P.7 MATHEMATICS LESSON NOTES TERM 1

LESSON 1

SET CONCEPTS

		DATE	CLASS	TIME	SUBJECT	N0. OF PUPILS
			P.7		MTC	

1. TOPIC — **SET CONCEPTS**

SUB-TOPIC — **REVISION EXERCISE ON DESCRIPTION OF SETS AND LISTING ELEMENTS**

1. Describe the following sets:

a) Q = {0, 2, 4, 6, 8, …}

b) N = {4, 8, 12, 16, 20, …}

c) M = {10, 20, 30, 40, 50, …}

d) K = {Jan, Feb, Mar, April, May, June, ….. }

e) L = {0, 1, 2, 3, 4, 5, ……}

f) R = {5, 10, 15, 20, 25, ….}

g) O = {2, 3, 5, 7, 11, ……..}

h) A = {1, 3, 5, 7, 9, 11, ……..}

i) B = {a, e, I, o, u, ……}

2. List the elements of the following sets.

a) A = {Multiples of 2 between 10 and 20}

b) B = {Factors of 24}

c) C = {Prime numbers between 90 and 100}

d) D = {Counting numbers between 10 and 20}

e) E = {Composite numbers less than 15}

f) F = {Square number less than 30}

Answers

1. a) Q = {A set of even numbers less than 10}

N = {Multiples of 4 less than 24}

M = {First 5 multiples of 10}

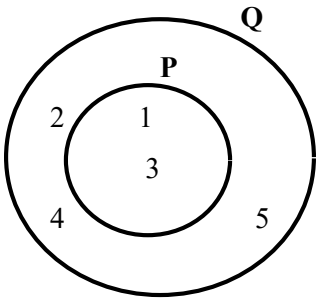
K = {First 6 months of the year}

L = {A set of whole number less than 6}

R = {Multiples of 5 from 5 to 25}

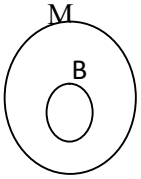
O = {First 5 prime numbers}

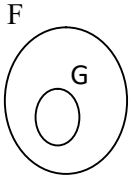
A = {Odd numbers from 1 to 11}

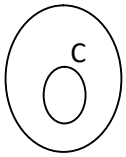
		B = {All vowel numbers} OR {English alphabet} 2. A = {12, 14, 16, 18} B = {1, 2, 3, 4, 6, 8, 12, 24} C = {97} D = {11, 12, 13, 14, 15, 16, 17, 18, 19} E = {4, 6, 8, 9, 10, 12, 14} F = {1, 4, 9, 16, 25}				
	REMARKS					
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2.	**TOPIC** **SUB-TOPIC**	**SET CONCEPTS** **REVISION EXERCISE ON DRAWING VENN DIAGRAMS** 1. <u>Draw the following Venn diagrams</u> a) All boys are males. b) All girls are females. c) All cows are animals. **$A \cup B = A$** **$P \cap Q = Q$** 2. Draw a Venn diagram to show the sets A and B below. A = {a, b, c, d, e}, B = {b, d, e, f, g, h} From the above Venn diagram. Find a) AnB e) n(AnB) b) AuB f) n(AuB) c) A – B g) n(A – B) d) B – A h) n(B – A) 3. Study the Venn diagram below and answer questions that follow.  a) List all the elements of set Q. b) How many objects are in set Q? c) Find set p. **d) Find n (P – Q)′** e) How many subjects are in set Q?				

f) Find the number of proper subjects in set P.

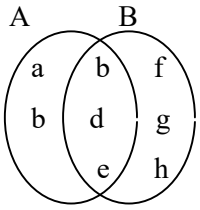
Answers

1. a) 

b) 

c) D 

2. (i)



a) AnB = {b, d, e}

b) A u B = {a, b, c, d, e, f, g, h}

c) A – B = {a, c}

d) B – A = {f, g, h}

e) n(AnB) = 3 elements

f) n(AuB) = 8 members

g) n(A-B) = 2 members

h) n(B – A) = 3 elements

3. a) Set Q = {1, 2, 3, 4, 5}

b) n(Q) = 5 members

c) Set P = {1, 3}

d) n(P) = 2 objects

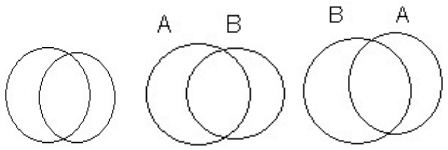
e) n(C) = 32 objects

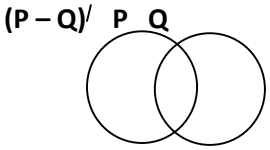
f) = 3 proper subjects

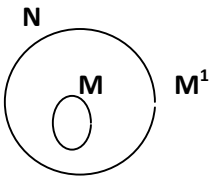
	REMARKS					
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3.	**TOPIC**	**SET CONCEPTS**				
	SUB-TOPIC	**SHADING AND DESCRIBING SHADED SETS.**				

1. <u>Shade the following parts of sets</u>.

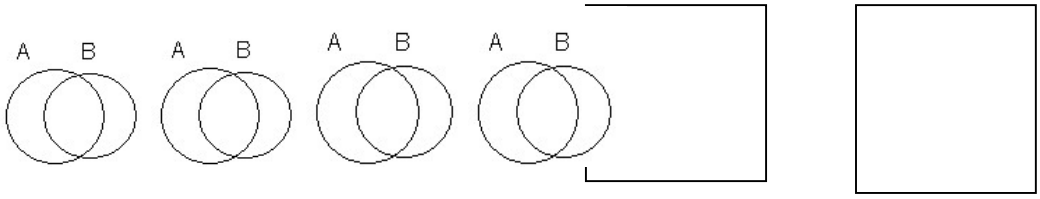
a) AnB b) AuB c) A-B





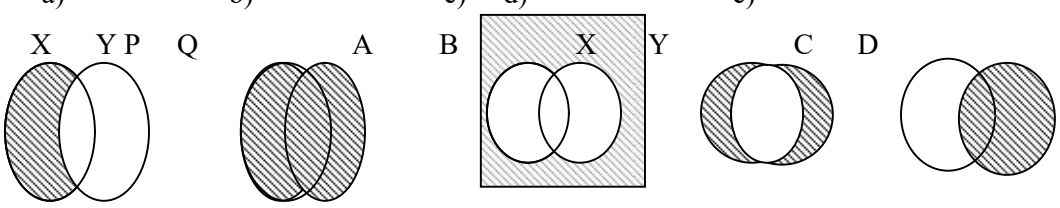


d) B – A e) A complement f) $(AnB)^1$ g) $(AuB)^1$



2. Describe the following shaded**and unshaded** regions

a) b) c) d) e)



i) shaded **i) shaded** **i) shaded** **i) shaded** **i) shaded**

ii)unshaded **ii)unshaded** **ii)unshaded** **ii)unshaded** **ii)unshaded**

	REMARKS					
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4.	**TOPIC**	**SET CONCEPTS**				
	SUB-TOPIC	**SUBSETS**				

		Concepts: a) A subset (s) is (are) a small set (s) got from a big set (universal) set. OR it is a part of a given set. b) Symbol for a subset = "C" c) An empty set is a subset of every set. Symbol = {} OR ∅. d) Every set is a subset of itself. Examples 1. List all the possible subsets of A = {0, 1, 2} Note The list begins with an empty and ends with a set itself. Soln A = {0, 1, 2} = {}, {0}, {1}, {2}, {0,1}, {0,2}, {1,2}, {0,1,2} 2. How many subsets can be counted from set x = {all vowels} Soln x = {a, e, i, o, u} n(x) = 5 members $n(\in) = 2^n$ $n(\in) = 2^5$ = (2 x 2) x (2 x 2) x 2 = (4 x 4) x 2 = 16 x 2 = 32 subsects
	EVALUATION	**EXERCISE** 1. List all the possible subsets of each of the following sets. a) A = {0, 1} B = {a, b, c} C = {2, 3, 5, 7} D = {e} 2. Calculate the number of subsets from: a) W = {0} X = {a, b} Y = {1, 2, 3} Z = {a, b, c, d} V = {0, 1, 2, 3, 4} U = {a, b, c, d, e, f}

		Answers: 1. a) A = {}, {0}, {1}, {0,1} B = {}, {a}, {b}, {c}, {a, b}, {a, c}, {b, c}, {a, b, c} C = {}, {2}, {3}, {5}, {7}, {2, 3}, {2, 5}, {2, 7} {3, 5}, {3, 7}, {5, 7}, {2, 3, 5}, {2, 5, 7} {3, 5, 7}, {2, 3, 7}, and {2, 3, 5, 7} D = {}, {e} 2. w = 2subsets, x = 4subsets, y = 8subsets, z = 16subsets, v = 32subsets u = 64subsets
	REMARKS	

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5.	**TOPIC**	**SET CONCEPTS**
	SUB-TOPIC	**PROPER SUBSETS**

Concepts:

1. A proper subset of a set is that subset of the set which is not a set itself.

   OR

   Proper subsets are subsets without the super set . mother set

A proper subset is a subset that is different from the set itself.

OR It is a subset that doesn't include a set itself.

2. Symbol for proper subset = "C"

Examples

a) List all the possible proper subsets of set P = {0, 1, 2}

Soln

P = {0, 1, 2}

= {}, {0}, {1}, {2}, {0, 1}, {0, 2}, {1, 2}

b) Calculate the number of proper subsets in set x = {a, b, c, d,e}

Soln

x = {a, b, c, d, e}

n(x) = 5 elements

$n(c) = 2^n - 1$

$n(c) = 2^5 - 1$

$= (2 \times 2) \times (2 \times 2 \times 2) - 1$

$= (4 \times 4) \times 2 - 1$

$= (16 \times 2) - 1$

$= 32 - 1$

= 31 proper subsets

	EVALUATION	**EXERCISE** List all the possible proper subsets of: a) x = {a} y = {a, b} z = {a, b, c} w = {a, b, c, d} 2. Find the number of proper subsets from: a) v = {a} w = {a, b} x = {a, b, c} y = {a, b, c, d} z = {a, b, c, d, e} Answers: 1. a) x = { } y = { } {a}, {b} z = { } {a}, {b}, {c}, {a, b}, {a, c}, {b, c} w = { }, {a}, {b}, {c}, {d}, {a, b}, {a, c} {a, d}, {b, c}, {b, d}, [c, d}, {a, b, c}, {a, c, d} {c, d, b}, {a, b, d}, {} 2. a) v = 1 proper subset w = 3 proper subsets x = 7 proper subsets y = 15 proper subsets z = 31 proper subsets

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6.	**TOPIC**	**SET CONCEPTS**
	SUB-TOPIC	**FINDING THE NUMBER OF ELEMENTS GIVEN SUBSETS** Concepts 1. Express the subsets given in powers of 2.

Examples

1. Set A has 8 subsets, how many elements are in set A?

Soln

$n(c) = 2^n$

2^n = 8 subsets

$2^n = 2 \times 2 \times 2$

$\longrightarrow$

$2^n = 2^3$

∴ n = 3 elements

2	8
2	4
2	2
	1

Set Q has 1 subset

Find n(Q)

2^n = n(C)

2^n = 1

2^n = 20

2. Given that set P has 15 proper subsets, find the number of elements in set P

Soln

$n(c) = 2n - 1$

$2^n - 1$ = 15 proper subsets

$2^n - 1 + 1 = 15 + 1$

$2^n - 0 = 16$

$2^n = 16$

$2^n = 2 \times 2 \times 2 \times 2$

$2^n \longrightarrow 2^4$

∴ n = 4 members

EVALUATION

EXERCISE

1. Given the following subsets, find the number of elements each set:

a) X = 4 subsets

Y = 16 subsets

Z = 32 subsets

W = 64 subsets

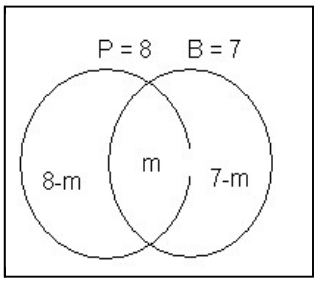
V = 128 subsets

b) A = 3 proper subsets

B = 7 proper subsets

C = 31 proper subsets

D = 63 proper subsets

		Answers a) X = 2 members Y = 4 members Z = 5 members W = 6 members V = 7 members b) A = 2 elements B = 4 elements C = 5 elements D = 6 elements				
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7.	**TOPIC** **SUB-TOPIC**	**SET CONCEPTS** **REPRESENTING INFORMATION ON A VENN DIAGRAM** Concepts 1. Summarize the statements given. Examples (i) In a group of 12 pupils, 8 pupils got pens (P) and 7 pupils got books (B). a) Show this information on a Venn diagram. Soln n(∈) = 12, n(P) = 8, n(B) = 7 n(PnB) = ? Venn diagram. ∈ = 12  b) From the Venn diagram above. Find the value of m.				

Soln

$(8 - m) + m + (7 - m) = 12$

$8 + 7 + m - m - m = 12$

$15 - m = 12$

$15 - 15 - m = 12 - 15$

$0 - m = -3$

$-m = -3$

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

M = 3 pupils

c) How many pupils got only one type of stationery?

Soln

Only one $= (8 - m) + (7 - m)$

$= (8 - 3) + (7 - 3)$

$= 5 + 4$

$= 9$ pupils

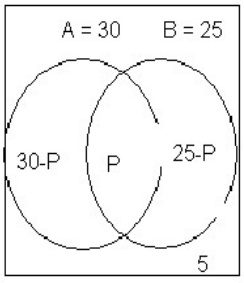
2. Given that n(A) = 30, n(B) = 25, n(AuB) = 45 and $n(AuB)^1 = 5$

a) Show this on a Venn diagram.

Soln

Let P be n(AnB)

$n(\in) = 45$



b) Find the elements in AnB.

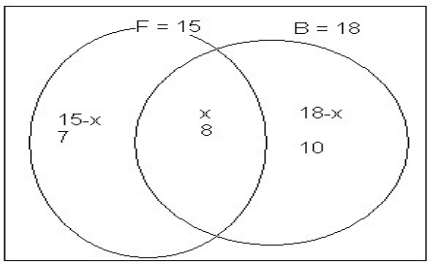
		Soln $30 + p + p + 25 - p + 5 = 45$ $30 + 25 + 5 - p = 45$ $60 - p = 45$ $60 - 60 - p = 45 - 60$ $0 - p = -15$ $-p = -15$ $-1(-p) = -1(-15)$ $\therefore P = 15$ elements c) How many elements are in at least one set only? Soln At least one $= (30 - p) + p + (25 - p)$ $= (30 - 15) + 15 + (25 - 15)$ $= 15 + 15 + 10$ $= 30 + 10$ $= 40$ pupils
	EVALUATION	**EXERCISE** 1. In a class of 25 pupils, 15 like fish (F), and 18 like beans (B). a) Show this on a Venn diagram. b) Find; (i) n(FnB) (ii) n(F) only (iii) n(B) only c) How many pupils like only one type of food? 2. If $n(x) = 15$, $n(y) = 20$, $n(xuy) = 35$, $n(xuy)^1 = 10$. a) Represent this information on a Venn diagram. b) Find the number of element in (i) xny (ii) set x only (iii) set y only 3. There are 75 members in a group of which 45 like debate (D), 40 like music (M), 15 like none of the two subjects while some like both. a) Put this on the Venn diagram. b) How many members like both subjects. 4. In a class, 16 pupils belong to a MTC club, (M), 20 belong to a debate club (D), 4 don't belong to any and 10 belong to both clubs. a) Put this on the Venn diagram. b) How many pupils are in the class altogether?

c) Find the number of pupils who belong to at least one club.

Answers

1. a)

$n(\in) = 25$



b) (i) FnB = 8 pupils

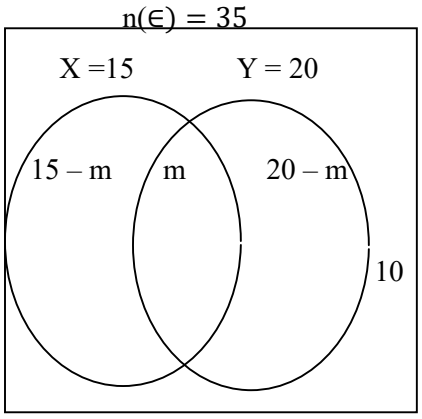
(ii) F only = 7 pupils

(iii) B only = 10 pupils

c) only one = 17 pupils

2. (a) Venn diagram

$n(\in) = 35$



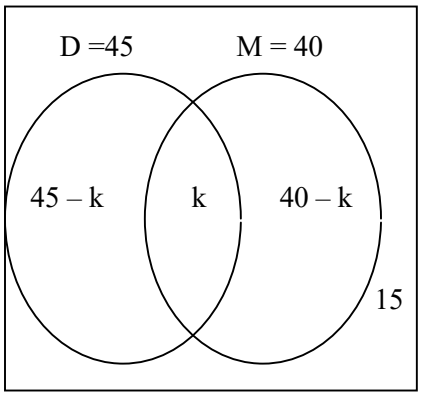
b) (i) Xny = 10 elements

(ii) set x only = 5 elements

(iii) y only = 10 elements

3. (a) Venn diagram

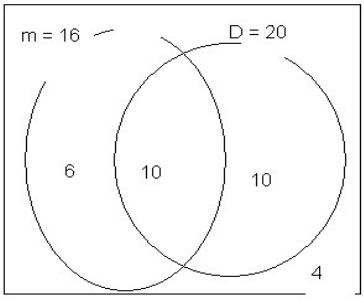
$n(\in) = 75$



b) K = 25 members

4. a) Venn diagram

$n(\in) = ?$



b) $n(\in) = 30\ pupils$

c) at least one = 26 pupils

REMARKS

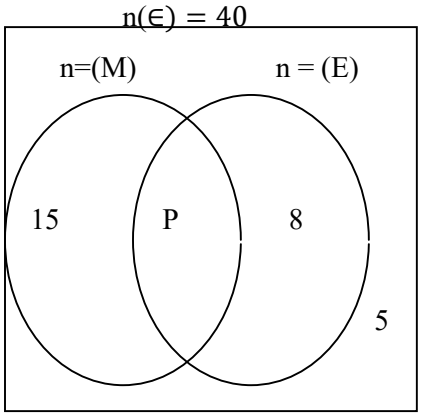
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8. TOPIC

SUB-TOPIC

MORE ABOUT APPLICATION OF SETS

1. Study the venn diagram below carefully



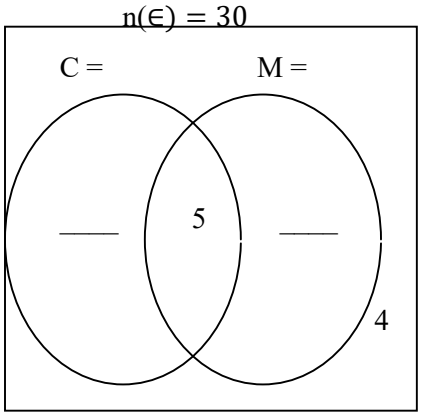
a) Find the value of P

b) How many members are in set m?

c) Calculate n(E)′

2. In a class of 30 members, 15 ate chicken(C) on Easter, y ate meat (M), 5 ate both meat and chicken, while 4 of them ate neither.

a) Complete the venn diagram below



b) Find the value of y.

c) Find the probability of selecting a member who ate chicken only.

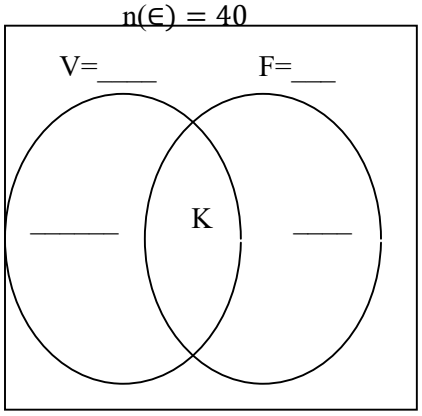
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9. TOPIC **MORE ABOUT APPLICATION OF SETS**

SUB-TOPIC

1. In a class of 40 pupils, 21 pupils play football (F) only, 15 pupils platy Volley ball (V) only and K pupils play both games.
   a) Use the information to complete the venn diagram below

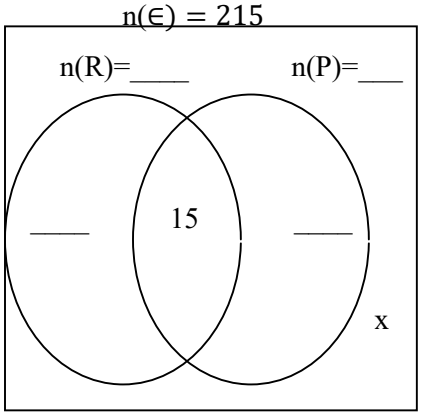
n(∈) = 40



   b) Find K
   c) Find the probability of picking a team captain who plays Volly ball.

2. At Nankinga Junior School, there are 215 pupils, 130 pupils eat Rice (R), 15 eat both rice and posho; 75 eat only posho (P) while x eat none of the two.
   a) Complete the venn diagram

n(∈) = 215



   b) How many pupils eat none of the foods?
   c) Find the number of pupils who eat posho.

	REMARKS					

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10 **TOPIC** **SET CONCEPTS**

SUB-TOPIC **FINITE AND INFINITE SETS**

Concepts:

1. A finite set is a set whose members can be listed.

   Note

   Finite means having an end.

2. An infinite set is that whose elements cannot be listed.

   Note

   Infinite means having no end.

   Examples

   State whether it is finite or infinite sets.

1. If A = {a, b, c, d, e}

   Soln

   A = 5 members

   :. Set A is a finite set.

2. A set B = {counting members}

   Soln

   Set B = {1, 2, 3, 4, 5, 6, 7, 8, 9, ……}

   Set B = infinite set.

EVALUATION

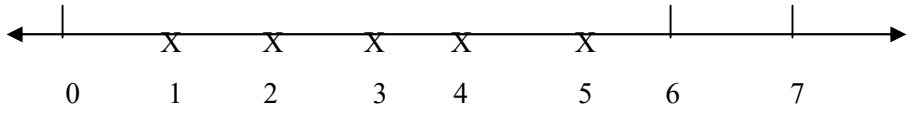
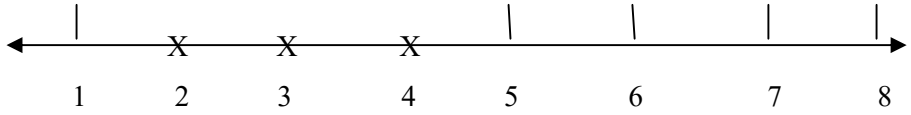
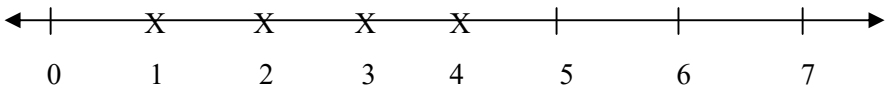
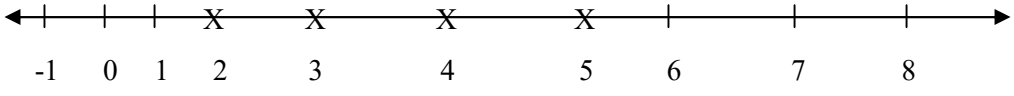
EXERCISE

Which of the following sets are finite and infinite.

1. The set of English Alphabet.
2. The set of all pupils in P.7.
3. The set of $1/2, 1/3, 1/4, \ldots\ldots 1/n$
4. The set of even numbers between 2 and 100.
5. The set of all whole numbers.
6. The set of all people in Uganda.
7. The set of all integers.
8. Give two infinite sets.

Answers

1. Finite set.
2. Finite set.
3. Infinite set.

		4. Finite set. 5. Infinite set. 6. Finite set. 7. Infinite set. 8. (i) A set of even numbers (n) A set of prime numbers
	REMARKS	
11	**TOPIC** **SUB-TOPIC**	**SET CONCEPTS** **SETS ON A NUMBER LINE** Concepts: 1. We use the word "interval" when representing sets on a number line. 2. Interval means parts of a line or a line segment. 3. Different meanings of brackets. (a) [ ] represent elements from the first to the last in given as set e.g [1, 5] = {(1),2, 3, 4, (5)} (b)  ( ) represents elements between the first and the last given in a set. e.g (1 , 5) = {2, 3, 4} (c)  [ ) represents elements in a given set where the last is not included. e.g [1, 5) = {(1), 2, 3, 4} d)  ( ] represents elements in a given set where the first is not included e.g ( ] = {2, 3, 4, (5)} 

	EVALUATAION	**EXERCISE** 1. List the elements of the following sets and show each on a number line (a) [1, 4] (b) (2, 6) (c) [1, 7) (d) (2, 6] 2. List the elements of the following sets. (a) [2, 4] U [1, 5] (b) (2, 5) n (3, 7) (c) [-5 , 3] (d) [-2, 8) Answers 1. a. = {1, 2, 3, 4} b. = {3, 4, 5} c. = {1, 2, 3, 4, 5, 6} d. = {3, 4, 5, 6} 2. a. = {1, 2, 3, 4, 5} b. = {4} c. = (-5, -4, -3, -2, -1, 0, 1, 2, 3} d. = {-2, -1, 0, 1, 2, 3, 4, 5, 6, 7}
	REMARKS	

PROBABILITY

DICE

1. If a dice is tossed once, what is the probability of having the following on top;
   a) Composite number?
   b) Even number?
   c) Odd number?
   d) Square number?
   e) Cube number?

f) Triangular number?

g) Number less than 5?

h) Multiple of 3?

i) Number?

Note : A dice has 6 faces numbered from one to six

2. In a bag, there are six oranges and four lemons. What is the probability of picking the following from the bad;
   a) An orange?
   b) A lemon?
   c) A mango?
   d) An orange and a lemon?
3. In a factory of 192 smart phones, the probability of picking a brown smart phone is $\frac{2}{3}$.

   How many black smart phones are there?

2. NUMERATION SYSTEMS AND PLACE VALUE

		DATE	CLASS	TIME	SUBJECT	N0. OF PUPILS
			P.7		MTC	
1	**TOPIC**	**WHOLE NUMBERS**				
	SUB-TOPIC	**IDENTIFYING MAIN PLACE VALUES**				
		Concepts:				
		1. A digit on the left is ten times greater than that on it's right.				
		2. In a place value table, the number is read from the right to the left i.e				
		Example.				
		In the number 3568924 there are;				
		4 Ones = 4 x 1				
		2 Tens = 2 x 10				
		9 Hundreds = 9 x 100				
		8 Thousands = 8 x 1000				
		6 Ten thousands = 6 x 10,000				
		5 Hundred thousands = 5 x 1, 000,000				
		3 millions = 3 x 1,000,000				

		FORMING NUMBERS FROM DIGITS Concepts a) Re-arrange the digits in the order given. Examples. Given the digits 5, 1, 2, 4, 3. / **Digits with a zero** Form the: a) The largest number. b) The smallest number. Soln a) Digits = 5, 1, 2, 4, 3 Largest = 5, 4, 3, 2, 1 Largest number = 54, 321 Soln b) Digits = 5, 1, 2, 4, 3 Smallest = 1, 2, 3, 4, 5 Smallest number = 12, 345
	EVALUATION	**EXERCISE** 1. Given the number 94567201 How many a) Tens are there? b) Millions are there? c) Ten thousands are there? d) Ones are there? e) Ten millions are there? 2. From the above number, find the position of the following digits a) 9 b) 6 c) 2 3. From the digits below 2, 9, 3, 7, 5 From the following numbers (i) Smallest (ii) Biggest (iii) What is the difference between the biggest and smallest numbers formed above? Answers

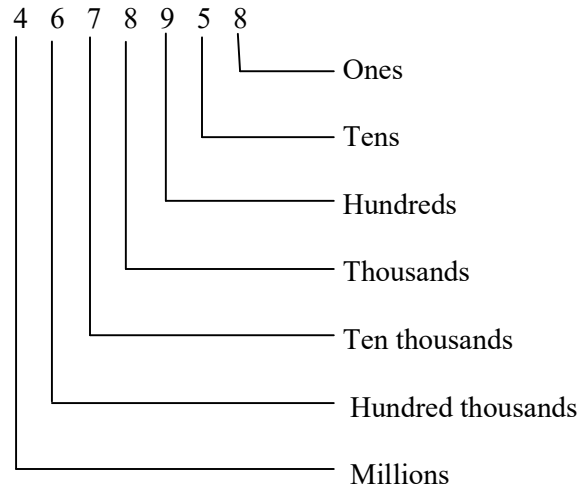
		1. (a) 0 Tens (b) 4 Millions (c) 6 Ten thousands (d) 1 Ones (e) 9 Ten millions 2. (a) Eighth (8^{th}) position (b) Fifth (5^{th}) position (c) Third (3^{rd}) position 3. (i) 23,579 → Smallest (ii) 97532 → Biggest (iii) 73953 → Difference

	REMARKS					
		DATE	**CLASS**	**TIME**	**SUBJECT**	**N0. OF PUPILS**
			P.7		**MTC**	
3	**TOPIC** **SUB-TOPIC**	**WHOLE NUMBERS** **WRITING WORDS IN FIGURES** Concepts: 1. Identify and group the problem into the 3 main place values i.e millions, thousands and ones. Examples 1. Write in figures "fifty seven millions, four hundred twenty one thousand, nine hundred five. Soln Fifty seven / four hundred twenty one thousand/nine hundred five 57,000,000 / 421,000 905 57,000,000 + 421,000 905 57,421,905 FIGURES IN WORDS Concepts: a) Group the number into 3 main place values by counting 3 digits from the right. Examples. Write 82, 057, 607 in words Soln				

		82, 057, 607 Millions | Thousands | Units 82 | 057 | 607 = Eighty two million fifty seven thousand, six hundred seven.
	EVALUATION	**EXERCISE** 1. Write in figures; (a) Seventy nine. (b) Eighty hundred fourteen. (c) Nine thousand eight. (d) Thirty three thousand, thirty three. (e) Four million seventy two. (f) Eight hundred seven million, four hundred two thousand, fourty two. 2. Write in words; a) 19 b) 202 c) 10101 d) 204509 e) 9876543 f) 123345678 g) 987654321 Answers: 1. a) 79 b) 814 c) 9,008 d) 33,033 e) 4,000,072 f) 807,402,042 2. a) Nineteen. b) Two hundred two. c) Ten thousand, one hundred one. d) Two hundred thousand, five hundred nine. e) Nine million, eight hundred seventy six thousand, five hundred forty three. (f) Twelve million, three hundred forty five thousand, six hundred seventy eight. (g) Nine hundred eighty seven million, six hundred fifty four thousand, three hundred twenty one.

	REMARKS					
		DATE	**CLASS**	**TIME**	**SUBJECT**	**N0. OF PUPILS**
			P.7		**MTC**	
	TOPIC	**WHOLE NUMBERS**				
	SUB-TOPIC	**IDENTIFYING PLACE VALUES**				

Concepts:



a) Identify the place value f each digit in the given numbers

i) 4531

j) 1035

k) 19836

l) 25183

b) Write the place value of the underlined digits in the numbers given below

j) 8 9 <u>3</u> 1

k) <u>5</u> 9 6 3

l) <u>9</u> 8 3 4 0

m) 1 5 6 <u>3</u> 7

n) 1 <u>4 3</u> 8 8

	REMARKS	

		DATE	CLASS	TIME	SUBJECT	N0. OF PUPILS
			P.7		MTC	

4. TOPIC

SUB-TOPIC

WHOLE NUMBERS

ROMAN NUMERALS

Concepts:

a) Identify the major Roman numerals.

b) Identify the groups of Roman numerals.

c) Expand then write each in Hindu or Roman form.

1. BASIC ROMAN NUMERALS

HINDUROMAN

1 → 1

5 → V

10 → X

50 → L

100 → C

500 → D

1000 → M

2. Groups of ROMAN NUMERALS

a) Repeated – one number repeats itself.

2 = 1+1

= II

20 = 10+10

= XX

200 = 100+100

= CC

3 = 1+1+1

= III

30 = 10+10+10

= XXX

300 = 100+100+100

= CCC

b) Addition – small one added to the major

6 = 5+1
= VI

60 = 50+10
= LX

600 = 500+100
= DC

7 = %+2
= VII

70 = 50+20
= LXX

700 = 500+200
= DCC

8 = 5+3
= VIII

80 = 50+30
= LXXX

800 = 500+300
= DCCC

c) Subtraction:- minor subtracted from the major / minor comes before the major.

4 = 5-1
= IV

40 = 50-10
= XL

400 = 500-10
= CD

9 = 10-1
= IX

90 = 100-10
= XC

900 = 1000 – 100
= CM

Conversions

a) HINDU TO ROMAN

Concepts:

- Expand in value form.
- Write each expanded in Roman form.
- Write a bar on top which means multiply by 1000.

e.g

1. Write in Romans 1962

Soln

1962 = 1000+900+60+2

1962 = M+CM+LX+II

:. 1962 = MCMLXII

2. What is 6000 in Romans?

Soln

6000 = 6 x 1000

$= \overline{VI}$

b) ROMANS TO HINDU ARABIC

Concepts:

(i) Expand in Roman form.

(ii) Write each expanded in Hindu-Arabic

Eg.

(i) Write CXCV in Hindu – form.

Soln

CXCV = C+ XC + V = 100+90+5 = 195

100
90
5

(ii) Write XV in Hindu-Arabic form

Soln

$\overline{XV}$ = XV x 100 = 15 x 1000 = 15,000

	EVALUATION	**EXERCISE** 1. Write in Roman form; a) 9 b) 18 c) 27 d) 84 e) 105 f) 404 g) 777 h) 1062 i) 2347 j) 45000 2. Write in Hindu-Arabic system. a) VIII b) XII c) XXXIX d) XCIX e) DCII f) CMLXXXIV g) MCDXLIX h) IV i) LVI j) CD Answers 1. a) IX b) XVIII c) XXVII d) LXXXIV e) CV f) CDIV g) DCCLXXVII h) MMCCCXLVII i) MLXII j) XLV 2. a) 8 b) 12 c) 39 d) 99 e) 602 f) 984 g) 1449 h) 4,000 i) 56,000 j) 400,000

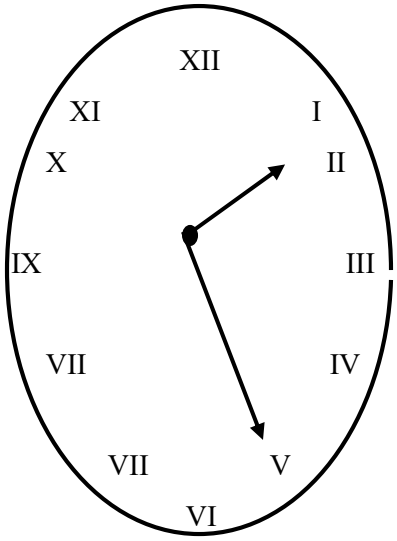
	REMARKS					
		DATE	**CLASS**	**TIME**	**SUBJECT**	**N0. OF PUPILS**
			P.7		**MTC**	

TOPIC **MORE ABOUT ROMAN NUMERALS**

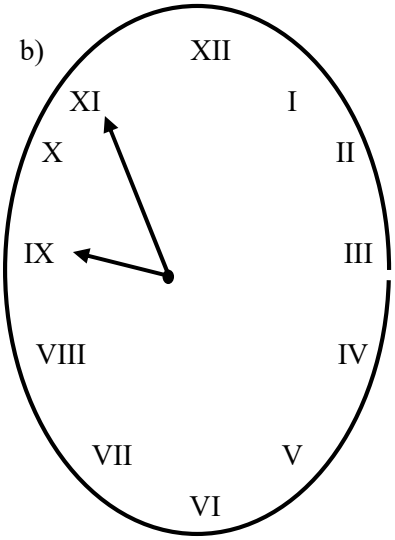
SUB-TOPIC

1. Read and write down the time on each of the clock faces below in Hindu Arabic

a)



b)



2. Romeo delivers grapes to a factory near his farm every week on Tuesday. The following is a record of the masses of grapes he delivered in five weeks. Read the table then answer the questions below i. e.

1st week	2nd week	3rd week	4th week	5th week
CCLX	CCXC	CCCV	CCCXLIX	CDII

a) How many kg of grapes did he deliver in the
   - 1st week
   - 2nd week
   - 3rd week
   - 4th week
   - 5th week

b) Which week did he deliver the most grapes?

c) Write true or false. From 1st week to 5th week, the amount of grapes he delivered was decreasing.

d) Explain your answer for part (C)

	TOPIC	**WHOLE NUMBERS**
	SUB-TOPIC	**ROUNDING OFF**
		Concepts: a) Borrow if the digit to the right of the required place is greater than 5 (5, 6, 7, 8, 9) b) Borrow 0 if the digit to the right is less than 5 (0,1, 2, 3, 4). c) Never include the zero's if the number is a decimal. Examples: 1. Round off 43256 to the nearest ten thousand. Soln 43256 43256 + 0 :. 43256 ≅ 40000 2. DECIMAL - Remove all the digits after the required place value then form a common fraction. - If the fraction is greater than half, borrow 1 but if it's less than half borrow O. - Round off 21. 267998 to the nearest ten thousandths. Soln 21. 267998 21. 267998 = 0 21. 2679 = 98 = 1> 100 2 21. 2679 + 1 :. 21.267998 ≅ 21.2680
	EVALUATION	**EXERCISE** 1. Write / Round off as instructed. a) 23 (tens) b) 1254 (Hundreds) c) 96702 (Thousands)

		d) 234567 (Ten thousands) e) 4208007 (Millions) 2. a). 6.73 (tenths) b) 12.998 (hundredths) c) 9.26782 (whole number) d) 39.245376 (thousands) e) 239.8967432 (millionths) <u>Answers:</u> 1 a) <u>20</u> b) <u>1,300</u> c) <u>97000</u> d) <u>230000</u> e) <u>4000000</u> 2. a) <u>6.7</u> b) <u>13.00</u> c) <u>10</u> d) <u>39.245</u> e) <u>239.896743</u>

	REMARKS					
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	TOPIC **SUB-TOPIC**	**WHOLE NUMBERS** **DECIMALS IN WORDS AND FIGURES** <u>Concepts:</u> 1. Group the number into wholes and decimals. 2. Give the place value of the last decimal. <u>Examples</u> 1. Write 125.678 in words

		Soln 125. 678 Whole | and | Decimals 125 | . | 678 → Th^{th} One hundred five and six hundred seventy eight thousandths. 2. Write in figures "fourteen and sixteen hundredths. Soln Fourteen | and | sixteen hundredths 14 | . | $\frac{16}{100}$ $14 + \frac{16}{100} = 14+0.16$ $= 14.16$
	EVALUATION	**EXERCISE** 1. Write in words; a) 1.2 b) 2.25 c) 0.125 d) 0.5 e) 3256.1235 f) 0.009 2. Write in figures; a) Tenths b) Three and eight tenths c) Seventy and five thousandths d) One hundred five and twenty eight thousandths e) Five and four ten thousandths Answers 1. a) one and two tenths. b) Two and twenty five hundredths. c) One hundred twenty five thousandths. d) Five tenths. e) Three thousand two hundred fifty six and one thousand two hundred thirty five ten thousandths.

		f) Nine thousandths. 2. a) 0.1 b) 3.8 c) 70.005 d) 105 . 028 e) 5.0004				
	REMARKS					
		DATE	**CLASS**	**TIME**	**SUBJECT**	**N0. OF PUPILS**
			P.7		**MTC**	
6.	**TOPIC** **SUB-TOPIC**	**WHOLE NUMBERS** **CONVERSATION IN DECIMALS** Concepts: 1. The number of zeroes in the denominator is equal to the number of decimal places and vice versa. a) Write $^{2}/_{100}$ as a decimal. Soln 2 zeroes = 2 decimal places. 002 / 100 = 0.02 b) Write $3^{4}/_{10}$ as a decimal Soln $3^{4}/_{10} = \frac{(3 \times 10) + 4}{10}$ $= \frac{30+4}{10}$ $= \frac{34}{10}$:. $3^{4}/_{10} = 3.4$				

		c) Write 0.02 as a common fraction. Soln $0.02 = \frac{0.02}{}$ $= \frac{0.02 \times 100}{1 \times 100}$ $= \frac{2}{100}$ d) Express 3.05 as a common fraction Soln $3.05 = \frac{3.05}{1}$ $= \frac{3.05 \times 100}{1 \times 100}$ $= \frac{305}{100}$ OR $3\frac{5}{100}$
	EVALUATION	**EXERCISE** 1. Express as decimals; a) $\frac{3}{10}$ b) $1\frac{1}{10}$ c) $\frac{4}{100}$ d) $\frac{45}{100}$ e) $\frac{125}{100}$

2. Write as common fractions;
   a) 0.2
   b) 2.5
   c) 0.05
   d) 1.25
   e) 0.125

Answers

1. a) 0.3
   b) 1.1
   c) 0.04
   d) 4.5
   e) 1.25

2. a) $^{2}/_{100}$
   b) $^{25}/_{100}$
   c) $^{5}/_{100}$
   d) $^{125}/_{100}$
   e) $^{125}/_{1000}$

REMARKS

DATE	CLASS	TIME	SUBJECT	N0. OF PUPILS
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TOPIC WHOLE NUMBERS

SUB-TOPIC BASES

Concepts:

1. A base is a system in which a number operates / works.

2.

	Base	Name	Digits
1	Two	Binary	= {0, 1}
2	Three	Ternary	= {0, 1, 2}
3	Four	Quarterly	= {0, 1, 2, 3}
4	Five	**Quaternary**	= {0, 1, 2, 3, 4}
5	Six	Senary	= {0, 1, 2, 3, 4, 5}
6	Seven	Septenary / Heptenary	= {0, 1, 2, 3,4, 5, 6}
7	Eight	Octal	= {0, 1, 2, 3, 4, 5, 6, 7}
8	Nine	Nonary	= {0, 1, 2, 3, 4, 5, 6, 7, 8}
9	Ten	Denary / Decimal	
		Ordinary / mother	= {0, 1, 2, 3, 4, 5, 6, 7, 8, 9}

CONVERSIONS:

a) TO BASE TEN

Concepts:

- Give the number the powers.
- Expand the number in the given base.
- Express each bracket in multiplication form.
- Get the value of each bracket then add.

Examples:

1. Express 1010_{two} in base ten.

Soln

$1010_{two} = 1010$

$1010_{two} = (1 \times 2) + (0x2) + (1x2) + (0x2)$

$1010_{two} = (1x2x2x2) + (0+2x2) + (1x2) + (0x1)$

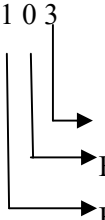
$1010_{two} = 8 + 0 + 2 + 0$

$\therefore 1010_{two} = 10ten$

2. Convert 103_{four} to decimal base

Soln

103_{four} = 1 0 3



= (1x4x4) + (0x4) + (3x1)

= 16 + 0 + 3

= 19

Ten

b) FROM BASE TEN TO ANY BASE.

Concepts.

- Divide the number in base ten by the required base only till the result is less than that base.
- Record the remainders from the bottom upwards as the answer (required base).

Examples

1. Convert 33 to binary system.

Soln

33_{ten} =

Base	N0.	Rem
2	33	R
2	16	1
2	8	0
2	4	0
2	2	0
	1	0

:. $33_{ten} = 100001_{two}$

OR

33_{ten} = (11) (11) (11) (11)(11)(11)(11)(11)(11)(11)(11)(11)(11)(11)(11)(11)

= 16 groups of 2 rem. 1

16_{ten} = (11)(11)(11)(11)(11)(11)(11)(11)

= 8 groups of 2 rem. 0

8_{ten} = 4 groups of 2 rem. 0

		4_{ten} = (11)(11) = 2 groups of 2 rem.0 2_{ten} = (11) = 1 group of 2 rem.0 $\therefore 33_{ten} = 100001_{two}$
	EVALUATION	**EXERCISE** 1. Convert the following to base ten; a) 10_{ten} b) 21_{three} c) 101_{two} d) 240_{five} e) $10110t_{wo}$ f) 33_{six} 2. Change the following into the base instructed in brackets; a) 9_{ten} to base two b) 13_{ten} (Ternary) c) 15_{ten} (Quinary) d) 30_{ten} (Senary) e) 24_{ten} (Quarternary) f) 18_{ten} (two) Answers 1. a) 2_{ten} b) 7_{ten} c) 5_{ten} d) 70_{ten} e) 22ten f) 21_{ten} 2. a) 1001_{two} b) 111_{three} c) 30_{five} d) 50_{six} e) 120_{four} f) 10010_{two}

	REMARKS					
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TOPIC **WHOLE NUMBERS**

SUB-TOPIC **EXPANDED BASE:**

Concepts:

a) Get the expanded number then change the required / common base used.

Example

1. What number has been expanded to give $(1x2^3) + (0x2^2) + (0x2^1) + (1x2^0)$?

Soln

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

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

$= 8 + 0 + 0 + 1$

$= 9_{ten}$

Common base = 2

9_{ten} = Base | N0. | Rem

2	9	R
2	4	1
2	2	0
	1	0

:. Expanded base = 1001_{two}

EVALUATION

EXERCISE

1. What base / number has been expanded to give;

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

b) $(2x3^2) + (1x3^1) + (0x3^0)$?

c) $(1x4^2) + (1x4^1) + (1x4^0)$?

d) $(1x2^4) + (0x2^3) + (1x2^2) + (0x2^1) + (1x2^0)$?

e) $(3x5^3) + (2x5^2) + (1x5^1) + (0x5^0)$?

f) $(1x6^1) + (1x6^0)$?

Answers

a) (i) 12_{ten}

(ii) 1100_{two}

b) (i) 21_{ten}

(ii) 210_{three}

c) (i) $\underline{21_{ten}}$

(ii) $\underline{111_{four}}$

d) (i) $\underline{21_{ten}}$

(ii) $\underline{11101_{two}}$

e) (i) $\underline{430_{ten}}$

(ii) $\underline{3210_{five}}$

f) (i) $\underline{7_{ten}}$

(ii) $\underline{11_{six}}$

REMARKS

DATE	CLASS	TIME	SUBJECT	N0. OF PUPILS
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TOPIC **WHOLE NUMBERS**

SUB-TOPIC **OPERATION IN BASES:**

Concepts

1. Addition

Concepts

- The sum must be less than the base used.
- If the sum is more than the used base, divide it by that base, record the reminder and carry the full units.

E.g

- Add. $101_{two} + 111_{two}$

Soln

101_{two}

$+ \underline{111_{two}}$

$\underline{1100_{two}}$

2. Subtraction

Concepts:

- If the problem is impossible, borrow the base units used and add then subtract.

e.g

		Subtract 1001_{two} - 111_{two} | side work Soln | $1 - 1 = 0$ $1\ 0\ 0\ 1_{two}$ | $2 - 1 = 1$ (Borrow 1two) - $0\ 1\ 1\ 1_{two}$ | $1 - 1 = 0$ $0\ 0\ 1\ 0_{two}$ | $0 - 0 = 0$

3. Multiplication

concepts:

- The product must be less than the base.
- If the product is more than the base, divide by that base, record the reminder first then carry the full unit.

Eg.

Multiply: 123_{four} x 23_{four}

Soln

22

123_{four}

x 23_{four}

1101

+ 3120

10221_{four}

4. Division

Concepts:

- First change all the numbers to base ten.
- Change the answer to the required base.

e.g

Divide $204_{five} \div 14_{five}$

Soln

$204 \div 14_{five} = (2x5^2) + (0x5^1) + (4x5^0) \div (1\ x5^1) + (4x5^0)$

$= (2x5x5) + (0x5) + (4x1) \div (1x5) + (4x1)$

$= (2x25) + 0+4 \div 5+4$

$= 54 \div 9$

$= 6_{ten}$

		Required base = 5 b) 6ten = Base | No | Rem 5 6 | R | | 1 | 1 :. 204five ÷ 14five = 11five.
	EVALUATION	**EXERCISE** 1. Work out: a) $1\ 2\ 4_{five}$ + $3\ 4\ 3_{five}$ b) $1\ 1\ 2_{three}$ + $2\ 2\ 2_{three}$ c) $2\ 4\ 5\ 6_{seven}$ + $2\ 4\ 6\ 3_{seven}$ 2. Simplify: a) $2\ 3\ 2_{four}$ - $1\ 2\ 3_{four}$ b) $3\ 4\ 1_{five}$ - $1\ 3\ 2_{five}$ c) Subtract $3\ 4\ 5_{six}$ from $4\ 3\ 1_{seven}$ and give your answer in base eight. Work out: 3. a) $1\ 2\ 1_{three}$ x 2_{three} b) 24_{six} x 32_{six} c) 64_{eight} x 24_{eight} and give your answer in a base nine. 4. Divide: a) $144_{five} \div 12_{five}$ b) $231_{six} \div 21_{six}$ c) $103_{nine} \div 15_{nine}$ answer in base five. Answers 1. a) 1022_{five} b) 1111_{three} c) 5252_{seven} 2. a) 103_{four} b) 204_{five} c) (i) $345_{six} = 137_{ten}$ (ii) $431_{seven} = 218_{ten}$ (iii) difference = 081_{ten}

(iv) 081ten = $\underline{121_{eight}}$

3. a) 1012_{three}

   b) (i) $\underline{1152_{six}}$ (ii) $\underline{1520_{nine}}$

4. a) (i) Quotient = $\underline{7_{ten}}$

   (ii) 7_{ten} = $\underline{12_{five}}$

b) (i) Quotient = $\underline{7_{ten}}$

   (ii) 7_{ten} = $\underline{11_{ten}}$

c) (i) Quotient = $\underline{6_{ten}}$

   (ii) 6_{ten} = $\underline{11_{five}}$

REMARKS

DATE	CLASS	TIME	SUBJECT	N0. OF PUPILS
	P.7		MTC	

TOPIC **WHOLE NUMBERS**

SUB-TOPIC **SOLVING FOR UNKNOWN BASES**

Concepts:

1. Change eache base/side to base ten.
2. Collect like terms and solve.

E.g

Solve for K : $K^2 = 71_{nine}$

Soln

$K^2 = 71^0{}_{nine}$

$K^2 = (7 \times 9^1) + (1 \times 9^0)$

$K^2 = (7 \times 9) + (1 \times 1)$

$K^2 = 63 + 1$

$K^2 = 64$

$\sqrt{K^2} = \sqrt{64}$

$\sqrt{K^2} = \sqrt{(2x2) \times (2x2) \times (2x2)}$

$\sqrt{K^2} = \sqrt{2^2 \times 2^2 \times 2^2}$

$K = 2 \times 2 \times 2$

$\therefore K = 8$

The used base in eight.

	EVALUATION	**EXERCISE** Solve for the unknown bases below; 1. $44p = 35_{nine}$ 2. $23_x = 19_{ten}$ 3. $55_n = 43_{eight}$ 4. $112_{three} = 22_x$ 5. $31_y = 221_{three}$ 6. $P^2 = 54_{nine}$ 7. $213_{six} = 100_n$ 8. $P^3 = 121_{seven}$ 9. $n^2 + n^2 = 112_{five}$ **10.** $n + 3_{five} = 2_{five}$ **11.** $p - 5\ s_{ix} = 4_{six}$ **12.** $2n_{six} = 15_{ten}$ Answers 1. p = 7 2. x = 8 3. n = 6 4. x = 6 5. y = 8 6. p = 7 7. n = 9 8. p = 8 9. n = 4

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	TOPIC **SUB-TOPIC**	**OPERATION ON WHOLE NUMBERS** **NUMBER SYSTEMS** Concepts: - Number systems are the different types of numbers we use. Examples 1. Natural numbers These are the same as counting numbers and they begin from 1. If m = {counting numbers less than 5} Soln M = {1, 2, 3, 4}

2. Whole numbers

These are numbers which start from zero.

X = {whole numbers greater than 5 but less than 10}

Soln

X = {6, 7, 8, 9}

3. Even numbers

These are whole numbers which are completely divisible by 2.

Note

How are even numbers obtained?

Concepts

a) When a whole number is multiplied by 2/ doubled you get an even number

Eg

0 x 2 = 0 2 x 2 = 4 4 x 2 = 8

1 x 2 = 2 3 x 2 = 6 5 x 2 = 10

Order of even numbers = {0, 2, 4, 6, 8, 10, ……..}

b) When any two even numbers are added, the result is an even number.

Eg.2 + 4 = 6

0 + 8 = 8

c) When any two even numbers are multiplied, the result is an even number.

Eg. Ox6 = 0

2 x 8 = 16

NB formular for even numbers = ”2n”

4. Odd numbers

These are whole numbers which are not completely divisible by 2.

Note:

How do we get odd numbers?

a) When a whole number is multiplied by 2 then add 1 to the result, you get an odd number.

OR add 1 to an even number

Formular = “2n + 1”

e.g (0x2) + 1 = 1

(1x2) + 1 = 3

(2x2) + 1 = 5

Order of odd numbers = {1, 3, 5, 7, 9, …….}

b) When any two odd numbers are multiplied, the result is an odd number.

Eg. 1x3 = 3

3x5 = 15

5x7 = 35

c) When any odd number is added to any even number, the result is an odd number.

Eg. 1+2 = 3

2+3 = 5

4+5 = 9

Note:

❖ When any odd number is subtracted from any odd number, the result is an even number.
Eg. 0x1 = 0

2x3 = 6

5x4 = 20

❖ When any odd number is subtracted from any odd number, the result is an even number.

Eg. 3-1 = 2

7-3 = 4

15-7 = 8

5. Prime numbers:

These are numbers which have only 2 factors ie one and itself.

- Order of prime numbers = {2, 3, 5, 7, 11, 13, 17, 19, 23, 29, …..}

6. Composite number.

These are numbers with more than two factors. (opposite of prime numbers) order of composite numbers = {4, 6, 8, 9, 10, 12, 14, 15, 16, ……}

7. Square numbers:

- These are numbers got by multiplying a number by itself / squaring a number.

e.g $1^2 = 1x1 = 1$

$2^2 = 2x2 = 4$

$3^2 = 3x3 = 9$

- Square numbers are also got by adding consecutive odd numbers from 1.
e.g 1 = 1

1+3 = 4

1+3+5 = 9

1+3+5+7 = 16

- Order of square numbers = {1, 4, 9, 16, ……}

		8. Triangular numbers: These numbers are got by adding consecutive counting numbers from 1. Eg 1 = 1 1+2 = 3 1+2+3 = 6 1+2+3+4 = 10 1+2+3+5 = 15 - Order of triangular numbers = {1, 3, 6, 10, 15, ……} 9. Cube numbers These are numbers obtained by multiplying counting number by itself three times / cubing a number. Eg. 1^3 = 1x1x1 = 1 2^3 = 2x2x2 = 8 3^3 = 3x3x3 = 27 4^3 = 4x4x4 = 64 - Order of cube number = {1, 8, 27, 64, ……} 10. Integers: These are a combination of negatives, positives with zero. Eg. –ve integers = {-2, -1} +ve integers = {+2, +1} With zero = {-2, -1, 0, 1, 2, ……} 11. Rational numbers: These are numbers which can be written as fractions / they are the same as fractions e.g = $\{^1/_2, ^2/_9, ^3/_4, \ldots\ldots\ldots\ldots\}$
	EVALUATION	**EXERCISE** 1. State the difference between whole and natural numbers. 2. What is the first? a) Whole number? b) Natural number? c) Even number? d) Odd number? e) Prime number? f) Composite number? g) Square number? h) Triangular number?

		i) Cube number? 3. a) Using the formular "2n", work out and list a set of any 5 even numbers. b) using the formular "2n", work out and list a set of any 5 odd numbers. 4. a) By squaring a number, work out and list a set of numbers greater than 9 but less than 100. b) By adding consecutive odd numbers from 1, work out and list a set of number from 25 to 100. c) By adding consecutive counting numbers from 1, workout and list a set of numbers from 21 to 55. d) Finally, by cubing any number, workout and list a set of numbers from 125 to 512. Answers 1. Whole numbers start from 0 while natural numbers start from 1. 2. a) 0 b) 1 c) 0 d) 1 e) 2 f) 4 g) 1 h) 1 i) 1 3. a) {2, 6, 10, 14, 18} b) {3, 7, 11, 15, 19} 4. a) {16, 25, 36, 49, 64, 81} b) {25, 36, 49, 64, 81, 100} c) {21, 28, 36, 45, 55} d) {125, 216, 343, 512}
	REMARKS	

OPERATION OF NUMBERS

1	**TOPIC** **SUB-TOPIC**	**NUMERATION (OPERATION)** **ARITHMETIC** Concepts: 1. Arithmetic is the study of numbers/ digits ie 0, 1, 2, 3, 4, 5, 6, 7, 8, 9 under different operations like addition, subtraction, multiplication and division. 2. The operations in arithmetic are called the "Four rules" ie a) Addition (together, sum, total, plus) – to b) Subtraction (difference, minus, take away) – from c) Multiplication product, groups of, times) – through (by) d) Division (quotient, over) – by (through)				

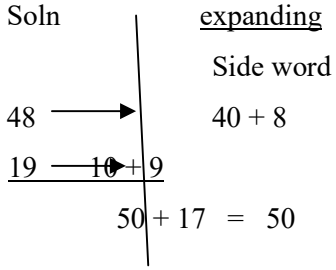
Note

1. Addition

Examples

a) Add 48 + 19

Soln



67

+ 17

67

b) Workout 378946 + 27996

Soln

1 1 1 1 1

3 7 8 9 4 6

+ 0 2 7 9 9 6

4 0 6 9 4 2

Exercise

1. Add the following:-
   a) 2,545 + 3,455 + 1,011
   b) 34 + 2,004 + 33,333 + 5,321
2. The principal of a National Teacher's College bought 1,450kg of flour in term 1, 2007kg and 1,549kg of flour in term II of the same year. How much flour did he buy during the period?
3. Manjasi High School bought 299,450 exercise books in February this year and 300,990 exercise books in July. How many exercise books were bought altogether?
4. Kigo Primary school received a grant of sh. 2,345,940 from the government of March 2009 and sh. 1,450,945 in July the same year. How much money did the school get that year?

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Subtraction:

Examples

1) Subtract: 48 – 19

Soln

48 → 40 + 8 → 30 + (10 + 8) → 30 + 18

- 19 → 10 + 9 → 10 + 9 → 10 + 9

20 + 9

20

+ 9

29

:. 48

- 19

29

2) Find the difference between 65717 and 579.

Soln

65717

- 00579

65138

Activity

1. Subtract
   a) 1,000 – 342
   b) 19,000 - 9889
2. Subtract one thousand ten from four thousand six
3. The reading of an electric meter is 003980. At the end of the month, it was reading 003993. How many units were used?
4. What is the difference between 456 264 and 109 239?

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Multiplication

Examples

1. Simplify: 58 x 3

Soln

58 → 50 + 8 → 150

x 3x 3 → 24

150 + 24 174

:. 58

x 3

174

2. A factory produced 4395 crates of soda, if each crate contains 24 bottles, how many bottles did it produce?

Soln

Crates = 4395

Bottles@ = 24

Product = 4395 x 24

= 4395

x 24

17580

+ 87900

105480 bottles

A factory produced 105,480 bottles.

Activity (Application of multiplication)

1. Multiply the following
   a) 243 x 14
   b) 531 x 19
2. In a school there are 29 classrooms with 149 pupils in each classroom.
   a) How many pupils are in the school?
   b) If one Friday each class had 24 pupils absent, how many pupils attended classes that day?
3. If there are 120 workers in Tororo District and each worker is paid sh. 9,460 a month, how much money will be paid to the workers in four months?
4. The bus charges sh. 400 per kilometer travelled and a bodaboda charges sh. 500 every two kilometers. How much money will Mary pay if she travelled 160km by bus and 20km by bodaboda?

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Division

The components of division include;

a) A divisor (D) – a number that divides into another.
b) A dividend (D) – a number that divided into.
c) A quotient (Q) – a number that tells the number of times a number is divided into.
d) A reminder (R) – a number that is left over when a number is not completely divided into.

Division formular.

Dividend = Division x Quotient + reminder.

Examples

1. Divide 148 ÷4

Soln

Note

The steps for long division in order;

a) Divide / group
b) Multiply
c) Subtract
d) Borrow

		037	side work
148 ÷ 4	=	4⟌148	- 0.4 in 1
	= 0 x 4	- 0	- 4+4+4 = 3 fours
		14	
		-	
	= 3 x 4	12	- 4+4+4+4+4+4+4 = 7 fours
		28	
		-	
	= 7 x 4	28	
		Xx	

:. 148 ÷ 4 = 37

Activity

1. Workout the following:-
   a) 6,069 ÷7
   b) 12,493 ÷13
2. Matovu had 3 children. He left dollars 78,240 to them when he died. If the children shared the money equally, how much money did each child get?
3. In a district, there are 26,688 pupils in the district. If each school had the same number of children, find the number of children in each school.
4. During the tree planting season, 27,045 young trees were shared equally among 621 schools. How many trees did each school get?

	REMARKS	

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TOPIC **NUMBERS (OPERATION)**

SUB-TOPIC **QUICK WAY CALCULATIONS / DISTRIBUTIVE PROPERTY**

Concepts:

- identify the common factor from the number parts (brackets).
- Pullout the common factor and the sign.

Examples

1. Calculate the following using distributive property only.

a) (379 x 27) + (27 x 21)

Soln

= (379 x 27) + (27 x 21)

= 27 x (379 + 21)

= 27 x (400)

= 27 x 400

= 10,800

500

side work

379

\+

021

400

x 27

2800

10,800

b) (156÷ 13) + (260÷ 13)

Soln

= (156÷ 13) + (260 ÷13)

= (156 + 260) ÷13

= 416 ÷13

4126

13

= 32

side work

156

260

416

EVALUATION

EXERCISE

1. Fill in the missing numbers;

a) (3 x 7) +(3x4) = 3x (--- + 4) = 3x ----------

b) (6x4) + (6x7) = ---- (4 + ----) = 6x -------

c) (13x15) + (13x5) = ---- x (15 + ----) = 13x --------

d) (25 x 130) – (25x30) = --- x (---- - 30) = 25 x -----

e) (147÷ 12) – (3 ÷12) = --- (-- - --) ÷12 = ----

2. Calculate using distributive property;

a) (59÷ 13) – (7 ÷13)

b) (125 ÷7) + (22 ÷7)

c) (27 x 29) – (27 x 19)

d) (420 x 12) + (420 x 8)

e) (17÷ 3) + (10 ÷3)

Answers

1. a) 3x(7+4) = 3 x 11

   b) 6 x (4 + 7) = 6 x 11

   c) 13 x (15 + 5) = 13 x 20

   d) 25 x (130 – 30) = 25 x 100

   e) (147 – 3) ÷12

2. a) 4 b) 21 c) 270 d) 8400 e) 9

REMARKS

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TOPIC NUMBERS (OPERATION)

SUBTOPIC EXPANDED NOTATION

Concepts

- Expanded notation is a way of making a number become bigger in size.
- Forms of expanded notation;
  a) Place value form.
  b) Value form.
  c) Exponent / index / power form.
  d) Scientific / standard form.

1. Place value form

   Concepts:

   Multiply a digit by its place value then get its value.

   Eg

   Expand 7962 in place value form.

   7962 = (7x1000) + (9x100) + (6x10) + (2x1)

2. Value form

   Concept:

   Multiply a digit by its place value then get its value.

   Eg

		Expand in value form; a) 7,962 b) 0.6259 Soln a) 7962 = (7x1000) + (9x100) + (6x10) + (2x1) = 7000 + 900 + 60 + 2 b) 0.6259 = $(6x\ ^{1}/_{10}) + (2x\ ^{1}/_{10}) + (5\ x\ ^{1}/_{10}) + (9\ x\ ^{1}/_{10,000})$ $= {}^{6}/_{10} + {}^{2}/_{100} + {}^{5}/_{1000} + {}^{6}/_{10,000}$ = 0.6 + 0.02 + 0.005 + 0.0006 3. Power/ exponent / index form Concepts - The powers of tern are the number of zeros a number has. - Multiply a digit by its place value. Eg Expand in power form; a) 7,962 b) 0.6259 soln a) 7,962 = (7x1000) + (9 x 100) + (6 x 10) + (2x1) = (7x10 x 10x10) + (9x10x10) + (6x10) + (2x) = $(7x10^3) + (9\ x10^2) + (6\ x10^1) + (2\ x\ 10^0)$ b) 0.6259 = $(0x1) + (6x\ ^{1}/_{10}) + (2x\ ^{1}/_{100}) + (5\ x\ ^{1}/_{1000}) + (9\ x\ ^{1}/_{10,000})$ $= (0x1) + (6\ x\ ^{1}/_{10}) + (2\ x\frac{1}{10^2}) + (5\ x\frac{1}{10^3}) + (9\ x\frac{1}{10^4})$ $= (6\ x\ 10^{-1}) + (2\ x\ 10^{-2}) + (5\ x\ 10^{-3}) + (9\ x\ 10^{-4})$
	EVALUATION	**EXERCISE** 1. Expand the following in place value form. a) 23 b) 234 c) 12345 d) 9876543 e) 9876543 2. a) 34 b) 2.3 c) 125.4 d) 2.3456 e) 3456.78

3. Expand in powers of ten:

a) 32 b) 134 c) 2.35 d) 135.6789 e) 0.12345

Answers

1. a) (2x10) + (3x1)

b) (2x100) + (3x10) + (4x1)

c) (1x10,000) + (2x1000) + (3 x 100) + (4x10) + (5x1)

d) (9x1000,000) + (8x100,000) + (7 x 10,000) + (6 x 1000) + (5 x 100) + (4x10) + (3x1)

e) (2x10,000) + (0x1000) + (4x100) + (5x10) + (0x1)

2. a)30 +4

b) 2+0.3

c) 100 + 20 + 5+ 0.4 + 0.06

d) 2+0.3 + 0.04 + 0.005 + 0.0006

e) 3000 + 400 + 50 + 6 + 0.7 + 0.08

3. a) $(3 \times 10^1) + (2 \times 10^0)$

b) $(1 \times 10^2) + (3 \times 10^1) + (4 \times 10^0)$

c) $(2 \times 10^0) + (3 \times 10^{-1}) + (5 \times 10^{-2})$

d) $(1 \times 10^2) + (3 \times 10^1) + (5 \times 10^0) + (6 \times 10^{-1}) + (7 \times 10^{-2}) + (8 \times 10^{-3}) + (9 \times 10^{-4})$

e) $(1 \times 10^{-1}) + (2 \times 10^{-2}) + (3 \times 10^{-3)} + (4 \times 10^{-4}) + (5 \times 10^{-5})$

REMARKS

REMARKS

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TOPIC **OPERATION ON WHOLE NUMBERS**

SUB-TOPIC **COMMUTATIVE PROPERTY**

Example 1

8 + 4 = 4 + 8

The statement is commutative under addition

Example 2

4 x 6 = 6 x 4

The statement is commutative under multiplication

N.B: The order in which any two numbers are added or multiplied does not affect the result.

		Exercise Fill in the missing numbers 1. 5 + 6 = ____ +5 2. 11 + 7 = ____ +11 3. 19 + 8 = 8 + ____ 4. 40 + 9 = ____ + 40 5. 5 x 2 = ___ x 5 6. 8 x 3 = ____ x 8 7. 4 x 7 = 7 x ____ 8. 11 x 5 = 5 x ____

	REMARKS					
		DATE	**CLASS**	**TIME**	**SUBJECT**	**N0. OF PUPILS**
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	TOPIC **SUB-TOPIC**	**OPERATION ON WHOLE NUMBERS** **ASSOCIATIVE PROPERTY** <u>Example 1</u> (6 + 4) + 5 10 + 5 11 15 3X (4X5) =3X20 =60 Therefore (3 x 4) x 5 = 3x(4x5) is associative property of multiplication **Note**: When carrying out addition or multiplication of more than two numbers, the way in which numbers are grouped does not affect the sum or product. **Exercise** Fill in the missing numbers 1. 4 + (6+3) = (4+ __) + 3 2. (9 + 2) + 5 = 9+ (2 + ___) 3. 7 + (6 + 8) = (7 + ___) + 8 4. (5 x 3) x 6 = ___ (3 x 6)				

		Workout the following using the associative property 1. 3 + 5 + 7 2. 16 + 14 + 10 3. 6 x 3 x 5 4. 8 x 5 x 9

NUMBER PATTERNS AND SEQUENCES

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TOPIC NUMBER PATTERNS AND SEQUENCES

SUB-TOPIC NEXT NUMBERS IN THE SEQUENCES

Concepts

- Identify the name of the sequence.
- Follow the order of the sequence.

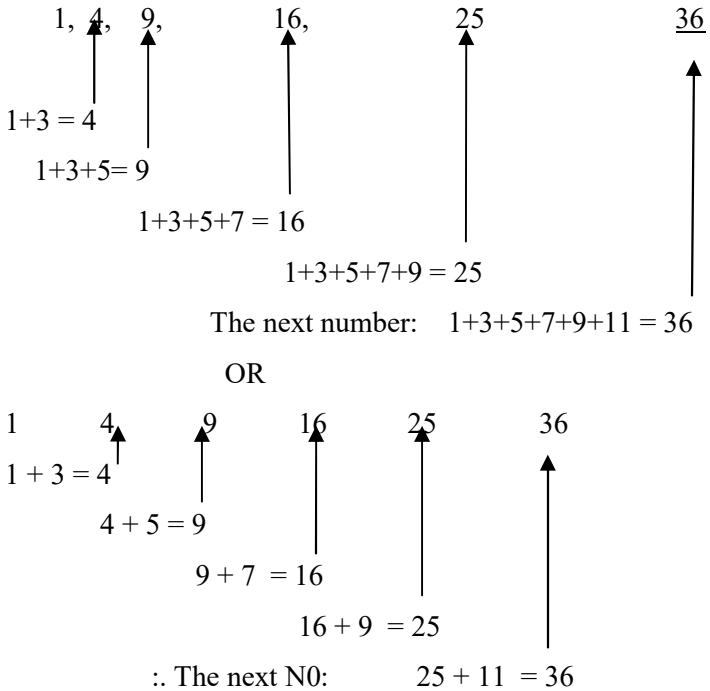
Examples

1. Square numbers

Find the next number in sequence below

1, 4, 9, 16, 25, -----

Soln



OR

2. Cube numbers

Got by multiplying a number by itself three time.

e.g

find the next number in the sequence below

1, 8, 27, 64, 125, ----------

Soln

1, 8, 27, 64, 125, 216

1^3 2^3 3^3 4^3 5^3 6^3

1x1x1 = 1

2x2x2 = 8

3x3x3 = 27

4x4x4 = 64

5x5x5 = 125

The next N0: = 6x6x6

= 216

3. Triangular numbers

NB

These are got by adding consecutive counting numbers starting from one. E.g. Find the next number in the sequence below. 1, 3, 6, 10, 15, 21, ------

Soln

1, 3, 6, 10, 15, 21, ---

1, 3, 6, 10, 15, 21, 28

1 + 2 = 3

3 + 3 = 6

6 + 4 = 10

10 + 5 = 15

15 + 6 = 21

:. The next N0: = 21 + 7 = 28

4. Other sequences

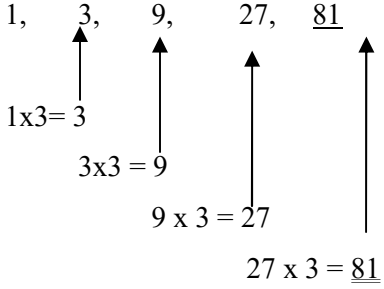
Examples

Find the next number:

a) 1, 3, 9, 27, ----

Soln

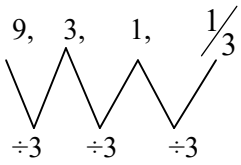
1, 3, 9, 27, 81



b) Find the next number 9, 3, 1, ------

Soln

9, 3, 1, $1/3$



c) What is the next number?

1, 3, 6, 11, 18, 29, 42, -----

Soln

1, 3, 6, 11, 18, 29, 42, 59

+2 +3 +5 +7 +11 +13 +17

:. The next N0: = 42

+ 17

59

d) 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, ---------

Soln

0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 8 + 2,9+ 2

:. 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10,11

	EVALUATION	**EXERICSE** Find the next number (s) in the sequence below: 1. 2, 4, 6, 8, 10, ----- 2. 17, 15, 13, 11, ----- 3. 1, 2, 4, 7, 11, ------ 4. 21, 18, 14, 9, -----, ----- 5. 1, 3, 4, 6, 7, 9, ----

6. 1, 2, 4, 5, 7, ---, ----
7. 1, 4, 9, ----
8. 1, 8, 27, ------
9. 16, 8, 4, -----
10. 9, 3, 1, $^1/_3$, -------

Answers

1. 12
2. 9
3. 16
4. 4, -4
5. 10
6. 8, 10
7. 16
8. 64
9. 2
10. $^1/_9$

Divisibility test for 2

A number is divisible by 2 if it ends with an even digit.

For example

42

42 is divisible by 2 since it ends with an even digit.

Exercise

1. Which of the following numbers is divisible by 2?
   4 6 3, 5 4 2, 8 6 0, 9 5 1

2. Without dividing, which number is divisible by 2?
   i) 4 8 9 or 9 4 6
   ii) 3 5 4 or 5 7 8
   iii) 9 4 5 or 3 3 4
   iv)7 5 6 or 2 5 3

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Divisibility tests for 3

A number is exactly divisible by 3 if the sum of its digits is divisible by 3.

For Example

33; Is divisible by 3 since its sum i.e 3 + 3 = 6 is divisible by 3.

Exercise

1. Which of the following numbers is divisible by 3?
   - 30, 32, 35, 37, 39
2. Without dividing, which number is divisible by 3?
   - 76 or 72
   - 96 or 94
   - 144 or 166
   - 135 or 73

Date	Class	Time	Subject	No. of pupils

Divisibility test for 4

A number is divisible by 4 if its last two digits are zero or multiples of 4

For example

356

356 is divisible by 4 since its last two digits are multiples of 4.

Exercise

1. Which of the following numbers are divisible by 4?
   10, 185, 949, 3700, 444
2. Without dividing, which number is divisible by 4?

m) 108 or 442

n) 62 0r 68

o) 18254 or 30700

p) 90 or 900

Divisible test for 5

A number is divisible by 5 if it ends with 0 or 5.

For example

70

70 is divisible by 5 since it ends with 0

Exercise

1. Which of the following numbers are divisible by 5

   4, 5, 7, 10, 55, 66

2. Without dividing, which number is divisible by 5?

- 101 or 205
- 18 or 30
- 12 or 80
- 60 or 78

REMARKS

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2 TOPIC NUMBER PATTERNS AND SEQUENCES

SUB-TOPIC DIVISIBILITY TESTS

1. Examples
1. Divisibility test for 6.

Concepts

- A number is divisible by 6 if it is divisible by 2 and 3.
- A number is also divisible by 6 if the sum of its digits is divisible by 3.

  Eg state whether 612 and 738 are divisible by 6.

  Soln

  612 = 6 + 1+ 2

  = 9 (divisible by 3)

  738 = 7+3+8

  = 10 + 8

  = 18 divisible by 3)

:. 612 and 738 are divisible by 6.

Date	Class	Time	Subject	No. of pupils

Activity

1. Which of the following numbers is divisible by 6.

- 7, 8,, 12, 18, 19, 20

2. Without dividing which number is divisible by 6?

- 1200 or 700
- 64 or 72
- 28 or 30
- 42 or 63

Date	Class	Time	Subject	No. of pupils

3. Divisibility test for 7.

Concepts.

When the last digit of a number is doubled and when the result is subtracted from the remaining number is divisible by 7.

e.g 1s 861 and 1792 divisible by 7?

Soln

86(1) = 1+1

86 = 2

86 = 86 – 2

= 84 (Divisible by 7)

Activity

1. Which of the following numbers is divisible by 7?

- 14, 16, 21, 25, 28

2. Without dividing, which number is divisible by 7

- 100 or 91
- 112 or 107
- 63 or 79
- 36 0r 56

NB. For big N0's repeat the procedure till you get a small number.

179 (2) = 2+2

= 4

179 = 179 – 4

= 175

17 (5) = 5+5

17 = 10

= 17 – 10

= 7 (divisible by 7).

:. 861 and 1792 are all divisible by 7.

Date	Class	Time	Subject	No. of pupils

4. Divisibility test for 8:

Concepts:

A number is divisible by 8 if the number formed by the last 3 digits is also divisible by 8.

e.g check whether 7.960 and 5788 is divisible by 8.

Soln

7 (960) = 960

8

= 120 (divisible)

188

8

= 23 ½ (Not divisible)

:. 7960 is divisible by 8 but not 5188.

Activity

1. Which of the following numbers is divisible by 8

- 135, 144, 400, 500, 600, 960, 188

2. Without dividing, which number is divisible by 8

- 1200 or 500
- 1244 or 5288
- 2700 or 35200
- 11288 or 9478

Date	Class	Time	Subject	No. of pupils

5. Divisibility test for 9.

Concepts

- A number is divisible by 9 if the sum of its digits is divisible by 9.

e.g take 198 to see whether its divisible by 9.

Soln

198 = 1 + 9 + 8

= 10 + 8

= 18 (divisible by 9)

:. 198 is divisible test for 9

Activity

1. Which of the following numbers is divisible by 9

- 10, 18, 21, 27, 28, 46, 50

2. Without dividing, which number is divisible by 9 ?

I 66 or 72

108 or 118

651 or 126

903 or 288

Date	Class	Time	Subject	No. of pupils

Divisibility test for 10

A number is divisible by 10 if the digit in the ones place is 0 or if it ends with 0.

Or: Any number divisible by 10 is also divisible by 2 and 5

For example

80 – is divisible by 10 since 0 is in the place of ones

Exercise

1. Which of the following numbers is divisible by 10

- 52, 10, 15, 20, 25, 55, 33, 77, 60

2. Without dividing, which number is divisible by 10

- 388 or 450
- 4508 or 1890
- 133 or 200
- 1458 or 2700

Date	Class	Time	Subject	No. of pupils

6. Divisibility test for 11

Concepts.

- A number is divisible by 11 if the difference between the sum of the digits in the even places and that of the digits in the odd places stating with odd zero or divisible by 11.

Examples.

1. Check whether 733689 and 676390 are divisible by 11.

Soln

Odd places starts from the last digit while even places start from the second last digit.

a) even position

7 3 3 6 8 9

odd position

(i) sum in odd position = 7 + 3 + 8

= 10+8

= 18

(ii) sum in even position = 3+6+9

= 9+9

= 18

(iii) difference between the sum = 18

- 18

00 (divisible by 11).

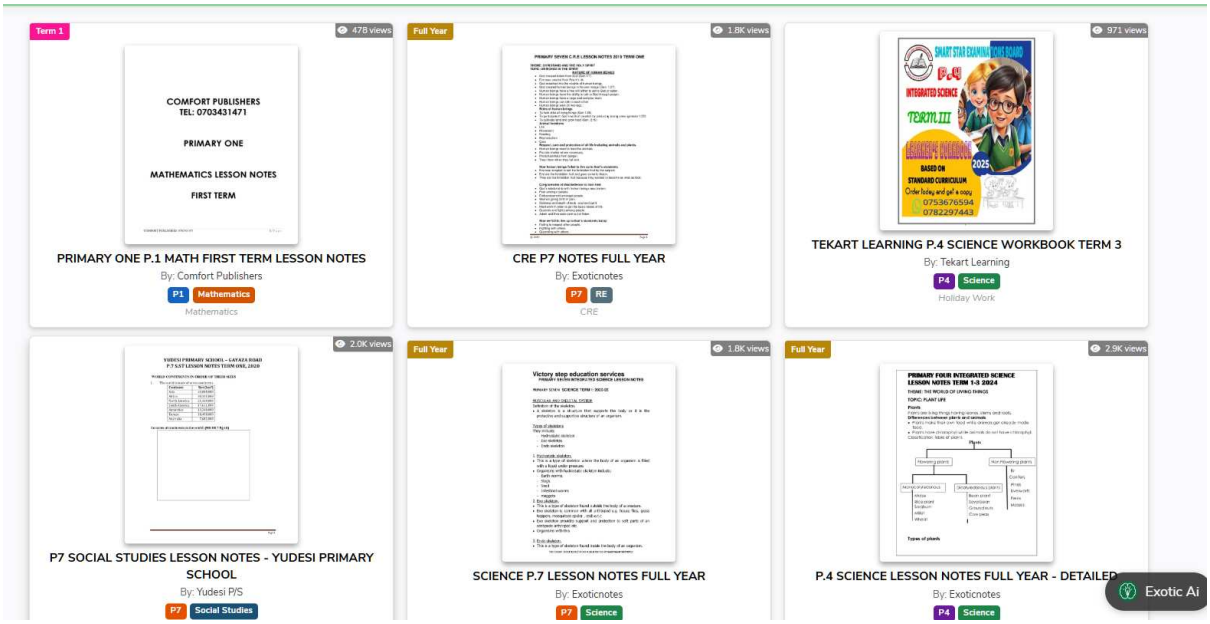
b) Odd

6 7 6 3 9 0

Even

		(i) Sum in even position = 7+3+0 = 10 (ii) Sum in odd position = 6+6+9 = 12 + 9 = 21 (iii) Difference in sums = 21 -10 11 (divisible by 11) :. 733689 and 676390 are all divisible by 11. **Activity** 1. Which of the following numbers is divisible by 11? - 121, 187, 128, 132, 143, 147, 148, 149 2. Without dividing, which number is divisible by 11? - 3333 or 6425 - 2678 or 1001 - 814 or 444 - 8080 or 6666
	EVALUATION	**EXERCISE** Which of the numbers given are divisible by the number given? 1. 6 = {2367, 2376, 814, 4625, 2782, 1001, 3333} 2. 7 = {379, 144, 912, 814} 3. 8 = (76344, 98020, 59752, 4576128} 4. 9 = {342, 783, 660, 8757, 4827, 70308, 54696} 5. 10 = {8001, 72000, 144, 245} 6. 11 = {2397, 901,938, 326044, 769034} Answers 1. By 6 = {2367, 2376, 3333} 2. By 7 = Nil 3. By 8 = {59752, 4576128} 4. By 9 = {342, 783, 8757, 70308} 5. By 10 = {72000} 6. By 11 = Nil
	REMARKS	

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