEME	**TOPIC/ THEME CLASS**	**TEACHABLE UNIT / DELIVERABLE LESSON**
NUMERACY	PATTERNS AND SEQUENCE	**LESSON ONE** **Read and spell** **divisibility , multiple , test , factor , fully , divisible** <u>DIVISIBILITY TEST</u> -Is a way of discovery whether a number is completely divisible by a given factor <u>Divisibility test of 6</u> -A number is completely divisible by 6 if it is divisible by 2 & 3 Or -If the number is even and the sum of the digits is a multiple of 3 **Example** 1) Test for divisibility of 6 in 612 -Identify the last digit in the given number 6 1 <u>2</u> - Add the digits in the number, if the sum got is a multiple of 3, then the number is fully divisible by 6. 6 + 1+ 2 = 9 9 ÷ 3 = 3 612 is divisible by 6 2) Without dividing show whether 443 is divisible by 6 or not. 4 4 3 | 4 + 4+ 3 = 11 4 4 3 | 443 is not fully divisible by 6 <u>Divisibility test for 7</u> -When the last digit of a given number is doubled and the result is subtracted from the number formed by the remaining digits and the answer is either a multiple of 7 then the number is divisible by 7 **Examples** Test for divisibility of 7 in 861. - Double the last digit

		1 x 2 = 2 -Subtract 2 from the number formed by 86 86 – 2 = 84 84 is a multiple of 7 therefore 861 is divisible by 7 2. Without dividing, show which of the numbers 384 and 462 is divisible by 7. 384 4 × 2 = 8 38 – 8 = 30 30 is not a multiple of 7 therefore 384 is not divisible by 7 462 2 × 2 = 4 46 – 4 = 42 42 is a multiple of 7 therefore 462 is divisible by 7 **Activity** 1) Prove the divisibility of 6 in 384 2) Test for the divisibility of 6 and divide if possible 3) show the numbers that are fully divisible by 7 from the list 2121, 321, 70700 without dividing 4) Show that 4921 is fully divisible 7 without dividing 5) Without dividing show which of the numbers 542 and 616 is divisible by 7
NUMERACY	PATTERNS AND SEQUENCE	**LESSON 2** **<u>Divisibility test of 8</u>** -A number is fully divisible by 8 if the number formed by the last three digits is a multiple of 8. Example 1) Test for 8 in 7960 -Identify the last three digits on the number and form a numeral 9 6 0 -Divide by 8, If it is fully divisible by 8 then the whole given number is fully divisible by 8. 960÷8 = 120 960 is multiple of 8 1960 is fully divisible by 8 2) Prove whether 67100 is fully divisible by 8 100 100÷8 =12 rem 4 100 is not a multiple of 8 67100 is not fully divisible by 8
		<u>Divisibility of 9</u>

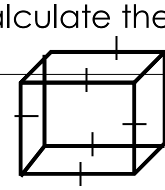
		-A number is fully divisible by 9 if the sum of its digits is a multiple of 9 Example 1) Identify the number which are fully divisible by 9 from the list below 198, 4211, 33651 **198** 1+9+8 = 18 18 is a multiple of 9 198 is divisible by 9 **4211** 4 + 2 + 1 + 1 = 8 8 is not a multiple of 9 4211 is not divisible by 9 **33651** 3 + 3+ 6+ 5+ 1 = 18 18 is a multiple of 9 33651 is divisible by 9 Add the digits of each number given, if the sum is a multiple of 9 then that number is fully divisible by 9. 198 and 33651 are divisible by 9 2) Without dividing show which of the numbers 972 and 444 is divisible by 9 **972** 9+7+2 = 18 18 is a multiple of 9, therefore 972 is divisible by 9 **444** 4+4+4 = 16 16 is not a multiple of 9, therefore 444 is not divisible by 9 **Activity** 1) Test for the divisibility of 9 in 1431 2) Prove that 90927 is fully divisible by 9. 3) Without dividing show which of the numbers 198 and 4824 is divisible by 8. 4.Find the least number that should be added to the product of 11and 9 to make it divisible by 8 5. Which of the following numbers is divisible by 8? 75632, 134615, 9852, 157041.
NUMERACY	PATTERNS AND	**<u>LESSON 3</u>** **Divisibility of 10**

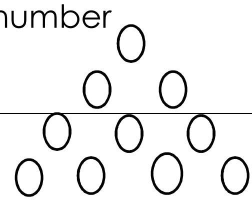
	SEQUENCE	A number is fully divisible by 10 when it ends in 0 **Example** 1) Show that 120250 is a multiple of 10 without dividing 120250 - Identify the last digit on the number, if it is 0 then the whole number is fully divisible by10. 120250 is fully divisible by 10 2) Use 2, 4 and 0 to form all the possible three digit numbers that are fully divisible by 10. 240, 420 **Divisibility test for 11** -A number is fully divisible by 11 if the sum of the digits in even position and those in odd positions given have a result of 0 or a multiple of 11 **Example** 1. Given the number 676390, show that it is fully divisible by 11 without dividing. O E O E O E 6 7 6 3 9 0 -Identify the position of each digit in the number -Add the digits in the even positions and those in odd positions respectively. -Subtract the results, if the difference is 0 or any multiple of 11 then the number is fully divisible by 11. 6 + 6+ 9 = 21 — 11 is a multiple of 11 7 + 3 + 0 = 10 Difference — 676390 is fully divisible by 11 21 – 10 = 11 2) Test for the divisibility of 11 in O E O E O E 7 3 3 6 8 9 7 + 3 + 8 = 18 3 + 6 + 9 = 18 Difference 18 – 18 = 0 733689 is fully divisible by 11 **Activity** 1. Identify the numbers which are fully divisible by 10

		from the list below: 2120, 355, 49010 2) Test for divisibility of 10 in 4050 and find their quotients. 3) Determine whether 219402 is fully divisible by 11. 4. Show that 121121 is fully divisible by 11
NUMERACY	PATTERNS AND SEQUENCE	<u>**LESSON 4**</u> **Read and spell (composite , prime)** <u>Composite numbers</u> -They are numbers with more than two factors - All numbers that are not prime are composite apart from 1. Examples 1) Write the composite numbers less than 20 4, 6, 8, 9, 10, 12, 14, 15, 16, 18, . . . 2) If set A= { All composite numbers between 50 and 60} List down all the members of set A {51, 52, 53, 54, 55, 56, 57, 58, 59} A = { 51, 52, 54, 55, 56, 57, 58} 3) Find the sum of the 5th and 10th composite numbers 4, 6, 8, 9, 10, 12, 14, 15, 16, 18 20, 21 Sum = 10 + 8 = 28 <u>Prime numbers</u> -Prime numbers have only two factors,1 and the given number 1) Write down the 1st five prime numbers 2, 3, 5, 7, 11 2) Workout the product of the fifth and 9th prime numbers 2, 3, 5, 7, 11, 13, 17, 19, 23, 29 11 x 23 = 253 **Activity;** 1. Write down the 1st 4 composite numbers. 2. Use the 1st, 2nd , and 3rd composite numbers to form three numbers that are fully divisible by 3. 3. Form a set of composite numbers between 30 and 41. 4. Work out the sum of the 7th prime number and

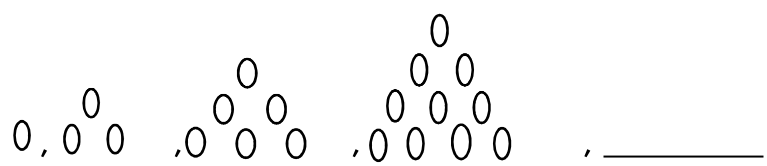
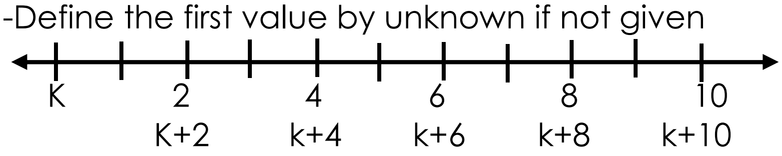
		10th composite numbers. 5. Complete the sequence below; 2 , 3 , 5 , 7 , ____ 6. Find the next number in the sequence below: 1, 5, 11, 19, 28,________
NUMERACY	PATTERNS AND SEQUENCE	**LESSON 5** **Square numbers** -Square numbers are obtained by multiplying a number by itself Square numbers can be obtained by adding consecutive odd numbers. **Examples** 1) List down all square numbers less than 50. 1 x 1= 1, 2 x 2 =4 , 3 x 3 = 9, 4 x 4 =16 5 x 5 = 25, 6 x 6 = 36, 7 x 7 = 49 1, 4, 9, 16, 25, 36, 49,. . . 2) Find the 12^{th} square number 12 x 12 = 144 3) Workout sum of the 6^{th} and 10^{th} square numbers **6^{th} square number** 6 x 6 = 36 **10^{th} square number** 10 x 10 = 100 **Sum** 100 + 36 136 4) Work out the area of a surface of a square table of side 63cm. Area = s x s Area = 63cm x 63cm $\begin{array}{r} 63 \\ \times\ 63 \\ \hline 189 \\ +\ 378 \\ \hline 3969 \\ \hline \end{array}$ Area = $3969cm^2$ **Activity** 1) Write down the set of square numbers between 36 and 100

		2) Find the value of K^2 if K is the 22^{nd} square number 3) Workout the difference of the 5^{th} square number and the10^{th} square number. 4) Find the square of 16. 5) If y value is greater than the square of 5 by 1. Find the prime factors of y.
NUMERACY	PATTERNS AND SEQUENCE	**LESSON 6** **Read and spell** **cube , three times , thrice** **Cube Numbers** Cube numbers are obtained when a value is multiplied by itself three times (thrice) - Identify any counting number and multiply it by itself thrice the result will be a cube number. **Examples** 1) Write down all the cube numbers less than 200 $1 \times 1 \times 1 = 1$ $2 \times 2 \times 2 = 8$ $3 \times 3 \times 3 = 27$ $4 \times 4 \times 4 = 64$ $5 \times 5 \times 5 = 125$ 1, 8, 27, 64, 125 2) Work out the sum of the 10^{th} and 6^{th} cube numbers **10^{th} cube number** $10 \times 10 \times 10 = 1000$ 6^{th} cube number $6 \times 6 \times 6 = 216$ **Sum** 1 0 0 0 + 2 1 6 1 2 1 6 3. Calculate the volume of the cube below



		--7cm Volume = s^3 Volume = 7cm x 7cm x 7cm Volume = 342 cm^3 **Activity** 1) Find the 6^{th} cube number 2)Workout the product of the 5^{th} prime number and 11^{th} cube number 3) If x =2 and p=9. Find the value of $x^2 + p^3$ 4) Form a set of cube numbers between 1 and 125. 5) Work out the volume of a cube with an edge of 12cm.
NUMERACY	PATTERNS AND SEQUENCE	<u>LESSON 7</u> **<u>TRIANGULAR NUMBERS</u>** -These numbers are obtained from addition of consecutive counting numbers 1 =1 1 + 2 =3 1 + 2 + 3 =6 1 + 2 + 3 + 4 =10 1 + 2 + 3 + 4 + 5 =15 1 + 2 + 3 + 4 + 5 + 6 =21 1, 3, 6, 10, 15, 21, … -Formula can be used to obtain variety of triangular values in their positions Thus $\frac{n(n+1)}{2}$, n to represent the position of the value asked **Examples** 1) Write down the 1^{st} five triangular numbers 1 1 + 2 = 3 1 + 2 + 3 = 6 1 + 2 + 3 + 4 = 10 1 + 2 + 3 + 4 + 5 = 15 1, 3, 6, 10, 15 2) Use an illustration to show the 4^{th} triangular number 

<table>
<tr>
<td></td>
<td></td>
<td>
$= 10$

3) What is the 21st triangular number
$\frac{n(n+1)}{2}$
$\frac{21(21+1)}{2}$ 231
$\frac{21 \times \cancel{22}^{11}}{\cancel{2}}$
Activity
1. With the help of an illustration, show the 6th triangular number.
2. Find the 11th triangular number
3) Calculate the product of the 9th triangular number and 5th square number
4. Use the given pattern to find the next pattern.

5. Find the sum of the 3rd and 5th triangular number.
</td>
</tr>
<tr>
<td>NUMERACY</td>
<td>PATTERNS AND SEQUENCE</td>
<td>
<u>LESSON 8</u>
<u>Consecutive even numbers</u>
-These numbers are obtained by adding on consecutive even numbers
-Define the first value by unknown if not given


{ k, k+2, k+4, k+6, …}
-Consecutive even value have a pattern of ± 2

Examples
1) The total of three consecutive even numbers is 60, find the numbers
Let the 1st number be h
</td>
</tr>
</table>

1st	2nd	3rd	total
h	h+2	h+4	60

$h + h + 2 + h + 4 = 60$

$h + h + h + 2 + 4 = 60$

$3h + 6 = 60$

$3h + 6 - 6 = 60 - 6$

$\frac{\cancel{3}^{1} h}{\cancel{3}_{1}} = \frac{\cancel{54}^{18}}{\cancel{3}_{1}}$

$h = 18$

1st number
18
2nd number
18+2 = 20

3rd number
18+4 = 22
18, 20, 22

2) In a list of four consecutive even values, the highest number is K. Find the value of K if their sum is 108.

1st	2nd	3rd	4th	total
k-6	k-4	k-2	K	108

$k-6+k-4+k-2+k = 108$

$k+k+k+k-6-4-2 = 108$

$4k - 12 = 108$

$4k - 12 + 12 = 108 + 12$

$\frac{\cancel{4}^{1} k}{\cancel{4}_{1}} = \frac{\cancel{120}^{30}}{\cancel{4}_{1}}$

$K = 30$

NUMERACY | PATTERNS AND SEQUENCE

<u>LESSSON 9</u>

<u>Consecutive odd numbers</u>

-These numbers have a pattern of ± 2

-They are obtained by adding on consecutive even numbers

-Define the unknown in the 1st position if not identified in the question.

- Position the values and form an equation

-Solve the equation

Examples

1) Three consecutive odd values have a sum of 51, write down the numbers in ascending order.

Let the 1st number be r

1st	2nd	3rd	total
r	r+2	r+4	51

$r + 2 = 15 + 2$

$r + r + 2 + r + 4 = 51$ $\quad$ 17

$r + r + r + + 2 + 4 = 51$ $\quad$ $r + 4 = 15 + 4$

$3r + 6 - 6 = 51 - 6$ $\quad$ 19

$\frac{\cancel{3}^{1} r}{\cancel{3}_{1}} = \frac{\cancel{45}^{15}}{\cancel{3}_{1}}$ $\quad$ Ascending order 15, 17, 19

$R = 15$

2). Five consecutive odd numbers with their median as P have a sum of 65. What is the difference between the 1st and last numbers?

1st	2nd	3rd	4th	5th	total
P-4	P-2	P	P+2	P+4	65

$P-4+P-2+P+P+2+P+4 = 65$

$P+P+P+P+P+4+2-4-2 = 65$

$5P + 6 - 6 = 65$

$\frac{\cancel{5}^{1} P}{\cancel{5}_{1}} = \frac{\cancel{65}^{13}}{\cancel{5}_{1}}$

$P = 13$

1st number
$p-4 = 13+4$
9

5th number
$P+4 = 13 + 4$
17

Difference
$17 - 9 = 8$

Activity

1) The sum of 4 consecutive even numbers is 52. Calculate the median of the numbers

2) Given the sum of three consecutive odd numbers as 69 with x as the middle value.

a) Find the value of x.

b) Round off the sum of the 1st two numbers on the list to the nearest one.

3) Marvin was asked to add four consecutive even numbers and obtained 84. If his fourth value was d, calculate the value of the 1st number

4) The sum of 4 consecutive odd numbers is 96. Find the numbers if the largest is y+1.

b) Find the range of the numbers.

NUMERACY	PATTERNS	<u>**LESSON 10**</u>

	AND SEQUENCE	**<u>Finding the missing numbers in the sequence</u>** **<u>Even and odd numbers</u>** -Add 2 to the existing value to obtain the next value. -Subtract 2 from the existing value to obtain the value before Examples 1) Find the next numbers in the sequences below a) 4, 6, 8, 10, _______ 4, 6, 8, 10, 12 +2 +2 +2 +2 b) 61, 63, 67, 69, ___ 61, 63, 65, 67, 69, 71 +2 +2 +2 +2 +2 c) Find the next number in the sequence below; 21 , 19 , 17 , 15 , ____ 21 , 19 , 17 , 15 , <u>13</u> -2 -2 -2 -2 <u>Triangular numbers</u> -Add the consecutive counting numbers Examples 1) Find the next number in the sequence 6,10,15,21 6, 10, 15, 21, 28 +4 +5 +6 +7 2) Calculate the sum of the next numbers in the sequence 15, 21, 28, 36,__, ___. 15, 21, 28, 36, <u>45</u>, <u>55</u>

		+6 +7 +8 +9 +10 **Sum** 4 5 + 5 5 1 0 0 **Activity;** 1. Find the next number in the sequences below; a) 33 , 31 , 29 , 27 , 25 , _____,_____ b) 4 , 5 , 8 , 13 , 20 , ____, ____ c) 4 , 6 , 8 , 10 , ____ d) 0 , 2 , 5 , 10 , 17 , ____ 2. Find the sum of the 3rd and 5th composite numbers. 3. Find the sum of the 7th and 4th triangular numbers. 4. Subtract the 5th prime number from the 8th even number. **Composite and prime numbers** -Identify the number of factors for the given numbers in the sequence -Composite number sequence has only numbers with more than two factors 4, 6, 8, 9, 10 … - Prime number sequence has only values with only two factors. 2, 3, 5, 7,11, 13, . . . **Examples** 1. Determine the next number in the sequence below: 4, 6, 8, 9, 10, 12, ___ 2) Find the quotient of the missing numbers in the series a) 2, 3, 5, 7, __, 13, ___ b) 1, 3, 6, 11, 18, __, ___ **Lesson 11** **Square numbers** -Multiply the consecutive counting numbers by itself to obtain the square numbers in the order. 1) Complete the sequence given below: 1, 4, 9, 16, 25, ___ 2) Test for divisibility of 3 in the next number in the sequence $^-2$, $^-1$, 3, 12, 28,__ **Cubic numbers** -Multiply the consecutive counting numbers by itself

		three times to obtain the cubic numbers in order. 1, 8, 27, 64,125,… **Activity;** 1. Find the next numbers in the sequence below; a) 2 , 3 , 7 , 16 , 32 , _______ b) 1 , 8 , 27 , 64 , _____ 2. Find the sum of the next two numbers in the sequence below; 125 , 64 , 27 , _____ , ____ 3. Find the sum of the 4th and 9th square numbers. 4. Subtract the 5th square number from the 6th cube numbers. 5. Find the next number in the sequence below; 200 , 151 , 115 , 90 , 74 , ______

#CREATIVE PRINTERS 0703745068 / 0785681207

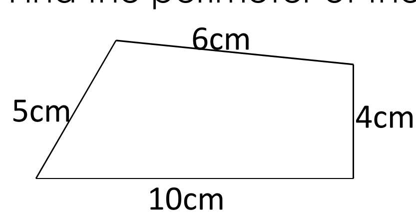
FORMAT OF LESSON NOTES (Theme based)

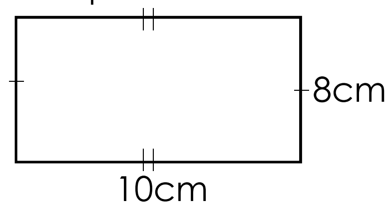
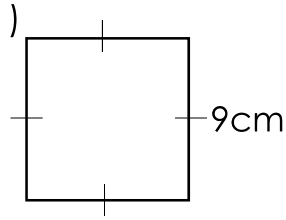
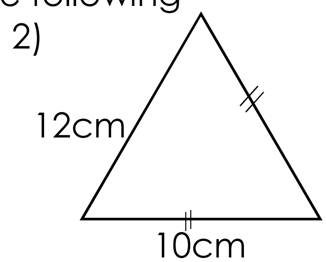
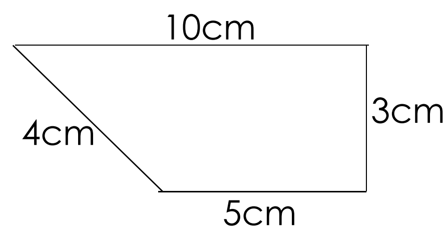
SUBJECT: ______________________ CLASS: ______ TERM:______YEAR:_________

<table>
<tr><th>Theme</th><th>Topic/mass and capacity</th><th>Teachable unit / deliverable lesson</th></tr>
<tr><td>Measurements</td><td>Length, mass and capacity</td><td>
Lesson I
Changing from a big unit of length to a small one
- Identify the metric equivalence of given units.
- When changing from a bigger unit to a smaller unit, multiply by the equivalence.
Example;
<table>
<tr><th>Km</th><th>Hm</th><th>Dm</th><th>m</th><th>dm</th><th>cm</th><th>mm</th></tr>
<tr><td>1</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td></td><td>1</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td></td><td></td><td>1</td><td>0</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td></td><td></td><td></td><td>1</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td></td><td></td><td></td><td></td><td>1</td><td>0</td><td>0</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td>1</td><td>0</td></tr>
</table>
In the table above 1km = 1000000mm, 1km = 100000cm, 1km = 1000m etc.

Change the following to cm.
a)4m
1m = 100cm
4m = (4 x 100)cm
= 400cm

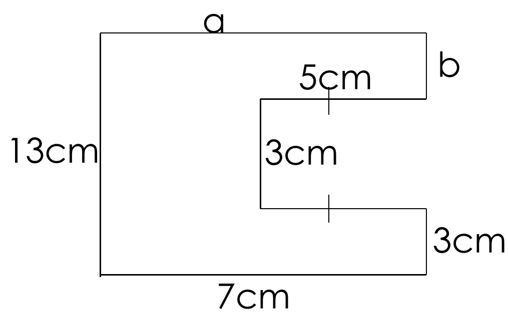
b)160m
1m = 100cm
160m = (160 x 100)
= 16000cm
c) Change 7Dm to cm.
1Dm = 1000cm
7Dm = 7 × 1000cm
7000cm
Activity;
1. Change the following to centimetres.
a) 2.4km
b) 5 Dm
c) 1.2dm
d) 7 Hm
e) $1\frac{1}{2}$ km to cm
2. Convert $\frac{2}{5}$ Dm to millimetres.
</td></tr>
</table>

		3. John has rode his bicycle covering 3.5km. Express the distance he covered in decimeters.
Measurements	Length, Mass and Capacity	**Lesson 2** **Changing from a smaller unit of length to a bigger one.** - Identify the equivalence of the given metric units. - When changing from a smaller unit to a bigger unit, divide the given measurement its the equivalence. **Example;** 1. Change 90cm to metres. 1m = 100cm 90cm = $(\frac{90}{100})$m = 0.9m 2. Convert 2000m to km. 1km = 1000m 2000m = $(\frac{\overset{2}{\cancel{2000}}}{\underset{1}{\cancel{1000}}})$ km = 2km **Activity;** 1. Express 120cm in metres 2. Change 50m to kilometres 3. Convert 47cm to decimetres 4. Odonge covered $\frac{2}{5}$ of his journey in one hour. If the total distance he was to cover was 800cm. Express the distance he covered in metres. b) Find the distance he was left with to cover in kilometres.
Measurements	Length, mass and capacity	**<u>Lesson 3</u>** **Finding perimeter of geometric shapes.** - Perimeter is the total distance round a shape. - To find perimeter of a shape, add the length of all the sides. **Examples;** 1. Find the perimeter of the shape below. 

		P = 10cm + 4cm + 6cm + 5cm = 25cm 2. Find the perimeter of the rectangle.  P = L + W + L + W P = 10cm + 8cm + 10cm + 8cm P= 36cm **Activity;** Calculate the perimeter of the following 1)  2)  3)  4) A spider moved around a rectangular surface of 10cm long and 8cm wide 4 times. What distance did it cover?
Measurement	Length, mass and capacity	**Lesson 4** **Finding perimeter of combined figures** - Identify the length of each side of the given shapes - To find the perimeter, add all the sides.

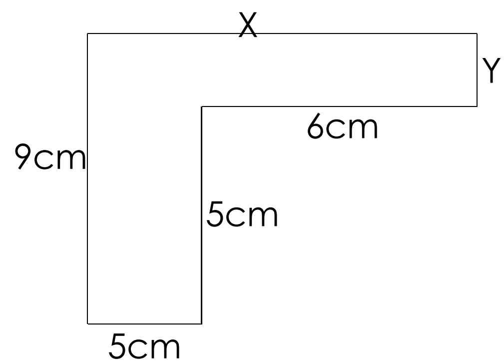
<table>
<tr>
<td></td>
<td></td>
<td>

Example;
Study the figure below carefully and answer the questions
a)Find the value of a and b in the shape below.



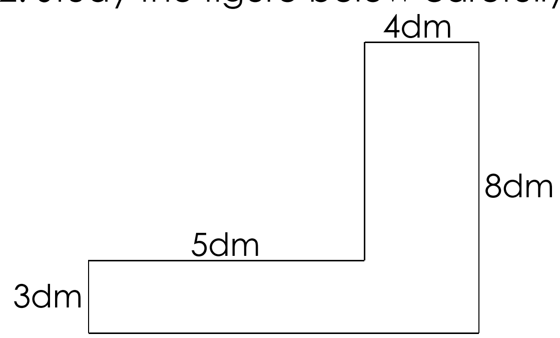
(i)a = 7cm
(ii) b =13cm– (5cm+3cm)
b= 13cm – 8cm
b= 5cm

b) Find the perimeter of the shape.
P =13cm+7cm+5cm+5cm+3cm+5cm+5cm+7cm
= 50cm
Activity;
1. Study the shape below carefully and answer the questions that follow.



Find the value of
i) X
ii)Y

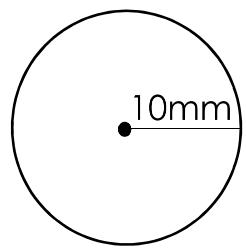
b) Work out the perimeter of the combined shape above.
2. Study the figure below carefully.



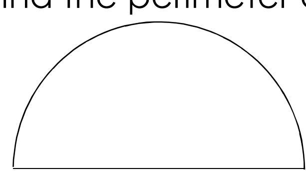
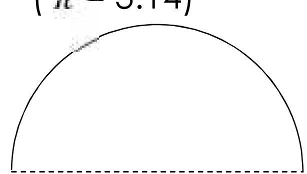
Find the distance around the figure.
</td>
</tr>
<tr>
<td>Measurements</td>
<td>Length, mass and capacity</td>
<td>

Lesson 5
Finding circumference of a circle
- Find the circumference of a circle when given diameter by multiplying pi(π) by the diameter thus, πD
- Since D = 2r, you can also find circumference when given radius by $2\pi r$
</td>
</tr>
</table>

<table>
<tr>
<td></td>
<td></td>
<td>

Note: Pi (π) is the ratio of the circumference to the diameter of the same circle.
Example:
1. Find the circumference of a circle whose diameter is 21dm. (Take $\pi = \frac{22}{7}$)
C = πD
C = $\frac{22}{\cancel{7}_{1}} \times \cancel{21}^{3}$dm
C = 22 × 3dm
C = 66dm
2. Find the circumference of the circle below ($\pi = 3.14$)


C = $2\pi r$
= 2 x 3.14 x 10mm
= 2 x $\frac{314}{10\cancel{0}}$ x 1$\cancel{0}$mm
= $\frac{628}{10}$ mm
= 62.8mm
Activity;
1. Find the circumference of a circle whose diameter is
a) 100cm b) 28cm
2. Work out the circumference of a circle whose radius is;
a) 14cm b) 35dm c) 20 cm
</td>
</tr>
<tr>
<td>Measurements</td>
<td>Length, mass and capacity.</td>
<td>

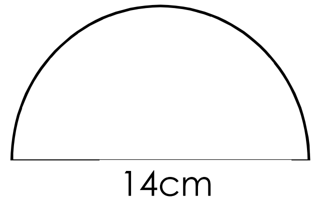
Lesson 6
Finding perimeter of a semi-circle.
- Find the perimeter of a semi-circle by adding circumference with diameter.
- If the diameter is dotted, then perimeter is equal to circumference.
(length of the arc)
Example;
Find the perimeter of the figure below ($\pi = \frac{22}{7}$)

21cm
P = $\frac{1}{2}\pi$D + D
P = ($\frac{1}{\cancel{2}_{1}} \times \frac{\cancel{22}^{11}}{\cancel{7}_{1}} \times \cancel{21}^{3}$cm) + 21cm
P = 33cm + 21cm
P = 54cm
2. Work out the perimeter of the semi-circle below.
(π = 3.14)

100mm
P = $\frac{1}{2}\pi$D
P = $\frac{1}{2}$ x 3.14 x 100mm
P = $\frac{1}{\cancel{2}_{1}} \times \frac{\cancel{314}^{157}}{100}$ x 100mm
P = 157mm
</td>
</tr>
</table>

<table>
<tr>
<td></td>
<td></td>
<td>

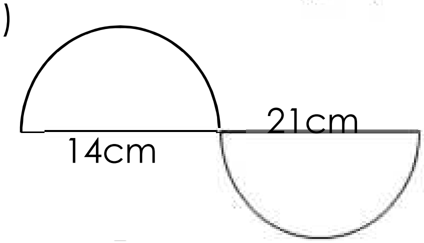
ACTIVITY;

1. Find the perimeter of the following shapes. ($\pi = \frac{22}{7}$)

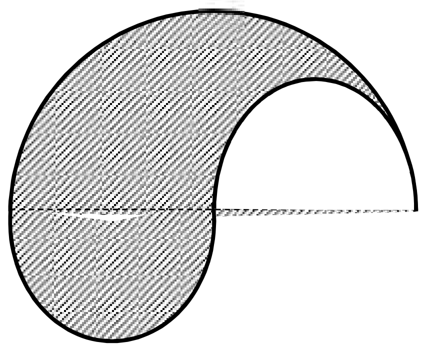
a)



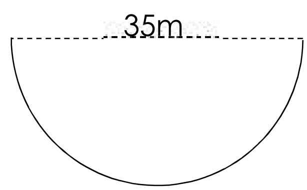
b)



2. A boy used a string to form a shaded shape below. Find the length of the string used by the boy to form the shape. (Take π as



4. Find the length of the arc AB below.



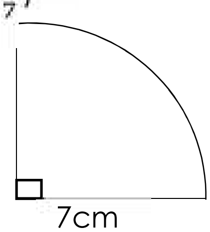
</td>
</tr>
<tr>
<td>Measurement</td>
<td>Length, mass and capacity</td>
<td>

Lesson 7
Perimeter of quadrants.

- You find the perimeter of a quadrant by adding circumference to radius are dotted, then perimeter is equal to circumference.
(length of the arc)

Example;

1. Find the perimeter of the quadrant below;
($\pi = \frac{22}{7}$)



$P = \frac{1}{4}(2\pi r) + r$

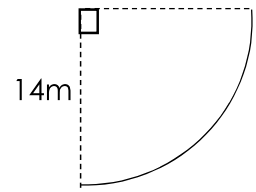
$P = (\frac{1}{\cancel{4}_{2}} \times \cancel{2}^{1} \times \frac{\cancel{22}^{11}}{\cancel{7}} \times \cancel{7}^{1}cm)+7cm+7cm$

$P = 11cm + 14cm$
$P = 25cm$

</td>
</tr>
</table>

<table>
<tr>
<td></td>
<td></td>
<td>

2. Work out the perimeter of the shape below.



$P = \frac{1}{4}(2\pi r)$

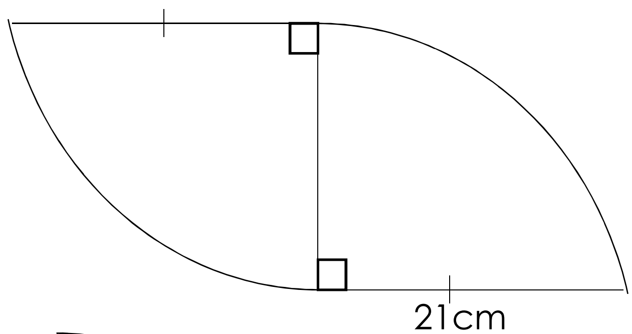
$P = \frac{1}{\cancel{4}_{\cancel{2}_1}} \times \cancel{2}^1 \times \frac{\cancel{22}^{11}}{\cancel{7}} \times \cancel{14}^2 m$

$P = 22m$

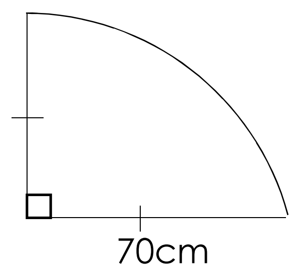
Activity;

1. Find the perimeter of the following shapes.

a)

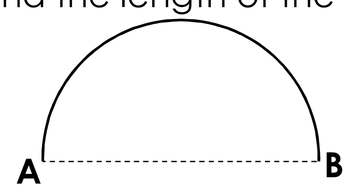


b)

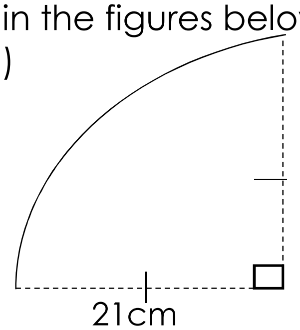


2. Find the length of the arc in the figures below.

a)



b)



</td>
</tr>
<tr>
<td>Measurements</td>
<td>Length, mass and capacity</td>
<td>

Lesson 8

Perimeter of sectors of circle.

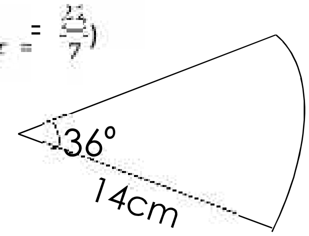
- Find the circumference of a sector by $\frac{\text{given angle}}{360^0}(2\pi r)$
- To find perimeter, you add circumference to radii.
- Do, not include the dotted lines / length in the perimeter.

</td>
</tr>
</table>

<table>
<tr>
<td></td>
<td></td>
<td>

Example;

1. Find the perimeter ($\pi = \frac{22}{7}$)



$P = \frac{\cancelto{1}{36^0}}{\cancelto{10}{360^0}}(2\pi r) + 2r$

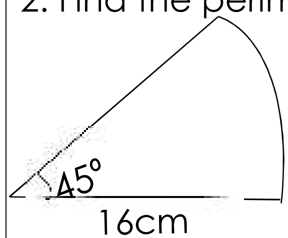
$P = (\frac{1}{10} \times 2 \times \frac{22}{\cancel{7}} \times \cancelto{2}{14}cm) + 14cm + 14cm$

$P = \frac{88}{10}cm + 28cm$

P = 8.8cm + 28cm

P = 36.8cm.

2. Find the perimeter of the figure below (π = 3.14)



$P = \frac{\cancelto{1}{45^0}}{\cancelto{8}{360^0}}(2\pi r) + 2r$

$P = (\frac{1}{\cancelto{1}{\cancel{8}}} \times \cancelto{1}{2} \times \frac{314}{100} \times \cancelto{4}{16}cm) + (2 \times 16cm)$

$P = \frac{1256}{100} + 32cm$

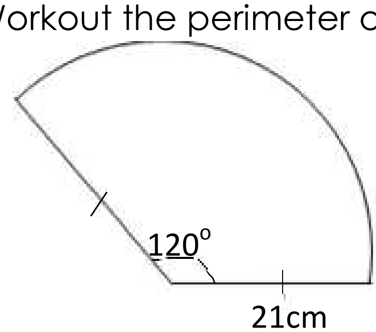
P = 12.56cm + 32cm

P = 4.56cm

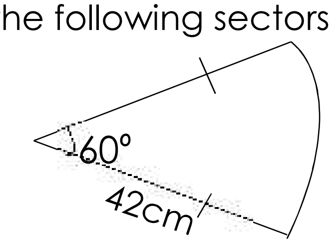
Activity

Workout the perimeter of the following sectors.(π =

a



b)



</td>
</tr>
<tr>
<td>Measurements</td>
<td>Length, mass and capacity</td>
<td>

Lesson 9

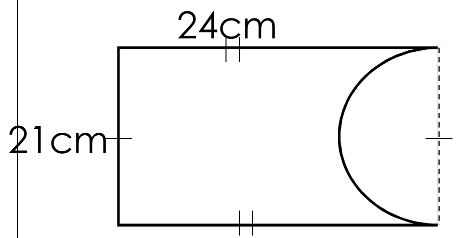
Perimeter of shapes combined with parts of a circle.

- Identify all the sides round a given shape.
- Find the length of the arc in the given shape.
- add all the sides to find the perimeter.
- Exclude any dotted lines while finding perimeter.

</td>
</tr>
</table>

Example;

Find the perimeter of the shape below.



Length of the arc.

$C = \frac{1}{2}\pi D$

$C = \frac{1}{2} \times \frac{22}{7} \times 21cm$

$C = 33cm$

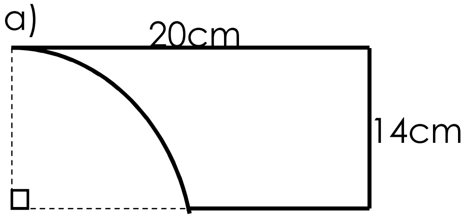
P = 21cm + 24cm + 33cm + 24cm

P = 102cm

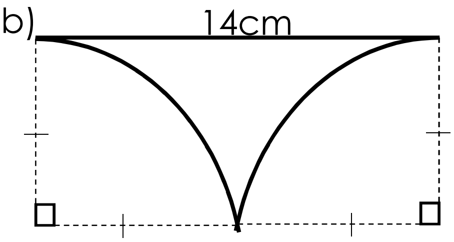
Activity;

Find the perimeter of the figure below.

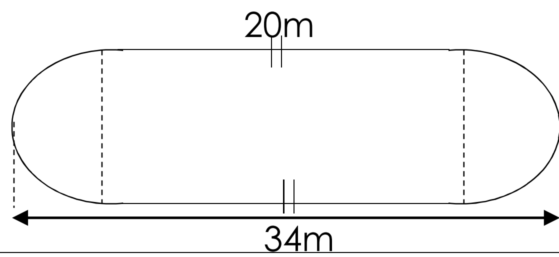
a)



b)



2. An athlete ran round the track shown below 4 times. What distance did he cover?



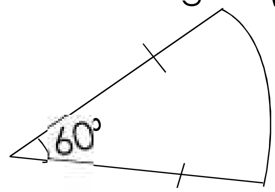
Lesson 10

<u>Application of perimeter of sectors</u>

- Identify the given perimeter.
- Apply the formula to find what is required.

Examples:

1. The perimeter of the figure below is 64cm. Find the radius of the figure (Take $\pi = \frac{22}{7}$)



$$\frac{\overset{1}{\cancel{60^0}}}{\underset{6}{\cancel{360^0}}}(2\pi r) + 2r = 64cm$$

$$\frac{1}{\underset{3}{\cancel{6}}} \times \overset{1}{\cancel{2}} \times \frac{22}{7} r + 2r = 64cm$$

$$\frac{22r}{3} + \frac{2r}{7} = 64cm$$

L C D = 21

$$\overset{1}{\cancel{21}} \times \frac{22r}{\underset{1}{\cancel{21}}} + \frac{2r}{1} \times 21 = 64cm \times 21$$

$$22r + 42r = 64cm \times 21$$

$$\frac{\overset{1}{\cancel{64r}}}{\underset{1}{\cancel{64}}} = \frac{\overset{1}{\cancel{64cm}} \times 21}{\underset{1}{\cancel{64}}}$$

$$r = 21cm$$

2. The perimeter of a semi-circle is 90cm. Workout its diameter.

$$\frac{1}{2}\pi D + D = P$$

$$\frac{1}{\underset{1}{\cancel{2}}} \times \frac{\overset{11}{\cancel{22}}}{7} \times D + D = 90cm$$

$$\frac{11}{7}D + \frac{D}{1} = 90cm$$

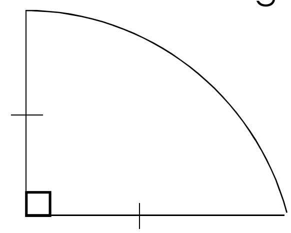
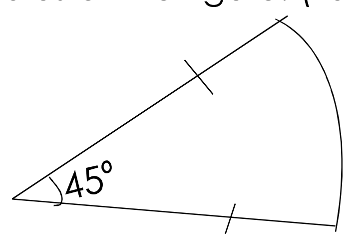
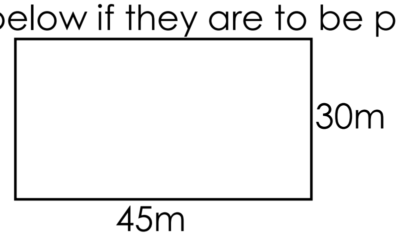
LCD = 7

$$\overset{1}{\cancel{7}} \times \frac{11}{\underset{1}{\cancel{7}}} D + \frac{D}{1} \times 7 = 90cm \times 7$$

$$11D + 7D = 90cm \times 7$$

$$\frac{\overset{1}{\cancel{18D}}}{\underset{1}{\cancel{18}}} = \frac{\overset{5}{\cancel{90cm}} \times 7}{\underset{1}{\cancel{18}}}$$

$$D = 35cm$$

		Activity: 1. The perimeter of the figure below is 36m.  Find the diameter of the figure (Take $\pi = \frac{22}{7}$) 2. Given that the perimeter of a quadrant is 75cm. Find the radius (Take $\pi = \frac{22}{7}$) 3. The perimeter of the figure below is 9.42m. Find the radius of the figure. (Take π = 3.14) 
Measurements	Length, mass and capacity	**Lesson 11** **Application of perimeter on closed and open figures.** - In a closed figure, the number of spaces is equal to number of poles. - In an open figure, the number of poles is more than the number of spaces by one. - Number of spaces is got by dividing the total distance round by the length apart. **Examples;** 1. Find the number of poles required to fence the garden below if they are to be put 5m apart.  P = 2 (L + W) P= 2 (45m + 30m) P = 2 x 75m P= 150m No. of poles = $\frac{total\ distance\ round}{length\ apart}$ No. of poles = $\frac{\cancel{150m}^{30}}{\cancel{5m}_{1}}$ No. of poles = 30 poles

2. Moses planted 44trees around his circular garden at intervals of 4m.
Find the radius of the garden. (Take $\pi = \frac{22}{7}$)

Circumference = 44 × 4m
Circumference = 176m

$$2\pi r = \text{circumference}$$

$$2 \times \frac{22}{7} \times r = 176m$$

$$\frac{44r}{7} = 176m$$

LCD = 7

$$\overset{1}{\cancel{7}} \times \frac{44r}{\underset{1}{\cancel{7}}} = 176m \times 7$$

$$44r = 176m \times 7$$

$$\frac{\overset{1}{\cancel{44}}r}{\underset{1}{\cancel{44}}} = \frac{\overset{\overset{4}{\cancel{88}}}{\cancel{176}}m \times 7}{\underset{\underset{1}{\cancel{22}}}{\cancel{44}}}$$

$$r = 4m \times 7$$

$$r = 28m$$

3. Primary five children planted trees along one side on the road, from the gate to the flag post, a distance of 240m. If the interval between the trees was 2metres long, find the number of intervals (spaces) between the trees.

$$\text{No. of spaces} = \frac{\text{Length(distance)}}{\text{Interval length(distance)}}$$

$$\text{No. of spaces} = \frac{\overset{120}{\cancel{240m}}}{\underset{1}{\cancel{2m}}}$$

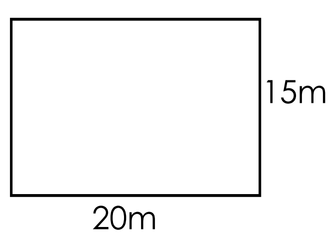
No. of spaces = 120

(b) Find the number of trees planted.

No. of trees = (No. of spaces) + 1
No. of trees = 120 + 1
No. of trees = 121

Activity

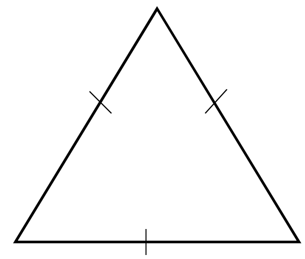
1. The figure above shows a shape of Odonge's piece of land. If he wants to fence the land, how many poles will he use?



2. If electric poles are planted along the path 400m long and each pole was 2000cm away from another, how

many poles were used?

3. The figure below is a triangular garden. Study it carefully:



30cm

Find the number of poles that can be used to fence the triangular garden shown above.

4. Matilda uses 88pegs to fence round her circular flower garden. The interval between the pegs 400cm. Find the diameter of the garden. (Take π as $\frac{22}{7}$)

5. A school planted trees on both sides of a road leading to the school. The road was 450m long. The interval between the trees was 5m. How many trees were planted altogether?

Lesson 13

Revolution and circumference

-When a wheel goes round once, it covers a distance equal to its circumference

-The distance is called revolution. Therefore one revolution is equal to circumference.

- To find the circumference and number of revolutions:
- Identify the information given.
- State the formula and substitute as required.

No. of revolutions = $\frac{\textbf{Distance}}{\textbf{Circumference}}$

Distance = **No. of revolution × circumference**

Circumference = $\frac{\textbf{Distance}}{\textbf{No. of revolution}}$

Examples

1. How many revolutions will a wheel of radius 21cm make to cover 660 m.

C = $2\pi r$

C = 2 x $\frac{22}{7}$ x 21cm

C = 132cm

Distance in cm

1m = 100cm

660m = (660 x 100) cm

660cm

		No. of revolutions Rev $= \frac{Distance}{Circumference}$ $\frac{\overset{500}{\cancel{66000cm}}}{\underset{1}{\cancel{132cm}}}$ 500 revolution 2. A bicycle wheel covered a distance of 2640 cm after making 20 revolutions. What was the diameter of the bicycle wheel? ($\pi = \frac{22}{7}$) Circumference = $\frac{\text{Distance}}{\text{No. of revolution}}$ Circumference = $\frac{\overset{132}{\cancel{2640cm}}}{\underset{1}{\cancel{20}}}$ Circumference = 132cm πD = C $\frac{22}{7} \times D = 132cm$ **LCD = 7** $\overset{1}{\cancel{7}} \times \frac{22}{\underset{1}{\cancel{7}}} \times D = 132cm \times 7$ $22 \times D = 132cm \times 7$ $\frac{\overset{1}{\cancel{22}} \times D}{\underset{1}{\cancel{22}}} = \frac{\overset{\overset{6}{\cancel{66}}}{\cancel{132}}cm \times 7}{\underset{\underset{1}{\cancel{11}}}{\cancel{22}}}$ D = 42cm **Activity** 1. John roled a wheel of diameter 49cm to Evans making 200 revolutions. How far apart were the two people? ($\pi = \frac{22}{7}$) 2. A wheel covered a distance of 26.4m. Its radius is 21cm. How many revolutions did it make? ($\pi = \frac{22}{7}$) 3. A wheel covers a distance of 66m after making 10 revolutions. Find the diameter of the wheel. 4. The wheel of a lorry has a radius of 42cm. What distance in kilometres does the wheel cover if it makes 2000 revolutions.

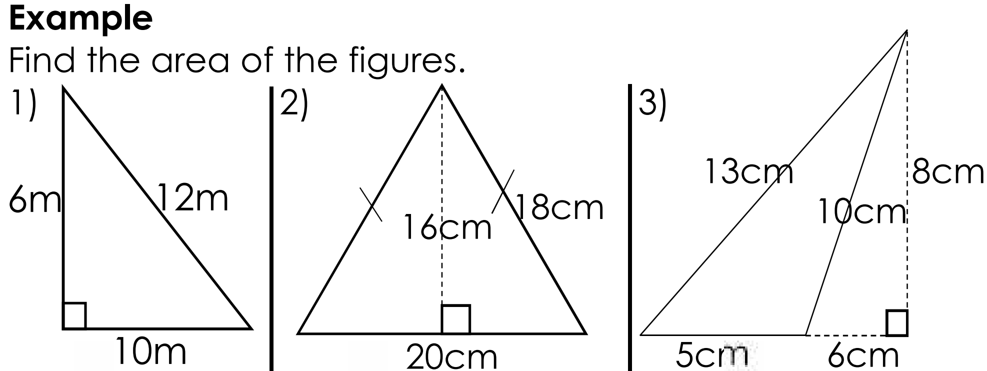
Measurements	Length, mass and capacity	**Lesson 13**

Area of a triangle

- To find the area of a triangle, multiply $\frac{1}{2} \times b \times h$
- Height and base meet at a right angle.
- Height may not be part of the triangle, but extended using imaginary line.

Example

Find the area of the figures.



1)
$A = \frac{1}{2} \times b \times h$
$A = \frac{1}{\cancel{2}_1} \times \cancel{10}^{5}m \times 6m$
$A = 5m \times 6m$
$A = 30m^2$

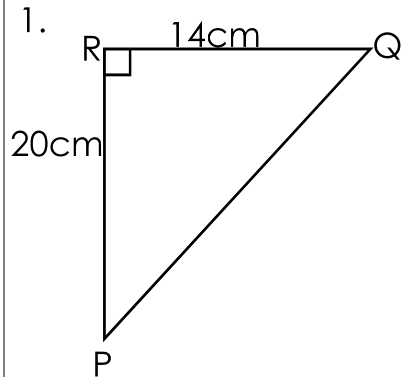
2)
$A = \frac{1}{2} xbxh$
$A = \frac{1}{\cancel{2}_1} \times \cancel{20}^{10}cm \times 16cm$
$A = 10cm \times 16cm$
$A = 160cm^2$

3)
$A = \frac{1}{2} bh$
$A = \frac{1}{\cancel{2}_1} \times 5cm \times \cancel{8}^{4}cm$
$A = 5cm \times 4cm$
$A = 20cm^2$

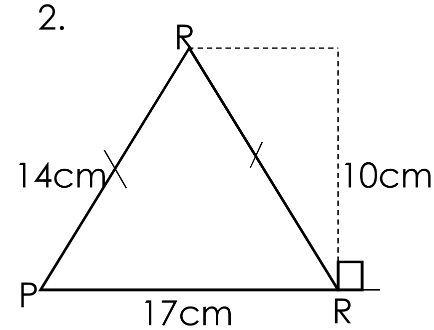
Activity

Work out the area of triangle PQR

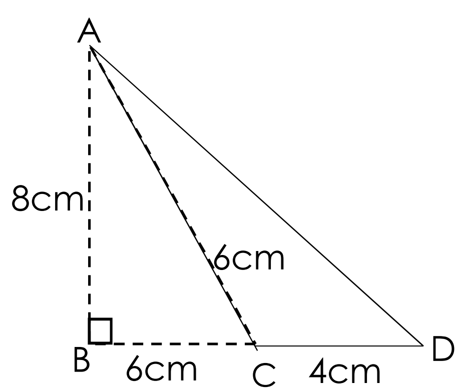
1.



2.



3. Find the area of triangle ACD.



4. Calculate the area of a triangle surface 17cm at the base and 14cm high.

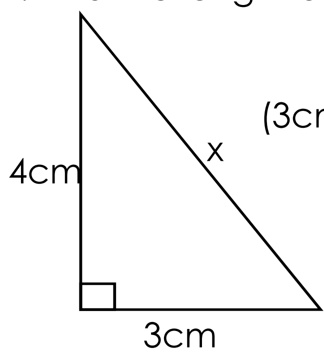
Measurements	Length, mass and capacity	**Lesson 14**

Pythagoras theorem

- Use Pythagoras theorem to find the missing side of a right angled triangle.
- In a right angled triangle, the square of the height plus the square of the base is equal to the square of hypotenuse thus $b^2 + h^2 = (\text{hypotenuse})^2$

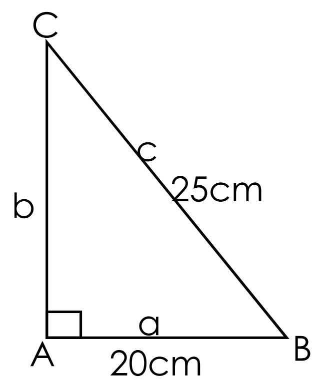
Example;

1. Find the length of side marked with X.



$$\begin{aligned}
b^2 + h^2 &= (\text{hypotenuse})^2 \\
(3cm)^2 + (4cm)^2 &= x^2 \\
(3cm \times 3cm) + (4cm \times 4cm) &= x^2 \\
9cm^2 + 16cm^2 &= x^2 \\
\sqrt{25cm^2} &= \sqrt{x^2} \\
5cm &= x
\end{aligned}$$

2.



Calculate the length of AC.

$$\begin{aligned}
b^2 &= c^2 - a^2 \\
b^2 &= (25cm)^2 - (20cm)^2 \\
b^2 &= (25 \times 25)cm^2 - (20 \times 20)cm^2 \\
b^2 &= 625cm^2 - 400cm^2 \\
\sqrt{b^2} &= \sqrt{225cm^2}
\end{aligned}$$

5	225
5	45
3	9
3	3
	1

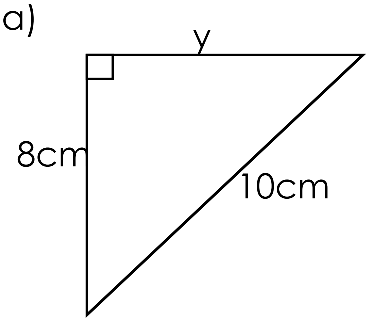
$$\begin{aligned}
\sqrt{b \times b} &= \sqrt{5 \times \cancel{5} \times \cancel{3} \times 3\ cm \times \cancel{cm}} \\
b &= 5 \times 3cm \\
AC &= 15cm
\end{aligned}$$

<table>
<tr>
<td></td>
<td></td>
<td>

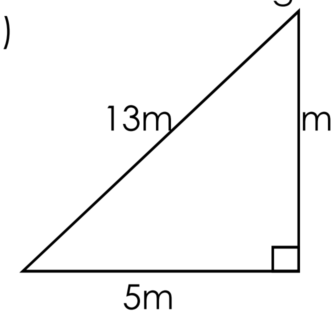
Activity;

1. Use Pythagoras theorem to find the missing side.

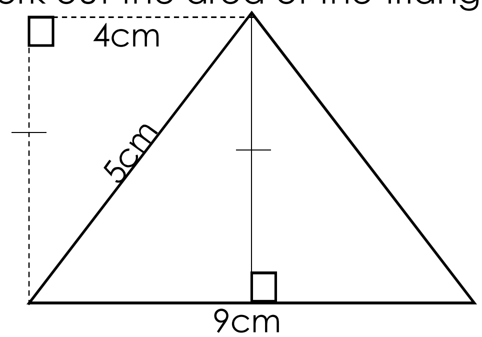
a)



b)



2. Work out the area of the triangle below:



</td>
</tr>
<tr>
<td>Measurements</td>
<td>Length, mass and capacity</td>
<td>

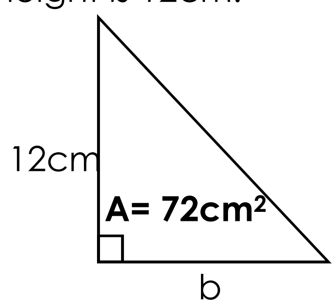
Lesson 14

Finding the missing side of a triangle when area is given.

- Substitute the given information in the formula for Area of a triangle and find the missing side.

Example;

Find the base of a triangle whose area is 72cm^2 and the height is 12cm.



$$\text{Area} = \frac{1}{2} \times b \times h$$

$$72\text{cm}^2 = \frac{1}{2} \times b \times \cancel{12}\text{cm}$$

$$\frac{\overset{12}{\cancel{72\text{cm}}} \times \text{cm}}{\underset{1}{\cancel{6\text{cm}}}} = \frac{b \times \overset{1}{\cancel{6\text{cm}}}}{\underset{1}{\cancel{6\text{cm}}}}$$

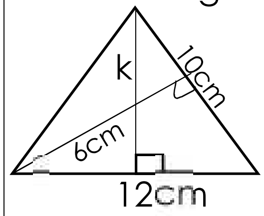
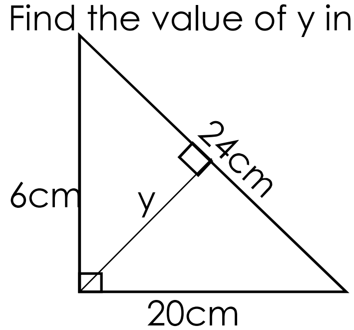
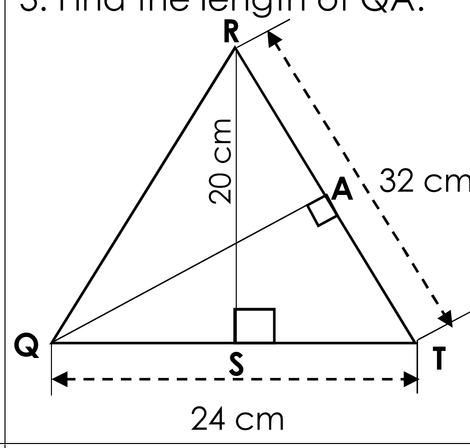
$$12\text{cm} = b$$

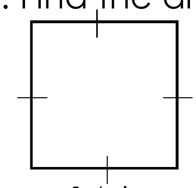
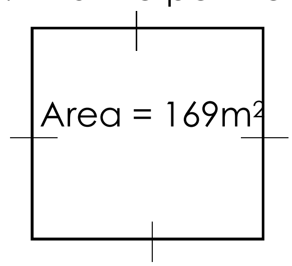
$$\text{base} = 12\text{cm}$$

You can also find the missing side of a triangle by comparing its area using the two given sets of information.

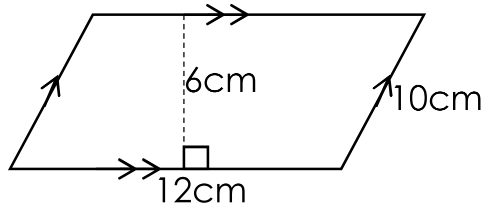
Example;

</td>
</tr>
</table>

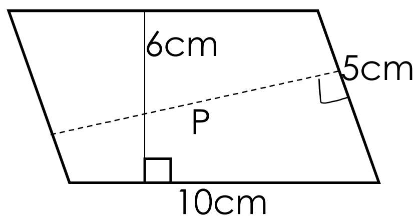
		1.Use the figure below to find the value of k  $\frac{1}{2}$xbxh $= \frac{1}{2} \times b \times h$ $\frac{1}{\underset{1}{\cancel{2}}} \times \cancel{12}\text{cm} \times k = \frac{1}{\underset{1}{\cancel{2}}} \times 10\text{cm} \times \overset{3}{\cancel{6}}\text{cm}$ 6cm × k = 10cm × 3cm $\frac{\overset{1}{\cancel{6\text{cm}}} \times k}{\underset{1}{\cancel{6\text{cm}}}} = \frac{\overset{5}{\cancel{30\text{cm}}} \times \text{cm}}{\underset{1}{\cancel{6\text{cm}}}}$ **k** = 5cm **Activity;** 1. A triangular piece of land has an area of $32m^2$. Its height is 8cm. Find its base. 2. Find the value of y in the triangle below.  3. Find the length of QA. 
Measurements	Length, mass and capacity	**Lesson 15** **Area of quadrilaterals (square) and it application.** - multiply side by side to find the area of a square. - Use the formula to find the missing side when area is given by substituting the given information into it.

<table>
<tr>
<td></td>
<td></td>
<td>
Example;
1. Find the area of a square whose side is 14dm.

14dm
Area = s x s
Area = 14dm x 14dm
Area = 196dm^2
2. Find the perimeter of a square whose area is 169m^2.


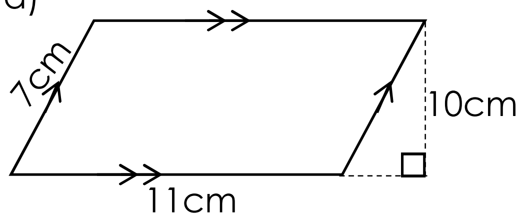
A = S x S
169m^2 = S^2
$\sqrt{169m^2}$ = S^2
<table>
<tr><td>13</td><td>169</td></tr>
<tr><td>13</td><td>13</td></tr>
<tr><td></td><td>1</td></tr>
</table>
$\sqrt{169m^2} = \sqrt{\cancel{13} x 13 \cancel{m} x m}$
S = 13m
Perimeter = 4s
Perimeter = 4 × 13m
Perimeter = 52m
Activity;
1. Work out the area of a square whose side is
a) $1\frac{5}{9}$ m
b) 20cm
2. Work out the perimeter of a square whose area is;
a) 1.44m^2
b) 49cm^2
</td>
</tr>
<tr>
<td>Measurements</td>
<td>Length, mass and capacity</td>
<td>
Lesson 16
Area of a parallelogram and its application.
- Find the area of a parallelogram by multiplying its base by height (perpendicular)
</td>
</tr>
</table>

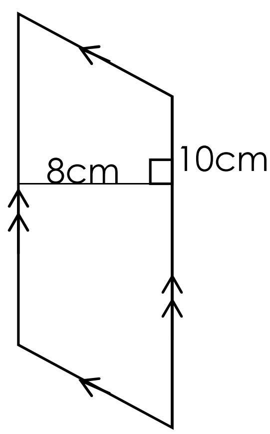
<table>
<tr>
<td></td>
<td></td>
<td>
- A symbol of a right angle connects the base to its height.
Example;
1. Workout the area of the figure below:


Area = B × H
Area = 12 cm × 6 cm
Area = 72 cm^2

2. Find the value of X in the figure below.


B x H = B x H
5cm x P = 10cm x 6cm
$\frac{\overset{1}{\cancel{5cm}} \times P}{\underset{1}{\cancel{5cm}}} = \frac{\overset{12}{\cancel{60cm}} \times cm}{\underset{1}{\cancel{5cm}}}$
P = 12cm

Activity
1. Find the area of the following shapes
a)


b)


2. Find the height of a parallelogram whose area is 95cm^2, if its base is 10cm.
3. Given that the surface area of a parallelogram is 80cm^2 with the base line of 8cm. Find the height.
</td>
</tr>
<tr>
<td>Measurements</td>
<td>Length, amss and capacity</td>
<td>
Lesson 17
Area of a rectangle and its application.
- Area of rectangle = L x W
- Find one side of a rectangle given the area and one side.
- You can also apply Pythagoras theorem to find the missing side of the rectangle.
</td>
</tr>
</table>

Example;

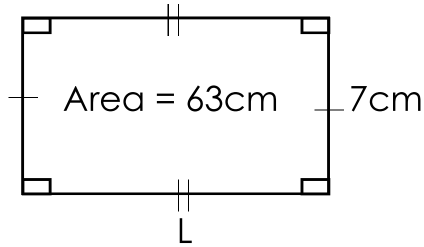
1. Find the area of a rectangle whose length is 9cm and width 6cm.

Area = L x W

= 9cm x 6cm

= $54cm^2$

2. A rectangle has an area of $63cm^2$. Calculate its length if the width is 7cm.



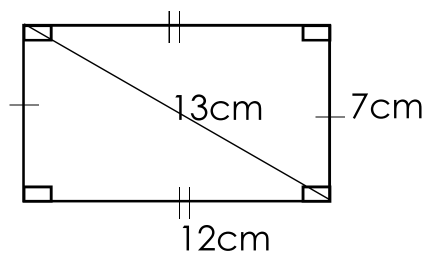
Area = L x W

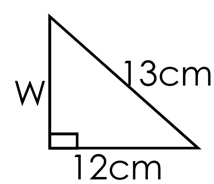
$63m^2$ = L x 7cm

$$\frac{\overset{9}{\cancel{63cm}} \times cm}{\underset{1}{\cancel{7cm}}} = \frac{\overset{1}{\cancel{7cm}} \times L}{\underset{1}{\cancel{7cm}}}$$

9cm = L

3. Find the area of the rectangle below:





$b^2 + h^2 = (\text{hypotenuse})^2$

$(12cm)^2 + W^2 = (13cm)^2$

$144cm^2 + W^2 = (13cm \times 13cm)$

$144cm^2 - 144cm^2 + W^2 = 169cm^2 - 144cm^2$

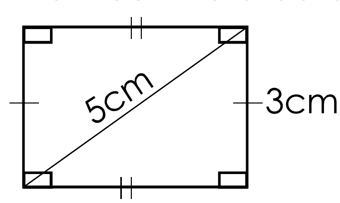
$W^2 = 25cm^2$

$\sqrt{W^2} = \sqrt{25cm^2}$

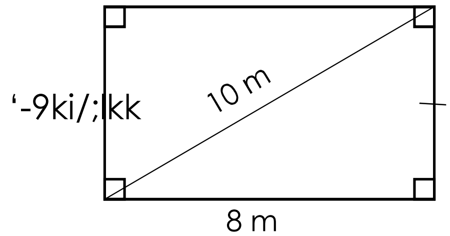
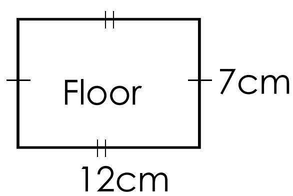
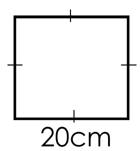
W = 5cm

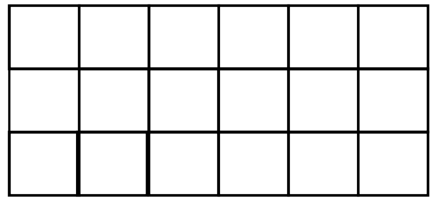
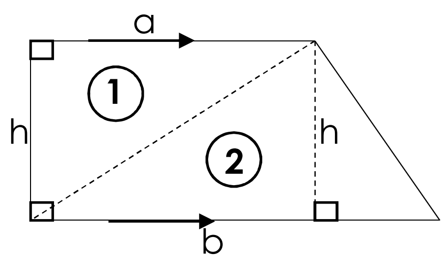
Activity;

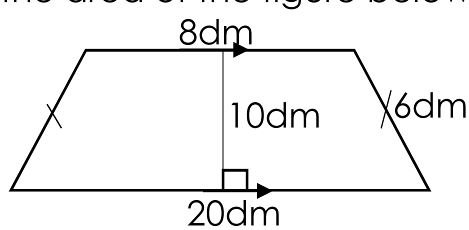
1. Work out the area of the rectangle below:



2. The area of a rectangular field is $108m^2$. Find its width if its length is 12m.
3. Calculate the length of a rectangular piece of land with an area of $20m^2$ and 2.5m wide.
4. Find the area of a rectangle whose length is 10.5 cm and width is 4.2 cm.
5. Find the area of the figure below:

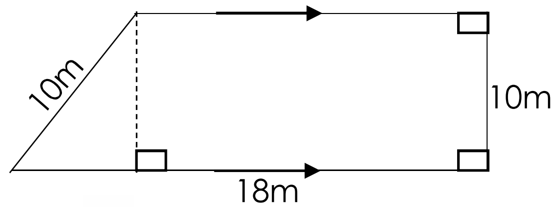
		
Measurements	Length, Mass and capacity	**Lesson 18** **Application of area of square and rectangle.** - To find the number of square tiles needed to cover a floor, get the product of the tiles along the length and the tiles along the width. **Example;** A floor measuring 12m by 7m was to be covered by square tiles of side 20cm. How many tiles are required to cover the floor?   Length and width of the Floor in cm. 1m = 100cm 12m = (12 x 100)cm = 1200 cm 7m = (7 x 100)cm = 700 cm **No. of tiles along the length** | **along the width** | **Total** $\frac{\cancel{1200}^{60}}{\cancel{20}_{1}}$ | $\frac{\cancel{700cm}^{35}}{\cancel{20cm}_{1}}$ | 60 x 35 2100tiles 60 | 35 **Activity;** 1. How many square tiles of side 30cm are needed to cover a floor of length 15m and width 9m? b) If a box containing 30 tiles costs sh. 200,000, How much money is needed to cover the floor?

<table>
<tr><td></td><td></td><td>2. The figure below shows a floor to be covered by square tiles of area $144m^2$.

a) Find the area of the floor.
b) Find the perimeter of the floor.</td></tr>
<tr><td>Measurements</td><td>Length, Mass and Capacity</td><td>Lesson 19
Area of a trapezium.
- Derive formula for area of trapezium.
- Apply the formula to find the area of trapeziums.
Example;


The area of triangle 1 + the area of triangle 2 = the area of the whole figure (trapezium).
$A = \frac{1}{2}bh + \frac{1}{2}bh$
$A = \frac{1}{2} \times a \times h + \frac{1}{2} \times b \times h$
$A = \frac{1}{2}h(a + b)$
Area of a trapezium = $\frac{1}{2}$h (a + b)
2. Find the area of the figure below.


Area = $\frac{1}{2}h(a + b)$
Area = $\frac{1}{\cancel{2}_{1}} \times \cancel{10}^{5}dm\,(8dm + 20dm)$
Area = 5dm x 28dm
Area = $140dm^2$</td></tr>
</table>

<table>
<tr>
<td></td>
<td></td>
<td>
2. Find the area of the figure below;



$A = \frac{1}{2}h(a+b)$

$A = \frac{1}{\cancel{2}_1} \times \cancel{8}^{4}m\ (12m + 18m)$

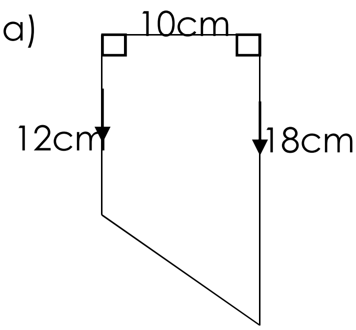
$A = 4m \times 30m$

$A = 120m^2$

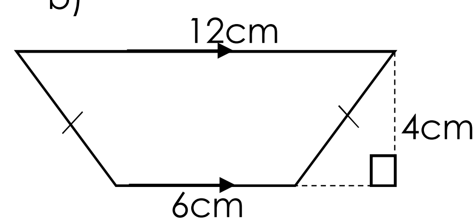
Activity;

Work out the area of the figures below.

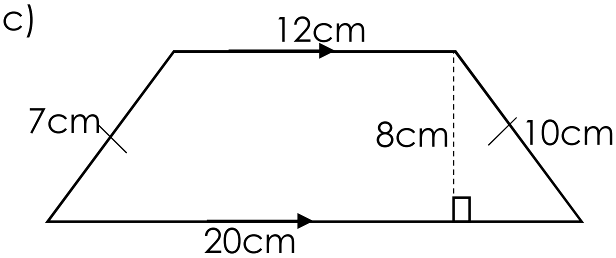
a)



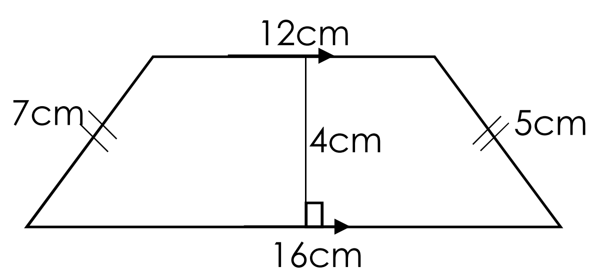
b)



c)



d)



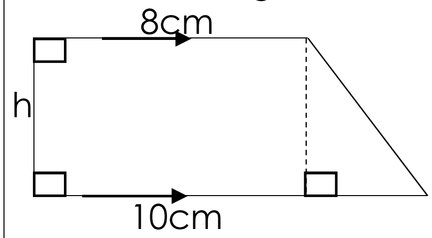
</td>
</tr>
<tr>
<td>Measurements</td>
<td>Length, Mass and Capacity</td>
<td>
Lesson 20

Application of area of a trapezium.

- Substitute the given information into the formula for finding area and find the missing information.
</td>
</tr>
</table>

Example;

1. Find the height of a trapezium below if its area is $72cm^2$



$$\text{Area} = \tfrac{1}{2} h (a + b)$$

$$72cm^2 = \tfrac{1}{2} h (10cm + 8cm)$$

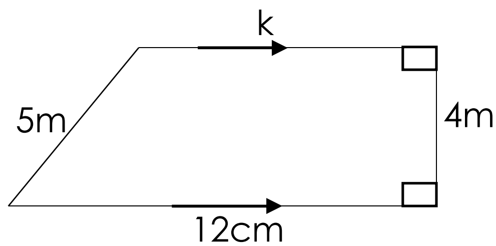
$$72cm^2 = \frac{1}{\cancel{2}_{1}} \times h \times \cancel{18}^{9}cm$$

$$72cm^2 = 9cm \times h$$

$$\frac{\cancel{72\,cm}^{8} \times cm}{\cancel{9\,cm}_{1}} = \frac{\cancel{9\,cm}^{1} \times h}{\cancel{9\,cm}_{1}}$$

$$8cm = h$$

2. Study the figure below carefully:



Find the value of k if the area of the figure is $42m^2$.

$\tfrac{1}{2}h\ (a+b)$

$$\frac{1}{\cancel{2}_{1}} \times \cancel{4}^{2}m\ (k + 12m) = 42m^2$$

$$\frac{\cancel{2m}^{1}(k + 12m)}{\cancel{2m}_{1}} = \frac{\cancel{42}^{21}m \times \cancel{m}}{\cancel{2m}_{1}}$$

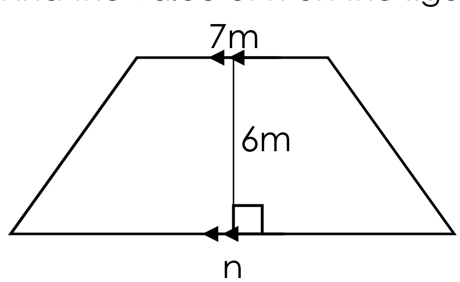
$$k + 12m = 21m$$

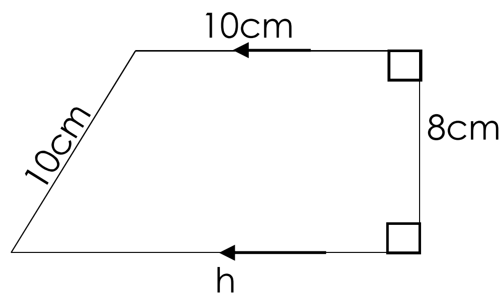
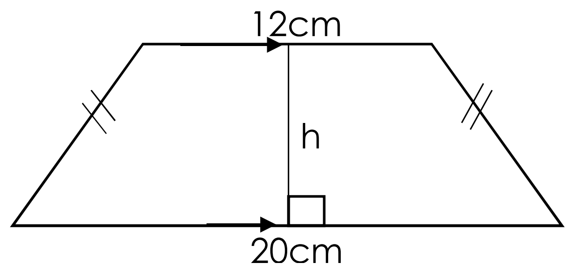
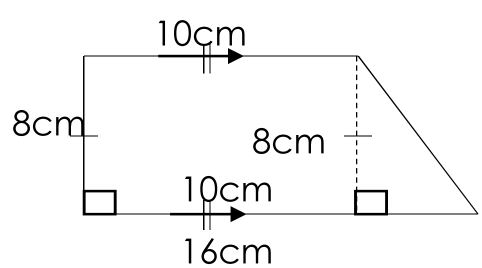
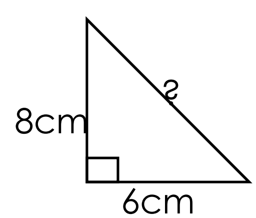
$$k + 12m - 12m = 21m - 12m$$

$$k = 9m$$

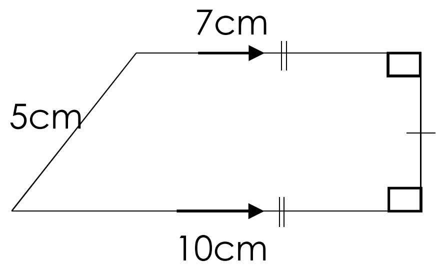
Activity;

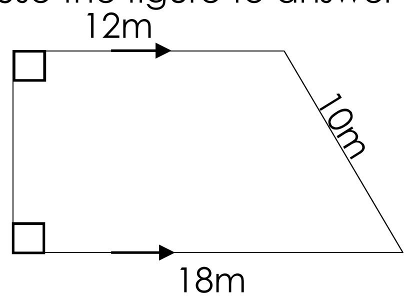
1. Find the value of n on the figure below if its area is $51m^2$

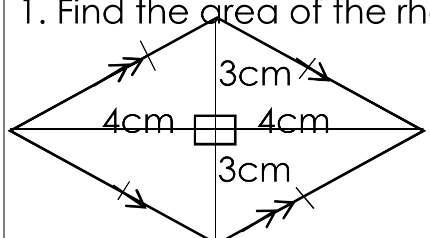


		2. Find the value of h if the area is $104cm^2$.  c)  Find the height of the figure above if the area is $112cm^2$.
Measurements	Length, Mass and capacity	**Lesson 21** **Applying Pythagoras theorem to find the missing side of a trapezium.** - Separate a trapezium to form a right angled triangle. - Identify the length of each given side of the right angled triangle and apply Pythagoras theorem to find the missing side. - You can now use the sides to find the perimeter and the area of a trapezium. **Example;** Find the perimeter of the trapezium below.   $a^2 + b^2 = c^2$ $(6cm)^2 + (8cm)^2 = c^2$ $(6cm \times 6cm) + (8cm + 8cm) = c^2$ $36cm^2 + 64cm^2 = c^2$ $\sqrt{100cm^2} = \sqrt{c^2}$ $10cm = c$ P = 16cm + 8cm + 10cm + 10cm

<table>
<tr>
<td></td>
<td></td>
<td>
P = 44cm

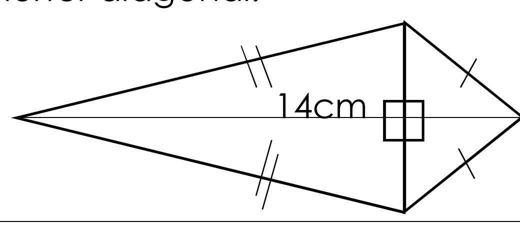
Activity;
Find the area of the trapezium below.


2. Use the figure to answer the questions that follow.


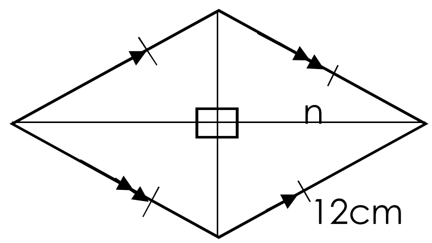
a) Find the height of the figure.
b) Work out the area of the figure.
c) Find the perimeter of the figure.
</td>
</tr>
<tr>
<td>Measurement</td>
<td>Length, Mass and capacity</td>
<td>
Lesson 22
Area of a Rhombus and a kite.
- Identify the formula to be used to find area of a Rhombus and kite.
- Find area of a Rhombus using formula $\frac{1}{2} \times d_1 \times d_2$.
- Substitute in the formula to find the missing information when area is given.
Example;
1. Find the area of the rhombus.


Area = $\frac{1}{2} \times d_1 \times d_2$
Are = $\frac{1}{\cancel{2}_1} \times \cancel{6}^{3}cm \times 8cm$

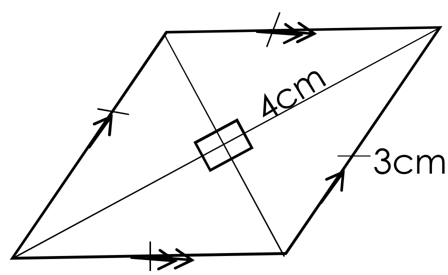
Area = 3cm x 8cm
Area = $24cm^2$

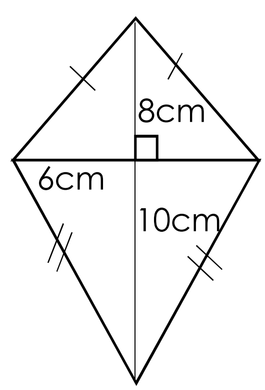
2. The area of the kite below is 56cm2. Find the length of its shorter diagonal.


</td>
</tr>
</table>

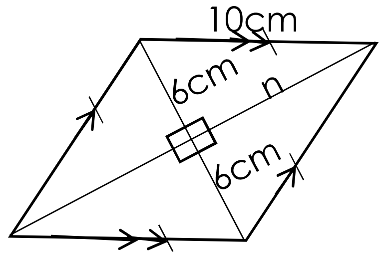
<table>
<tr>
<td></td>
<td></td>
<td>
Area = $\frac{1}{2} \times d_1 \times d_2$
$56cm^2 = \frac{1}{\cancelto{1}{2}} \times d_1 \times \cancelto{7}{14}cm$
$\frac{\cancelto{8}{56cm} \times cm}{\cancelto{1}{7cm}} = \frac{\cancelto{1}{7cm} \times d_1}{\cancelto{1}{7cm}}$
$8cm = d_1$
$d_1 = 8cm$
Activity;
1. Find the area of a kite whose longer diagonal is 24cm and the shorter diagonal is 10cm.
2. The area of the Rhombus below is $384cm^2$.


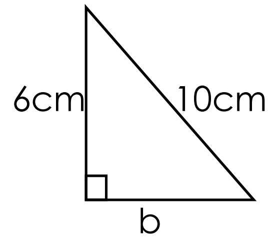
Find the value of n.

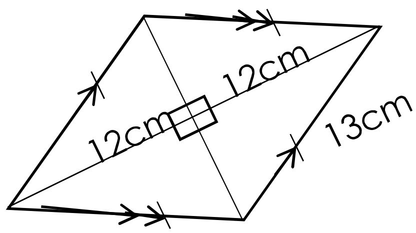
3. Find the area of the figures below;
a)


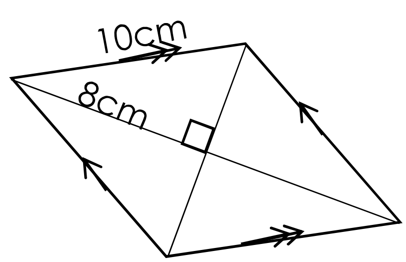
b)


</td>
</tr>
<tr>
<td>Measurements</td>
<td>Length, Mass and Capacity.</td>
<td>
Lesson 23
Finding area of a Rhombus given one diagonal and side.
- Extract one right angled triangle, identify the length of each of its sides, apply Pythagoras theorem to find the missing side that will help you identify the missing
</td>
</tr>
</table>

<table>
<tr><td></td><td></td><td>diagonal.
Example;
Find the area of the Rhombus.


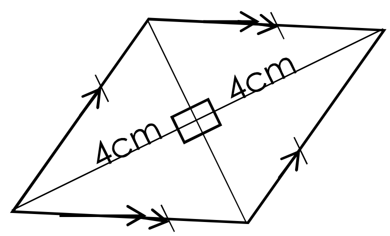


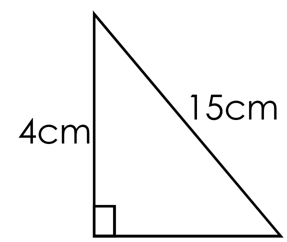
$a^2 + b^2 = c^2$
$b^2 + (6cm)^2 = (10cm)^2$
$b^2 + (6cm \times 6cm) = (10cm \times 10cm)$
$b^2 + 36cm^2 = 100cm^2$
$b^2 + 36cm^2 - 36cm^2 = 100cm^2 - 36cm^2$
$\sqrt{b^2} = \sqrt{64cm^2}$
$b = 8cm$
<u>Missing diagonal</u>
8cm + 8cm
16cm
Area $= \frac{1}{2} \times d_1 \times d_2$
Area $= \frac{1}{\cancel{2}_1} \times 12cm \times \cancel{16}^{8}cm$
Area $= 12cm \times 8cm$
Area $= 96cm^2$
Activity;
Work out the area of the figures shown below.
a)


b)

</td></tr>
<tr><td>Measurements</td><td>Length, Mass and Capacity</td><td>Lesson 24
Finding area of a Rhombus given perimeter and one diagonal.
- First apply formula for perimeter to find the Length of</td></tr>
</table>

each side.
- Extract one right angled triangle and use Pythagoras theorem to find the missing side.
- Double the side of the triangle got to get the second diagonal and use the diagonals to find the area of the Rhombus.

Example;
Given that the perimeter of the figure below is 20cm, Find its area.





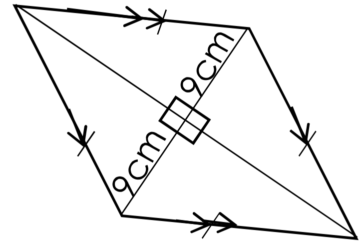
$P = 4S$
$20cm = 4S$
$\frac{20cm}{4} = \frac{4S}{4}$
$5cm = S$
$= 25cm^2$
Side = 5cm

$a^2 + b^2 = c^2$
$a^2 + (4cm)^2 = (5cm)^2$
$a^2 + 4cm \times 4cm = 5cm \times 5cm$
$a^2 + 16cm^2$ Type equation here.
$a^2 + 16cm^2 - 16cm^2 = 25cm^2 - 16cm^2$
$\sqrt{a^2} = \sqrt{9cm^2}$
$a = 3cm$

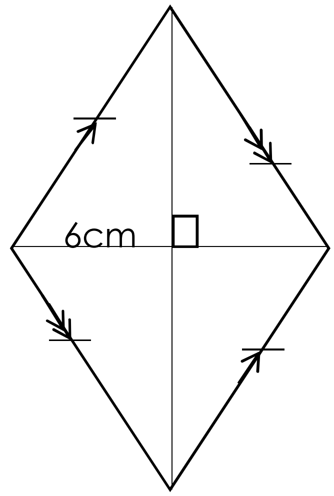
Diagonal = 2 x 3cm
= 6cm
Area = $\frac{1}{2} \times d_1 \times d_2$
Area = $\frac{1}{2} \times \overset{3}{\cancel{6}}cm \times 8cm$

Area = 3cm x 8cm
Area = $24cm^2$

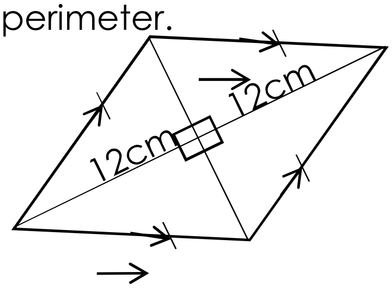
Activity;
1. The total distance round the rhombus is 60cm. Work out its area.

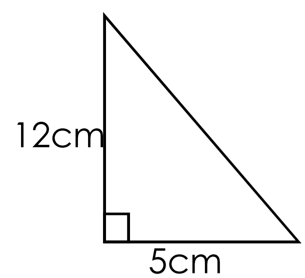


<table>
<tr>
<td></td>
<td></td>
<td>
2. Find the area of the figure below if the perimeter is 40cm.



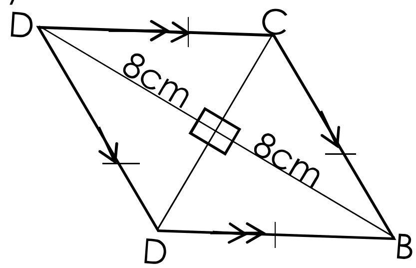
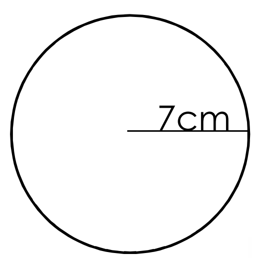
</td>
</tr>
<tr>
<td>Measurements</td>
<td>Length, Mass and Capacity</td>
<td>
Lesson 25
Finding perimeter of a Rhombus given Area and a diagonal.
- Apply the formula for area of a Rhombus to find the missing diagonal.
- Extract a right angled triangle and apply Pythagoras theorem to find the missing side.
- Use the side to find the perimeter of the Rhombus.
Example;
The area of the rhombus below is 120cm2, work out its perimeter.



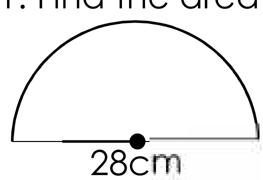


Area = $\frac{1}{2}$ x d_1 x d_2
$120cm^2 = \frac{1}{2} \times d_1 \times \cancel{24}cm$
$\frac{\overset{10}{\cancel{120cm}} \times cm}{\underset{1}{\cancel{12cm}}} = \frac{\overset{1}{\cancel{12cm}} \times d_1}{\underset{1}{\cancel{12cm}}}$
$10cm = d_1$
Perimeter
P = 4 x side
P= 4 x 13

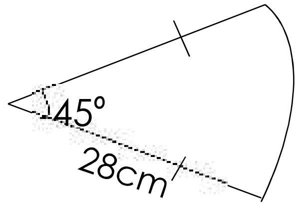
$a^2 + b^2 = c^2$
$(5cm)^2 + (12cm)^2 = c^2$
$(5cm \times 5cm + (12cm \times 12cm) = c^2$
$25cm^2 + 144cm2 = c^2$
$169cm^2 = c^2$
$13cm = c$
Side =13cm
</td>
</tr>
</table>

		P= 52cm **Activity;** 1. Study the rhombus below and answer questions that follow.  a) Given that the area of the rhombus is $96cm^2$, find the length of diagonal AC. b) Work out the perimeter of the rhombus. 2. The area of a rhombus is $600cm^2$. Find its perimeter if one the diagonals is 30cm. b) Workout its perimeter.
Measurements	Length, Mass and capacity	**Lesson 26** **Area of a circle and its application.** - Identify and write formula of a circle as used in P.6. - Finds area of a circle with formula πr^2. - Apply the formula for area by substituting to find the radius. **Example;** 1. Work out the area of a circle whose radius is 7cm.  Area = πr^2 Area = $\frac{22}{\cancel{7}_{1}} \times \cancel{7}^{1}cm \times 7cm$ Area = $22 \times 7cm^2$ Area = $154cm^2$ 2. Find the radius of a circle whose area is $616m^2$. Area = πr^2 $616m^2 = \frac{22}{7} r^2$ $\frac{7 \times \cancel{616}^{28} m^2}{\cancel{22}_{1}} = \frac{\cancel{22} r^2}{22}$ $7 \times 28m^2 = r^2$ $\sqrt{196m^2} = \sqrt{r^2}$ $14m = r$ Radius = 14m **Activity;** 1. Find the area of a circle whose radius is; a) 10cm b) 21cm 2. Work out the radius of a circle whose area is;

		a) $616cm^2$ b) $154m^2$ 3. Find the radius of a circle whose area is 154cm2. (Take $\pi = \frac{22}{7}$)
Measurements	Length, Mass and Capacity	**Lesson 27** Finding area of a circle when given circumference. - apply the formula for circumference to find the radius of the circle. - Use the radius to find the area of the circle. **Example:** Calculate the area of a circle whose circumference is 44cm. **Radius of the circle** $C = 2\pi r$ $44cm = 2 \times \frac{22}{7} r$ $7 \times 44cm = \frac{44r}{\cancel{7}} \times \cancel{7}$ $\frac{7 \times \cancel{44}cm}{\cancel{44}} = \frac{\cancel{44}r}{\cancel{44}}$ $7cm = r$ **Area of the circle** Area $= \pi r^2$ Area $= \frac{22}{7} \times 7cm \times 7cm$ Area = 22cm x 7 Area = $154cm^2$ **Activity;** 1. Work out the area of a circle whose circumference is; a) 88dm b) 132cm 2. A circular flower garden has a circumference of 22m. Find its area. 3. The circumference of a circular plate is 62.8dm. Find the area of the plate. (Take $\pi = 3.14$)
Measurements	Length, Mass and Capacity	**Lesson 28** **Finding circumference of a circle when given area.** - Since the area is given, apply the formula for area to find the radius. -Use the radius to work out the circumference. **Example;** A circle has an area of $1386cm^2$. Calculate its circumference Area $= \pi r^2$ $1386cm2 = \frac{22r^2}{7}$ $7 \times 1386cm2 = \frac{22r^2}{7} \times 7$ $\frac{7 \times \overset{63}{\cancel{1386}}cm^2}{\cancel{22}_1} = \frac{\overset{1}{\cancel{22}}r^2}{\cancel{22}_1}$

		$7 \times 63cm^2 = r^2$ $\sqrt{441cm^2} = \sqrt{r^2}$ $21cm = r$ **Circumference** $C = 2\pi r$ $C = 2 \times \frac{22}{\cancel{7}_{1}} \times \cancel{21}^{7}cm$ $C = 2 \times 22 \times 7cm$ $C = 44 \times 7cm$ $C = 132cm$ **Activity;** 1. Work out the total distance round a circular pond whose area is $616m^2$. 2. Find the circumference of a circle whose area is $154cm^2$. 3. The area of a circle is $314m^2$. Find its circumference. (Take $\pi = 3.14$)
Measurements	Length, Mass and Capacity.	**Lesson 29** **Area of parts of a circle.** - Identify the part (fraction) of the circle given. - Multiply the fraction by the area of a circle (πr^2) **Example;** 1. Find the area of the semi-circle. ($\pi = \frac{22}{7}$)  radius = $\frac{\cancel{28}^{14}cm}{\cancel{2}_{1}}$ radius = 14cm Area = $\frac{1}{2}\pi r^2$ Area = $\frac{1}{\cancel{2}_{1}} \times \frac{\cancel{22}^{11}}{\cancel{7}_{1}} \times \cancel{14}^{2}cm \times 14cm$ Area = $22cm \times 14cm$ Area = $308cm^2$

<table>
<tr>
<td></td>
<td></td>
<td>2. Work out the area of the sector below. ($\pi = \frac{22}{7}$)

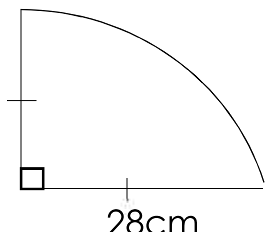


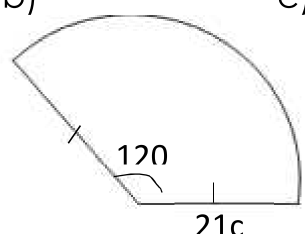
Area = $\frac{\cancel{45^0}^{1}}{\cancel{360^0}_{8}}\pi r^2$

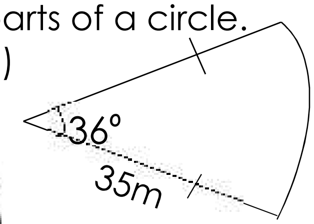
Area = $\frac{1}{\cancel{8}_{\cancel{2}_{1}}} \times \frac{\cancel{22}^{11}}{\cancel{7}_{1}} \times \cancel{28}^{\cancel{4}^{1}}cm \times 28cm$

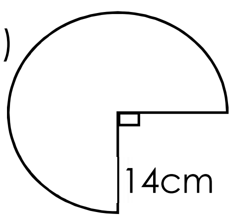
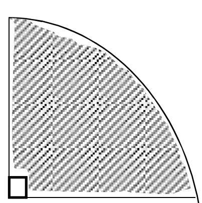
Area = 11cm × 28cm

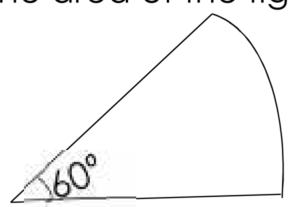
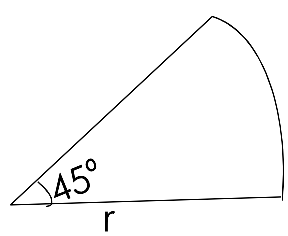
Area = $308cm^2$

Activity;
Calculate the area of the following parts of a circle.
a)


b)


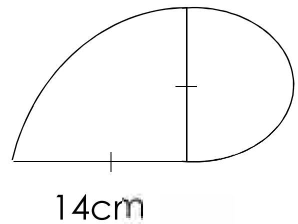
c)


d)

</td>
</tr>
<tr>
<td>Measurements</td>
<td>Length, Mass and Capacity</td>
<td>Lesson 30
Application of area of parts of circles.
- Identify the part (fraction) of the circle given.
- Apply the formula for the area of that particular part to find the radius.
Example:
1. The area of the quadrant below is $154m^2$. Find its radius.

Areas = $\frac{1}{4}\pi r^2$
$154m^2 = \frac{1}{\cancel{4}_{2}} \times \frac{\cancel{22}^{11}r^2}{7}$
$14 \times 154m^2 = \frac{11r^2}{\cancel{14}_{1}} \times \cancel{14}^{1}$
$\frac{14 \times \cancel{154}^{14}m^2}{\cancel{11}_{1}} = \frac{\cancel{11}^{1}r^2}{\cancel{11}_{1}}$
$196m^2 = r^2$
14m = r
r = 14m</td>
</tr>
</table>

		2. The area of the figure below is $231m^2$.  Find the radius of the figure. $\frac{\cancel{60^0}^{1}\pi r^2}{\cancel{360^0}_{6}} = A$ $\frac{1}{\cancel{6}_{3}} \times \frac{\cancel{22}^{11}}{7} \times r^2 = 231m^2$ $\cancel{21} \times \frac{11r^2}{\cancel{21}} = 231m^2 \times 21$ $\frac{\cancel{11}r^2}{\cancel{11}} = \frac{\cancel{231}^{21}m^2 \times 21}{\cancel{11}_{1}}$ $\sqrt{r^2} = \sqrt{441m^2}$ $r = 21m$ **Activity** 1. A semi circle has an area of $308cm^2$. a) Find the length of its diameter. b) Work out the total distance round the semi-circle. 2. The area of the figure below is $77cm^2$.  a) Find the value of r (Take $\pi \frac{22}{7}$) b) Find the perimeter of the figure.
Measurements	Length, Mass and Capacity	**Lesson 31** **Area of combined shapes.** - Identify the shapes combined in the given figure. - Find area of each of the shapes using respective formulae - Add the areas to get the area of the combined shape.

Examples

Find the area of the figure below:



Area of a semi-circle

Area = $\frac{1}{2}\pi r^2$

Area = $\frac{1}{2}$ x $\frac{22}{7}$x7cmx7cm

Area = 77cm2

Area of quadrant

Area = $\frac{1}{4}\pi r^2$

Area = $\frac{1}{4}$ x $\frac{22}{7}$ x 14cm x 14cm

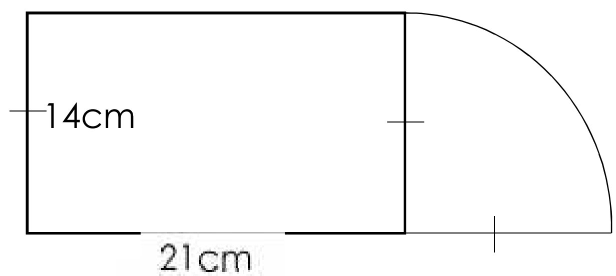
Area = 77cm x 2cm

Area = 154cm^2

Total area

154cm^2
+77cm^2
231cm^2

2. Workout the area of the figure below:



Area of a quadrant

Area = $\frac{1}{4}\pi r^2$

Area $= \frac{1}{\underset{\overset{2}{1}}{\cancel{4}}} \times \frac{\overset{11}{\cancel{22}}}{7} \times \overset{7}{\cancel{14}}$cmx14cm

Area = $(\frac{11}{\underset{1}{\cancel{7}}} \times \overset{1}{\cancel{7}} \times 14)cm^2$

Area = 154 cm^2.

Area of rectangle;

A = L x W

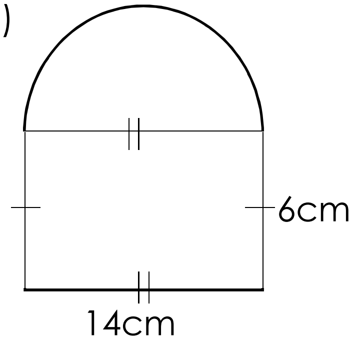
A = 21cm x 14cm

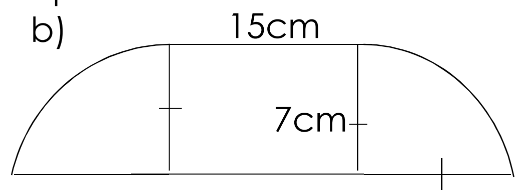
A = 294cm

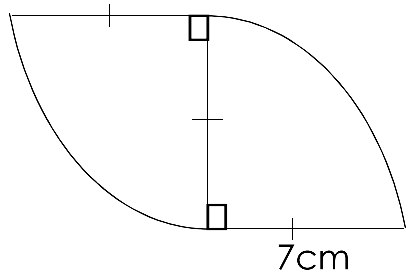
Total area

2 9 4 cm^2
+1 5 4 cm^2
4 4 8 cm^2

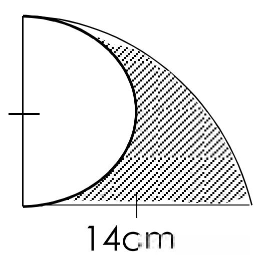
<table>
<tr>
<td></td>
<td></td>
<td>

Activity;
Calculate the area of the shapes below.
a)


b)


c)


</td>
</tr>
<tr>
<td>Measuremnets</td>
<td>Length, Mass and Capacity</td>
<td>

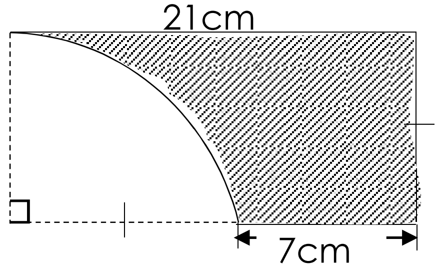
Lesson 32
Finding area of shaded parts involving circles.
- Identify the shapes involved and find their area using the respective formula
- Subtract the area of the small shape from the area of the big shape to get the remaining area.
Example;
1.In the figure below, find the area of the shaded part.


Area of a semi-circle.
Area = $\frac{1}{2}\pi r^2$
Area = $\frac{1}{\cancel{2}_1} \times \frac{\cancel{22}^{11}}{\cancel{7}_1} \times 7cm \times \cancel{7}^{1}cm$
Area = 77cm^2

Area of quadrant.
Area = $\frac{1}{4}\pi r^2$
Area = $\frac{1}{\cancel{4}_{\cancel{2}_1}} \times \frac{\cancel{22}^{11}}{\cancel{7}_1} \times 14cm \times \cancel{14}^{\cancel{7}^{1}}cm$
Area = 11 × 14cm^2
Area = 154cm^2
Area of shaded part
154 cm^2
- 77 cm^2
77 cm^2

</td>
</tr>
</table>

2. Calculate the area of the shaded part in the figure below:



Width

Width = 21cm – 7cm

Width = 14cm

Area of a quadrant

$A = \frac{1}{4}\pi r^2$

$A = \frac{1}{\cancel{4}_{\cancel{2}_{1}}} \times \frac{\overset{11}{\cancel{22}}}{\cancel{7}_{1}} \times \overset{\overset{1}{\cancel{7}}}{\cancel{14}}\text{cm} \times 14\text{cm}$

$A = (11 \times 14)\text{cm}^2$

$A = 154\text{cm}^2$

Area of Rectangle

Area = L x W

Area = 21cm x 14cm

Area = 294cm^2

Area shaded

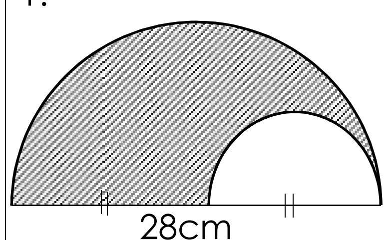
$(294 – 154)\text{cm}^2$

140cm^2

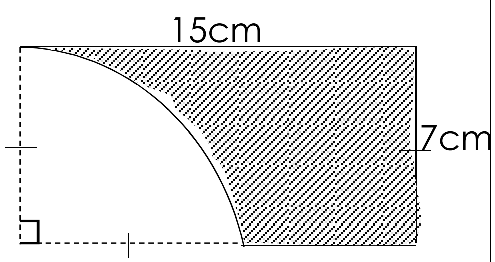
Activity;

Find the area of the shaded part in the figures below.

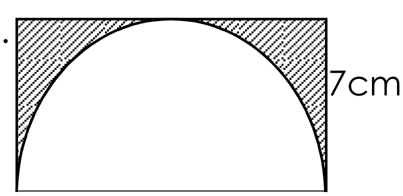
1.



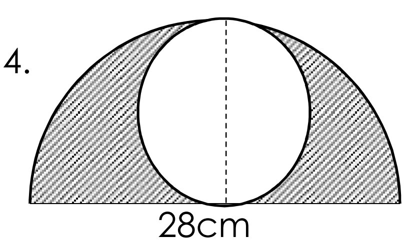
2.



3.



4.



Measurements	Length, Mass, capacity	Lesson 33

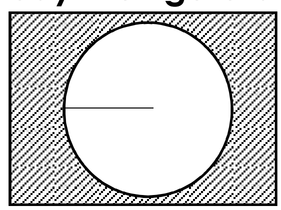
Lesson 33

Application of Area of shaded parts.

- Identify the areas given carefully.
- When given area of shaded and area of bigger shape, subtract to get area of smaller shape.
- When given area of shaded part and area of smaller shape, add to get area of bigger shape.
- Use the area got to find any missing information required.

Example

1.Study the figure below;



Given that the area of the shaded part is 296cm². Find the radius of the circle.

Area of rectangle

Area = L x W

Area = 30cm x 15cm

Area = 30cm x 15cm

Area = 450cm^2

Area of circle

$$\begin{array}{r} 450\text{cm}^2 \\ -\ 296\text{cm}^2 \\ \hline 154\text{cm}^2 \\ \hline \end{array}$$

Area $= \pi r^2$

$154\text{cm}^2 = \frac{22r^2}{7}$

$7 \times 154\text{cm}^2 = \frac{22r^2}{\cancel{7}} \times \cancel{7}$

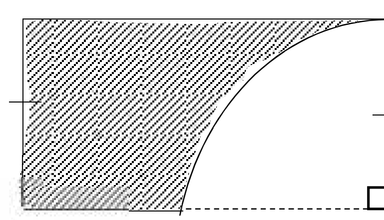
$\frac{7 \times \cancel{154}\text{cm}^2}{\cancel{22}} = \frac{\cancel{22}r^2}{\cancel{22}}$

$\sqrt{49\text{cm}^2} = \sqrt{r^2}$

7cm = r

Radius = 7cm

2. Given that the area of the shaded part below is 140cm^2. Find the length of the rectangle.



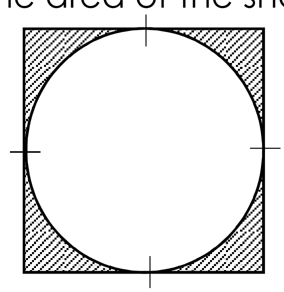
<u>Area of a quadrant</u>

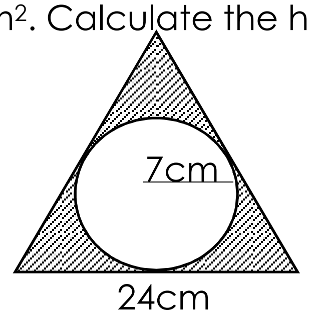
$A = \frac{1}{4}\pi r^2$

$A = \frac{1}{4} \times \frac{\cancel{22}}{\cancel{7}} \times \cancel{14}\text{cm} \times 14\text{cm}$

$A = 154\text{cm}^2$

<table>
<tr>
<td></td>
<td></td>
<td>
<u>Area of a rectangle.</u>
<u>Area of quadrant + Area shaded</u>.
$$\begin{array}{r} 154cm^2 \\ +\ 140cm^2 \\ \hline 294cm^2 \\ \hline \end{array}$$

<u>Length of rectangle</u>
L x W = Area
L x 14cm = 294cm^2
$$\frac{L \times \cancel{14cm}}{\cancel{14cm}} = \frac{\overset{21}{\cancel{294}}cm \times \cancel{cm}}{{}_1\cancel{14cm}}$$
L = 21cm
Activity;
1. Given that the area of the unshaded part in the figure below is 154cm^2,
i) Find the length of each side of the square.
ii) Find the area of the shaded part.


2. In the figure below, the area of the shaded part is 62cm^2. Calculate the height of the triangle.


</td>
</tr>
<tr>
<td>Measurements</td>
<td>Length, Mass and Capacity</td>
<td>
Lesson 34
Application of area of circles
-Divide length of rectangle by diameter, then divide the width by diameter and multiply.
-This can be done on other shapes, divide each side by the diameter.
-To find the number of circles that can be obtained from a rectangular shape, find the product of circles along the length and along the width.
-To get the area unused, subtract the area of all circles obtained from the area of the rectangular shape.
</td>
</tr>
</table>

Example;

1.Birungi prepared a rectangular dough of 70cm by 56cm. If she cut out pancakes of diameter 14cm,

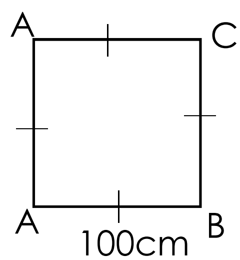
a) How many pancakes did she cut out?

Along the length	**Along width**	**Total**
$\frac{\overset{5}{\cancel{70cm}}}{\underset{1}{\cancel{14cm}}}$ = 5 pancakes pancakes	$\frac{\overset{4}{\cancel{56cm}}}{\underset{1}{\cancel{14cm}}}$ = 4 pancakes	$\underline{(5x4)}$ 20 pancakes

b) Find the area of the dough left unused.

Area of dough	**Area of pancakes**	**Areas unused**
A = L x W	A = πr^2 x 20	
A = 70cm x 56cm	A = $\frac{22}{\cancel{7}_1}$ x $\overset{1}{\cancel{7}}$cmx7cmx20	3920cm^2
A = 3950cm^2	A= 154cm^2 x 20	- 3080cm^2
	A = 3080cm^2	840cm^2

2. Mwanga made a dough of the shape shown below and used a glass with a circular opening of radius 74cm to obtain pancakes.



Diameter

(14 + 14)cm

28cm

How many pan cakes will be obtained?

Along the AB

$\frac{\overset{\textbf{3 rem 16}}{\cancel{100cm}}}{\underset{1}{\cancel{28cm}}}$ = 3 pancakes

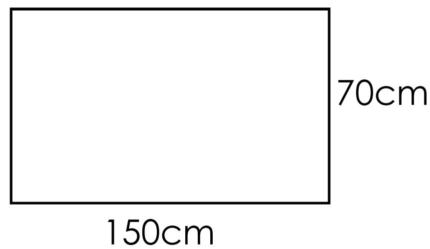
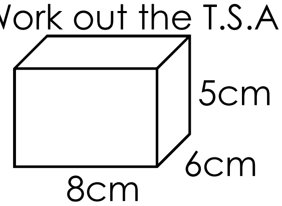
Along the BC

$\frac{\overset{\textbf{3 rem 16}}{\cancel{100cm}}}{\underset{1}{\cancel{28cm}}}$ = 3 pancakes

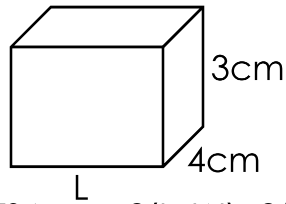
Total

3 x 3 = 9 pancakes

NB: Write the whole number and ignore the remainder

		Activity 1. How many circular sheets of radius $3\frac{1}{2}$ cm can be cut from a square sheet of metal measuring 42cm? b) Calculate the area of sheet of metal wasted. 2. Find the area of the unused sheet of paper after obtaining circular parts of radius 7cm from the figure below. 
Measurements	Length, Mass and Capacity	**Lesson 35** **Total surface area of a cube and cuboid with their application.** - Identify all the faces of the given prism. - Find the sum of the areas of all the faces (T.S.A) - Since a cube has all faces equal, multiply area of each face by faces hence 6xsxs. - A cuboid has opposite faces equal hence 2(L x W) + 2(L x H) + 2(H x W) **Example;** 1. Find the total surface area of a cube whose side is 10cm. T.S.A = 6 x s x s T.S.A = 6 x 10cm x 10cm T.S.A = 600cm^2 2. Work out the T.S.A of the prism below.  T.S.A = 2(LxW) + 2(LxH) + 2(WxH) T.S.A = 2(8cmx6cm)+2(8cmx5cm)+2(6cmx5cm) T.S.A = 2 x 48cm^2 + 2 x 40cm^2 + 2 x 30cm^2 T.S.A = 96cm^2 + 80cm^2 + 60cm^2 T.S.A = 236cm^2

3. Given that the total surface area of the cuboid below is $94cm^2$. Find its length.
- When given the total surface area, state the formula and substitute the values.



TSA = 2(LxW)+2(LxH)+(WxH)

$94cm^2 = 2(L\times4cm)+(2(L\times3cm)+2(4cm\times3cm)$

$94cm^2 = 2(4cmL) + 2(3cmL) + 2(12cm^2)$

$94cm^2 = 8cmL + 6cmL + 24cm^2$

$94cm^2 – 24cm^2 = 14cmL + 24cm^2 – 24cm^2$

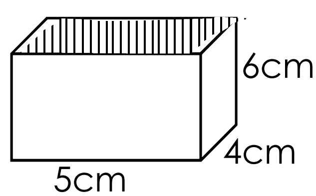
$$\frac{\cancel{70cm}^{5} \times cm}{\cancel{14cm}_{1}} = \frac{\cancel{14cm}^{1}L}{\cancel{14cm}_{1}}$$

$5cm = L$

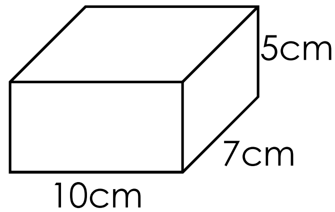
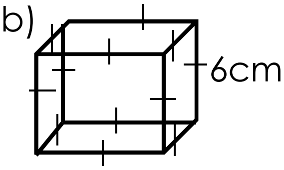
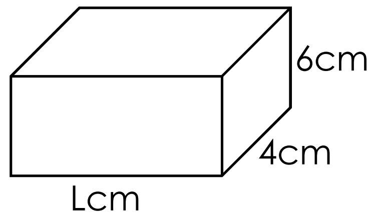
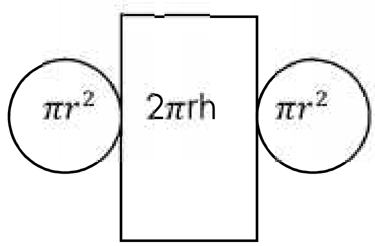
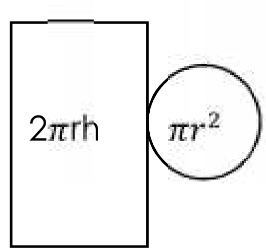
In case you are told the cuboid is open, remove one face of (LxW) from the formula and find the total of the remaining 5 faces.

Examples;

Find the total surface area of the cuboid below if it has no cover.

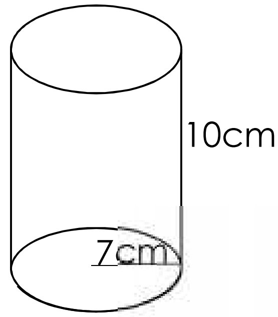


T.S.A = L x W + 2(L x H) + 2(W x H)
T.S.A = (5cm x 4cm) + (2(5cm x 6cm) + 2(4cm x 6cm)
T.S.A = $20cm^2 + 2(30cm^2) + 2(24cm^2)$
T.S.A = $20cm^2 + 60cm^2 + 48cm^2$
T.S.A = $128cm^2$

		Activity 1. Work out the total surface area of the prisms below. a)  b)  2. Find the total surface area of a cube of 9cm if it has no cover. 3. Study the figure below carefully:  Given that the total surface area of the figure above is $216cm^2$. Find the value of L.
Measurements	Length, Mass and Capacity	**Lesson 36** **Total surface area of a cylinder.** - Cylinder has 3 faces, 2 circles and a curved surface. - When the curved surface is opened, it becomes a rectangle or square whose length is equal to the circumference of the circle and the width is equal to the height of the cylinder.  - To find the T.S.A, find the area of the two circular ends and add to the area of the curved surface. - If the cylinder is open, then you will have only one circular end and the curved surface. 

Example:

1. Workout the T.S.A of the cylinder below.



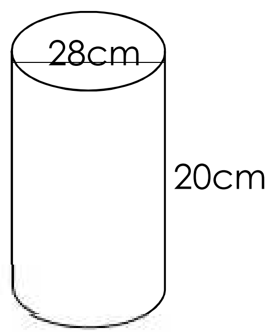
T.S.A = $2\pi r^2 + 2\pi rh$

T.S.A = $(2 \times \frac{22}{\cancel{7}_1} \times 7cm \times \cancel{7}^{1}cm) + (2 \times \frac{22}{\cancel{7}_1} \times \cancel{7}^{1}cm \times 10cm)$

T.S.A = $308cm^2 + 440cm^2$

T.S.A = $748cm^2$

2. Calculate the total area of the material used to make a metal tank below which is open on top.



Circumference of a circle

C = $2\pi r$

C = $2 \times \frac{22}{\cancel{7}_1} \times \frac{\cancel{28cm}^{\cancel{4}\,1}}{\cancel{2}_1}$

C = 44cm

Area of a circle.

A = πr^2

A = $\frac{22}{\cancel{7}_1} \times \frac{\cancel{28cm}^{\cancel{4}^{\cancel{2}^{1}}}}{\cancel{2}_1} \times \frac{28cm}{\cancel{2}_1}$

A = $616cm^2$

Area of a curve surface

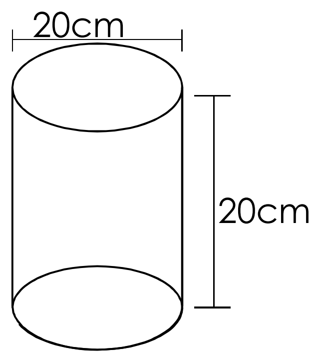
A = L x W

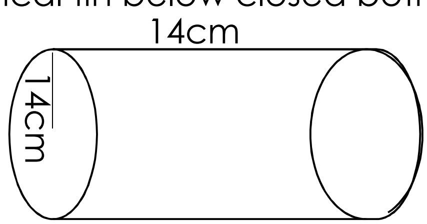
A = 44cm x 20cm

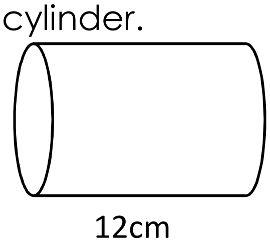
A = $880cm^2$

TSA = $616cm^2$
$+ 880cm^2$
1 4 9 6cm

TSA = $1496cm^2$

<table>
<tr>
<td></td>
<td></td>
<td>
Activity;
1. Calculate the total surface area of an open cylinder of radius 7cm and height 8cm ($\pi = \frac{22}{7}$)
2. Find the total surface area of the cylinder below.
(π = 3.14)


3. Find the total surface area of a material used to make a cylindrical tin below closed both ends. (π=$\frac{22}{7}$)


</td>
</tr>
<tr>
<td>Measurements</td>
<td>Length, Mass and Capacity</td>
<td>
Lesson 37
Application of Total surface area of a cylinder.
- Apply the formula for the information given to find the missing link that will connect you to the questions asked.
Example;
The circumference of the circular part of the cylinder below is 44cm. Calculate the total surface area of the cylinder.


</td>
</tr>
</table>

$C = 2\pi r$

$44cm = 2 \times \frac{22}{7} \times r$

$7 \times 44cm = \frac{44r}{7} \times \cancel{7}$

$\frac{7 \times \cancel{44}}{\cancel{44}} cm = \frac{\cancel{44} r}{\cancel{44}}$

$7cm = r$

$TSA = 2\pi r^2 + 2\pi rh$

$TSA = (2 \times \frac{22}{\cancel{7}} \times 7cm \times \cancel{7}cm) + (2 \times \frac{22}{\cancel{7}} \times \cancel{7}cm \times 12cm)$

TSA = 308cm2 + 528cm^2

TSA = 836cm^2

2. If the curved surface of a cylindrical tin has an area of 880cm^2. Find it's diameter if the height is 20cm.

Length of the rectangular / circumference of a curved surface

L x W = Area

L x 20cm = 800cm^2

$\frac{L \times \cancel{20cm}}{\cancel{20cm}} = \frac{\cancel{880cm} \times cm}{\cancel{20cm}}$

L = 44cm

Length = Circumference = 44 cm

C = 44cm

Circumference $= \pi d$

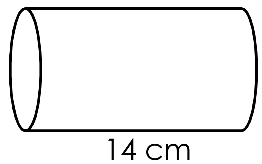
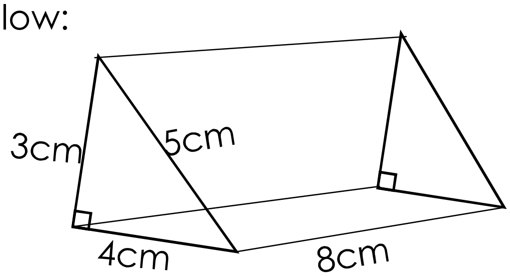
$C = \frac{22}{7}d$

$7 \times 44cm = \frac{22d}{\cancel{7}} \times \cancel{7}$

$\frac{7 \times \cancel{44}cm}{\cancel{22}} = \frac{\cancel{22}d}{\cancel{22}}$

28cm = d

diameter = 28cm

<table>
<tr>
<td></td>
<td></td>
<td>Activity;
1. The area of the curved surface of a cylindrical tin is $220cm^2$. Calculate the radius of the cylinder if its height is 10cm.
2. Given that the circumference of the circular end of the tank below is 22cm. Calculate its total surface area when opened one end.

</td>
</tr>
<tr>
<td>Measurements</td>
<td>Length, Mass and Capacity</td>
<td>Lesson 38
Total surface area of a triangular prism
- Identify the shapes of all the faces and the formula for finding area
- A triangular prism has 5 faces, 2 equal triangular faces and 3 rectangles (squares)
- Identify their edges with the measurements on them (units)
- Find the area of each and get the total area.
Example;
Calculate the total surface area of the triangular prism below:


Total surface area

$2\triangle s + \square + \square + \square$

$(2 \times \frac{1}{2}bh) + (L \times W) + (L \times W) + (L \times W)$

$(\overset{1}{\cancel{2}} \times \frac{1}{\underset{1}{\cancel{2}}} \times 4cm \times 3cm)+(8cm \times 4cm)+(8cm \times 3cm)+(8cm \times 5cm)$

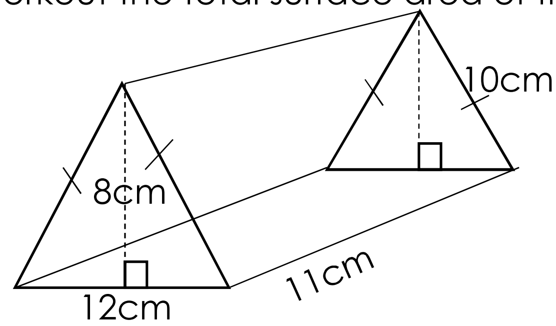
$12cm^2 + 32cm^2 + 24cm^2 + 40cm^2$

$108cm^2$.</td>
</tr>
</table>

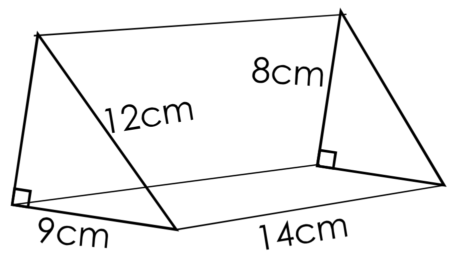
<table>
<tr>
<td></td>
<td></td>
<td>

Activity

1. Workout the total surface area of the prism below



2. Calculate the sum of the area of all faces on the given figure below?



</td>
</tr>
<tr>
<td>Measurements</td>
<td>Length, Mass and Capcity</td>
<td>

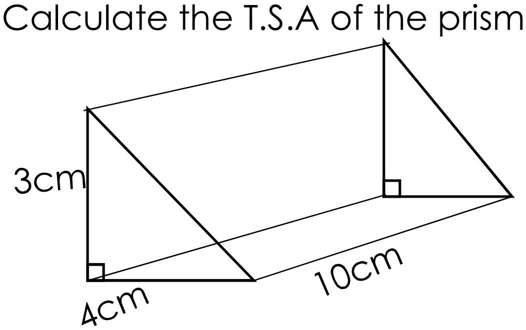
Lesson 39

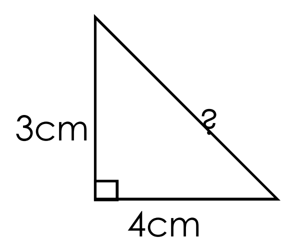
Finding missing edge and total surface area of the triangular prism.

- Ensure you have the required lengths of each face of the prism before finding TSA.
- You can apply the Pythagoras theorem to find a missing side of the triangle before finding the T.S.A.
- If given the area of one of the rectangles to find the side missing on the rectangle, use the formula for finding area of a rectangle.

Example:

Calculate the T.S.A of the prism.





$a^2 + b^2 = c^2$

$(4cm)^2 + (3cm)^2 = c2$

$(4cm x 4cm) + (3cm \times 3cm) = c^2$

$16cm^2 + 9cm^2 = c^2$

$\sqrt{25cm^2} = \sqrt{c^2}$

$5cm = c$

</td>
</tr>
</table>

Total surface area

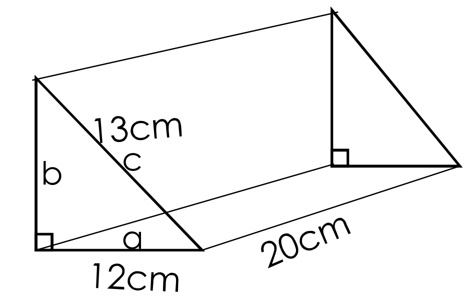
TSA = (2x½bh) + (L x W) + (L x W) + (L x W)

$(\overset{1}{\cancel{2}} \times \frac{1}{\cancel{2}} \times 4cm \times 3cm)+(10cm \times 4cm)+(10cm \times 3cm)+(10cm \times 5cm)$

$12cm^2 + 40cm^2 + 30cm^2 + 50cm^2$

$132cm^2$

2. Calculate the T.S.A of the figure.



Height

$b^2 = c^2 - a^2$

$b^2 = (13cm)^2 - (12cm)^2$

$b^2 = (13 \times 13)cm^2 - (12 \times 12)cm^2$

$b^2 = 169cm^2 - 144cm^2$

$\sqrt{b^2} = \sqrt{25cm^2}$

5	25
5	5
	1

$\sqrt{\cancel{b \times b}} = \sqrt{\cancel{(5x5)} \times \cancel{(cmxcm)}}$

b = 5cm

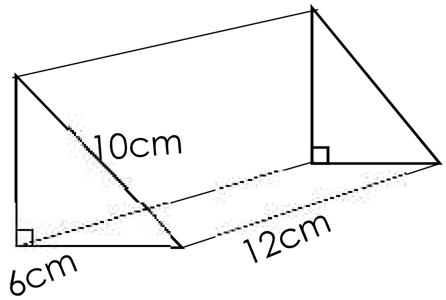
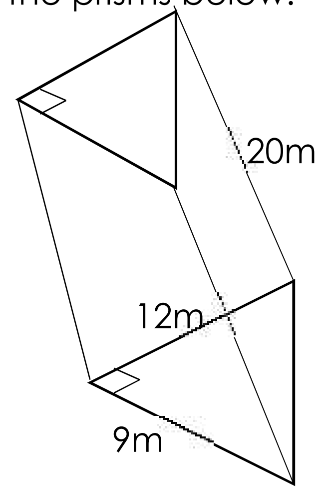
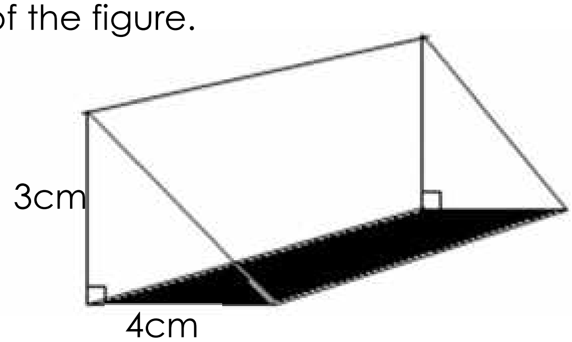
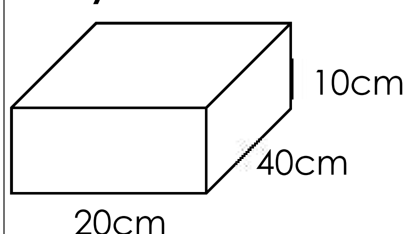
T.S.A = 2△+□+□ +□

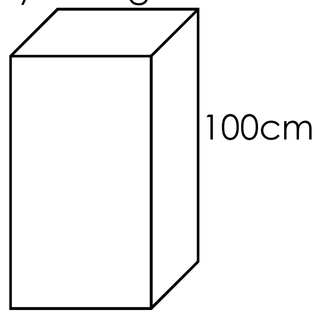
$TSA=(\overset{1}{\cancel{2}} \times \frac{1}{\cancel{2}} \times \overset{6}{\cancel{12}}cm \times 5cm)+(20cm \times 13)+(20cm \times 12cm)+(20cm \times 5cm)$

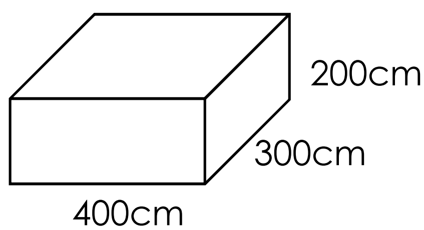
T.S.A = $(2 \times 30cm^2)$ $260cm^2+240cm^2+100cm^2$

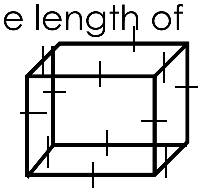
T.S.A = $60cm^2 + 500cm^2 + 100cm^2$

T.S.A = $660cm^2$

		Activity; 1. Work out the total surface area of the prisms below.   3. If the area of the shaded part is $32cm^2$, calculate the TSA of the figure. 
Measurements	Lengths, Mass and Capacity	**Lesson 40** **Volume and capacity of cubes and cuboids** - Volume of a prism is got by base area x height. - Since 1 litre = $1000cm^3$, to find capacity of a prism, divide its volume by $1000cm^3$. **Example;** **Study the cuboid below and find its volume.**  $V = (L \times W) \times H$ $V = 20cm \times 40cm \times 10cm$ $V = 8000cm^3$ b) How many litres of milk does it hold? 1 litre = $1000cm^3$ 8000cm3 = $\frac{8\cancel{000cm^3}}{1\cancel{000cm^3}}$ 8 litres

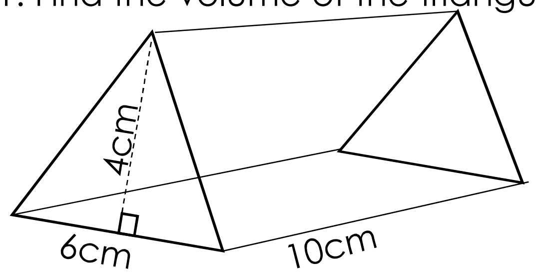
<table>
<tr><td></td><td></td><td>Study the figure below carefully


Given that the base area of the figure above is $32cm^2$.
How many litres of water can it hold when full?
Volume = bA x h
Volume = $32cm^2$ x $100cm^2$
Volume = $3200cm^2$
<u>Capacity</u>;
1 litre = $1000cm^3$
$3200cm^2 = \frac{32\cancel{00cm^3}}{10\cancel{00cm3}}$
$\frac{32}{10}$L
3.2 litres
Activity;
1. How many litres of water can the rectangular tank below hold?


2. Given that the tank below holds 27 litres of water, find the length of its sides.

3. Find the capacity of rectangular tank whose base area is $36cm^2$ and height is 15cm.</td></tr>
<tr><td>Meaurements</td><td>Length, Mass and Capacity</td><td>Lesson 41
Volume of Triangular prism
- Volume of triangular prism is area of one Triangular face x length.
- Apply the same formula when volume is given and find the missing length.
- Substitute the given measurements in the formula.</td></tr>
</table>

Example;

1. Find the volume of the triangular prism below.

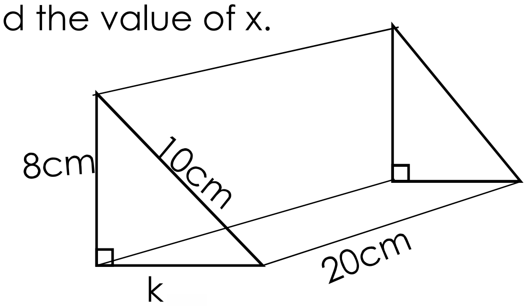


Volume = $\frac{1}{2}$ bh x L

Volume = $\frac{1}{\cancel{2}_{1}} \times \overset{3}{\cancel{6}}\text{cm} \times 4\text{cm} \times 10\text{cm}$

Volume = 120cm^3

2. Given that the volume of the prism below is 480cm3, Find the value of x.



$\text{Volume} = \frac{1}{2}\,\text{bh} \times \text{L}$

$480\text{cm}^3 = \frac{1}{\cancel{2}_{1}} \times 8\text{cm} \times \text{k} \times \overset{10}{\cancel{20}}\text{cm}$

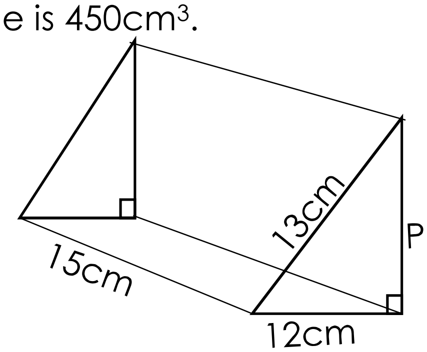
$480\text{cm}^3 = 80\text{cm} \times \text{cm} \times \text{k}$

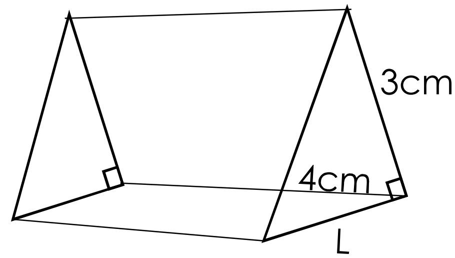
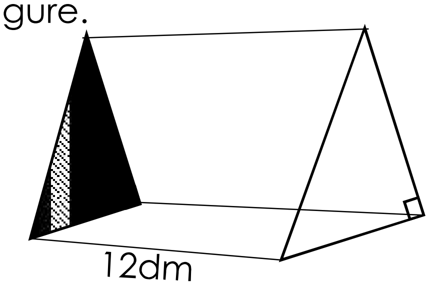
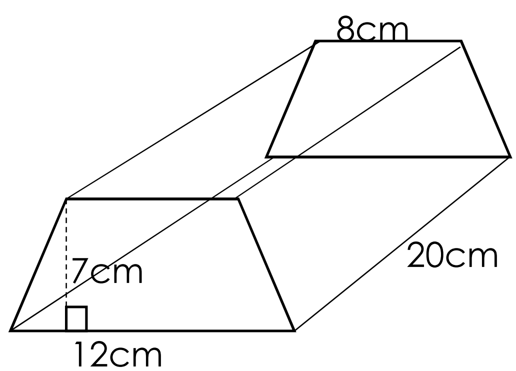
$$\frac{\overset{6}{\cancel{480\text{cm}}} \times \text{cm} \times \overset{1}{\cancel{\text{cm}}}}{\underset{1}{\cancel{80\text{cm}}} \times \underset{1}{\cancel{\text{cm}}}} = \frac{\overset{1}{\cancel{80\text{cm}}} \times \overset{1}{\cancel{\text{cm}}} \times \text{k}}{\underset{1}{\cancel{80\text{cm}}} \times \underset{1}{\cancel{\text{cm}}}}$$

$6\text{cm} = \text{k}$

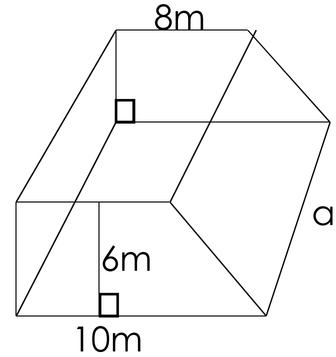
Activity;

1. Calculate the value of P in the figure below if its volume is 450cm^3.



		2. Find the length of the triangular prism below whose volume is $108cm^3$.  4. If the area of the shaded part is $48dm^2$, find the volume of the figure. 
Measurements	Length, Mass and Capacity	**Lesson 42** **Volume of Trapezoidal prism** - Cross-section of the Trapezoidal is a Trapezium) - Volume = Area of one face of Trapezium x Length - Apply the formula to find the missing length when volume is given. **Example;** Calculate the volume of the prism given below.  Volume = $\frac{1}{2}$ h (a + b) x L Volume = $\frac{1}{2}$ × 7cm (8cm + 12cm) x 20cm Volume = $\frac{1}{\cancel{2}_{1}}$ x 7cm x 20 cm x $\overset{10}{\cancel{20}}$ cm Volume = 7 cm × 200 cm^2 Volume = $1400cm^3$

2. The volume of the figure below is $810m^3$



$$\frac{1}{2}h(a+b) \times L = \text{Volume}$$

$$\frac{\overset{}{1}}{\underset{1}{\cancel{2}}} \times \overset{3}{\cancel{6m}}\,(10m + 8m) \times a = 810m^3$$

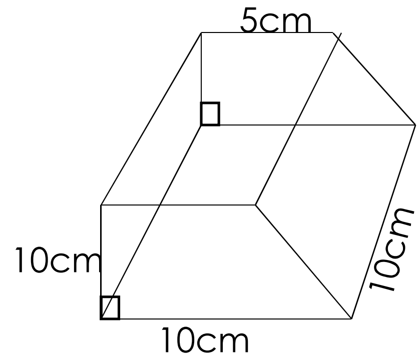
$$3m\,(18m) \times a = 810m^3$$

$$\frac{\overset{1}{\cancel{3m}} \times \cancel{18m} \times a}{\underset{1}{\cancel{3m}} \times \underset{1}{\cancel{18m}}} = \frac{\overset{\overset{15}{\cancel{30}}}{\overset{\cancel{270}}{\cancel{810m}}} \times \overset{1}{\cancel{m}} \times \overset{1}{m}}{\underset{1}{\cancel{3m}} \times \underset{\cancel{2}1}{\cancel{18m}}}$$

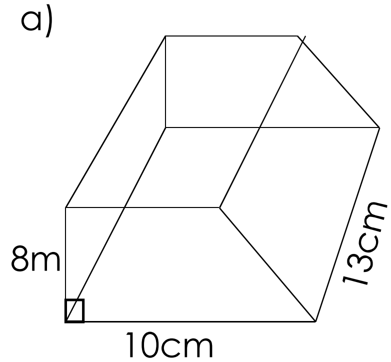
$$a = 15m$$

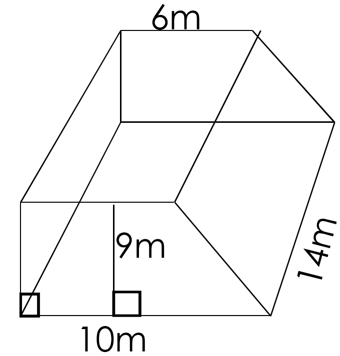
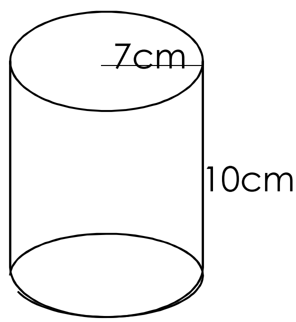
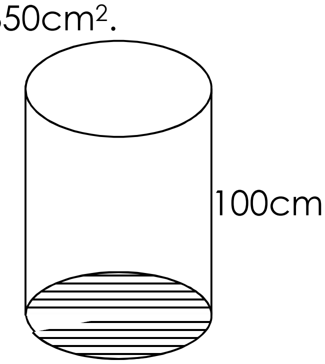
Activity;

1. Find the length of the prism below if it's volume is $750cm^3$.



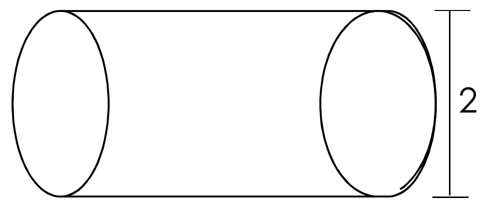
2. Find the volume of the figures below.
   a)



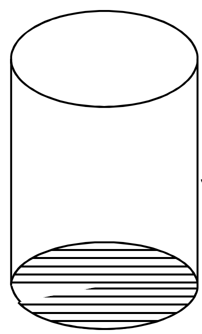
		b) 
Measurements	Length, Mass and Capacity	**Lesson 43** **Volume of cylinders** - The base of a cylinder is a circle. - The volume of a cylinder is Base area x height. - Since the area of a circle is πr^2 - The volume of a cylinder is πr^2 x h - Apply the same formula to find the missing length when volume is given. **Example;** 1. Workout the volume of the cylindrical tank below.  Volume = πr^2h Volume = $\frac{22}{\cancel{7}_{1}}$ x 7cm x $\cancel{7}^{1}$cm x 10cm Volume = $154cm^2$ x 10cm Volume = $1540cm^3$ 2. The area of the shaded part in the figure below is $3850cm^2$.  Work out its volume. V = Base area x height V = $3850cm^2$ x 100cm V = $385000cm^3$

Activity;

1. Calculate the volume of a cylindrical tank of radius 140cm and height 15cm.
2. Find the volume of the cylinder below.



3. The area of the shaded part in the figure below is 616m^2. Find the volume of the figure.



4. Find the volume of a cylinder whose base area is 314dm^2 and height is 10dm.

Lesson 44

<u>Application of volume of a cylinder.</u>

Identify the volume given.
Identify what is required.
Use the formula to find what is required.

Examples:

1. The volume of the cylinder is 6280cm^3. Find the radius if the height is 20cm. (π = 3.14)

πr^2h = volume

$\frac{314}{10\cancel{0}} \times r^2 \times 2\cancel{0}cm = 6280cm^3$

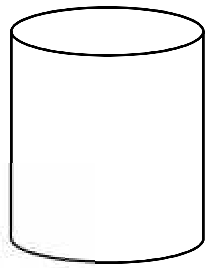
$\overset{1}{\cancel{10}} \times \frac{628r^2}{\underset{1}{\cancel{10}}} cm = 6280cm \times cm \times cm \times 10$

$\frac{\overset{1}{\cancel{628}}r^2 \times \overset{1}{\cancel{cm}}}{\underset{1}{\cancel{628}} \times \underset{1}{\cancel{cm}}} = \frac{\overset{10}{\cancel{6280}}\cancel{cm} \times cm \times cm \times 10}{\underset{1}{\cancel{628}} \times \underset{1}{\cancel{cm}}}$

$\sqrt{r^2} = \sqrt{100cm^2}$

r = 10cm

2. The volume of the figure below is $1540dm^3$. Find the height if the base area is $154dm^2$.



$$\pi r^2 \times h = \text{Volume}$$

$$154dm^2 \times h = 1540dm^3$$

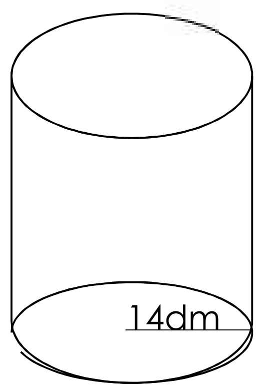
$$\frac{\cancel{154dm^2}^{1} \times h}{\cancel{154dm^2}_{1}} = \frac{\cancel{1540dm}^{10} \times dm \times \cancel{dm}^{1}}{\cancel{154dm}_{1} \times \cancel{dm}_{1}}$$

$$h = 10 \times dm$$

$$h = 10dm$$

Activity:

1. The volume of the cylinder is below is $18480dm^3$. Find its height. (Take $\pi = \frac{22}{7}$)



2. The volume of a cylinder is $15700cm^3$. Find the radius if the height is 50cm. (Take $\pi = 3.14$)
3. Find the height of a cylinder whose volume is $385000m^3$ and diameter 70m. (Take $\pi = \frac{22}{7}$)
4. Find the radius of a cylinder whose volume is $62800cm^3$ and height 50cm.

<table>
<tr>
<td>Measurements</td>
<td>Length, Mass and Capacity</td>
<td>

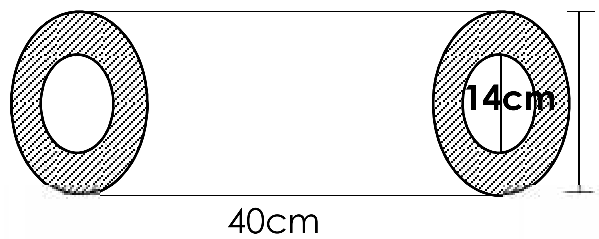
Lesson 45

Application of volume of cylinders.

- Identify the shapes and their measures.
- Find the volume of each and subtract.
- Consider the units used.

Example;

Calculate the volume of concrete used to make the hollow pipe below.



Volume of the whole figure

V = πr^2h

V= $\frac{22}{\cancel{7}_{1}} \times \cancel{14}^{2}$cm x 14cm x 40cm

V= 44cm x 14cm x 40cm

V= 24640cm^3

Volume of the hollow part

V = πr^2h

V= $\frac{22}{\cancel{7}_{1}} \times$ 7cm x $\cancel{7}^{1}$cm x 40cm

V= 154cm^2 x 40cm

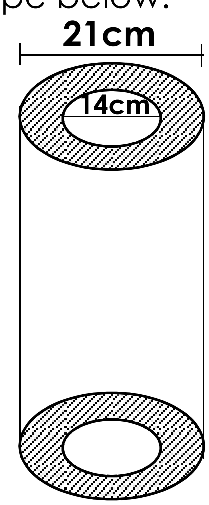
V= 6160cm^3

Volume of concrete use.

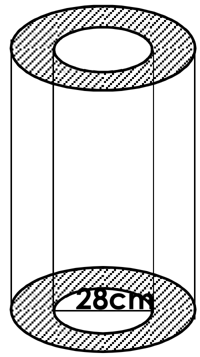
$$\begin{array}{r} 24640\ cm^3 \\ -\ \ 6160\ cm^3 \\ \hline 18480\ cm^3 \\ \hline \end{array}$$

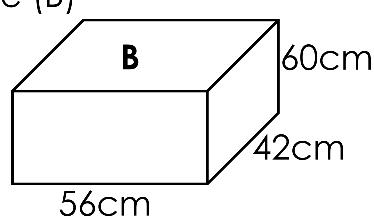
Activity;

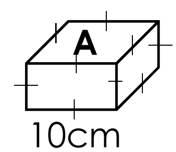
Calculate the volume of metal used to make the hollow pipe below.



</td>
</tr>
</table>

<table>
<tr><td></td><td></td><td>2. The diagram below shows hollow concrete cylinder.


If the diameter of the whole figure is two times that of the hollow (space), find the concrete used to make the cylinder.</td></tr>
<tr><td>Measurements</td><td>Length, Mass and capacity</td><td>Lesson 46
Packing boxes / cubes into bigger boxes / cuboids
-Find the number of boxes packed along the length by dividing the lengths. Do the same along the width and height.
- To find the number of boxes packed in the box, multiply boxes along length x along width x along height
Example
How many cubes of size (A) can be packed in the box of size (B)




Along the Length
$\frac{\text{Length}}{\text{Length}}$
5 rem 6
$\frac{\cancel{56cm}}{\cancel{10cm}_1}$ = 5 cubes

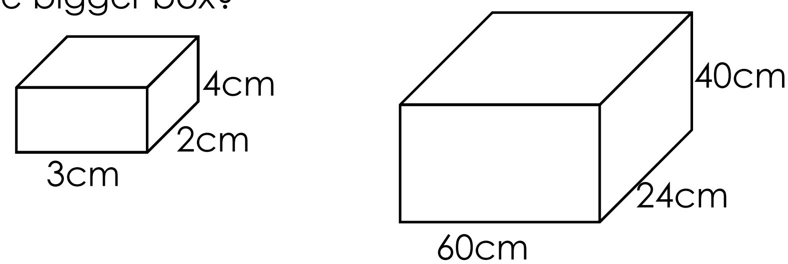
Along the Width
$\frac{\text{Width}}{\text{width}}$
4 rem 2
$\frac{\cancel{42cm}}{\cancel{10cm}_1}$ = 4 cubes

Along the Height
$\frac{\text{Height}}{\text{Height}}$
6
$\frac{\cancel{60cm}}{\cancel{10cm}_1}$ = 6 cubes

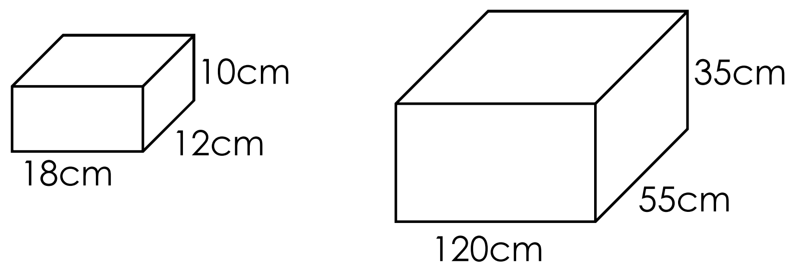
Total number of cubes
5 x 4 x 6
6 x 20
120cubes</td></tr>
</table>

<table>
<tr>
<td></td>
<td></td>
<td>

Activity
1.Find the maximum number of small cuboids that will fill the bigger box?



2. Boxes of size A are packed in box B.

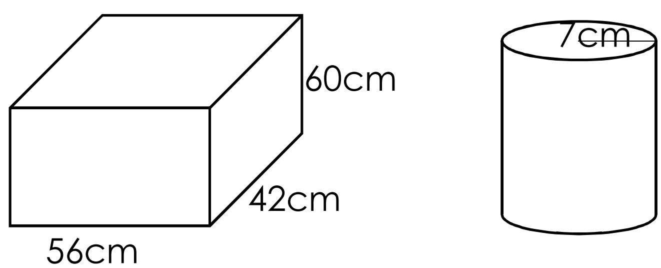


a) Find the number of boxes of size A that can be packed in box B.
b) Find the volume of the space left after packing boxes of size A in box B.

</td>
</tr>
<tr>
<td>Measurements</td>
<td>Length, Mass and Capacity</td>
<td>

Lesson 47
Packing cylinders in boxes
- Along the length, divide the length of the box by diameter.
- Along the width, divide the width of the box by diameter
- Along the height, divide the height of the box by the height
- To get space left, subtract volume of all cylinders from the volume of the box.

Examples
Cylindrical tins of radius 7cm and height 10cm were packed in the box shown below.



</td>
</tr>
</table>

a) How many tins were packed in the box?

Along Length

$\dfrac{\overset{4}{\cancel{56cm}}}{\underset{1}{\cancel{14cm}}}$ = 4 tins

Along width

$\dfrac{\overset{3}{\cancel{42cm}}}{\underset{1}{\cancel{14cm}}}$ = 3 tins

Along height

$\dfrac{\overset{\textbf{4 rem 4}}{\cancel{60cm}}}{\underset{1}{\cancel{14cm}}}$ = 4 layers

Total number of tins

4 x 3 x 4

48 tins

b) Calculate the volume of space left un covered after packing.

Volume of box.

V = 56cm x 42cm x 60cm

V = 141120cm^3

Volume of 48 tins

V = πr^2H x 48

V= $\frac{22}{7}$ x 7cm x 7cm x 10cm x 48

V=1540cm^3 x 48

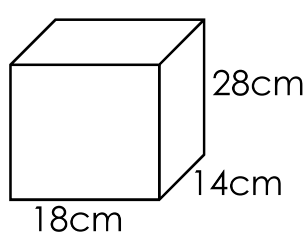
V=73920cm^3

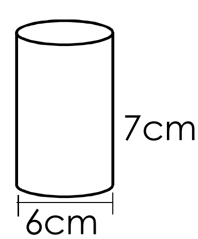
Volume of space left

$$\begin{array}{r} 141120 \text{ cm}^3 \\ -73920 \text{ cm}^3 \\ \hline 67200 \text{ cm}^3 \\ \hline \end{array}$$

Activity;

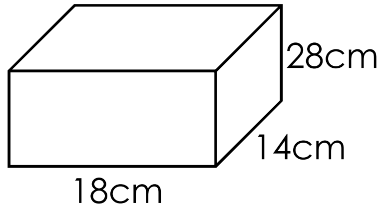
1. Tins of milk of diameter 6cm and height 7cm are packed in a box measuring 18cm by 14cm by 28cm.

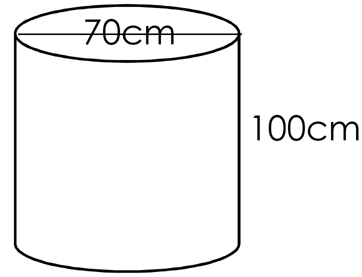




a) How many tins can be packed on the first layer?

b) How many layers of tine were packed in the box?
c) Calculate the volume of space left after packing.
2.





If containers of size B were packed in box A, how many containers of size B can be packed in A?

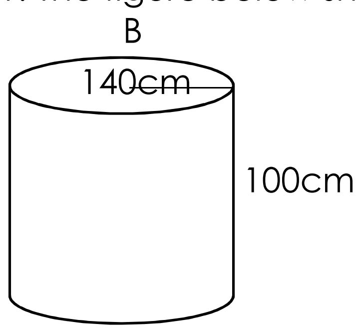
Lesson 48

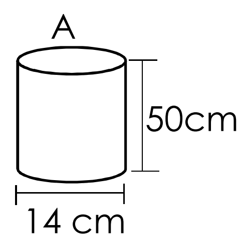
<u>Application of packing</u>

- Find the volume of the bigger figure.
- Find the volume of the smaller figure.
- Find the number of full containers by dividing the volume of the bigger figure by volume of smaller figure(s)
-Incase there is a remainder ignore and take only whole number (quotient)

Examples;

1. The figure below shows different containers.





How many full containers of size A can be used to fill container be with water. (Take = $\frac{22}{7}$)

Volume of B

$V = \frac{22}{\cancel{7}_{1}} \times \overset{20}{\cancel{140}}cm \times 140cm \times 100cm$

$V = 440cm \times 14000cm^2$

$V = 6160000cm^3$

Volume of

$V = \frac{\cancel{22}^{2^{1}}}{\cancel{7}_{1}} \times \frac{\cancel{14}cm}{\cancel{2}_{1}} \times \frac{\cancel{14}^{7}cm}{\cancel{2}_{1}} \times 50cm$

$V = 154cm^2 \times 50cm$

$V = 7700cm^3$

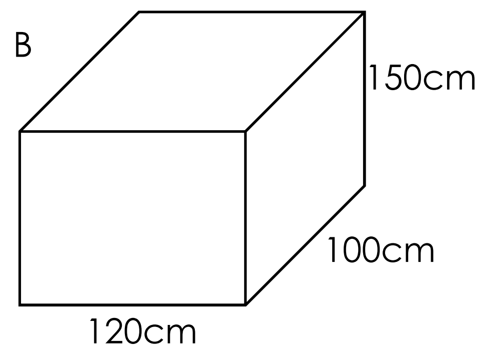
No. of full containers

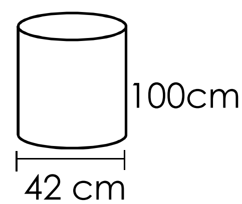
$\frac{\cancel{6160000cm^3}^{\cancel{5600}\ 800}}{\cancel{7700cm^3}_{\cancel{7}\ 1}}$

800 full containers

Activity;

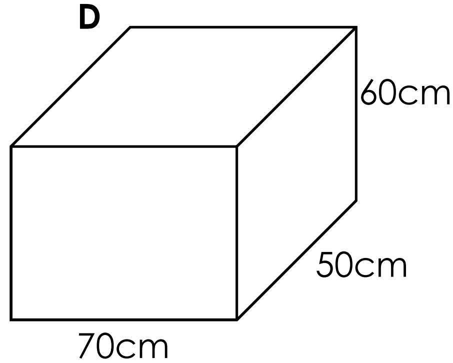
1. Mr. Owino used the containers below during an experiment in the lesson.



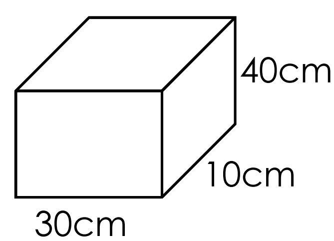


a) Find the volume of the cylindrical tin.
b) How many full tins of size A can be used to fill tin B.
2. Joseph used two containers below in an experiment.

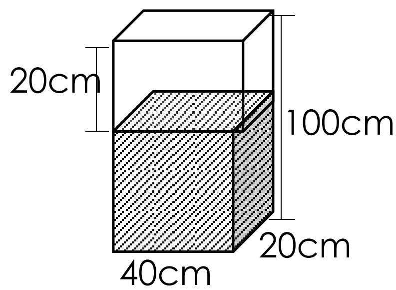
D



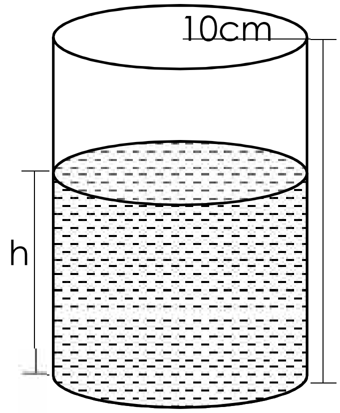
C



a) Find the number of full containers of size C that can be used to fill container D.

Measurements	Length, Mass and Capacity	**Lesson 49** **Application of capacity** - Identify the kind of figure given and use the formula for finding its volume. - Find capacity by dividing volume by $1000cm^3$ - Multiply capacity by $1000cm^3$ to get volume. **Example;** 1. Given the tank,  a) How many litres of water are in the tank? $V = L \times W \times H$ $V = 40cm \times 20cm \times 80cm$ $V = 64000cm^3$ Capacity = $\frac{64\cancel{000cm^3}}{1\cancel{000cm^3}}$ = 64litres b) How many litres of water are needed to fill the tank? $V = L \times W \times H$ $V = 40cm \times 20cm \times 20cm$ $V = 16000cm^3$ Capacity = $\frac{16\cancel{000cm^3}}{1\cancel{000cm^3}}$ = 16 litres

2. Study the figure below carefully:



If the water in the tank is 6.28L, find the value of h.
(π = 3.14)

$1\,L = 1000cm^3$

$Volume = 6.28 \times 1000cm^3$

$= \left(\frac{628}{1\cancel{00}} \times 10\cancel{00}\right)cm^3$

$= 6280cm^3$

$Volume = \pi r^2 h$

$6280cm^3 = 3.14 \times 10cm \times 10cm \times h$

$6280cm^3 = \frac{314}{1\cancel{00}} \times 1\cancel{0}cm \times 1\cancel{0}cm \times h$

$6280cm^3 = 314cm^3 \times h$

$$\frac{\overset{20}{\cancel{6280}}cm \times \overset{1}{\cancel{cm}} \times \overset{1}{\cancel{cm}}}{\underset{1}{\cancel{314cm}} \times \underset{1}{\cancel{cm}}} = \frac{\overset{1}{\cancel{314cm}} \times \overset{1}{\cancel{cm}} \times \overset{1}{\cancel{cm}} \times h}{\underset{1}{\cancel{314cm}} \times \underset{1}{\cancel{cm}}}$$

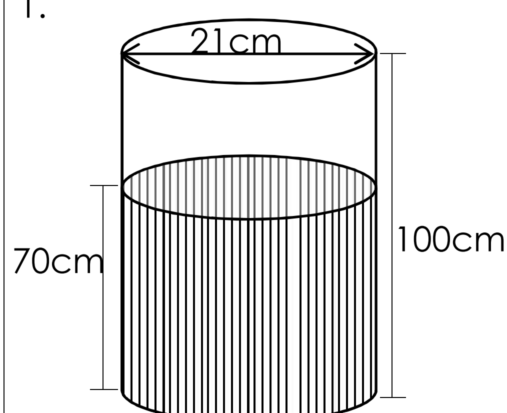
$20cm = h$

$h = 20cm$

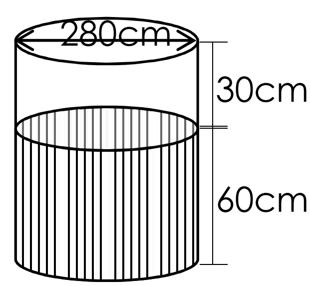
Activity;

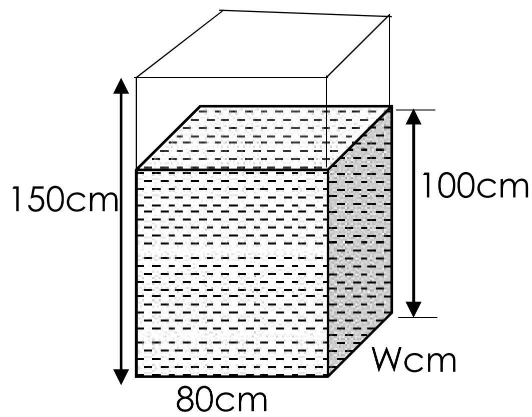
Calculate the amount of water needed to fill the tanks shown.

1.



2.



		3. Study the figure below carefully:  a) If the water in the tank above is 3.2 litres, find the value of w. b) Find the capacity of water remaining to fill the tank.

#CREATIVE PRINTERS

PRIMARY SEVEN NUMERACY LESSON NOTES (Theme based)

Theme	Topic / Theme & class	Teachable unit / deliverable lesson
Numeracy	**Operation on whole numbers**	**Lesson 1** **Addition of numbers and its application.** - Identify the values in the word problem. - Arrange the numbers vertically in accordance to place values. - Add starting from the ones place value. - Regroup if the sum got has more than one digit to the next place value. **Example;** 11.Add: 8736941 + 3617072 $\begin{array}{r} 1\ \ \ 1\ 1\ 1\ \ \ \ \\ 8\,7\,3\,6\,9\,4\,1 \\ +\ 3\,6\,1\,7\,0\,7\,2 \\ \hline 1\,2\,3\,5\,4\,0\,1\,3 \\ \hline \end{array}$ 2. Katamba had 436787kg of maize and Kalungi had 64375kg. How many kilograms do they have altogether? $\begin{array}{r} 1\,1\,1\,1\,1\ \ \ \ \ \ \ \ \\ 4\,3\,6\,7\,8\,5\text{ kg} \\ +\ \ 6\,4\,3\,7\,5\text{ kg} \\ \hline 5\,0\,1\,1\,6\,0\text{ kg} \\ \hline \end{array}$ 3. Paul's farm has 420 goats, 349 sheep 128 more chicken than sheep. How many animals are on the farm? **Number of chicken.** $\begin{array}{r} 1\ \ \\ 3\,4\,9 \\ +\ 1\,2\,8 \\ \hline 4\,7\,7 \\ \hline \end{array}$ **Number of animals.** $\begin{array}{r} 1\,1\ \ \\ 4\,2\,0 \\ +\ 3\,4\,9 \\ 4\,7\,7 \\ \hline 1\,2\,4\,6 \\ \hline \end{array}$ 1246 animals.

<table>
<tr><td></td><td></td><td>Activity
1. Add: 6467999 + 147875
2. John had sh. 6739000, Kabuye had sh. 5764600 and Kintu had 576900. How much money did they have altogether?
3. Find the sum of 47830 and 154670
4. Mpaata sold 4210 mangoes on Monday, 5098 on Tuesday, Four hundred four on Wednesday and 390 more mangoes on Thursday than Wednesday. How many mangoes did he sell altogether?</td></tr>
<tr><td>Numeracy</td><td>Operation on whole numbers</td><td>Lesson 2
Subtraction of numbers and its application
- Identify the quantities in the question to be subtracted.
- Other words that call for subtraction are;
Difference, rang, take away, decrease, remain
- Arrange the numbers according to place value.
Examples (In case of borrowing it is done in tens)

Subtract: 5737340 – 1892016

$$\begin{array}{r} \cancel{5}^{4}\ \cancel{7}^{16}\ {}^{1}3\ 7\ 3\ \cancel{4}^{3}\ {}^{1}0 \\ -\ 1\ 8\ 9\ 2\ 0\ 1\ 6 \\ \hline 3\ 8\ 4\ 5\ 3\ 2\ 4 \\ \hline \end{array}$$
2. A business man had sh. 4675000 and withdrew sh. 1980900. How much money did he remain within the bank?

$$\begin{array}{r} \text{Sh. } \cancel{4}^{3}\,\cancel{6}^{15}\,{}^{1}7\,\cancel{5}^{4}\,0\,{}^{1}0\,0 \\ -\quad 1\,9\,8\,0\,9\,0\,0 \\ \hline \text{Sh. } 2\,6\,9\,4\,1\,0\,0 \\ \hline \end{array}$$
3. Find the range of 40092 and 9991
Range = Hv – Lv

$$\begin{array}{r} \cancel{4}^{3}\,\cancel{\cancel{0}^{10}}^{9}\,\cancel{0}^{10}\,\cancel{9}^{8}\,2 \\ -\ 9\,9\,9\,1 \\ \hline 3\,0\,1\,0\,1 \\ \hline \end{array}$$
Activity;
1. Subtract 1000700 – 496463
2. Subtract 576404 from 830769.
3. Kasoba had 974372 hens. He sold off 98423 hens. How many hens remained?</td></tr>
</table>

		4. The number of children at Namungodi P/S was 2091 last year, if this number dropped by 204 this year, how many children are in the school now?
Numeracy	**Operation on whole numbers**	**Lesson 3** **Multiplication of numbers and its application** - Identify the values to be multiplied from the question. - Arrange the values vertically with the sign of multiplication. - Multiply the numbers beginning with digits in place value of ones. **Examples** Workout: 3747 x 45 3 7 4 7 x 4 5 1 7 7 3 5 +1 4 9 8 8 1 6 7 6 1 5 2. A school has 18 classrooms and each class has 65 pupils. How many pupils are in the school? (18 x 65) pupils 1 8 x 6 5 9 0 +1 0 8 1 1 7 0 pupils **Activity;** 1. Multiply: 4354 x 27 2. What is the product of 843 and 124? 3. During the covid-19 pandemic, each village was provided with 4645 masks. If there are 497villages, how many masks were given out? 4. Ewalu bought 942 box files for the school at sh. 5500 each. How much money did he pay for all the box files?
Numeracy	**Operation on whole numbers**	**Lesson 4** **Division of numbers and its application** - Identify the values in the question - Use long division to workout

		1. Divide: 90672 by 12 7556 12 | 90672 7 x 12 = 84 66 5 x 12 = 60 67 5x12 = 60 6x12 = 72 - 72 - - 2. The inspector of schools distributed 5760 books to 18 schools. How many books did each school get? 3 2 0 18) 5 7 6 0 3x8 = 5 4 3 6 2x18 = 3 6 0 0x18 = 0 - 3 2 0 books **Activity;** 1. A coffee dealer paid sh. 578970 as commission to his 18 workers. How much money did each worker get? 2. The RDC of a certain district used sh. 38 237500 to buy bicycles. If he bought 115 bicycles, how much money did he pay for each bicycle? 3. Find the quotient of 2013 2013 and 2013. 4. A presidential aspirant gave sh. 240,500 to 13 people to share equally. How much did each get? 5. Find the quotient of 68175 and 15.
Numeracy	**Operations on whole numbers**	**Lesson 5** **Association property, commutative property and Distributive property.** **Associative property** 1. This property states that the grouping of numbers in addition and multiplication does not alter (change) the answer. **Examples;** 1. (a+b) + c = a + (b + c)

<table>
<tr>
<td></td>
<td></td>
<td>2. (4 x 5)x 6 = 4 x (5 x 6)
2. (10 + 17) + 8 = 10 + (17 + 8)
Commutative property.
This property states that the order in which numbers are added or multiplied does not change the answer.
4 x 3 = 3 x 4
b x c = c x b
6 + 2 = 2 + 6
Distributive property
-Recognize the common factor (number) used.
- Pullout the common number (factor) and operate using the sign between brackets.
- Simplify the answer to obtain the product or quotient.
- When common operation sign in brackets is division, then one of the common figures becomes the divisor.

Examples;
1. Work out; (15 x 64) + (36 x 15) using the distributive property.
(15x64) + (36 x 15)
15(64 + 36)
15 (100)
15 x 100
1500

2. Use the distributive law to workout;
(175 ÷ 13) – (84 ÷ 13)
(175 – 84) ÷ 13
91 ÷ 13
7</td>
</tr>
<tr>
<td>Numeracy</td>
<td>Operations on whole numbers</td>
<td>Lesson 6
Expanding whole numbers using indices.
-Identify the place values of digits.
-Relate the digits in the different place values to the power numbers.
Multiply each digit by its power number.
Examples;
Expand 43752 using indices.

<table>
<tr><td>4</td><td>3</td><td>7</td><td>5</td><td>2</td></tr>
<tr><td>10^4</td><td>10^3</td><td>10^2</td><td>10^1</td><td>10^0</td></tr>
</table></td>
</tr>
</table>

<table>
<tr>
<td></td>
<td></td>
<td>
$(4 \times 10^4) + (3 \times 10^0) + (7 \times 10^2) + (5 \times 10^1) + (2 \times 10^0)$

2. Write 265401 in expanded form using powers of ten.
<table>
<tr><td>2</td><td>6</td><td>5</td><td>4</td><td>0</td><td>1</td></tr>
<tr><td>10^5</td><td>10^4</td><td>10^3</td><td>10^2</td><td>10^1</td><td>10^0</td></tr>
</table>

$(2 \times 10^5) + (6 \times 10^4) + (5 \times 10^3) + (4 \times 10^2) + (6 \times 10^1) + (1 \times 10^0)$
Activity;
Expand the following using indices.
a) 94056 b) 70043 c) 137492 d) 5074
. Express the following in expanded form using powers of ten.
a) 891376
b) 200,0001
</td>
</tr>
<tr>
<td>Numeracy</td>
<td>Operation on whole numbers</td>
<td>
Lesson 7
Writing expanded numbers in short.
- Simplify the powers and get values of different digits.
- Add the value to obtain a single number.
Examples;
1. Write the number whose expanded form is;
$(4 \times 10^4) + (8 \times 10^2) + (9 \times 10^0)$
$(4 \times 10000) + (8 \times 100) + (9 \times 10)$
40000 + 800 + 9

$$\begin{array}{r} 40000 \\ 800 \\ +\quad 9 \\ \hline 40809 \\ \hline \end{array}$$

2. Find the number that has been expanded to give;
$(3 \times 10^4) + (6 \times 10^2) + (9 \times 10^0)$
$3 \times 10 \times 10 \times 10 \times 10 + 6 \times 10 \times 10 + 9 \times 1$
$3 \times 10{,}000 + 6 \times 100 + 9$
30,000 + 600 + 9

$$\begin{array}{r} 30{,}000 \\ 600 \\ 9 \\ \hline 30{,}609 \\ \hline \end{array}$$
</td>
</tr>
</table>

		Activity; Write the numbers below in short. a) $(4x10^4) + (3x10^3) + (7x10^1)$ b) $(3x10^3) + (9 \times 10^o)$ c) $(7x10^5) + (2x10^4) + (6 \times 10^2) + (8 \times 10^o)$ 2. Write the numbers whose expanded form is given below. a) $(1 \times 10^5) + (9 \times 10^3)$ b) $(6 \times 10^6) + (3 \times 10^o)$
Numeracy	**Operations on whole numbers**	**Lesson 8** **Scientific notation (Standard form)** -This is the shortest way of writing large numbers. - When writing a whole number in scientific notation; i) Divide the number by 10 until one counting number (1 – 9) is left on the left. ii) Count the number of times 10 has divided the number and the number of times divided is the index. iii) If the decimal point is to move to the right, we multiply and the index becomes a negative **Example;** 1. Write 4377 in scientific notation; 4 3 7 7. ÷ 10 4 3 7. 7 ÷ 10 4 3 .7 7 ÷ 10 4 .3 7 7 x 10^3 2. Express 0.000493 in scientific notation 0.0 0 0 4 9 3 x 10 0 0.0 0 4 9 3 x 10 0 0 0.0 4 9 3 x 10 0 0 0 0 .4 9 3 x 10 4 .9 3 x 10^{-4}

		Activity; Express the following in standard form. 1. 369400 2. 1497.36 3. 0.0003679 4. 1240.06 5. 0.000374
Numeracy	**Operations on whole numbers**	**Lesson 9** **Changing from standard form to ordinary form** - Express the decimal into a fraction - Simplify the power number. - If the index is a negative, turn it into a positive by using the reciprocal of the base. **Examples** 1. Express 9.73 x 10^5 in ordinary form $\frac{973}{100} \times 100000$ $\frac{973}{1\cancel{00}} \times 1000\cancel{00}$ 973 × 1000 973000 2. Write the number whose standard form is 4.39 x 10^{-3} $\frac{439}{100} \times \frac{1}{10^3}$ | $\frac{439}{100} \times \frac{1}{1000}$ | $\frac{439}{100000}$ | 0.00439 **Activity** Express the following in ordinary form. a) 9.35 x 10^{-2} b) 1.704 x 10^5 2. Find the number whose standard form is given. a) 4.06 x 10^{-1} b) 3.96 x 10^6 c) 4.358 x 10^2.
Numeracy	**Operation on whole numbers**	**Lesson 10** **Writing prime factors of whole numbers.** - We find prime factors by prime factorizing using the ladder method or factor tree. - We use the prime numbers i.e 2 , 3 , 5 , 7 , etc to prime factorise - We express the factors in;

a) Subscript form (set notation)
b) power form
c) Multiplication (production form)

Example;

1. Write the prime factors of 24.

$$\begin{array}{r|l|} 2 & 24 \\ \hline 2 & 12 \\ \hline 2 & 6 \\ \hline 3 & 3 \\ \hline & 1 \end{array}$$

24 = 2 x 2 x 2 x 3 (product form)

OR

$F_{24} = \{2_1 , 2_2 , 2_3 , 3_1\}$ (subscript / set notation)

$24 = 2^3 \times 3^1$

2. Write 36 as a product of its prime factors.

$$\begin{array}{r|l|} 2 & 36 \\ \hline 2 & 18 \\ \hline 3 & 9 \\ \hline 3 & 3 \\ \hline & 1 \end{array}$$

36 = 2 x 2 x 3 x 3

Activity

1. Express 108 as a product of its prime factors.
2. Prime factorise 72 and give your answer in set notation
3. Prime factorise 256 and give you answer in power form.
4. Prime factorise 54 and state your answer in subscript form.

Lesson 11

<u>Application of prime factorization</u>.

- Identify the prime factors.
- Multiply them to get the prime factorized number if needed.

Examples;

1. Given that $X = \{2_1 , 2_2 , 3_1 , 7_1\}$. Find the value of x.

X = 2 x 2 x 3 x 7
X = 4 x 21
X = 84

2. If F42 = {2_1, y, 7}. Find the value of y.
- To find the missing prime factor, we divide the given number by the product of the prime factors given.

$$\frac{\cancel{42}^{\cancel{21}^{3}}}{\cancel{2}_1 \times \cancel{7}_1} = \frac{\cancel{2}^1 \times y \times \cancel{7}^1}{\cancel{2}_1 \times \cancel{7}_1}$$

$3 = y$

$y = 3$

Finding LCM and GCF given the prime factors.

-To find G.C.F, identify the common factors and find product.

-To find L C M, identify all the common factors and multiply them once by the other factors.(find the product of the factors that form the union set)

Examples

1. Given that $F_{24} = \{2_1, 2_2, 2_3, 3_1\}$, $F_P = \{2_1, 2_2, 3_1, 3_2\}$

   a) Find the value of P.

   $P = 2 \times 2 \times 3 \times 3$

   $P = 4 \times 9$

   $P = 36$

   b) Find the LCM of 24 and P.

   $F_{24} \cup F_P = \{2_1, 2_2, 2_3, 3_1, 3_2\}$

   L.C.M $= 2 \times 2 \times 2 \times 3 \times 3$

   L.C.M $= 8 \times 9$

   L.C.M $= 72$

2. Given that $48 = 2^4 \times 3^1$ and $K = 2^2 \times 3^2$. Use the prime factors to find the LCM of 48 and K.

$2 \times 2 \times 2 \times 2 \times 3$

$2 \times 2 \times 3 \times 3$

The factors with the rings are common factors that are to be multiplied once.

$2 \times 2 \times 2 \times 2 \times 3 \times 3$

$8 \times 2 \times 9$

16×9

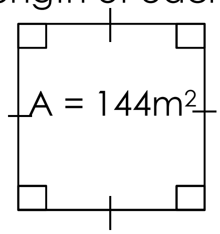
144

		Activity; 1. Given that $F_{72} = \{2_1,2_2,2_3,3_1,y\}$ and $F_K = \{2_1,2_2,3_1,3_2,3_3\}$ a) Find the value of y. b) Find the value of K. c) Find the LCM of 72 and K. d) Find the GCF of 72 and K. 2. Given that; $F_{18} = 2 \times 3^2$ and $F_{24} = 2^3 \times 3^1$ a) Find the LCM of 18 and 24 using the above factors. b) Work out the GCF of 18 and 24 using the above factors.
Numeracy	**Operation on whole numbers**	**Lesson 12** **Squares and square roots** - We obtain the square of a number by multiplying it by itself. - We find the square roots by prime factorizing the given number using prime numbers. **Examples;** 1.Find the square root of 196 $\sqrt{196}$ = $\begin{array}{c\|r} 2 & 196 \\ \hline 2 & 98 \\ \hline 7 & 49 \\ \hline 7 & 7 \\ \hline & 1 \end{array}$ $\sqrt{196} = \sqrt{(\cancel{2} \times 2) \times (\cancel{7} \times 7)}$ $\sqrt{196} = 2 \times 7$ $\sqrt{196} = 14$ 2. Find the square of 16. 16 x 16 $\begin{array}{r} 16 \\ \times 16 \\ \hline 96 \\ +16 \\ \hline 256 \\ \hline \end{array}$ **Activity;** Find the square root of the following numbers a) 144 b) 2025 c) 729 d) 256 2. Find the squares of the following. a) 9 b) 36 c) 19
Numeracy	**Operations on whole numbers**	**Lesson 13** **Application of square roots** - Identify the area given

- Find the length of the side by finding the square root by prime factorization.

Examples;

1. The area of a square garden is $144m^2$. Calculate the length of each side.



Area = s x s

$\sqrt{144m^2} = \sqrt{s^2}$

2	$144m^2$
2	$72m^2$
2	$36m^2$
2	$18m^2$
3	$9m^2$
3	$3m^2$
m	$1m^2$
m	1m
	1

$\sqrt{(2\times\cancel{2}) \times (2\times\cancel{2}) \times (3\times\cancel{3}) \times (m \times \cancel{m})} = s$

$2 \times 2 \times 3 \times m = s$

$12m = s$

The side is 12metres

2. The area of a square book is 64cm2. Find the length of its side.

$S2 = A$

$\sqrt{s \times s} = \sqrt{64cm^2}$

S =

2	$64cm^2$
2	$32cm^2$
2	$16cm^2$
2	$8cm^2$
2	$4cm^2$
2	$2cm^2$
cm	$1cm^2$
cm	cm
	1

		$S = \sqrt{(\cancel{2} \times 2) \times (\cancel{2} \times 2) \times (\cancel{2} \times 2) \times (\cancel{cm} \times cm)}$ S = 2 x 2 x 2 x cm S = 8cm **Activity;** 1. The area of a square is 625cm^2. Find its perimeter. 2. A cube has a total surface area of 486cm^2. Find the length of each side. 3. Work out the length of a square whose area is 2.25m^2. 4. Given that $P^2 = 625$. Find the value of P.

THEME	TOPIC	TEACHABLE UNIT / DELIVERABLE LESSON
ALGEBRA	ALGEBRA	**Lesson One** **Read and Spell** *power number, exponents ,indices, base, component* **<u>Algebraic expressions involving law of indices in Multiplication</u>** -When multiplying power numbers of the same base, maintain the base, and add the exponents / indices -Components of power numbers include base, exponent e.g. **Examples** 1. Simplify X^m X X^n $X^m \times X^n = X^{m+n}$ 2. Evaluate: m^3 X m^4 $m^3Xm^4 = m^{3+4}$ m^7 **OR** m^3Xm^4 = m X m X m X m X m X m X m = m^7 m^3 X m^4 = m X m X m X m X m X m X m m^3 X m^4 = m^7 3. **3**P^3 x **5**P^2 (**3** x **5)** P^{3+2} (**15)**P^{3+2} 15 x P^5 $15P^5$ **NOTE:** We can also multiply the given base of the power number as many times as shown by the exponent to simplify the given power numbers. **Activity** 1. Simplify: K^6 X K^1 2. Simplify n X n^3 3. Find the product of 4^k and 4^{3k} 4. Simplify: 3^p X 3^4 5. Simplify Y^nX Y^1 X Y^n 6. $10q^2$ x $2q^4$
Algebra	Algebra	**Lesson 2** **<u>Algebraic expressions involving law of indices in division</u>** -When dividing power numbers of the same base, maintain the base and subtract the exponents / indices

		Example 1. Simplify: $n^2 \div n^5$ n^{2-5} n^{-3} 2. Simplify: $y^m \div y^n$ $y^m \div y^n = y^{m-n}$ $y^{(m-n)}$ **Note:** We can also expand the bases of the power numbers as many times as the exponent but in fraction form to obtain the simplified quantity required. e.g Simplify: $n^2 \div n^5$ $= \frac{\cancel{n}^1 \times \cancel{n}^1}{\cancel{n}_1 \times \cancel{n}_1 \times n \times n \times n} = \frac{1 \times 1}{1 \times n \times n \times n} = \frac{1}{n^3} = n^{-3}$ 3. Simplify: $6^{5p} \div 6^{7p}$ $6^{5p} \div 6^{7p} = 6^{5p - 7p}$ 6^{-2p} **Activity** 1) Simplify: $3^{3a} \div 3^{2a}$ 2. Simplify $P^{2k} \div P^k$ 3). What is the quotient of $12^r \div 12^{6r}$ respectively 4). Workout: $g^6 \div g^7$ 5). Simplify $t^4 \div t \div t^{-1}$
Algebra	**Algebra**	**Lesson 3** **Algebraic expression involving index 0** **Power number with index** -Any power number with index 0 is 1 - When zero (0) is raised to index 0 is 0 $0^o = 0$ **Example 1** 1. $P^3 \div P^3 = P^{3-3}$ $\frac{P \times P \times P}{P \times P \times P} = P^0$ $\frac{1}{1} = P^0$ $1 = 1$ 2. Simplify: $P^6 \div P^6$ $= P^{6-6}$ $= P^o$ $P^o = 1$ 3. Find the value of $2P^5 \div 2P^5$ $\frac{2P^{5-5}}{2}$ $\frac{\cancel{2}P^5}{\cancel{2}\,P^5}$

<table>
<tr><td></td><td></td><td>$\frac{\cancel{2}P^o}{\cancel{2}}$ $P^5 \div P^5$
P^{5-5}
$P^o = 1$ $P^o = 1$

Activity
1. What is the value of $2^r \div 2^r$
2. Find the value of $m^7 \div m^7$
3. Workout $K^0 + 3^0 + Y^0$</td></tr>
<tr><td>Algebra</td><td>Algebra</td><td>Lesson 4
<u>Algebraic expressions involving indices on mixed operation</u>
- Identify the operation used.
- Using the law of indices simplify the numbers.
- We can also expand the base of the power numbers and simplify
Examples
1. Find the value of $K^0 + 4^3 - P^0$
$9^0 + 8^2 \quad = 1 + (4 \times 4 \times 4) - 1$
$= 1 + 64 - 1$
$65 - 1 = 64$
2. Simplify $\frac{m^2 \times m^3}{m^3 \div m^2}$
$= \frac{m^{2+3}}{m^{3-2}}$
$= \frac{m^5}{m^1}$
$= m^5 - m^1$
$= m^{5-1}$
$= m^4$
Or
$mxmxmxmxm \div \frac{(mx\cancel{m}x\cancel{m})}{\cancel{m}x\cancel{m}}$
$\frac{mxmxmxmxm}{\cancel{m}_1}$
m^4

Activity
1) Evaluate $2^3 - p^0$
2) Workout $2K^0 + 45^1$
3) Simplify $t^4 \div t^2$
4) Simplify $2^3 - Y^0 + 5^2$
5) Simplify $\frac{b \times b^3}{b^3 \div b^2}$</td></tr>
<tr><td>ALGEBRA</td><td>ALGEBRA</td><td>Lesson 5
Writing the Algebraic expressions from phrases.
- Algebraic expression comprises of the letters and numbers connected by operation signs.
- An expression does not require the equal signs or any signs of comparison.
- To simplify the expressions written.
-Identify the operation applied in the question.
-Use the operations to simplify</td></tr>
</table>

<table>
<tr>
<td></td>
<td></td>
<td>
Examples
1. Add 4 to y and multiply the result by 2
(y + 4) x 2
2(y + 4)
2. Mwenda is 6years older than Mugumia what is their total age.
<table>
<tr><td>Mugumia</td><td>Mwenda</td><td>Total</td></tr>
<tr><td>P</td><td>P+6</td><td>P+P+6</td></tr>
</table>
3. A mother is twice the age of her daughter. Find their total age.
daughter mother total
K 2K K + 2K
Total age = 3K
4. There are (K + 25) pupils in P.7 class and this is ahalf the number of pupils in P.6. How many pupils are in P.6 ?
<table>
<tr><td>P.7</td><td>P.6</td></tr>
<tr><td>(K + 25)</td><td>(K + 25) x ½</td></tr>
</table>
½ (K + 25) pupils

Activity
1. Multiply the quotient of K and P^2 by 3
2. Add 2m to the product of x and y
3. A third the sum of a and b
4. The average of 2p and 3
5. If the number of workers at VES is three quarters that of the children. Find the total number of children and workers at VES.
</td>
</tr>
<tr>
<td>Algebra</td>
<td>Algebra</td>
<td>
Lesson 6
<u>Writing algebraic expressions in words/ phrases.</u>
-Identify the operations used in the expression together with the letters or numbers.
- Follow the order of the terms in the operation using the results to write he phrase.
Examples
1. Write a + b in words.
Add b to a or sum of a and b
2. What is 2k + 4 in words form?
The sum of twice K and 4
3. Form a phrase that results to $\frac{1}{2}(p - 12)$
A half the difference of P and twelve
Activity
1. Write the expression as phrases
</td>
</tr>
</table>

		a) $\frac{3b}{4}$ c) $\frac{3k-p}{3}$ b) 2m + n d) $\frac{3k-3}{2}$ e) (2x +y) – (p + 2)
Algebra	Algebra	**Lesson 7** **Simplifying algebraic expression without power numbers.** -Identify the like terms in the expression with the signs before them -Collect the like terms with the operational signs -Uses the operations to simplify the values given **Examples** 1. Simplify 3x -6x + 7x 3x + 7x – 6x 10x – 6x 4x 2. Evaluate: 4a-2p+5a 4a +5a -2p 9a -2p 9a-2p 3. Simplify the expression 10xy -3y +2x -16xy 10xy -16xy -3y +2x -6xy -3y +2x **Activity** 1) Simplify: 7 +2a -3 +5a 2) Workout 3km -3 + 6m +m 3) Simplify: 2p –k +5p -6k 4) Write the simplified form of -3y +2 -5y =3 5) Subtract 4x -1 from 5x
Algebra	**Algebra**	**Lesson 8** **Simplifying expressions involving brackets** -Remove the applied brackets by multiplying the digits outside the brackets by every term in brackets. -Observe the integer signs involved. - Collect the like terms involved **Examples** 1) Simplify $\frac{1}{3}$ (9a + 12b) $\frac{1}{\cancel{3}} \times \cancel{9}a + \frac{1}{\cancel{3}} \times \cancel{12}\,b$ 3a + 4b 2) Subtract 4k – 2 from 3k + 6 (3k+6)-(4k-2) 3k+6-4k+2 3k -4k+6+2 -k+8 Activity

		1). Simplify: $\frac{1}{3}(6a - 9ab) + \frac{2}{3}(a - 15ab)$ 2. Work out: $\frac{1}{5}(20y - 15k)$ 3. Simplify: half of (4a-6b) plus a third of (6a-9ab) 4. Subtract $\frac{1}{9}(18t - 36pq)$ from $\frac{1}{10}(20t + 50pq)$ 5. Find the sum of 2(x – y) and (x + y)
Algebra	**Algebra**	**Lesson 9** **Simplifying algebraic expressions with indices on addition and subtraction** -Identify the like terms and index used on each term. (collect the like terms) -Maintain the exponents and operate the bases of the power numbers on addition and subtraction **Examples** 1. Simplify $2y^3 – y^3 + 3k$ $Y^3 + 3k$ 2. Simplify: $10xy^4 – 3xy^4$ $7xy^4$ 3.Simplify $2a^2 – ab - a^2b + 2ab$ $2a^2 - a^2b + 2ab – ab$ $a^2b + ab$ **Activity** 1)Simplify: $2k^3 + 2P^1 – K^3$ 2) Simplify $3x^3 + xy - x^2 – 5xy$ 3) Collect the like term in $2a^2 + P^0 – a^2 + 3$ 4) Simplify: $2b^7 - 3ab^3 + b^7 – 6ab^3$ 5) Collect like terms and simplify: $5ab^2 - 4ab – 2ab^2 – ab$
Algebra	**Algebra**	**Lesson 10** **Simplifying algebraic expressions involving powers in Multiplication and division** -Multiply the co-efficient of the terms and add the indices of the power numbers - Divide the co-efficient and subtracts the exponents of the power number -Expand the unknown as per the index given and cancels the common terms by cancelling **Examples** 1) Simplify: $4n^2 \times 3n^2$ $(4 \times 3)\ n^{2+2}$ $12n^4$ 2) Evaluate : $12y^6 \div 4y^4$ $(12 \div 4)\ y^{6 \div 4}$ $3y^2$ $\cancel{12}^3 \times \cancel{y} \times \cancel{y} \times \cancel{y} \times y \times y \times y$

		$\cancel{4} \times \cancel{y} \times y \times \cancel{y} \times \cancel{y}$ $3y^2$ **Activity** 1. Simplify $5k^3 \times 7k^4$ 2. Workout $3m^7 \times m^1 \times 4m^2$ 3. Simplify: $2n^6 \div n^3$ 4. Find the shorter value of $24k^7 \div 6k^6$ 5. Evaluate $4P^6 \div 2p^4$
Algebra	**Algebra**	**Lesson 11** **Substituting algebraic expressions with integers** - Identify the values of all unknowns in the question. - Replace the value in place of the given letter - Operates the figures according to the integer signs **Examples** 1. Given that x = 2 and y = -3 find the value of x – y 2 - -3 = 2-(-3) 2 + 3 5 i) If a = -4, b = c = -2 workout a) a(b-c) -4 (-2 - -2) -4 (-2 – (-2) -4 (-2 + 2) -4 x 0 0 b) $\frac{ab+c}{a-c}$ $\frac{(axb) + c}{a - c}$ $\frac{(-4 \times -2) + (-2)}{-4 - (-2)}$ $\frac{+8 -2}{-4 +2}$ $\frac{+6}{-2}$ -3 **Activity** 1) Given that y = -3 and k = +12, what is the value of Y – K + 2Y 2) If m = 4, n = -3 and -6 =d a) workout $\frac{m + n}{- 6 d}$ b) Find the value of $\frac{n - d}{m}$ 3. Given that m = 3n and n = -5. Find the value of n+$\frac{1}{3}m$
Algebra	**Algebra**	**Lesson 12** **Substituting algebraic expressions involving powers.** - Substitute the value of the letter in the expression given. - Multiply the figures substituted correctly **Examples** 1) If n = 2 and m = 3. Find the value of 2mn 2 x 3 2 2 x 3 x 3 6 x 3 18

		2. What is the value of $\frac{2a(b2 + 3c2)}{a + c}$ if a = 3, b = 6, 4 = c $\frac{2 \times 3 (62 + (3 \times 4\ 2)}{3 + 4}$ $\frac{6 [(6 \times 6) + (3 \times 4 \times 4)]}{7}$ $\frac{6 (36 + 48)}{7}$ $\frac{84}{7} = 12$ **Activity** 1) Given that P = 6, q = -3 and r = 4 a) Calculate the value of $2q + p^2$ b) Find the value of $q^3 \times p$ 2) If m = k = -2, y = 4 a) Workout $\frac{6k^2 + y}{y^2}$ b) solve $2y^2 – m^3$
Algebra	**Algebra**	**Lesson 13** **Subtracting algebraic expressions involving fractions** - Replace the letters used with their values given correctly with clear operations - Operates the figures using integer signs given and uses the fractional approaches. **Examples** a) If p = ½ and n = 2/5 , find the value of p + n p + n = ½ +2/5 $= \frac{(1/2 \times \cancel{10}\ 5) + (2/5 \times \cancel{10})}{10}$ $= \frac{5 + 4}{10}$ $= \frac{9}{10}$ b) If a = ½ and b = 3 Find the value of $a - \frac{1}{5}(a - \frac{1}{3})$ $\frac{1}{2} - \frac{1}{5}(\frac{1}{2} - \frac{1}{3})$ $\frac{1}{2} - \frac{1}{5}(\frac{3-2}{6})$ $\frac{1}{2} - \frac{1}{5} \times \frac{1}{6}$ $\frac{1}{2} - \frac{1}{30} = 1\frac{5-1}{30} : \frac{14}{30} = \frac{7}{15}$

		Activity a) Workout a(2b-c), if a = $\frac{2}{5}$, b = ½ and c = $\frac{3}{4}$ b) If y = $\frac{2}{9}$ and k = $\frac{3}{5}$ what is the value of $\frac{1}{3}$ $(6y - 45k)$ c) Given that P = $\frac{2}{3}$ and q = $\frac{1}{6}$ find the value of p÷ q
Algebra	**Algebra**	**Lesson 14** **Solving equations (simple equations)** - Identify the unknown in the given equation with the operation involved. - Collect the like terms (solve the equation) **Examples** 1. Solve: -2x + 5 = 15 -2x + 5 -5 = 15 -5 $\frac{\cancel{-2}x}{\cancel{-2}} = \frac{\cancel{10}^{5}}{\cancel{2}}$ X = -5 3. Solve: $2x^2 = 18$ $\frac{\cancel{2}x^2}{\cancel{2}} = \frac{\cancel{18}}{\cancel{2}}$ $\sqrt{X^2} = \sqrt{9}$ 3 | 9 3 | 3 | 1 $\sqrt{(\cancel{X} \times X)} = \sqrt{(\cancel{3} \times 3)}$ X = 3 2. Find the value of n in 6n + 6 = n+11 6n + 6 – 6 = n + 11 - 6 6n = n + 5 6n – n = n – n + 5 $\frac{\cancel{5}n}{\cancel{5}} = \frac{\cancel{5}}{\cancel{5}}$ n = 1 **Activity** 1) Solve 3a – 8 = 7 2) Find the value of 3q – 11 =7 3) Solve $P^2 – 3 = 33$ 4) Solve for m in 13 + 3m = 21 -3x 5) Solve 6 – 2p = 8
Algebra	**Algebra**	**Lesson 15** **Solving equations with fractions** - Identify the unknown and operations used in the equation. - Solve the equation by help of like collecting like terms.

Examples

1) Solve $\frac{2x}{5} + 1 = 5$

$$\frac{2x}{5} + 1 - 1 = 5 - 1$$
$$\frac{2x}{5} = 4$$
$$\frac{2x}{\cancel{5}} \times \cancel{5} = 4 \times 5$$
$$2x = 20$$
$$\frac{\cancel{2x}}{\cancel{2}} = \frac{\cancel{20}\,10}{\cancel{2}}$$
$$x = 10$$

Note: We can also use the LCD to simplify and solve fraction equation.

$$\frac{2x}{5} + 1 = 5$$
$$\frac{2x}{5} + \frac{1}{1} = \frac{5}{1}$$
LCD = 5
$$5 \times \frac{2x}{5} + \frac{1}{1} \times 5 = \frac{5}{1} \times 5$$
$$2x + 5 = 25$$
$$2x + 5 - 5 = 25 - 5$$
$$\frac{2x}{2} = \frac{20}{2}$$
$$X = 10$$

2) Evaluate: 2/9 f + 6 = 8

$$\frac{2}{9} f + 6 - 6 = 8 - 6$$
$$\frac{2}{9} f = 2$$
$$2/9 \text{ f} \times 9 = 2 \times 9$$
$$2f = 18$$
$$\frac{\cancel{2} f}{\cancel{2}} = \frac{\cancel{18}\,9}{\cancel{2}}$$
$$F = 9$$

3) Workout for the value of P in 2P/3 – P = 5

$$\frac{2P}{\cancel{3}} \times \cancel{3} - P \times 3 = 5 \times 3$$
$$2P - 3P = 15$$
$$-P = 15$$
$$(-P/-1) = -(+15/-1)$$
$$P = -15$$

		Activity 1. Solve $\frac{3y}{2} + 7 = 13$ 2. Workout the value of x in 1/6x -7 = 0 3. What is the value of n in 3y/7 – 2y = 34 4. Find the value of m in 7M – 13 – 3/13 M = 81

		Lesson 16 **Solving equations involving fractions;** **Identify the unknown.** **Find the LCD** **Multiply the LCD by all the terms given in the equation.** **Example 1** $\frac{k-1}{2} = \frac{2k+1}{3}$ LCD = 6 $6 \times (\frac{k-1}{2}) = 6 \times (\frac{2k+1}{3})$ $3(k-1) = 2(2k+1)$ $3k - 3 = 4k + 2$ $3k - 3 + 3 = 4k + 2 + 3$ $3k = 4k + 5$ $3k - 4k = 4k - 4k + 5$ $-k = 5$ $\frac{-k}{-1} = \frac{5}{-1}$ $K = -5$

Example 2

Solve: $\frac{2n + 1}{4} - \frac{n}{3} = 3$

LCD = 12

$12 \times \left(\frac{2n + 1}{4}\right) - \frac{n}{3} \times 12 = 3 \times 12$

$3(2n + 1) - 4n = 36$

$6n + 3 - 4n = 36$

$6n - 4n + 3 = 36$

$2n + 3 - 3 = 36 - 3$

$2n = 33$

$\frac{\cancel{2}^{1} n}{\cancel{2}_{1}} = \frac{\cancel{33}^{16r1}}{\cancel{2}_{1}}$

$n = 16\frac{1}{2}$

Activity:

Solve the following equations.

1. $\frac{13x - 5}{9} = \frac{11x - 8}{7}$

2. $\frac{3y - 1}{3} - \frac{y}{2} = 3$

3. $\frac{2n + 3}{5} - \frac{n-3}{3} = 2$

4. $2k - \frac{k + 1}{3} = 3$

4) Solve: $\frac{3x + 1}{4} = \frac{x + 2}{2}$

Algebra	**Algebra**	**Lesson 17** **Solving equations involving decimals** -Identify the unknown used and the chemical number. - Express the decimal number as a common fraction -Solve the equation by collection of like terms. Examples **1) Solve: 0.4p + 0.5 = 2.1** $\frac{4p}{10} + \frac{5}{10} = \frac{21}{10}$ $\frac{4p}{10} + \frac{5}{10} - \frac{5}{10} = \frac{21}{10} - \frac{5}{10}$ $\frac{4P}{10} = \frac{21-5}{10}$ $\frac{4P}{10} = \frac{16}{10}$ $\frac{4P}{10} \times 10 = \frac{16}{10} \times 10$ $4p = 16$ $\frac{\cancel{4p}}{4} = \frac{\cancel{16}}{4}$ $p = 4$ **2) Find the value of k in 0.3k – 5 = 0.5 k + 3** $\frac{3k}{10} - 5 = \frac{5k}{10} + 3$ $\frac{3k}{10} = \frac{5k}{10} + 8$ $\frac{3k}{10} - 5 + 5 = \frac{5k}{10} + 3 + 5$ $\frac{3k}{10} - \frac{5k}{10} = \frac{5k}{10} - \frac{5k}{10} + 8$ $\frac{3k - 5k}{10} = \frac{5k - 5k}{10} + 8$ $\frac{-2k}{10} = 8$ $\frac{-2k}{\cancel{10}} \times \cancel{10} = 8 \times 10$ $\frac{-2k}{2} = 8 \times 10$ $(\frac{\cancel{-2}k}{\cancel{-2}}) = (\frac{\cancel{80}\ 40}{\cancel{-2}})$ $K = 40$

Activity

1) Find the value of n in 0.4 t – 0.8 = 2.4

2) Solve for x in 4x + 0.5 – 0.2x = 8.1

3) If the sum of 0.5 t and 0.4 t is 2.9 Find the value of t

4) Workout for the value of p in $\frac{2p}{5} - 0.6 = 4.8 + 0.2$

Algebra	Algebra	Lesson 18

Lesson 18

Solving equations involving finding square roots

-Use the LCM to multiply on each term

-Find the square root for the terms

1) **Find the value of P in ½ p² = 8**

$$\frac{P^2}{2} = 8$$

$$\frac{P^2}{\cancel{2}} \times \cancel{2} = 8 \times 2$$

$$P^2 = 16$$

$$\sqrt{P^2} = \sqrt{16}$$

2	16
2	8
2	4
2	2
	1

$$\sqrt{\cancel{P} \times P} = \sqrt{(\cancel{2} \times 2) \times (\cancel{2} \times 2)}$$

$$P = 2 \times 2$$

$$P = 4$$

2) Solve for X in $\frac{3x^2}{9} = 3$

$$\frac{3x^2}{9} \times 9 = 3 \times 9$$

$$3x^2 = 27$$

$$\frac{\cancel{3}x^2}{3} = \frac{\cancel{27}\ 9}{\cancel{3}}$$

$$\sqrt{X^2} \qquad \sqrt{9}$$

3	9
3	3
	1

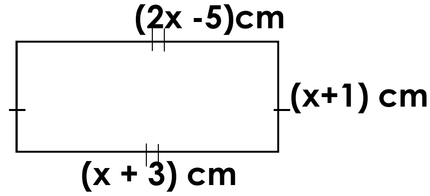
$\sqrt{}$ $\sqrt{}$

		X^2 = 9 X x X = 3 x 3 **X = 3** Activity 1**. Solve 1/9 x ^{2} = 4** **2. Workout for the value of y in (1/13) y^2 – 4 = 48** **3. Given the equation ¾)m^2 + 2 = 14, find the value of m** **4. If 4 – 1/6 x2 = 28 what is the value of x.** **5. Solve 4(x^2 – 1) = 21**
Algebra	**Algebra**	**Lesson 18** **Solving equations involving brackets** - Identify the terms in the equation and their operation. - Remove the brackets by multiplying every term by the figure outside the brackets - Solve the equation using collection of like terms. **Examples** 1) Solve: 2(3x – 1) -4(x – 1) = 4 6x – 2 – 4x + 4 = 4 6x – 4x + 4 – 2 = 4 2x + 2 = 4 2x + 2 – 2 = 4 – 2 $\frac{\cancel{2}x}{\cancel{2}} = \frac{\cancel{2}}{\cancel{2}}$ X = 1 2) Find the value of y in the equation 3(y – 1) -3(-3 – y) = 0 3y – 3 + 9 + 3y = 0 3y + 3y + 9 – 3 = 0 6y + 6 = 0 6y + 6 – 6 = 0 – 6 6y = -6 $\frac{\cancel{6}y}{\cancel{6}} = \frac{\cancel{-6}}{\cancel{6}}$ Y = -1 3) Solve: 3(2x – 2) = 2(x – 9) 6x – 6 = 2x – 18 6x – 6 + 6 = 2x – 18 + 6 6x = 2x – 12 6x – 2x = 2x – 2x -12 4x = -12 $\frac{\cancel{4}x}{\cancel{4}} = \frac{\cancel{12}\ 3}{\cancel{4}}$ X = -3 Activity 1. Solve: 5(m + 4) = 30

2. Workout for the value of $7(3x – 2) = 50$
3. Find the value of n in $3(3n – 1) – 6(n – 2) = 24$
4. Given that $4(3y – 2) – 5(x – 3) = 28$
What is the value of y
5. Solve $6(9x – 2) = 3(2x – 5)$

Lesson 20
Solving equations formed polygons
-Identify the polygon and its properties
-Identify the unknown and the units used on the polygon
- Form the equation using the terms on the sides which are equal
-Solve the equation.

Examples
Use the diagram below to answer the questions that follow:

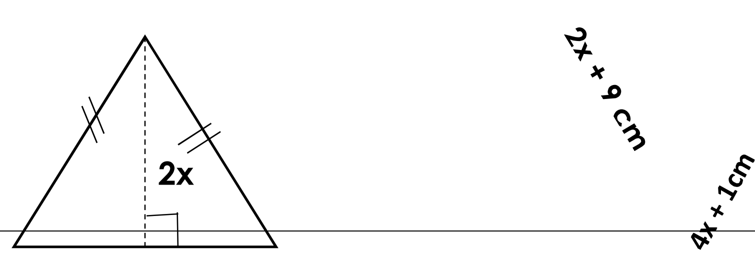


a) Find the value of x?

$$\frac{(2x - 5)\cancel{cm}}{\cancel{cm}} = \frac{(x + 3)\cancel{cm}}{\cancel{cm}}$$
$$2x – 5 = x + 3$$
$$2x – 5 + 5 = x + 3 + 5$$
$$2x = x + 8$$
$$2x – x = x – x + 8$$
$$X = 8$$

b) Workout the area of the figure
Length = (2 x 8) – 5) cm
(16 x 5) cm
Width = (8 + 1) cm
= 9cm
A = L x W
A = 1cm x 9cm
A = 99 cm^2

2. Study the triangle below and answer the questions that follow:



10cm

a) Find the value of x on the figure Given.

$4x + 1cm = 2x + 9cm$
$4x + 1cm - 1cm = 2x + 9cm - 1cm$
$4x = 2x + 8 cm$
$4x - 2x = 2x - 2x + 8cm$
$2x = 8cm$

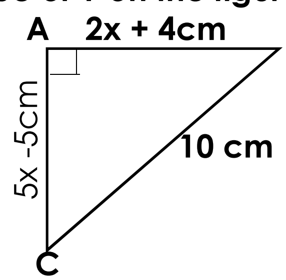
$\frac{\cancel{2x}}{\cancel{2}} = \frac{\cancel{8}^{4}\cancel{cm}}{\cancel{2}}$

$x = 4cm$

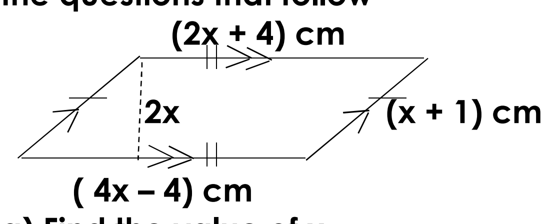
b) Find the distance around the figure
$4 \times 4 cm + 1cm$
$16cm + 1cm$
$17cm$

$p = 17cm + 17cm + 10cm$
$= 34cm + 10cm$
$p = 44cm$

Activity
1. Given $\overline{AB} = \overline{AC}$ on the figure below. Calculate for the value of Y on the figure



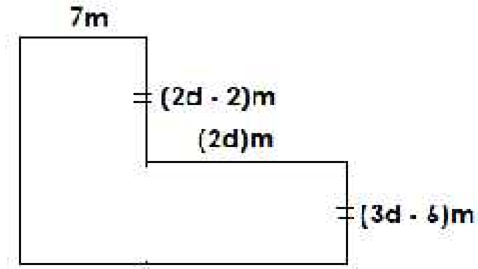
b) Find the distance around the polygon?
2. The figure below is a parallelogram, use it to answer the questions that follow



a) Find the value of x
b) Workout the area of the parallelogram.
c) What is the distance around the figure?

<table>
<tr>
<td></td>
<td></td>
<td>

3. Study the figure below carefully.



a) Find the value of d.

b) Workout the perimeter of the above figure.

</td>
</tr>
<tr>
<td>Algebra</td>
<td>Algebra</td>
<td>

Lesson 21

Forming and solving equations in daily life.
-Define the unknown in the equation
-Form the equation depending on the operations involved.
- Solve the equation formed.

Examples
1. Think of a number add 7 to it double the result and obtain 40 as the answer. What is the number you thought of?
Let the number be k

$$2(k + 7) = 40$$
$$2k + 14 = 40$$
$$2k + 14 - 14 = 40 - 14$$
$$2k = 26$$
$$\frac{2k}{2} = \frac{26}{2}$$
$$k = 13$$

2. Akumu walks 2km more than Kaweesi when going to markets. If the two moved 16km in total, how many metres did Akumu cover?

Let the distance covered by Kaweesi be P

<table>
<tr><th>Kaweesi</th><th>Akumu</th><th>Total</th></tr>
<tr><td>P</td><td>P+2km</td><td>16km</td></tr>
</table>

</td>
</tr>
</table>

<table>
<tr>
<td></td>
<td></td>
<td>
$P + P + 2 = 16$
$2P + 2 = 16$
$2P + 2 - 2 = 16 - 2$
$\frac{\cancel{2P}}{\cancel{2}} = \frac{\cancel{14}\,7}{\cancel{2}}$
$P = 7$ Km

Kaweesi's distance
7Km + 2Km
9Km
1Km = 1000m
9 Km = (9 x 1000)m
9Km = 9000m

Activity
1. James had 18books more than those of John. If they all had 36 books, how many books did each of them have?
2. In a mini-tournament Arsenal played 3 matches. If it scored the same number of goals in the first and last match with eight goals in the second match. Arsenal ended with 20 goals in total, how many goals did it score in the first match?
3. Nalyaka, Christine and Avisa shared 31 books. Christine got 5 more books than Nalyaka and Avisa got 3 less books than the total number that Nalyaka and Christine got. Find the number of books that each got.
</td>
</tr>
<tr>
<td>Algebra</td>
<td>Algebra</td>
<td>
Lesson 22.
Forming and solving equations in daily life.
-Define the quantity and the unknown
-Form the equation from the given Mathematical phrases in the question.
-Collects the like terms and solve the equation formed
1. Akiki is 10 years older than Amoti. If their total age is 38 years.
(a) Find the age of Amoti.
Let Amoti's age be a.
<table>
<tr><td>Amoti</td><td>a</td></tr>
<tr><td>Akiki</td><td>a + 10</td></tr>
<tr><td>Total</td><td>38</td></tr>
</table>
$a + a + 10 = 38$
$2a + 10 = 38$
$2a + 10 - 10 = 38 - 10$
$2a = 28$
$\frac{2a}{2} = \frac{28}{2}$
$a = 14$
</td>
</tr>
</table>

		(b) How old will Akiki be in 7 years' time? Akiki's age in 7 years' old (a + 10 + 7) years (14 + 10 + 7) years 31 years. 2. A mother is three times older than her daughter in 18years times she will be twice the age of her daughter. How old is each one of them now? Let the daughter's age be k <table><tr><td>Daughter</td><td>mother</td><td></td></tr><tr><td>3k</td><td>K</td><td>Now</td></tr><tr><td>3k + 18</td><td>K + 18</td><td>18 yrs</td></tr></table> 3k + 18 = 2(k + 18) 3k = 2k + 18 3k + 18 = 2k + 36 – 18 3k – 2k = 2k –k +18 3k + 18 -18 = 2k + 36 -18 k = 18years Daughter mother 18 years (3 x 18) years 54 years b) What was the daughter's age 10 years ago? Daughters new age is 18 years 10 years ago 18 years – 10 years 8 years Activity 1.Tom is 6years older than Job, If their total age is 36 find each one's age 2) A mother is twice as old as her daughter. The product of their age is 648. How old is each? 3) A father is five times as old as Mercy. In 10 years' time, the father' age will be thrice tat of Mercy. How old is each one of them now? 4) Kibet is twice as old as Kamau who is 5years younger than Kantai. Noel is 2years older than Kibet. If their total age is 49 years, how old is Noel? (b) Find the range of their age?

<table>
<tr>
<td>Algebra</td>
<td>Algebra</td>
<td>
Lesson 23
Forming and solving equations with fractions
-Identify the required quantity and define it with unknown
-Form the equation from the mathematical phrases in the question
- Solve the equations
Examples
1. The number of boys in a school is half that of girls. How many girls are in the school if there are 54 children in the school?
Let the number of girls be b
<table>
<tr><th>Girls</th><th>Boys</th><th>Total</th></tr>
<tr><td>b</td><td>$\frac{1}{2}$ b</td><td>54</td></tr>
</table>
$b + \frac{1}{2} b = 54$ There are 36 girls
$b + \frac{b}{2} = 54$
$b \times 2 + \frac{b}{\cancel{2}} \times \cancel{2} = 54 \times 2$
LCD = 2
$2b + b = 54 \times 2$
$\frac{\cancel{3} b}{\cancel{3}} = \frac{\cancel{54}^{18} \times 2}{\cancel{3}}$
$b = 36$

2. John's age is a third of Marvin's age. In five years' time their total age will be 50 years. How old is each one of them now?
Let the age of Marvin be r
<table>
<tr><th></th><th>Now</th><th>5 years' time</th></tr>
<tr><td>Marvin</td><td>r</td><td>r + 5</td></tr>
<tr><td>John</td><td>$\frac{1}{3}$ r</td><td>$\frac{1}{3}$ r + 5</td></tr>
<tr><td>Total</td><td></td><td>50</td></tr>
</table>
$r + 5 + \frac{1}{3}r + 5 = 50$
$r + \frac{1}{3} r + 5 + 5 = 50$
$r + \frac{1}{3} r + 10 = 50$
$r + \frac{1}{3} r + 10 - 10 = 50 - 10$
$r + \frac{1}{3} r = 40$
</td>
</tr>
</table>

$3x\, r + \frac{1}{\cancel{3}} r \times \cancel{3} = 40 \times 3$

$3r + r = 120$

$4r = 120$

$\frac{\cancel{4}r}{\cancel{4}} = \frac{\cancel{120}}{\cancel{4}}$

$r = 30$

3.

Job's age is a half of Musa's age who is 2y/5 years now. In 5years' time their total age will be 40. Find the value of y

	Now	5 years' Time
Musa	$\frac{2}{5}y$	$\frac{2y}{5} + 5$
Job	$\frac{1}{2} \times \frac{2y}{5}$	$\frac{2y}{10} + 5$
Total		40

$\frac{2y}{5} + 5 + \frac{2y}{10} + 5 = 40$

$\frac{2y}{5} + \frac{2y}{10} + 5 + 5 = 40$

$\frac{2y}{5} + \frac{2y}{10} + 10 = 40$

$\frac{2y}{5} \times 10 + \frac{2y}{10} \times 10 + 10 \times 10 = 40 \times 10$

$4y + 2y + 100 = 400$

$6y + 100 - 100 = 400 - 100$

$6y = 300$

$\frac{6y}{6} = \frac{300}{6}$

$y = 50$

<table>
<tr>
<td></td>
<td></td>
<td>
Activity
1. The cost of address is $\frac{2}{5}$ the cost of the shirt If the difference in their costs is sh. 6000 What is the cost of each item.
2. Odongo’s age is a third that of Hellen in 4 years’ time, Odongo will be twice as old as Hellen. How old is Hellen now?
3. Samuel is $\frac{1}{3}$ the father’s age and joan is $\frac{1}{5}$ the father’s age. If the sum of the age of Samuel and Joan is 32 years. Find the father’s age.
b) How old is Samuel and Joan.
4. The cost of a book is two times the cost of a pen while the cost of a pencil is half the cost of a pen. Calculate the cost of all the items if the total cost is sh. 21000
</td>
</tr>
<tr>
<td>Algebra</td>
<td>Algebra</td>
<td>
Lesson 24

Forming and solving equations in daily life
Examples
1. Sarah is 30 years old and Peter is 20 years old. In how many years’ time will the ratio of their age be 4 : 3?
Let the years’ time be n.
<table>
<tr><td></td><td>now</td><td>‘n’ years’ time</td></tr>
<tr><td>Sarah</td><td>30</td><td>(30+n)</td></tr>
<tr><td>Peter</td><td>20</td><td>(20 +n)</td></tr>
</table>

$(30+n) : (20+n) = 4 : 3$
$\frac{(30+n)}{(20+n)} = \frac{4}{3}$

$3(30+n) = 4(20+n)$
$3 \times 30 + 3 \times n = 4 \times 20 + 4 \times n$
$90 + 3n = 80 + 4n$
$90 + 3n - 3n = 80 + 4n - 3n$
$90 = 80 + n$
$90-80 = 80-80 + n$
$10 = n$
10 years’ time.
</td>
</tr>
</table>

2. Joel is 12 years old and Joseph is 27 years old. In how Many years' time will Joseph be twice as old as Joel?

let the number of years be x

	Joel	Joseph
now	12 years	27 years
(x) yrs	(12 + x) yrs	(27+x) yrs

$2(12+x)$ years $=$ $(27+x)$ years

$2(12+x) = 27+x$

$2 \times 12 + 2 \times x = 27 + x$

$24 + 2x = 27 + x$

$2x + 24 - 24 = 27 - 24 + x$

$2x = 3 + x$

$2x - x = 3 + x - x$

$x = 3$ years

Namuli is 30 years old now and Sandra is 40 years old. How many years ago was Sandra twice as old as Namuli?

Let the years ago be m

	Now	M years ago
Namuli	30	(30-m)
Sandra	40	(40-m)

2(30-m) = 40-m
2 x 30 – 2 x m = 40 – m
60 -2m = 40 – m
60 – 2m +2m = 40-m +2m
60 = 40 + m
60- 40 = 40 – 40 + m
20 = m
20 years ago

Activity

1. John is 15 years old and Daniel is 20 years old. In how many years' time will the ratio of their age be 4 : 5 Respectively?
2. Timothy is 20 years old and Joel is 30 years old. How many years ago was Joel twice as old as Timothy?
3. Joyce is 12 years old and Joan is 15 years old. In how many years' time will the ratio of their age be 6:7?
4. Geoffrey is 40 years old and Kiwanuka is 19 years old. In how many years' time will Geoffrey be twice as old as Kiwanuka?

		Lesson 25 **Equations involving indices** **Identify the operations used.** **Apply the law of indices to simplify the power numbers.** **Express the number in same power numbers.** **Equate the indices to solve the unknown.** **Examples.** **1. Solve $2^n \times 2^n = 8$** **$2^n \times 2^n = 8$** 2 | 8 2 | 4 2 | 2 | 1 **$2^n \times 2^n = 2^3$ (We are multiplying power numbers of the same base, so add the indices)** **$2^{n+n} = 2^3$** **$2^{2n} = 2^3$ (Since the bases are the same, equate the indices)** **$\frac{2n}{2} = \frac{3}{2}$** **$n = 1\frac{1}{2}$** **2. Solve: $3^k \div 3^1 = 1$** **$3^k \div 3^1 = 1$ (Express one in exponential form with the base used in the equation)** **$3^k \div 3^1 = 3^0$** **$3^{k-1} = 3^0$** **$K - 1 = 0$** **$K - 1 + 1 = 0 + 1$** **$K = 1$**

3. Solve: $2^p \times 5^2 = 100$

$2^p \times 5^2 = 100$

$2^p \times 5 \times 5 = 100$

$$\frac{2^p \times 25}{25} = \frac{100}{25}$$

$2^p = 4$

2	4
2	2
	1

$2^p = 2^2$

P = 2

Activity

Solve the following equations.

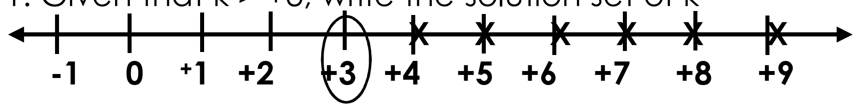
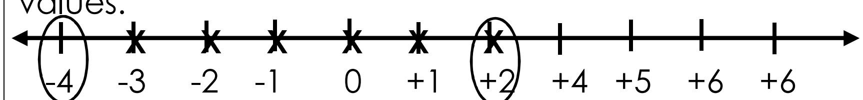
1. $4^{2n} \times 4^n = 4^6$

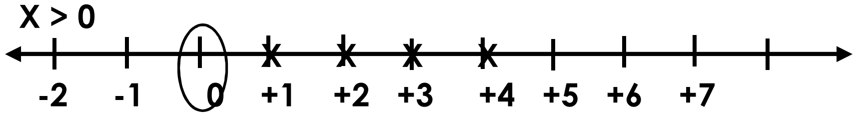
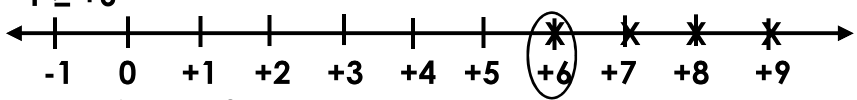
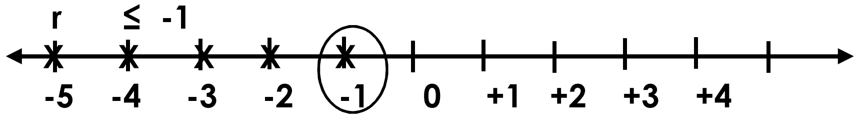
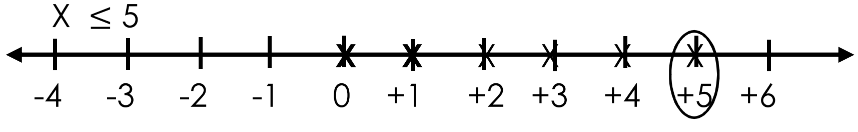
2. $5^{2k + 1} \div 5^2 = 125$

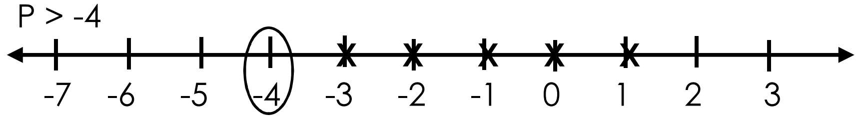
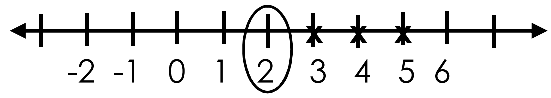
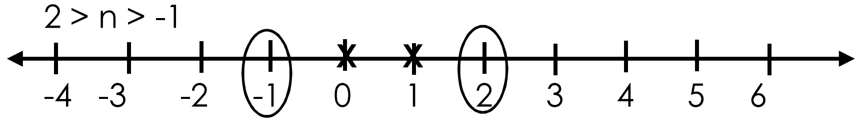
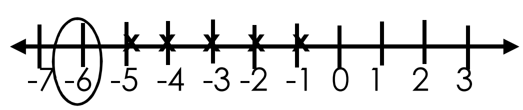
3. $2^{4y} \div 4^y = 2^8$

4. $3^p \times 3^{2p} = 2^7$

4. $6^{2y+3} = 6^9$

Algebra	**Algebra**	**Lesson 23** **Inequalities and finding their solution sets.** * Use less than (<), greater than (>), less than or equal (≤) and greater than or equal (≥) to compare sides of an inequality. *A solution set involves possible values of the letter in the given inequality. * Use curry brackets to list the members * This set of members can identified from a number line * Three dots are put at the end of infinite set **Examples** 1. Given that k > +3, write the solution set of k  Locate the integer in the question on a number line. For greater than list all integers on its right. K = { +4, +5, +6, +7, ….} -For less than locate the integer and write all the integers on the left. 2. What are the possible values of y in y ≥ - 4 3. write the solution set for -4<y<2. For two signs used, Identify both integers on the inequality on the number line. List all the values (integers) between the identified values.  Y = { -3, -2, -1, 0, +1} **Activity** 1. Write the solution set for x in x < -5 2. List down all the possible values of m in the inequality m ≥ +2 3. Given the inequality -1 ≤ n ≥ +2. Find the solution set. 4. Find the solution set g in g ≤ -7, where the g is a negative value. 5. If 2 ≤ y ≤ 7. Find the possible values of y
Algebra	**Algebra**	**Lesson 24** **Finding solution set from inequality involving addition or subtraction.** **-Identify the inequality sign used in the question** **-Solve the inequality** **-Draw a number line and identify the integers**

		Examples **1) Solve x + 3 > 3 and find the solution set for x** **X + 3 -3 > 3 -3** **X > 0**  **X = { +1, +2, +3, +4, …..}** **2. Find the possible values of y in y – 2 ≥ 4** **Y – 2 + 2 ≥ 4 + 2** **Y ≥ +6**  **Y = { +6, +7, +8, ….}** **3. Solve and write the solution set for r in r + 4 ≤ 3** **r + 4 – 4 ≤ 3- 4** **r ≤ -1**  **r = {-1, -2, -3, -4, …}** **Activity** **1. Solve x + 6 > 3 and write the solution set for x** **2. Write down the solution set for n in n – 6 < -3** **3. list down the possible values of a in the inequality a – 7 ≤ 4** **4. Solve 2- k ≤ 6** **5. Solve 4 – 3P > 15 and write the solution set.**
Algebra	**Algebra**	**Lesson 25** **More or Solving and finding set for inequalities.** -A negative coefficient must be expressed as a positive by dividing either side by a negative value its self. -At the point of division the inequality sign change to its opposite i.e. > turns to < or ≤ turns to ≥ -The unknown must remain positive and write its solution set **Examples** 1) Solve 2x ≤ 10 and write the solution set for x $\frac{\cancel{2}x}{\cancel{2}} \le \frac{\cancel{10}\,5}{\cancel{2}}$ X ≤ 5  X = {+5, +4, +3, +2, …..} 2). Work out the inequality -5p < 20 and give a solution

		set for p $-5p < 20$ $\frac{\cancel{-5} p}{\cancel{-5}} > \frac{\cancel{20}^{4}}{\cancel{-5}}$ $P > -4$  P = { -3, -2, -1, 0 …} 3)Solve for k in 2k + 4 > 8 and list the possible values of k $2k + 4 > 8$ $2k + 4 – 4 > 8 -4$ $\frac{\cancel{2}k}{\cancel{2}} > \frac{\cancel{4}^{2}}{\cancel{2}}$ $K > 2$  k = { +3, +4, +5, …} 4. Write down the solution set for n in 4 > 2n > -2 -For more than two terms, coefficient divides all terms $4 > 2n > -2$ $\frac{\cancel{4}^{2}}{\cancel{2}} > \frac{\cancel{2}n}{\cancel{2}} > \frac{\cancel{-2}}{\cancel{2}}$ $2 > n > -1$  n ={ 0,1} **Activity** 1. Solve for k in 3k < -9 and write the solution set k 2. Find the solution set for t in the inequality $2 – x \leq 4$ 3. Work out the inequality 2 (x +1) > 4 and write the solution set for x 4. -15 ≥ -3 (x + 2) , list down all possible values of x 5. Solve for m 2m – 4 ≤ -6 and write the solution set for m
Algebra	**Algebra**	**Lesson 26** **Solving the inequality involving fractions** -Solve the inequality by collecting like terms in consideration of the sign on coefficient - Draw the number line and identify the possible values from the number line. **Examples** a) Solve: 1/6 p + ≥ 3 b) Write the solution set for p $p/6 + 4 \geq 3$ $\frac{p}{6} + 4 -4 \geq 3 – 4$ 

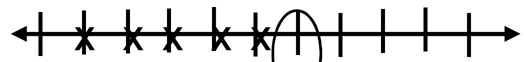
$\frac{P}{6} \geq -1$ P = {-5, -4, -3, -2, …}

$\frac{P}{\cancel{6}} \times \cancel{6} \geq -1 \times 6$

$P \geq -6$

2) What are the possible values of n in
The inequality

$\frac{-2n}{3} - 4 > -6$



$-\frac{2}{3}n - 4 + 4 > -6 + 4$

$-2n \times \quad > -2$ n = { +2, +1,+ 0, -1, -2 …}

$\frac{-2n}{3} \times 3 \quad > -2 \times 3$

$-2n \quad > -6$

$\left(\frac{-\cancel{2}n}{\cancel{2}}\right) < \left(\frac{-\cancel{6}\,3}{\cancel{2}}\right)$

$n < +3$

Activity

1. Solve for h in 3/8 h ≥ 3 and write the solution set fir h
2. find the solution for f in the inequality 1/3 f + 2 < 4
3 Solve the inequality 3g/4 -5 > 1
4. Write the solution set for n -t/2 ≥ -3