INTEGRATED EASY MATHEMATICS

Students V TO XII standard, College Students and preparing for Competitive Exams

Includes CBSE and Samacheer Syllabus
(Problem with Solutions)

Dr.L.RAMESH

Assistant Professor,
Department of Information Technology,
Vels Institute of Science, Technology & Advanced Studies (VISTAS)
Pallavaram, Chennai, Tamil Nadu, India.

Dr.S.GOPINATHAN

Professor & Head,
Department of Computer Science,
Guindy Campus,
University of Madras,
Chennai, Tamil Nadu, India.

LEILANI KATIE
PUBLICATION & PRESS
The International Journals and Books
142, Periyar Nagar, Madakulam,
Madurai - 625 003, Tamil Nadu, India.
leilanikatiepublication@gmail.com
www.leilanikatiepublication.org

Title: **INTEGRATED EASY MATHEMATICS**

Author's Name: Dr.L.RAMESH

Dr.S.GOPINATHAN

Published by: Leilani Katie Publication & Press

Madurai – 625 003, Tamil Nadu, India.

Edition Details: I

ISBN: 978-81-968567-3-1

Month & Year: December, 2023

Pages: 174

Price: ₹275/-

DEDICATED TO

BHARAT RATNA

Dr.A.P.J.ABDULKALAM

DEDICATED TO

My Grand Mother

D.POONGAVANAM

CONTENTS

UNIT - 1

INTEGERS

Positive Integers :

The Numbers +1,+2,+3 …. etc

Negative Integers :

The numbers -1, -2, -3….. etc

Zero is neither negative or positive

Natural Numbers :

1,2,3,4,5……. etc

Whole Numbers :

0,1,2,3,4,5……. etc

Even Numbers :

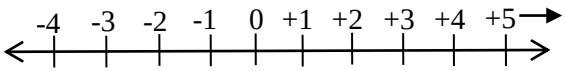
2,4,6,810…….. etc

Odd Numbers:

1,3,5,7,9….. etc

Number Line :

← Negative Integers Positive Integers →



Predecessor :

One less than a given integer is called its predecessor

Example :

O is the predecessor of - 1

Successor :

One more than a given integer is called its successor .

Example :

-2 is the successor of -3

Comparison of Integers :

Example :

7 > 6 > 5

-7 < -6 < -5

-1 > -2, 2 > 1, 5 > 3, etc.

Addition of Integers :

i) (+6) + (+3) = 9

ii) (-9) + (+3) = -6

iii) (+7) + (-12) = -5

Subtraction of Integers from second number to first number :

i) 6,18 $\begin{array}{r} 18 \\ -6 \\ \hline 12 \end{array}$

ii) -3, 6 $\begin{array}{r} 6 \\ +3 \\ \hline 9 \end{array}$

iii) -27,54 $\begin{array}{r} 54 \\ +27 \\ \hline 81 \end{array}$

Multiplication of Integers

First Number x Second Number =

i)	+	x +	= +
ii)	+	x -	= -
iii)	-	x +	= -
iv)	-	x -	= +

Example :

i) 40 x 2 = 80

ii) 10 x -2 = -20

iii) -5 x 4 = -20

iv) -6 x -5 = 30

HINT :

* If **Minus Sign** appears **an - odd Number** of times in a product as the final **product is negative**.
* If **Minus Sign** appears as **even number** of times in a product as the final **product is positive**.

Division of Integers

First Number ÷ Second Number =

+	÷	+	= +
+	÷	-	= -
-	÷	+	= -
-	÷	-	= +

Example :

i) 20 ÷ 5 = 4

ii) 20 ÷ -2 = -10

iii) -15 ÷ 5 = -3

iv) -20 ÷ -4 = 5

Simplify :

1. -4 x -2 x1
   = -4 x -2
   = 8 x 1
   = 8
2. Simplify : - 7 x -8 x -1
   = -7 x -8
   = 56 x -1
   = -56
3. Simplify : -15 x -8 x -287 x 0
   = 0
   HINT :
   O is multiply by any number = 0
4. Find : [-155+(-100)] ÷ [-300+45]
   = [-155-100] ÷ -255
   = -255 ÷ -255
   = $\frac{-\cancel{255}}{-\cancel{255}}$ [- ÷ - = +]
   = 1
5. Evaluate : -8000 ÷ (-20)
   = $\frac{\overset{400}{-\cancel{8000}}}{-20}$ [- ÷ - = +]
   = 400

6. Adding / Subtracting Integers :
   Find the Sum :
   (-12) +7 = -5
7. Find the Sum : (-10) + (-9) = -19
8. Find the Sum : (-8) + 12 = 4
9. Find the Sum : (-1) + (-48) = -49
10. Find the Sum : 39 + (-40) = -1
11. Find the Sum : (-2) + (-40) = -42
12. Find the Sum : (-30) + 5 = -25
13. Find the Sum : (-8) + 15 = 7

Find Each Difference

14. 2-(-5) = 2+5 (- x - = +)
    = 7
15. (-1) -11 = -1-11
    = -12
16. 10-9 = 1
17. (-10) - (-5) (- x - = +)
    = -5
18. (-38) -20 = -58
19. (-1) - (-3) = -1+3
    = 2
20. (-2) - (-30) = -2+30
    = 28

Evaluate Each Expression

21. 35 + 12
    = 47
22. (-35) -44
    = -35 -44
    = -79
23. (-15) + (-12)
    = - 15+(-12)

= -15-12

= -27

24. 16+(-13) +5

= 16-13+5

= 3+5

= 8

25. 2- (-9) -7

= 2+9-7

= 11-7

= 4

Multiplying and Dividing Positives and Negatives

26. Find each product :

= -11x8 → -x+=-

= - 88

27. Find product :

= -8x-7

= +56 → -x-=+

28. Find product :

= 12x-5 → +x-=-

= -60

29. Find product :

-15x2 → +x+=-

= -30

30. Find product :

= +12x+4 → +x+=+

= +48

31. Find product :

= 5 x -6x2 → +x-=-

= -30x2 → -x+=-

= -60

-x+=-
-x-=+
+x-=-
+x+=

32. Find product :

= 5x-3x-2 → +x-=-

= -15x-2 → -x-++

= +30

33. Find product :

-3 x 2 x-5 → -x+=-

= -6 x -5

= +30 → -x-+=+

34. Find the product of (-3) (-3) (-3) (-3)

= -3 x -3 x -3 x -3 -x-=+

= +9 x -3 → +x-=-

= -27 x -3 → -x-=+

= +81

35. Find the product of :

(-3) (3) (-3) (-3)

= -3 x 3 x -3 x -3 → -x+=-

= -9 x -3 → +÷-x-

= +27 x -3

= -81

36. Find each quotient :

$= \frac{10^{2}}{5} \frac{+10}{+5}$ +÷+=+

= 2

+ ÷ + = +
+ ÷ - = -
- ÷ - = +
- ÷ + = -

37. $\frac{-20^{10}}{-2_{1}}$ → -÷-=+

= 10

38. $\frac{-15^{3}}{5}$ → -÷+=-

= 3

39. $\frac{70^{7}}{-10}$ → +÷-=-

= -7

40. $\frac{-66^{11}}{-6}$ → -÷-=+

= 11

FACTS ABOUT EVEN AND ODD NUMBERS

1. The sum of two even numbers is always **even**.
2. The sum of two odd numbers is a always **even**.
3. The sum of an even and odd numbers is always **odd**.
4. The product of two even numbers is always **even**.
5. The product of two odd numbers is always **odd.**
6. The product of an even and odd number is always **even.**

Math fact

The number 1 is neither prime nor composite

Prime and Composite Numbers

Number	Divisors
1	1
2	1,2
3	1,3
4	1,2,4
5	1,5
6	1,2,3,6
7	1,7
8	1,2,4,8
9	1,3,9
12	1,2,3,4,6,12

A Prime Number is a whole number greater than 1 which is divisible only by itself and 1.

EXERCISE :

1. Add (-15) + (-9)
2. Add (+8) + (-20)
3. Subtraction -5, 10
4. Subtraction 57,70
5. Multiplication -20x-5x-10
6. Multiplication 12x-7x-3
7. Divide -75÷5
8. Divide 105÷-5
9. Simplify -20 - (-3)
10. Find - 15 - (-46)

UNIT - 2

DECIMAL NUMBERS

DECIMAL NUMBERS :

DEFINITION :

- A decimal may have both a whole number part and a fractional decimal are those digits to the left of the decimal point.
- The decimal point is used to separate these parts.

Examples :

DECIMAL	WHOLE - NUMBER PART	FRACTIONAL PART
3.25	3	25
5.182	5	182
52.04	52	04
0.269	0	269
142.89	142	89
157.3	157	3

Millions	Hundred	Ten Thousands	Thousands	Hundreds	Tens	Ones	and	tenths	Hundreds	Thousands	Ten Thousands	Hundred Thousands	Millions
						3	.	2	5				
						4	.	1	7	8			
				2	5	6	.	0	0	9			
		4	3	7	2	0	.	1	7	8			
4	5	9	2	1	3	7	.	2	9	0	8	7	6

Ex : Write each phrase as a decimal

No.	PHRASE	DECIMAL
1.	Twenty - Six Hundredths	0.26
2.	Nine Tenths	0.9
3.	Fourteen and Four Hundredths	14.04
4.	Twenty - five and eighty one hundredths	25.81
5.	Nineteen and seventy - eight thousands	19.078

Ex : Write each decimal using words.

No.	DECIMAL	PHRASE
1.	0.005	Five thousands
2.	100.6	One Hundred and six tens
3.	2.28	Two and twenty - eight hundredths
4.	71.062	Seventy - one and sixty - two thousandths
5.	3.0589	Three and five hundred eighty - nine ten thousands

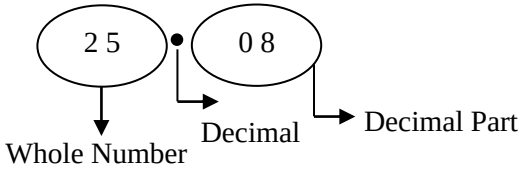
Example : Expanded form

We can write the whole number15a in expanded form as follows :
15a = (1 x 100) + (5 x 10) + (9 x 1)

Example : Write each decimal in expanded form

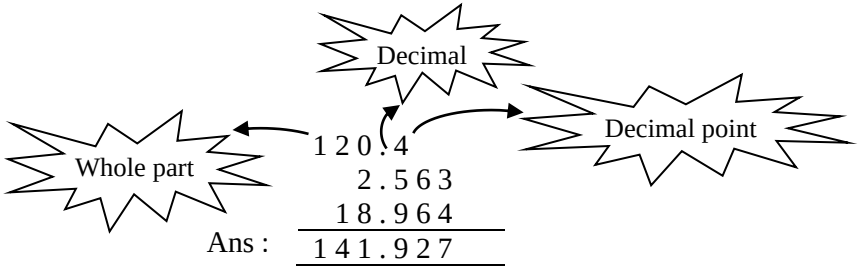
DECIMAL	EXPANDED FORM
4.12	$(4 \times 1) + (1 \times \frac{1}{10}) + (2 \times \frac{1}{100})$
0.9	$(0 \times 1) + (a \times \frac{1}{10})$
9.735	$(9 \times 1) + (7 \times \frac{1}{10}) + (3 \times \frac{1}{100}) + (5 \times \frac{1}{1000})$
1.0827	$(1 \times 1) + (0 \times \frac{1}{10}) + (8 \times \frac{1}{100}) + (2x \frac{1}{1000}) + (7 \times \frac{1}{10000})$

Example :



ADDITION OF DECIMALS

1. Add : 120.4, 2.563, 18.964
   Solution :



2. Add : 128.04, 56.089, 208.5
   Solution :

	H	T	O	.	Tenths	Hundredths
	1	2	8	.	0	4
		5	6	.	0	8 9
	2	0	8	.	5	
Ans :	3	9	2	.	6	2 9

3. Add : 15.86 + 29.069 + 360.280
   Solution :

	1	5	.	8	6		
	2	9	.	0	6	9	
	3	6	0	.	2	8	0
Ans :	4	0	5	.	2	0	9

4. Find the sum of 743.285, 75.4, 61.05, 8147.9005
   Solution :

		7	4	3	.	2	8	5
			7	5	.	4		
(+)			6	1	.	0	5	
	8	1	4	7	.	9	0	0 5
Ans :	9	0	2	7	.	6	3	5 5

5. Find the sum of 8.86, 5.3, 1.817
   Solution :

	8	.	8	6		
(+)	5	.	3			
	1	.	8	1	7	
Ans :	1 5	.	9	7	7	

6. Find the sum of 27.89, 7.0, 0.008, 8.07

Solution :

$$\begin{array}{r} 27.89 \\ 7.0 \\ 0.008 \\ 8.07 \\ \hline \text{Ans : } 42.968 \end{array}$$

7. Find :

213 + 2.514 + 0.514 + 8.8015

Solution :

$$\begin{array}{r} 213 \\ 2.514 \\ 0.514 \\ 8.8015 \\ \hline \text{Ans : } 224.8295 \end{array}$$

SUBTRACTION OF DECIMALS

8. Simplify : 8.743 from 18.684

Solution :

$$\begin{array}{r} 18.684 \\ (-)\ 8.743 \\ \hline 9.941 \end{array}$$

Check :

$$\begin{array}{r} 8.743 \\ 9.741\ (+) \\ \hline 18.684 \end{array}$$

9. Subtract : 0.376 from 1

Solution :

$$\begin{array}{r} 1.000 \\ 0.376 \\ \hline 0.624 \end{array}$$

Check :

$$\begin{array}{r} 0.376 \\ 0.624\ (+) \\ \hline 1.000 \end{array}$$

10. Subtract : 0.0083 from 0.086

Solution :

$$\begin{array}{r} \overset{\frown}{15}\ 10 \\ 0.086\not{0} \\ 0.0083 \\ \hline 0.0777 \end{array}$$

MULTIPLYING DECIMALS

11. Simplify Multiply :

- 5 . 5 x - 4 . 8 7	(3)
3 8 5	(4)
4 4 0 *	(2)
2 2 0 * *	
2 6 7 8 5	

Left decimal number there are **1** decimal point
Right decimal number there are **2** decimal points
Hence, after three decimals from right to left put a Decimal point.

12. Multiply :

1. 7 x -2 . 1	
1 7	
3 4	
-3 . 5 7	

+	x	-	=	-
-	x	-	=	+
+	x	+	=	+
-	x	+	=	-

13. Multiply :

-4. 6 x -7 . 2	
1 9 2	
3 2 2	
3 3 . 1 2	

-	x	-	=	+

14. Multiply :

- 7.5 x 2 x - 8.2

= -7.5 x 2	(1)	- x + = -
15.0		

15 . 0 x - 8 . 2
3 0 0
1 2 0 0
- 1 2 3. 0 0

+	x	-	=	-

Ans : - 123

15. Multiply :

- 4.04 x 0 x 2
0

Any number with multiplying Zero means Zero

Ans : 0

DIVIDING DECIMAL NUMBERS

16. Divide :

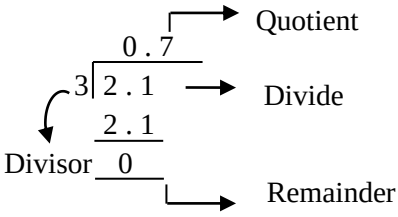
$\frac{-8.2}{-4.1}$ 2

-	÷	-	=	+
+	÷	-	=	-
-	÷	+	=	-
+	÷	+	=	+

= 2

17. Divide :

$= \frac{2.1}{3}$



18. Divide :

$$= \frac{0.06}{2}$$

$$2 \overline{)0.06} = 0.03$$

$$\begin{array}{r} 0.06 \\ \hline 0 \end{array}$$

EXERCISE :

1. Add : 1750.50, 196.8, 5683, 589
2. Add : 192.568, 52.5, 363.90
3. Subtract : 0.896 from 1
4. Subtract : 0.0090 from 0.0098
5. Multiply : -289.6 x 50.20
6. Multiply : -5280.10 x -10.20
7. Divide : -420.40 ÷ 25
8. Divide : -150.45 ÷ 10
9. Simplify : -2568.18 +1996.10 - 11.876
10. Simplify : 1246.14 - 22296 + 1568.50 - 416.5

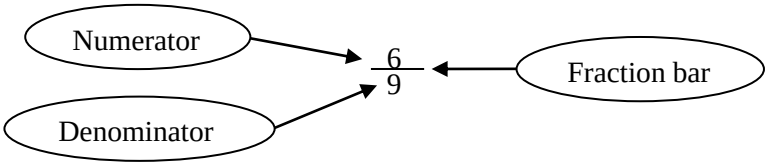
UNIT - 3

FRACTION

Definition :

A fraction is, in its broadest definition, the quotient of two quantities. It has three components - a tap number called the hum orators a bottom number called the denominator, and a traction bar separating them to indicate their relationship.

Example :



Some Fractions Definition :

Proper Fraction :

A fraction is called a proper fraction if its Denominator > Numerator

Example :

$\frac{2}{3}, \frac{5}{7}, \frac{6}{8}$

Improper Fraction :

A fraction is called an improper fraction it its Numerator > Denominator.

Example : $\frac{5}{3}, \frac{8}{5}, \frac{57}{25}$

Mixed Fraction :

A fraction consisting of a natural and a proper fraction is called a mixed fraction.

Example :

$2\frac{4}{2}, 1\frac{6}{7}, 5\frac{2}{3}$

Mixed fraction = Natural Number + proper fraction.

Addition of Fractions

1. **Simplify :** $\frac{3}{2}+\frac{4}{5}$ Same denominator: Addition of fraction

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

   $=\frac{7}{5}$ [Improper fraction]

   $=1\frac{2}{5}$ [Mixed fraction]

2. **Simplify :** $\frac{-5}{7}+\frac{8}{7}$

   $=\frac{-5+8}{7}$ $\qquad\qquad$ $\frac{8}{-5}$

   $=\frac{3}{7}$ [Proper fraction]

Different Denominator

3. **Simplify :** Addition of fraction

   $\frac{2}{4}+\frac{6}{12}+\frac{7}{22}$

   Denominator is different means to take L.C.M of 4,12,22 =

   = 2x2x3x11

   L.C.M = 132

   $\frac{2}{4}$ x $\frac{33}{33}=\frac{66}{132}$

   $\frac{6}{12}$ x $\frac{11}{11}=\frac{66}{132}$

   $\frac{7}{22}$ x $\frac{6}{6}=\frac{42}{132}$

   $=\frac{66+66+42}{132}$

   $=\frac{174}{132}$ (∵Improper fraction)

   $=1\frac{42}{132}$ (∵Mixed fration)

4. Simplify : $5\frac{1}{3} + 4\frac{4}{6} + 6\frac{3}{8}$

   To convert Improper fraction

   $= \frac{16}{3} + \frac{28}{6} + \frac{51}{8}$

   Denominators are different so take L.C.M of 3,6,8

   = 24

   $\frac{16}{3} \times \frac{8}{8} = \frac{128}{24}$

   $\frac{28}{6} \times \frac{4}{4} = \frac{112}{24}$

   $\frac{51}{8} \times \frac{3}{3} = \frac{153}{24}$

   $= \frac{128+112+153}{24}$

   $= \frac{393}{24}$ (Improper fraction)

   $= 16\frac{9}{24}$ (Mixed fraction)

Subtraction of fractions:

5. Simplify : $\frac{8}{7} - \frac{3}{7}$ (Same Denominator)

   $\frac{8-3}{7}$

   $\frac{5}{7}$

6. Simplify : $\frac{-8}{9} - \frac{7}{9}$

   $= \frac{-8-7}{9}$

   $= \frac{-15}{9}$ (Improper Fraction)

   =$-1\frac{6}{9}$ (Mixed fraction)

HINT :

Same Sign means

-8 -7 = -15

Different Denominator
Subtraction of fraction

7. Simplify :

   $\frac{2}{5} - \frac{8}{9}$

   Different denominator means

to take L.C.M 5,9 = 45

$\frac{2}{5}$ x $\frac{9}{9} = \frac{18}{45}$

$\frac{8}{9}$ x $\frac{5}{5} = \frac{40}{45}$

$= \frac{18-40}{45}$

$= \frac{-22}{45}$

8. Simplify : $2\frac{4}{5} - 3\frac{1}{6} + 7\frac{6}{8}$

To convert Improper fraction

$= \frac{14}{2} - \frac{19}{6} + \frac{62}{8}$

HINT :

$\frac{-40}{(-)18}$

-22

= Different denominator to take L.C.M of 5,6,8

= 120

$= \frac{14}{5}$ x $\frac{24}{24} = \frac{336}{120}$

$\frac{19}{6}$ x $\frac{20}{20} = \frac{380}{120}$

$\frac{62}{8}$ x $\frac{15}{15} = \frac{930}{120}$

$= \frac{336-380+930}{120}$

$= \frac{-44+930}{120}$

$= \frac{\cancel{886}}{\cancel{120}}\ \frac{443}{60}$ (Improper fraction)

$= 7\frac{23}{60}$ (Mixed fraction)

HINT :

Mixed fraction to Improper fraction

Natural Number x Denominator + Numerator = Improper fraction.

Multiplication of fraction

9. Find :

$\frac{3}{5}$ x 4 (∵There is no Denominator means that is 1)

$= \frac{3}{5}$ x $\frac{4}{1}$

$= \frac{12}{5}$ (Improper fraction)

$= 2\frac{2}{5}$ (Mixed fraction)

10. Find : $5 \times \frac{2}{6}$

$= \frac{5}{1} \times \frac{2}{6}$

$= \frac{\cancel{10}^{5}}{\cancel{6}^{3}}$

$= \frac{5}{3}$ (Improper fraction to convert mixed fraction)

$= 1\frac{2}{3}$ (Mixed fraction)

11. Find :

$\frac{15}{11} \times 7$

$= \frac{15}{11} \times \frac{7}{1}$

$= \frac{15x7}{11x1}$

$= \frac{105}{11}$ (Improper fraction)

$= 9\frac{6}{11}$ (Mixed fraction)

12. Find : $6 \times 7\frac{2}{3}$

To multiply a mixed fraction by a whole numbers first convert the mixed fraction to an improper fraction and then multiply.

$= 6 \times \frac{23}{3}$

$= \frac{6x23}{3}$

$= \frac{\cancel{138}^{46}}{\cancel{3}}$ (Improper fraction)

$= 46$

13. Find :

$4\frac{2}{9} \times 7$

$= \frac{38}{9} \times 7$

$= \frac{38}{9} \times \frac{7}{1}$

$= \frac{38x7}{9}$

$= \frac{266}{9}$ (Improper fraction)

$= 29\frac{5}{9}$ (Mixed fraction)

FRACTION AN OPERATOR 'of'

'of' indicates multiplication

14. Find : $\frac{1}{5}$ of $\frac{2}{4}$

$= \frac{1}{5}$ x $\frac{2}{4}$

$= \frac{1}{5}$ x $\frac{2}{4}$

$= \frac{\cancel{2}^{1}}{\cancel{20}_{10}}$ (Reduce form)

$= \frac{1}{10}$ (Proper fraction)

15. Multiply :

$= \frac{1}{2}$ of 28

$= \frac{1}{2}$ x $\frac{28}{1}$

$= \frac{\cancel{28}^{14}}{\cancel{2}}$ (Reduce form)

$= 14$

16. Multiply : $\frac{7}{10}$ of 100

$= \frac{7}{10}$ x $\frac{100}{1}$

$= \frac{\cancel{700}^{70}}{\cancel{10}}$

$= 70$

17. Multiply and express as a mixed fraction

$= 3$ x $6\frac{3}{5}$

$= \frac{3}{1}$ x $\frac{33}{5}$

$= \frac{99}{5}$

$= 19\frac{5}{4}$

Multiplication of a fraction by a fraction

18. Find : $\frac{1}{6}$ of $\frac{4}{8}$

    $= \frac{1}{6} \times \frac{4}{8}$

    $= \frac{\cancel{4}^{1}}{\cancel{48}_{12}}$

    $= \frac{1}{12}$

19. Find : $\frac{5}{9} \times \frac{3}{2}$

    $= \frac{15}{18}$

20. Ramesh reads $\frac{12^{th}}{4}$ of a book in 1 hour. How much of the book will he read in $4\frac{1}{2}$ hours?

    Solutions :

    The part of the book read by Ramesh in 1 hour = $\frac{2}{4}$

    So, the part of the book read by him in $4\frac{1}{2}$ hour = $4\frac{1}{2} \times \frac{2}{4}$

    $= \frac{9}{2} \times \frac{2}{4}$

    $= \frac{\cancel{18}^{9}}{\cancel{8}_{4}}$

    $= \frac{9}{4}$ (Improper fraction to convert mixed fraction)

    ∴ Ramesh reads $\frac{9}{4}$ part of a book in $2\frac{1}{4}$ hours

21. Multiply and reduce the lowest form

    $\frac{7}{8} \times \frac{9}{14}$

    $= \frac{7x9}{8x14}$

    $= \frac{\cancel{63}^{9}}{\cancel{112}_{16}}$

    $= \frac{9}{16}$

22. Find $\frac{4}{8} \times \frac{6}{10}$

    $= \frac{4x6}{8x10}$

$= \frac{\cancel{24}}{\cancel{30}} \frac{\cancel{12}}{\cancel{10}} \frac{\cancel{6}^{3}}{\cancel{20}_{10}}$

DIVISION OF A FRACTION

23. Division a Whole Number by a Fraction :

To divide a whole number by any fraction multiply that whole number by the reciprocal of that fraction.

Example: $8 \div \frac{2}{5}$ Reciprocal of second fraction

$= 8x \frac{5}{2}$

$= \frac{\cancel{40}^{20}}{\cancel{2}}$

$= 20$

24. $5 \div 4\frac{5}{6}$

$= 5 \div \frac{29}{6}$

$= 5 \text{ x } \frac{6}{29}$

$= \frac{5}{1} \text{ x } \frac{6}{29}$

$= \frac{30}{29}$ (Improper fraction)

$= 1\frac{1}{29}$ (Mixed fraction)

DIVISION OF A FRACTION BY ANOTHER FRACTION

Hint :

To divide a fraction by another fraction, multiply the first fraction by the reciprocal of the second fraction.

Example :

$= \frac{2}{5} \div \frac{4}{8}$

$= \frac{2}{5} \text{ x } \frac{8}{4}$

$= \frac{2x8}{5x4}$

$= \frac{\cancel{16}}{\cancel{20}} \frac{\cancel{8}^{4}}{\cancel{10}_{5}}$ (Reduce form)

$= \frac{4}{2}$ (Proper fraction)

25. Find : $2\frac{3}{4} \div \frac{3}{5}$

$= \frac{11}{4} \text{ x } \frac{5}{3}$

$= \frac{11x5}{4x3}$

$= \frac{55}{12}$ (∵ Improper faction)

$= 4\frac{7}{12}$ (Mixed fraction)

26. Find : $1\frac{2}{4} \div 16$

$= \frac{6}{4} \text{ x } \frac{1}{16}$

$= \frac{\cancel{6}^{3}}{\cancel{64}_{32}}$

$= \frac{3}{32}$

27. Simplify :

$43 \text{ x } \frac{1}{86} \div \frac{1}{14} \text{ x } \frac{2}{7} + \frac{9}{4} - \frac{1}{4}$

Solution :

$= \frac{43}{1} \text{ x } \frac{1}{86} \div \frac{1}{14} \text{ x } \frac{2}{7} + \frac{9}{4} - \frac{1}{4}$

$= \frac{43}{1} \text{ x } \frac{1}{\cancel{86}_{43}} \text{ x } \frac{\cancel{14}^{7}}{1} \text{ x } \frac{2}{7} + \frac{9}{4} - \frac{1}{4}$

$= \frac{\cancel{43}^{1} \, x \, 1 \, x \cancel{7}^{1} \, x \, 2}{\cancel{43}_{1} x \cancel{7}_{1}}$

$= \frac{2}{1} + \frac{9}{4} - \frac{1}{4}$

= L.C.M of 1,4,4 = 4

$= \frac{8+9-1}{4}$

$= \frac{17-1}{4} = \frac{\cancel{16}\,\cancel{8}^{4}}{\cancel{4}\,\cancel{2}_{1}} = 4$

28. Simplify :

$3 \div 16 + 1.2 \text{ x } \frac{1}{4} - \left\{\frac{1}{5} + (1 - 0.8)\right\}$

$3 \div 16 + 1.2 \text{ x } \frac{1}{4} - \{(1 + 5 - 0.8)/5\}$

$3 \div 16 + 1.2 \text{ x } \frac{1}{4} - \{(6 - 4)/5\}$

$3 \div 16 + 1.2 \times \frac{1}{4} - \{(1 + 5 - 0.8)/5\}$

$3 \div 16 + 1.2 \times \frac{1}{4} - \{2/5\}$

$3 \div 16 + 1.2 \times \frac{1}{4} - \frac{2}{5}$

$= \frac{3}{16} + \frac{1.2}{4} - \frac{2}{5}$

16,4,5

= L.C.M of 80

$= \frac{15+24-2}{80}$

= 7/80

Ans = 0.0875

COMPARING FRACTIONS

i. Comparing Like fraction

Like fraction have the same denominator so to find out which fraction is greater we have to compare the numerators only.

Example : 1

$\frac{8}{9} > \frac{2}{9}$

Example : 2

$\frac{6}{7} > \frac{4}{7}$

Example : 3

$\frac{8}{11} > \frac{6}{11}$

ii. Comparing unlike fractions :

Unlike fraction have different denominators.

So here two cases arise:

i) Unlike fractions with same numerators

ii) Unlike fractions with different numerators

i. Unlike fractions with same numerators :

$\frac{1}{3}$, $\frac{1}{5}$ are unlike fractions with the same numerator. They can be represented by mudels as,

* Which is the greater of these fraction $\frac{1}{3}$
* Which is the smeller of these fraction $\frac{1}{5}$

Thus $\frac{1}{3} > \frac{1}{5}$

In $\frac{1}{3}$ the whole is divided into three equal parts and in $\frac{1}{3}$, the whole is divided into 5 equal parts.

So $\frac{1}{3}$ is a greater number.

ii. Unlike fractions having different numerators :

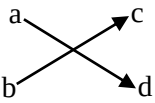
Let $\frac{a}{b}$ and $\frac{c}{d}$ be two fractions (b,d,≠0)

To compare them we have to find the cross products ad and bc

(i) If ad > bc then $\frac{a}{b} > \frac{c}{d}$

(ii) If ad < bc then $\frac{a}{b} < \frac{c}{d}$

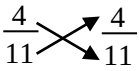
(iii) If ad = bc then $\frac{a}{b} = \frac{c}{d}$



Cross Multiply

Example : 1 $\frac{a}{b} > \frac{c}{d}$

Compare the fraction $\frac{6}{7}$ and $\frac{4}{11}$



Solution:

After cross multiplication 

the cross products are 6x11 = 66 and 7x4 = 28

∴ 66 > 28

∴ $\frac{6}{7} > \frac{4}{11}$

Example : 2 $\frac{a}{b} < \frac{c}{d}$

Compare the fraction $\frac{3}{5}$ and $\frac{8}{10}$

Solution :

After cross multiplication $\frac{3}{8} \times \frac{8}{10}$

the cross products are 3x10 = 30 and 4x8 = 40

∴ 30<40

∴ $\frac{3}{5} < \frac{8}{10}$

$\frac{a}{b} = \frac{c}{d}$

Example : 3

Compare the fractions

$\frac{5}{10}$ and $\frac{3}{6}$ the cross products

are 5x6 = 30 and 10x3 = 30

∴30 = 30

∴ $\frac{5}{10} = \frac{3}{6}$

Exercise : 3

EXERCISE :

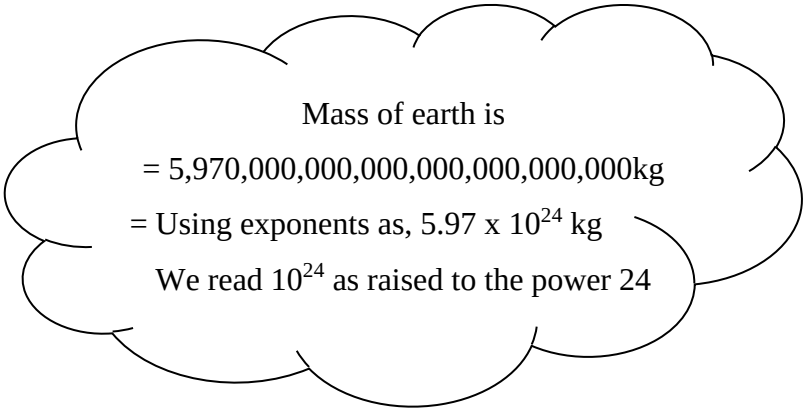
1. Add the fraction $\frac{-7}{6} + \frac{8}{6}$
2. Add the fraction $\frac{-9}{10} + \frac{(-2)}{10}$
3. Simplify $\frac{5}{6} + \frac{7}{13} + \frac{8}{15}$
4. Simplify $\frac{-2}{10} + \frac{6}{12} + \frac{4}{16}$
5. Simplify $4\frac{2}{3}$ -$5\frac{6}{9}$ +$1\frac{4}{5}$
6. Subtract the fraction $\frac{5}{9}$ - $\frac{10}{12}$
7. Find 6 x $\frac{5}{7}$
8. Find $\frac{16}{18}$ x 8
9. Multiply $\frac{8}{10}$ of 100
10. Find $1\frac{5}{6} \div 20$

UNIT – 4

POWERS AND EXPONENTS

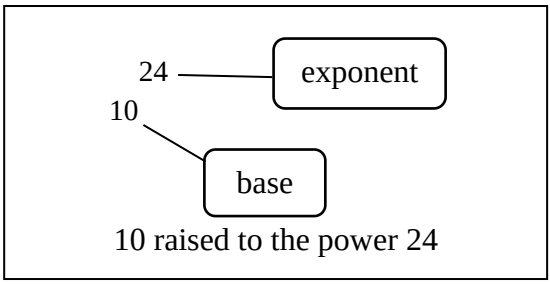
INTRODUCTION :

Do you know?



$2^6 = 2x2x2x2x2x2$

and $2^n = 2x2x2x…x2x2$ (n times)



POWERS WITH NEGATIVE EXPONENTS :

1. Example 1 :

   $10^2 = 10 \times 10 = 100$

   $10^{-1} = \frac{1}{10}$

2. Example 2 :

   $3^4 = 3x3x3x3$

   $3^4 = 8^1$

3. Example 3 :

   $3^0 = 1$

$\because a^\circ = 1$

Law of Exponents :

$\frac{a^M}{a^n} = a^{m-n}$

$(a^m)^n = a^{mn}$

$a^m \times a^n = a^{m+n}$

$a^m \times b^m = (ab)^m$

$\frac{a^M}{b^m} = a^{m-n}$

$a^\circ = 1$

4. Find : 2^{-4}

   $\Rightarrow \frac{1}{2^4} = \frac{1}{2x2x2x2}$

   $= \frac{1}{16}$

5. Find : $\frac{1}{3^{-3}}$

   $= 3^3$

   $= 3x3xx$

   $= 27$

3x3x3
= 9x3
=27

6. Simplify : $(-4)^6 \times (-4)^{-8}$

   $a^m \times a^n = am + n$

   $(6+(-8))$

   $= (-4)$

   $= (-4)^{6-8}$

   $= (-4)^{-2}$

   $= \frac{1}{(-4)^2}$ $\quad [\because a^{-m} = \frac{1}{a^M}]$

7. Find : $3^5 \div 3^{-6}$

   $(a^m \div a^n = a^{m-n})$

   $= (3)^{5-(-6)}$

   $= 3^{5+6}$

   $= 3^{11}$

8. Find : $8^{-5} \div 8^{-3}$

   $= (a^m \div a^n = a^{m-n})$

   $= 3^{-5-(-3)}$

   $= 3^{-5+3}$

   $= 3^{-2}$

   $= \frac{1}{8^2} (a^{-m} = \frac{1}{a^m})$

9. Using exponents, write

   PxPxPxPxP

   Solution :

   $= pxpxpxpxp$

   $= p^5$

10. Using exponents, write

    -5x-5x-5

    Solution :

    $= -5x-5x-5$

    $= (-5)^3$

11. Using exponents write

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

Solution :

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

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

12. Express in power Notation -216

Solution :

$-216 = (-6) \times (-6) \times (-6)$

$= (-6)^3$

13. Express in power Notation 81

Solution :

$81 = 3x3x3x3$

$=(3)^4$

14. Express in power Notation $\frac{25}{49}$

Solution :

$\frac{25}{49} = \frac{5x5}{7x7} = \frac{5^2}{7^2} = (\frac{5}{7})^2$

15. Simplify : $(-3)^2 \times 4^3$

Solution :

$(-3)^2 \times 4^3 = -3 \times -3 \times 4 \times 4 \times 4$

$= 9 \times 64$

$= 576$

16. Simplify :

$(-2)^4 \times (-3)^2 \times -2$

$(-2)^4 \times (-3)^2 \times -2 = -2 \times -2 \times -2 \times -2 \times -3 \times -3 \times -2$

$= 16 \times 9 \times -2$

$= 144 \times -2$

$= -288$

17. Express the following product in exponential form $8^5 \times 8^{11}$

Solution :

$8^5 \times 8^{11}$

$8^5 \times 8^{11} \longrightarrow a^m \times a^n = a^{m+n}$

$8^{5+11} = 8^{16}$

18. Express the following product in exponential form $2^7 \times 2^6$

Solution :

$2^7 \times 2^6 \longrightarrow a^m \times a^n = a^{m+n}$

$2^{7+6} = 2^{13}$

19. Express the following products in exponential form

$(-8)^2 \times (-8)^3 \times (-8)^5$

Solution :

$(-8)^2 \times (-8)^3 \times (-8)^5 = (-8)^{2+3+5}$

$= (-8)^{10}$

20. Simplify and express the result in power notation $\left(\frac{3}{5}\right)^7 \times \left(\frac{3}{5}\right)^9$

$= \left(\frac{3}{5}\right)^7 \times \left(\frac{3}{5}\right)^9$

$= \left(\frac{3}{5}\right)^{7+9}$

$= \left(\frac{3}{5}\right)^{16}$

21. Simplify $(3^4)^5$

Solution : $(a^m)^n = a^{mxn} \longrightarrow$

$(3^4)^5$

$= 3^{4x5}$

$= 3^{20}$

22. Express the following with a single exponent $(2^4)^6 \times (2^7)^3$

Solution :

$(2^4)^6 \times (2^7)^3$ $\qquad (a^m)^n = a^{mxn}$

$= 2^{24} \times 2^{21}$ $\qquad (a^m x\, a^n = a^{m+n}$

$= 2^{24+21}$

$(2^4)^6 \times (2^7)^3 = 2^{45}$

23. Expand : $(2x3)^3$

Solution :

$(2x3)3 = (2x3) \times (2x3) \times (2x3)$

$= (2x2x2) \times (3x3x3)$

$= 2^3 \times 3^3$

24. Simplify : $(7a)^3$

Solution :

(7a)3 = 7a x 7a x 7a

= (7x7x7) x (axaxa)

= 7^3 x a^3

25. Simplify : 6 x $(2^5)^2$

Solution :

= 6 x $(2^5)^2$

= 36 x 2^{10}

= 36 x 2 x 2 x 2 x 2 x 2 x 2 x 2 x 2 x 2 x 2

= 36 x 10^{24}

6^2 x $(2^5)^2$ = 36,864

26. Simplify : $\frac{4^6}{4^4}$

$\frac{a^m}{a^n}$ = a^{m-n}

Solution :

= $\frac{4^6}{4^4}$

= 4^{6-4}

= 4^2

$\frac{4^6}{4^4}$ = 16

27. Simplify :

$(\frac{5}{4})^{10} \div (\frac{5}{4})^4$ $a^m \div a^n = a^{m-n}$

Solution :

$(\frac{5}{4})^{10-4}$ = $(\frac{5}{4})^6$

28. Simplify :

$(\frac{6^5}{6^2})$ $a^m \div a^n = a^{m-n}$

= 6^{5-2}

= 6^3

29. Find the value of $3^\circ + 4^\circ + 5^\circ$

Solution :

= $3^\circ + 4^\circ + 5^\circ$ ⟶ $a^\circ = 1$

= 1 + 1 + 1

$3^\circ + 4^\circ + 5^\circ$ = 3

30. Find the value of $(9^{\circ} - 5^{\circ}) \times (8x4)$

Solution :

$(9^{\circ} - 5^{\circ}) \times (8x4)$

$= (1x1) \times 12 = 0 \times 12 = 0$

EXERCISE :

1. Simplify : $(-2)^6 \times (-5)^7 \times (-2)^8$
2. Simplify : $(3)^8 \div (3)^{10}$
3. Simplify : $((2)^2)^3$
4. Using exponents, write -6 x -6 x -6
5. Express in power notation : $\frac{81}{64}$
6. Find the value of $7^{\circ} + 8^{\circ} + 9^{\circ}$?
7. Find the value of $(11^{\circ} - 6^{\circ}) \times (9+3)$?
8. Simplify : $\frac{7^6}{7^4}$
9. Simplify : $(\frac{6}{10})^4 \div (\frac{6}{10})^4$
10. Expand : $(5x4)^3$

UNIT – 5

MONEY

₹ 1=100 Paise

Addition :

1. Find the total amount of ₹ 36.75, ₹ 470.50, ₹ 6,077.25 and ₹ 8.50

	Rupee	Paise
₹	1 2 2	1
	3 6.	75
₹	4 7 0.	50
₹	6 0 7 7.	25
₹	8.	50
(+)		
₹ =	6 5 9 3.	00

2. Add : ₹ 745.50+ ₹ 750.50+ ₹ 60.00

	1 1	
₹	7 4 5.	50
₹	7 5 0.	50
₹	6 0.	00
₹ =	1 5 5 6.	00

SUBTRACTION

1. Subtract ₹ 739.75 from 5,269,50

	6 13	
₹	~~7~~ ~~3~~ 9.	5
₹	5 2 6 9.	50
(-)	5 4 9 0.	25

2. Subtract ₹ 685.75- ₹ 290.50

	5 18	
₹	~~6~~ ~~8~~ 5.	75
	2 9 0.	50
(-)	3 9 5.	25

3. Subtract : ₹ 178.00- ₹ 80.00

₹	178.	00
₹	80.	00
₹	98.	00

MULTIPLICATION

1. Find ₹ 540x15

₹ 540x15
2700
240*
8100

2. Find ₹ 355.50x5

₹ 355.50x5
₹ 1777.50

₹ 1777.50

3. Find ₹ 66.75x2

   ₹ 66.75x2

   ₹ 13.3.50

   ₹ 133.50

EXERCISE :

1. Add ₹ 640.50+ ₹ 50.50+ ₹ 672.50
2. Add ₹ 555.50+ ₹ 65.50+ ₹ 50
3. Add ₹ 679.50+ ₹ 79.50+ ₹ 69
4. Subtraction ₹ 6992.50- ₹ 555
5. Subtraction ₹ 77.50-29.50
6. Subtraction ₹ 89.20-50.50
7. Multiply ₹ 245.50x12
8. Multiply ₹ 250.50x17
9. Multiply ₹ 970x15
10. Multiply ₹ 575x13

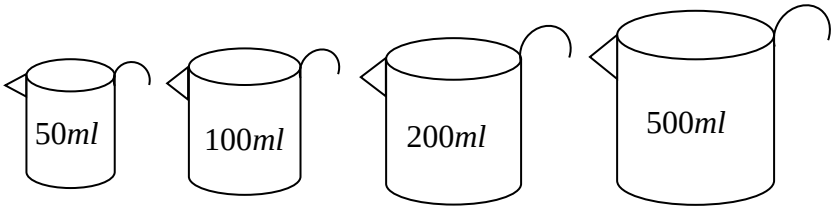
UNIT - 6

CAPACITY

Introduction :

Capacity of a container, closely related to the volume of the container.

Different Capacities :



1l = 1000 ml

Conversion of Litres into milliliters

To convert litres into milliliters, multiply litre by 1000

1. Convert 3 litres into milliliters
   3l = 3x1000
   = 3000 ml
2. Convert 5l 350ml into milliliters
   Solution:
   5l 350ml
   = 5l+350ml
   = (5x1000) ml + 350ml
   = 5000ml + 350ml
   = 5350 ml
3. Convert 7l 500ml into milliliters
   Solutions:
   7l 500ml
   = 7l+500ml
   = 7x1000ml + 500ml
   = 7000ml + 500ml
   = 7500ml

CONVERSION OF MILLILITRES INTO LITRES

To convert milliliters into litres divide milliliters by 100

1. Convert 400ml into l

   4000ml = 4000 ÷1000

   $= \frac{4000}{1000}$

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

   4000ml = 4l

2. Convert 7000ml into l

   7000 = 7000 ÷ 1000

   $= \frac{7000}{1000}$

   $= \frac{7}{1}$

   7000ml = 7l

Addition

1. 3l 350ml, 7l 150ml

	l	ml
	3	350
(+)	7	150
	101	500 ml

2. 5L 550ml , 7l 300ml

	l	ml
	5	552
(+)	7	300
	212	850 ml

3. 20l 450ml , 4l 50ml

	l	ml
	20	450
(+)	4	50
	241	500 ml

Subtraction

1. 5L 250ml – 2l 150ml

	1	ml
	5	250
(-)	2	150
	3l	100 ml

2. 9l 700ml - 3l 250ml

	1	ml
	9	700
(-)	3	250
	61	450 ml

Multiplication

1. Multiply 45l 100ml by 5

L	ml
3	150
X	3
12l	450ml

2. Multiply 45l 100ml by 5

L	ml
45	100
X	5
22l	500ml

Division

1. Divide : 4l 650ml by 4

```
     1     16
   ┌──────────
   │ 4 640
(-)  4 6
   ─────────
       0 4
   ─────────
        24
    (-) 24
   ─────────
       000
         0
   ─────────
         0
```

4l 640ml ÷ 4 = 1l 160ml

EXERCISE :

1. Add : 85l 300ml and 70l 150ml
2. Add : 55l 700ml and 80l 200ml
3. Subtraction : 35l 300ml from 84l 600ml
4. Multiply : 5l 100ml by 5
5. Divide : 42 l 980ml ÷ 14.

UNIT - 7

LEAST COMMON MULTIPLE (L.C.M)

Definition :

A common multiple is a number that is a multiple of two or more numbers. the common multiplies of 3 and 4 are 0,12,24. The least common multiple (LCM) of two numbers is the smallest number (not Zero) that is a multiple of both.

1. Find the L.C.M of 3 and 4?

   Multiple of 3 :

   (0), 3 , 6 , 9, (12), 15, 18, 21, (24).....

   Multiple of 4 :

   (0), 4 , 8 , (12), 16, 20, (24), 28.....

   Common factors : 0, 12, 24

The L.C.M of 3 and 4 is = 12

2. Find the L.C.M of 10, 12 ?

   Between two numbers :

2	10,12
2	5, 6
3	5, 3
5	5, 1
	1, 1

   10, 12 = 2 x 2 3 x 5

   = 60

3. Find the L.C.M of 13, 15, 25 ?
   Between Three Numbers :

13	13, 15, 25
5	1, 15, 25
3	1, 3, 5
5	1, 1, 5
	1, 1, 1

   13, 15, 25 = 13 x 5 x 3 x 5
   = 975
4. Find the L.C.M of 20, 18, 72, 80 ?
   Between Four Numbers :

2	20, 18, 72, 80
2	10, 9, 36, 40
2	5, 9, 18, 20
5	5, 9, 9, 10
3	1, 9, 9, 2
2	1, 3, 3, 2
3	1, 3, 3, 1
	1, 1, 1, 1

   20, 18, 72, 80 = 2 x 2 x 2 x 5 x 3 x 2 x 3
   = 720
5. Find the L.C.M of 13, 15, 20, 22, 90?
   Between Five Numbers :

2	13, 15, 20, 22, 90
2	13, 15, 10, 11, 45
2	1, 15, 10, 11, 45
5	1, 3, 1, 5, 9
3	1, 3, 1, 5, 9
2	1, 1, 1, 5, 3
3	1, 1, 1, 5, 1
	1, 1, 1, 1, 1

   13, 15, 20, 22, 90 = 2 x 13 x 5 x 2 x 3 x 3 x 5
   = 11700

6. Find the L.C.M of 15, 6

3	15, 16
2	5, 2
5	5, 1
	1, 1

13, 15, 20, 22, 90 = 2 x 13 x 5 x 2 x 3 x 3 x 5
= 11700

7. Find the L.C.M of 24, 36 ?
Between Five Numbers :

3	24, 36
2	8, 12
2	4, 6
2	2, 3
3	1, 3
	1, 1

24, 36 = 3 x 2 x 2 x 2 x 3
= 72

8. Find the L.C.M of 35, 25

5	35, 25
5	7, 5
7	7, 1
	1, 1

35, 25 = 5 x 5 x 7
= 175

9. Find the L.C.M of 24, 32 ?

2	24, 32
2	12, 16
2	6, 8
3	3, 4
2	1, 4
2	1, 2
	1, 1

24, 32 = 2 x 2 x 2 x 3 x 2 x 2

= 96

10. Find the L.C.M of 28, 14, 21

2	28, 14, 21
2	14, 7, 21
2	2, 1, 3
3	1, 1, 3
	1, 1, 1

28, 14, 21 = 2 x 7 x 2 x 3

= 84

11. Find the L.C.M of

3	39, 6, 10
2	13, 2, 10
5	13, 1, 5
13	13, 1, 1
	1, 1, 1

= 390

12. Find the L.C.M of 33, 22

11	33, 22
2	3, 2
2	3, 1
3	1, 1

33, 22 = 11 x 2 x 3

= 66

13. Find the L.C.M of 12, 80

2	12, 80
2	6, 40
3	3, 20
2	1, 20
2	1, 10
5	1, 5
	1, 1

12, 80 = 2 x 2 x 3 x 2 x 2 x 5

= 240

14. Find the L.C.M of 5, 92

2	5, 92
2	1, 92
3	1, 46
2	1, 23
	1, 1

5, 92 L.C.M of = 5 x 2 x 2 x 23

= 460

15. Find the L.C.M of 100, 40

10	100, 40
2	10, 4
3	5, 2
2	5, 1
	1, 1

100, 40 = 10 x 2 x 2 x 5

= 200

UNIT - 8

HIGHEST COMMON FACTOR (HCF)

INTORDUCTION :

Common factor : When two or more numbers have the same number as factor, it is called a common factor of those numbers.

For example :

Consider the numbers 18 and 24

Factors of 18 = 1, 2, 3, 6, 9, 18

Factors of 24 = 1, 2, 3, 4, 6, 8, 12, 24

Common factors of 18 and 24 1, 2, 3 and 6

H.C.F of 18 and 24 = 6

Highest common factor : (HCF)

The greatest number which is a common factor of two or more numbers is called (H.C.F).

(Using 2 numbers)

HCF by prime factorization method

Step : 1 :

Write down the prime factorization of each of the numbers.

Step : 2 :

Select the common factors.

Step : 3 :

Write the product of these common factors.

Step : 4 :

This product is the HCF of the given numbers.

Exercise : 1

Find the HCF of 84 and 90

2	84
2	42
3	21
7	7
	1

84 = 2 x 2 x 3 x 7

2	90
3	45
3	15
5	5
	1

90 = 2 x 3 x 3 x 5

The common factors are 2 and 3

HCF = 2 x 3 = 6

HCF by Prime factorization method

Using Three Number :

Exercise : 2

Find the HCF of 72, 120 and 192.

2	72
2	36
2	18
3	9
3	3
	1

72 = 2 x 2 x 2 x 3 x 3

2	120
2	60
2	30
3	15
5	5
	1

90 = 2 x 2 x 2 x 3 x 5

90 = 2 x 2 x 2 x 2 x 3

2	192
2	96
2	48
2	24
2	12
2	6
3	3
	1

2 x 2 x 2 x 2 x 3 x 3

2 x 2 x 2 x 2 x 3 x 5

The common factors are 2, 2 and 3

H.C.F = 2 x 2 x 2 x 3 = 8 x 3 = 24

HCF by continued Division method

Exercise : 1

Find the HCF of 255 and 357

Solution :

255	357 -255	1
102	255 -204	2
51	102 -102	2
	0	

Since 51 is the last divisor, so it is the HCF of 225 and 357.

HCF of more than Two Numbers

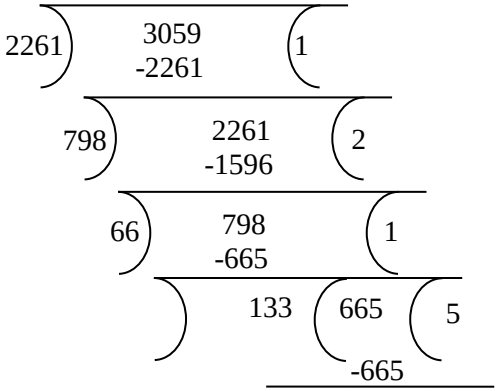
Exercise : 2

Find the HCF of 2261, 3059 and 3325

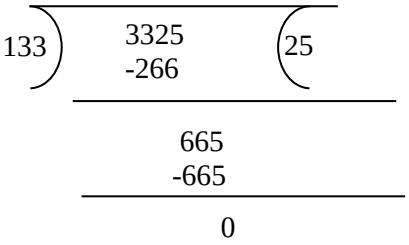
Solution :

Step 1 :

Solution :



Step 2 :



HCF of 2261 and 3059 = 133. Therefore HCF of 2261, 3059 and 3325 is 133.

LEAST COMMON MULTIPLES

EXERCISE :

1. Find the L.C.M of 5, 10?
2. Find the L.C.M of 10, 15, 30?
3. Find the L.C.M of 18, 20, 25, 32 ?
4. Find the L.C.M of 5, 7, 20, 13, 18 ?
5. Find the L.C.M of 3, 20, 18 ?

HIGHEST COMMON FACTORS

EXERCISE :

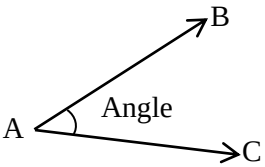
1. Find the HCF of 40 and 90
2. Find the HCF of 140, 150, 190 using prime factorization method.
3. Find the H.C.F of 184, 230 and 276 by using continuous division method.
4. Find the H.C.F of 136, 170 and 255 by using division method.
5. Find the HCF of 891, 1215 and 1377 using long division method.

UNIT - 9

ANGLES

INTRODUCTION:

- Angles are used throughout geometry, to describe shapes such as polygons and polyhedrons, and to explain the behaviour of lines.
- Angle are formed between two rays extending from a single point.

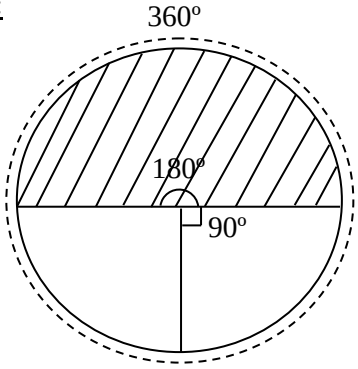


- Angles are commonly drawn as an are (part of a circle)

PROPERTIES OF ANGLES:

1. Angles are measured in degrees, which is measure of circularity, or rotation.
2. A full circle = 360º
3. A Half circle is = 180º
4. A quarter circle is = (or) Right Angle = } 90º

Diagram:



Naming Different Angles:

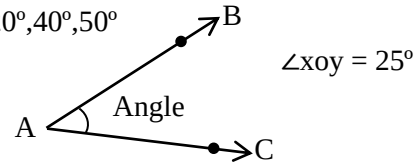
Types of Angles:

1. Acute Angle:

   An angle whose measure is greater than 0˚ but less than 90˚

   Example:

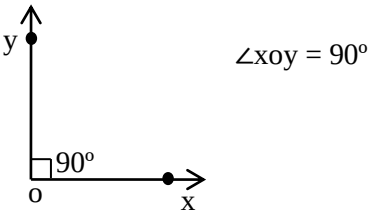
   $20^o, 40^o, 50^o$



2. Right Angle:

   An angle measure 90^o

   Example:

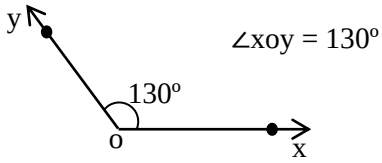


3. Obtuse Angle :

   An angle whose measure is greater than 90˚and less than 180˚

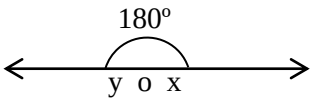
   Example:

   $105^o, 130^o, 150^o, 170^o$



4. Straight Angle:

   When the Rays of an angle, are opposite rays forming a straight like

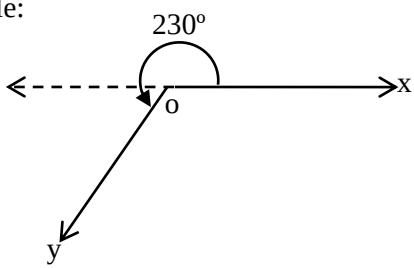


∠xoy = 180º

5. Reflex Angle:

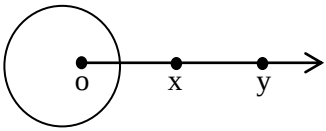
   An angle whose measure is more than 180˚ but less than 360º

   Example:

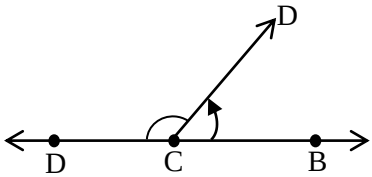


6. Complete Angle:

   The angle formed by one complete circle, that is 360º



1. Find the value of x in the given figure



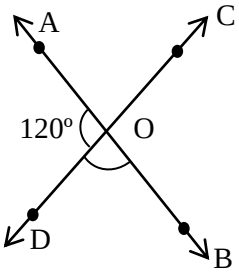
   Solution:

   ∠ BCD + ∠ DCA = 180º(∴ ∠ BCA = 180º is a straight angle)

   50º+x= 180º

   x =130º

2. Find the value of x in the given figure



Solution:

$\angle AOP + \angle DOB = 180^o$

$\angle AOB = 180^o$

$120^o + x = 180^o$

$x = 180^o - 120^o$

$x = 60^o$

3. Two complementary angles are in the ratio 7:8 find the angles.

Solution:

Let the angles be $8x^o$

The given angle are complementary

$\therefore 7x + 8x = 90^o$

$15x = 90^o$

$x = 6^o$ $7x$

$7(6) = 42$

$8x$

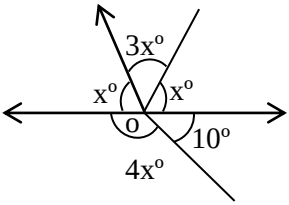
$8(6) = 48$

$x = \frac{\cancel{18}\ 6}{\cancel{90}\ \cancel{15}\ \cancel{3}\ 1}$

The Required angles are 42^o and 48^o

4. Calculate the value of x in the given figure

Solution:



As the sum of the angles round a point = 360º

∴ x+3x+2x+10º+4x=360º

10x+10º = 360º

10x = 360º

10x = 350º-10º

10x = 350º

$x = \frac{350^{\circ}}{10}$

x = 35º

5. Angle is 30º less than two times its supplement. Find the angles.

Solution:

Let one angle 6 xº

The supplement of this angle is (180º-x)º

∴According to the question

x = 2 (180-x) - 30

x = 360-2x-30

x+2x=330

$x = \frac{330}{3}$ (110)

x = 110º

Supplement = 180º-11º

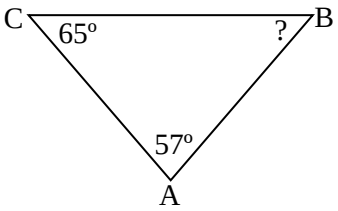
= 70º

Required angles are

110º and 70º

ANGLES IN TRIANGLE

6. Find the measure of each angle indicated



Adding three angles are 180^o

$A + B + C = 180^o$

$57^o + \ ? + 65^o = 180^o$

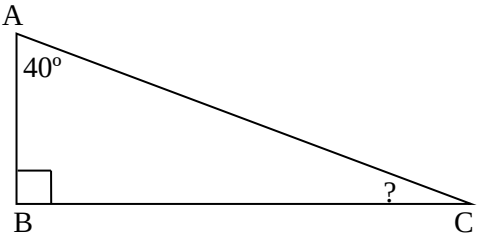
$122 + B = 180^o$

$= 180^o - 122$

$B = 58^o$

7. Find the measure of each angle indicated.

Solution:



$A + B + C = 180^o$

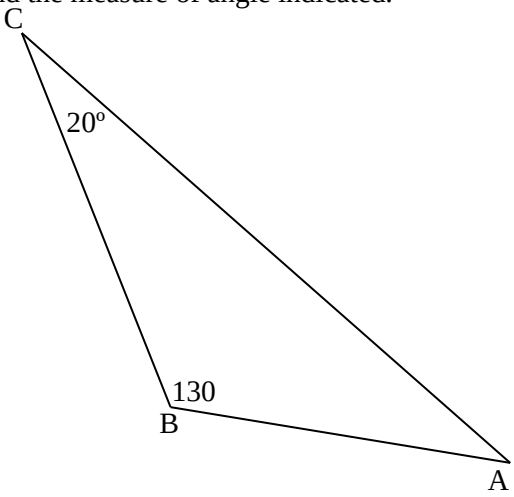
$40^o + 90^o + C = 180^o$

$130^o + C = 180^o$

$C = 180^o - 130^o$

$C = 50^o$

8. Find the measure of angle indicated.



Solution :

$A + B + C = 180^o$

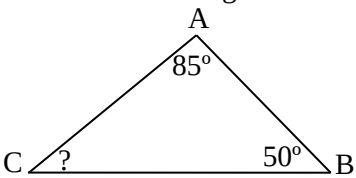
$A + 130^o + 20^o = 180^o$

$A + 150^o = 180^o$

$A = 180^o - 150^o$

$A = 30^o$

9. Find the measure of each angle indicated.



Solution:

Triangle tree side all 180^o

$A + B + C = 180^o$

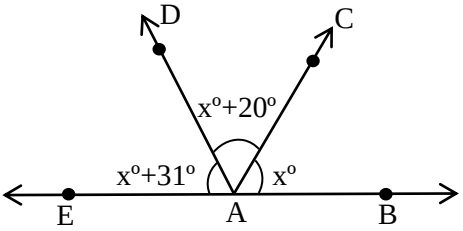
$85^o + 50^o + C = 180^o$

$135^o + C = 180^o$

$C = 180^o - 135^o$

$C^o = 45^o$

10. In the given figure, find x



Solution:

As the sum of the angles at a point on a straight line = 180^o

∴ $x+31^o+x+20^o+x = 180^o$

$3x + 51^o = 180^o$

$3x = 180^o-51^o$

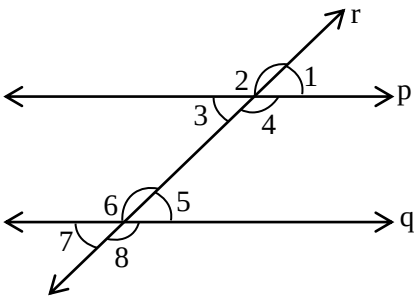
$3x = 129^o$

$x = \frac{\cancel{129}^{\,o}}{\cancel{3}} 43^o$

$x = 40^o$

TEST FOR PARALLEL LINES

11. In the figure, if $\angle 2 = 120^o$ and $\angle 5 = 60^o$ show that pllq



Solution:

$\angle 1 + \angle 2 = 180^o$

$\Rightarrow 120^o + \angle 1 = 180^o$

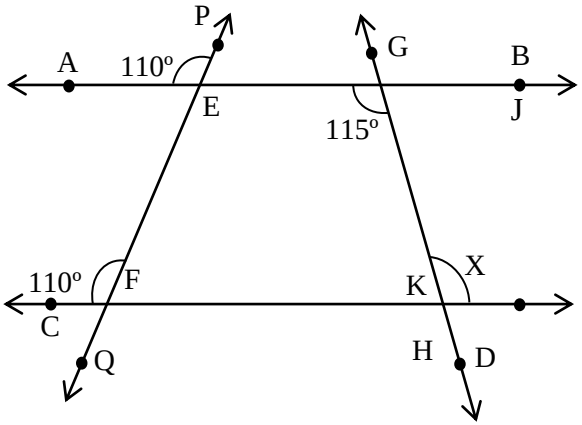
$\therefore \angle 1 = 180^o - 120^o = 60^o$

Given, $\angle 5 = 60^o$

$\angle 1$ and $\angle 5$ are corresponding angles and $\angle 1 = \angle 5$

$\therefore$ pllq

12. In the figure show that AB//CD and find x



Solution:

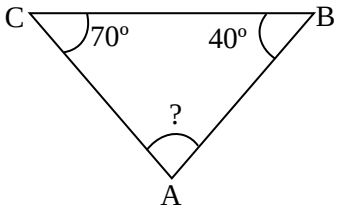
Given ∠AEP = ∠CFE and they being corresponding angles, AB//CD

Then ∠DKJ = ∠KJE = 115º (alternate angles)

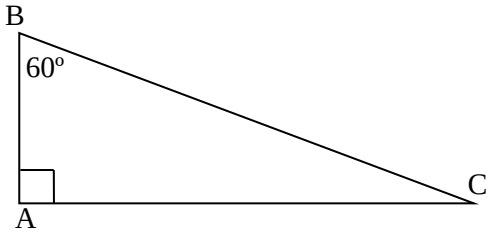
∴ x = 115º

Exercise :

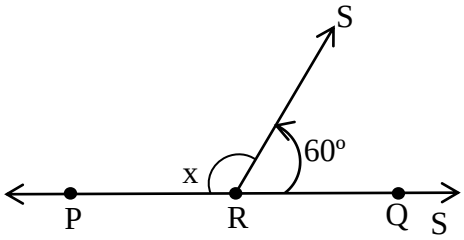
1. Find the measure of each angle indicated



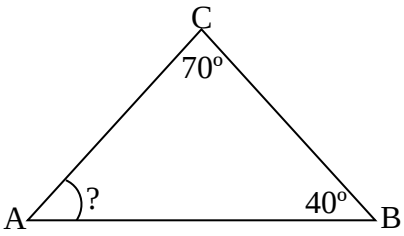
2. Find the measure of each angle indicated



3. Find the value of x in the given figure



4. Two complementary angles are in the ratio 6:9 find the angles.
5. Find the measure of each angle indicated.



UNIT - 10

LINEAR EQUATIONS IN ONE VARIABLE

Solution or Root of an Equation

A Number which satisfies an equation is called the solution or root of the equation.

Equation :

Any equation consists of left side, an equal sigh ('=') and right side. The following is the general pattern.

Left side = Right side

In the equation x-3 = 7

left side is x-3; the right side is 7

Check whether the value given in brackets is a solution (root) of the given equation or not?

1. x+7 = 10, when (x=3)
   Solution:
   x+7 = 10
   3+7 = 10
   10 = 10
   ∴ x = 3 is a solution (or) root of the equation.
2. 3m = 21, when (m = 7)
   Solution:
   3 (7) = 21
   3x7 = 21
   21 = 21
   L.H.S = R.H.S
   ∴ m=7 is a solution (or) root of the equation
3. y-11=4, when (y = 16)
   Solution:
   y-11=4
   16-11 = 4

5 = 4

L.H.S ≠ R.H.S

∴ y = 16 is a not solution (or) not root of the equation

4. 7x+3=17, when (x=2)

   Solution:

   7x+3 = 17

   7(2)+3 = 17

   14+3 = 17

   17 = 17

   L.H.S = R.H.S

   x = 2 is a solution (or) root the equation

5. 5x-2=13, when (x=2)

   Solution :

   5x-2 = 13

   5(2)-3 = 13

   5x2-3 = 13

   10-3 = 13

   7 = 13

   L.H.S ≠ R.H.S

   ∴ x=2 is a not a solution (or) not root of the equation

6. $\frac{a}{4}$ = 2 when, (a = -8)

   Solution:

   $\frac{a}{4}$ = 2

   $\frac{-8^2}{4}$ = 2

   -2=2

   L.H.S ≠ R.H.S

   ∴ a = -8 is a not a solution (or) not root of the equation

SOLVING SIMPLE EQUATIONS

Example:1

Solve the equation x+5 = 12

Solution:

Left side = Right side

x+5 = 12

x = 12-5

x = 7

Check

x = 7

x+5 = 12

7+5 = 12

12 = 12

Example : 2

Solve the equation 7=x-2

Solution:

7 = x-2

7+2 = x

9 = x

x = 9

Check

n = 9

7 = x-2

7 = 9-2

7 = 7

Example :

Solve the equation 5a = 30

Solution:

5a = 30

$a = \frac{\cancel{30}^{6}}{\cancel{5}}$

a = 6

Check

a = 6

5a = 30

5 x 6 = 30

30 = 30

MIXED EQUATION

Example : 4

Solve the equation $3\frac{m}{8}$

Solution:

$3\frac{m}{8}$

3x8 = m

24 = m

m = 24

Check

m = 24

$3\frac{m}{8}$

$3\frac{24^3}{\cancel{8}}$

3 = 3

Mixed equations

Example : 5

Solve 6x+7 = 31

Solution:

6x+7 = 31

6x = 31-7

6x = 24

$x = \frac{\cancel{24}^4}{\cancel{6}}$

x = 4

Check

x = 4

6x + 7 = 31

6x 4 + 7 = 31

24+7 = 31

31 = 31

Example : 6

Solve 27 = 7x-1

Solution:

27 = 7 x-1

27+1 = 7x

28 = 7x

$\frac{\cancel{28}^4}{\cancel{7}}$ = x

x = 4

Check

x = 7

27 = 7x4-1

27 = 28-1

27 = 27

Example : 7

Solve the equation 6x + 14 = 16

Solution:

$6x + 14 = 16$

$6x = 16 - 14$

$6x = 12$

$x = \frac{\cancel{12}^{2}}{\cancel{6}}$

$x = 2$

EXERCISE:

1. Solve the equation $x + 5 = 9$
2. Solve the equation $a + 10 = 12$
3. Solve the equation $x-7 = 4$
4. Solve equation check your answer $3y = 9$
5. Solve the equation $5x + 2 = 3x + 12$
6. Solve the equation $2a -5 = 8a + 1$
7. Solve the equation $6x + 14 = 16$
8. Solve the equation $6 (5x-2) + 12 = 30$
9. Solve $2m-10 = 7m-15 + 5$
10. If $\frac{5m-2}{2} = -11$, find the value of $2m+3$

UNIT - 11

POLYNOMIALS

Definition :

A polynomial is an expression that can be built from constants and symbols called in terminates or variables by means of additions, multiplication and exponononentiation to a non-negative integar power.

INTRODUCTION OF POLYNOMIALS :

Polynomials = Poly (means many) + nomials
(Means terms). Thus a polynomial contains many terms Thus, a type of algebric expression with many terms having variables and co-efficient is called polynomial.

Polynomial examples :

i. $3x$
ii. $5y^2 + 3x + 7$
iii. $3x^2 + 4$

3x2 + 4 in this 'X' is called variable
Power of 'X', i.e 2 is called exponent
Multiple of 'X', i.e 3 is called constant
The term '4' is called constant

TYPES OF POLYNOMIAL :

1. **MONOMIAL**
   - Algebraic expression with only one term is called monomial
   Example : 5x, 3, 4y, etc.,
2. **BINOMIAL**
   - Algebraic expression with two terms is called Binomial
   Example : $2x + 3$, $5y^2 + 7$, $3m + 7$, etc.,
3. **TRINOMIAL**

- Algebraic expression with Three terms is called Trinomial

Example : $3x + 2y + 5$, $6y^2 + 5y + 6$, etc.,

4. POLYNOMIALS :

- Algebraic expression having more than two terms are collectively known as polynomials.

Example : $6y^3 + 5y^2 + 6y - 8$

$- 5m^5 + 2m^4 - 2m^2 + m - 8$

ADDING AND SUBTRACTING POLYNOMIALS

1. Simplify $(5P^2 - 3) + (2P^2 - 3P^3)$

Solution :

$$\begin{array}{r} 5\,P^2 - 3 \\ -3\,P^3 + 2P^2 + 0 \\ \hline -3\,P^3 + 7P^2 - 3 \end{array}$$

2. Simplify :

$(4 + 2n^3) + (5n^3 + 2)$

Solution :

Re - arranging the expression in Ascending order

$$\begin{array}{r} 2\,n^3 + 4 \\ 5\,n^3 + 2 \\ \hline 7\,n^3 + 6 \end{array}$$

3. Simplify : $(2a^3 - 2a^2) - (3a^2 - 4a^3)$

$(2a^3 - 2a^2) - (3a^2 - 4a^3)$

$= 2a^3 - 2a^2 - 3a^2 + 4a^3$

$= 6a^3 - 5a^2$

- x + = -

- x - = +

4. Simplify :

$= (5n - 4n^3) - (3n^3 - 7n)$

$= 5n - 4n^3 - 3n^3 + 7n$

$= -2n - 3n^3$

5. Simplify :

$= (5r^3 + 2r^4) - (r^5 - 6r^3)$

$= 5r^3 + 2r^4 - r^5 + 6r^3$

$= 11r^3 + 2r^4 - r^5$

$= - r^5 + 2r^4 + 11r^3$

- x + = -

6. Simplify :

$= (8n + 3n^4 + 10n^2) - (3n^2 + 11n^4 - 7)$

$= 8n - 3n^4 + 10n^2 - 3n^2 - 11n^4 + 7$

$= 11r^3 + 2r^4 - r^5$

$= - r^5 + 2r^4 + 11r^3$

7. Simplify :

$= (10a^5 - 5a - 10a^3) - (10a - 2a^5 - 14a^4)$

- x - = +

$= 10a^5 - 5a - 10a^3 + 10a + 2a^5 - 14a^4$

$= 12a^5 \_ 14a^4 - 10a^3 - 15a$

8. Simplify :

$(12a^5 - 6a - 10a^3) - (8a - 2a^5 - 14a^4)$

$= 12a^5 - 6a - 10a^3 - 8a + 2a^5 + 14a^4$

$= 14a^5 + 14a^4 - 10a^3 - 14a$

9. Simplify :

$(13a^2 - 5a^5 - 3a) - (-10a^2 - 10a^5 + 9a)$

Step : 1

Multiplying second polynomial to (-) sign

$= 13a^2 - 5a^5 - 3a + 10a^2 + 10a^5 - 9a$

$= 23a^2 + 5a^5 - 12a$

10. Simplify :

$(2U^5 - 7V^3 - 10V^2) - (-12V^5 + 4V^3 + 10V^2)$

$= 2V^5 + 7V^3 - 10V^2 + 12V^5 - 4V^3 - 10V^2$

$= 14V^5 - 4V^3 - 20V^2$

$$\begin{array}{r} 13a^2 \\ 10a^2 \\ \hline +23a^2 \\ \hline +10a^5 \\ -\ 5a^5 \\ \hline +\ 5a^5 \\ \hline -\ 9a \\ -\ 3a \\ \hline -12a \\ \hline \end{array}$$

MULTIPLYING POLYNOMIAL

11. Simplify :

$= 2x(5y - 5)$

$= 10xy - 10x$

+ x + = +

+ x - = +

12. Simplify :

$= 7(-8v - 5)$

$= -56v + 35$

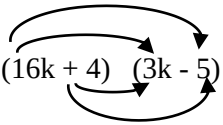
13. Simplify :

$= (2n + 3)\ (5n - 2)$

$= 10n^2 + 4n + 15n + 6$

$= 10n^2 + 19n + 6$

14. Simplify :

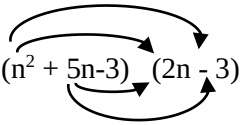


$= (16k + 4)\ (3k - 5)$

$= 18k^2 + 30k + 12k + 20$

$= 18k^2 + 42k + 20$

15. Simplify :



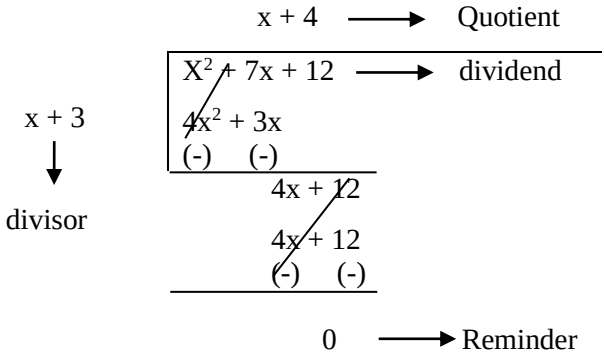
$= (n^2 + 5n-3)\ (2n - 3)$

$= 2n^3 + 3n^2 + 10m^2 + 15n-6n+9$

$= 2n^3 + 7n^2 + 21n + 9$

DIVISION POLYNOMIALS

16. Simplify : $(x^2 + 78x + 12) \div x + 3$



17. Simplify : $(15x^2 + 26x + 8) \div (5x + 2)$

$3x + 4$

$5x + 2$ | $15x^2 + 26x + 8$

$15x^2 + 6x$

(-) (-)

$20x + 8$

$20x + 8$

(-) (-)

0 →

Reminder

18. Simplify : $(15x^2 + 26x + 8) \div (5x + 2)$

$x2 + x - 12$

$x + 3$ | $x^3 + 4x^2 + 9x - 36$

$x^3 + 3x^2$

(-) (-)

$x^2 - 9x$

$x^2 + 3x$

(-) (-)

$12x^2 - 36$

$12x^2 - 36$

(-) (-)

0

Step : 1

$\frac{x3}{x} = x^2$

Step : 2

$x^2 (x + 3)$

$= x^3 + 3x^2$

Step : 3

Subtract

Step : 4

$\frac{x3}{x} = x^2$

Step : 5

$x (x+3) = x^2 + 3x$

Step : 6

Subtract

STEP :7

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

EXERCISE :

1. Add : (8p2 - 5) + $-6p^3 + 2\ p^2 + 7$
2. Add : $(9 + 4x^3 + 5y^2) + (9y^2-5+5x^3)$
3. Subtract : $(-5a^3 - 2a^2) - (9a^2+7a^3)$
4. Subtract : $(7n-4n^2)-(6n^2 + 9n)$
5. Multiply : 5x (5y-9)
6. Multiply : 9(-8x+15)
7. Multiply : (2x+5) (5x-2)
8. Multiply : (-4k+7) (-2k+8)
9. Divide : $2x^2 + 7x^2 + 2x + 9 \div 2x + 3$
10. Divide : $32 + 3x + 5 \div x + 1$

Unit -12

ALGEBRA

Introduction To Algebra

Algebra **From Arabic "Al- Jabr"**, literally meaning "reunion of broken parts is one of the broad parts of mathematic, together with **number theory**, **geometry and analysis.**

In its most general from algebra is the study of mathematical symbols and the rules for manipulating these symbols, it is a unifying thread of almost all of mathematics.

ALGEBRAIC EXPRESSIONS:

Algebraic expressions represent mathematical ideas and operation in a short way using symbols and variables.

Algebraic expression terms:

A symbols in algebraic which has a fixed value i,e., whose value does not change is called a constant.

Example:

7,-8,0,5 $\frac{8}{9}$, etc., all are constants

Variable:

A symbol which can be assigned different numerical values is called a variable.

In algebra, the variables are denoted by the letters in the English Alphabet, Viz, a, b, c,….x, y, z.

Example:

$2x, \frac{3a}{5}, x - y, p + q$

All are algebraic expression.

Variable can also be written in an expression exponential from in the similar manner as constants.

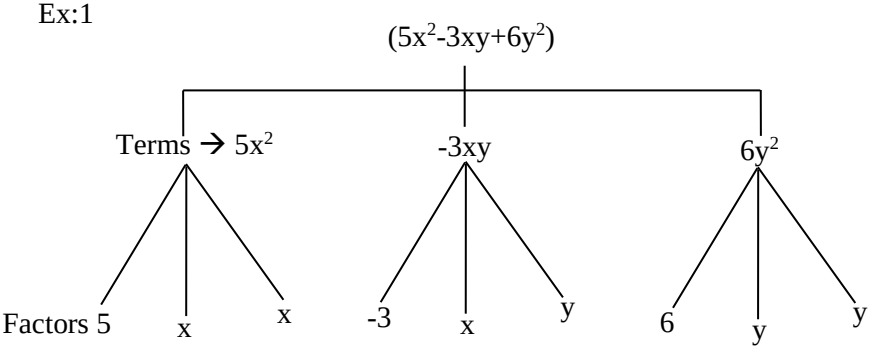
a^4= a x a x a x a

z^3= z x z x z, etc…

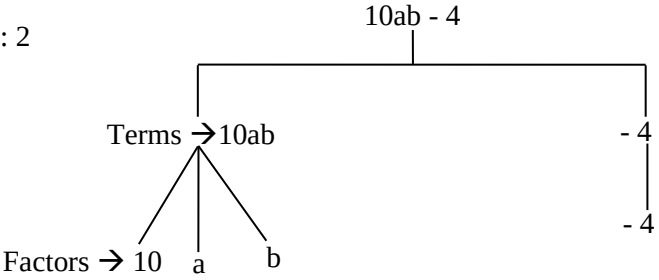
A term is an arithmetic number, letter, group of letter or group composed of an arithmetic number and letter which are joined by multiplication or division.

TREE DIAGRAM

Ex:1



Ex : 2



Foundational Concepts for Algebra

1. Example :
   Find, $2x+5 = 11$
   $2x = 11 - 5$
   $2x = 6$
   $n = \frac{\cancel{6}^{3}}{\cancel{2}}$
   $x = 3$

2. Example :2
   Find 5a+20=20

Solution:

5a+20 = 50

5a = 50 - 20

5a = 30

$a = \frac{\cancel{30}^{6}}{\cancel{5}}$

a = 6

3. Example :3
   Find 6p-18 = 42
   Solution :

6p - 18 = 42

6p = 42 +18

6p = 60

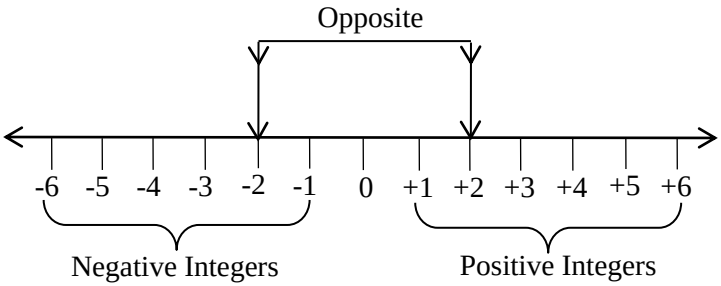
$p = \frac{\cancel{60}^{10}}{\cancel{6}}$

p = 10

TAKING THE OPPOSITE

Rule: To take the opposite of the number, simply change the sign

The number line below shows the relationship between opposite.



Examples:

i. The Opposite of +5 is -5
ii. The Opposite of +2 is -2
iii. The Opposite of +7 is -7

Examples:

	Number	Its Opposite
1.	77	-77
2.	-75	+75
3.	-240	+240
4.	-7580	+7580
5.	-999	+999
6.	+889	-899

Adding Opposite:

Rule : The sum of any number and its opposite is always zero

Example:

1. 100 + (-100) = 0
2. -330 + 330 = 0
3. $-\frac{1}{5}+\frac{1}{5}=0$
4. 32 + (-32) = 0

RECIPROCALS

DEFINTION:

The reciprocal of a number is its multiplication inverse when we multiply a number by its reciprocal we get a product of 1
Reciprocal means the flip side (or) inverse

EXAMPLE:

1. The reciprocal of $\frac{4}{5}$ is $\frac{5}{4}$
2. The reciprocal of $\frac{7}{3}$ is $\frac{3}{7}$
3. The reciprocal of $\frac{2}{8}$ is $\frac{8}{2}$

4. The reciprocal of $\frac{3}{9}$ is $\frac{9}{3}$
5. The reciprocal of $\frac{4}{7}$ is $\frac{7}{4}$
6. The reciprocal of $\frac{10}{20}$ is $\frac{20}{10}$

FINDING THE RECIPROCAL OF A WHOLE NUMBER

The reciprocal of 6 is $\frac{1}{6}$ because any whole number can be writer as a fraction with a 1 in its denomination inverse $(6 = \frac{6}{1})$;we just flip it to get the reciprocal.

The reciprocal of a whole number will always have a number of 1.

EXAMPLE:

1. The reciprocal of 10 = $\frac{10}{1}$
2. The reciprocal of 3 = $\frac{3}{1}$
3. The reciprocal of 7 = $\frac{7}{1}$
4. The reciprocal of -14 = $\frac{-14}{1}$
5. The reciprocal of -5 = $\frac{-5}{1}$

SOLVE 'x' VALUES

1. Solve for x : x + 5 = 24

   x = 24 – 5

   x = 19

   + = -

   - = +

   x = /

   / = x

2. Solve for x: 3 x = 54

   $x = \frac{54^{18}}{\cancel{3}}$ x = ÷

   x = 18

3. Simplify the expression 2 (x+3)

   = 2 (x+3)

$\Rightarrow 2x+6 = 10$

$\Rightarrow 2x = 10-6$

$2x = 4$

$2x = 4$

$x = \frac{\cancel{4}^{2}}{\cancel{2}}$

$x = 2$

4. Solve for x $3x-2 = 34$

$3x - 2 = 34$

$3x = 34+2$

$3x = 36$

$x = \frac{\cancel{36}^{12}}{\cancel{3}}$

$x = 12$

5. Solve for x: $-3(12x) = 36$

$= 36x = 36$

$x = \frac{\cancel{36}}{\cancel{36}}$

$x = 1$

6. Evaluate the following expressions for

n = 6

n+12

Solution:

= n+12

= 6+12

= 18

7. Evaluating the following expression for

n = 4

= 3n-10

= 3 (4) - 10

= 12 - 10

= 2

8. Evaluate:

P-q when P = -2, 9 = 8

= P-q

= -2-8

= -10

9. Evaluate $4a^2+4a-3$ when a = -3

   Putting a = -3

   $= 4a^2 - 4a-3$

   $4(-3)^2 -4 (-3) -3$

   = 4 (-3x-3) -4x-3-3

   = 4x9-4x-3-3

   = 36 +12-3

   = 48-3

   = 45

10. Evaluate a+8 when a =-2

    Putting a=-2

    -2+8

    = +6

11. Given m=-3 and n=5, evaluate

    m+n

    -3+5

    = 2

12. Given P=-3 and q=5, evaluate

    $= 2p^2+8q$

    $= 2 (-3)^2 +8 (5)$

    = 2x-3x-3+40

    = 2x9+40

    = 18+40

    = 58

13. Simplify the expressing and find their value if x=2, 9=-1, 6=-3

    $= 4a^2-b^2+6a^2-7b^2$

    $= 4 (2)^2-(-3)^2 +6 (-1)^2 -7 (-3)^2$

    = 4x2x2-(-3x-3) +6x-1x-1-7x-3x-3

= 16-(+9) +6 -63

= 16-9+6-63

= -72+22

= -50

14. Evaluating the following expressions for n=5

= $90-4n^2$

= $90-4\ (5)^2$

= 90-4x5x5

= 90-100

= -10

15. If a=5, b=-4 find a^2-b^2 =?

Solution:

a=5

b=-4

$a^2-b^2=(a-b)\ (a+b)$

= (5-(-4)) (5+(-4))

= (5+4) (5-4)

= 9x1

$a^2-b^2 = 9$

16. If a=-2, b=3 find the $(a+b)^2$=?

Solution:

(a+b) 2 = $\frac{a=-2,b=3}{a^2+2ab+b^2}$

= $(-2)^2$+2x-2x3+(3)2

= 4+(-12)+9

= 4-12+9

= -8+9

$(a+b)^2$ =1

17. If a=-4, b=2, find the $(a-b)^2$=?

Solution:

a=-4

b=2

$(a-b)^2 =a^2-2ab+b^2$

$= (-4)^2-2x-4x2+(2)^2$

$= 16+16+4$

$(a-b)^2 = 36$

18. If a=3, b=2, c=1, find the $(a+b+c)^2$=?

    $(a+b+C)^2 = a^2+b^2=c^2+2ab+2ac+2ba$

    Solution:

    a = 3

    b = 2

    c = 1

    $(a+b+c)^2 = a^2+b^2+c^2+2ab+2ca+2bc$

    $= (3)^2+(2)^2+(1)^2+2x3x2+2x1x3+2x2x1$

    $= 9+4+1+12+6+4$

    $(a+b+c)^2=38$

19. If a=3, b=2, c=4, find the $(a-b-c)^2$=?

    Solution:

    a = 3

    b = 2

    c = 4

    $(a-b-c)^2= a^2+b^2+c^2-2ab-2ac+2bc$

    $= (3)^2+(2)^2+(4)^2-2(3)(2) -2x3x4-2x2x4$

    $=9+4+16-12-24-16$

    $= 29-12-24-16$

    $(a-b-c)^2 = -23$

20. If a=3, b=2, find the (a+b)3=?

    Solution:

    a=3, b=2

    $(a+b)^3 = a^3+3a^2b+3ab^2+b^3$

    $= (3)^3+3x(3)^2x2+3x3x(2)^2+(2)^2$

    $= 9+3x9x2+3x3x4+4$

    $= 9+54+36+4$

    $(a+b)^3 = 103$

21. If a=4, b=5, find the $(a-b)^3$=?

    Solution:

a = 4

b = 5

$(a-b)a^3=a^3-3a^2b+3ab^2-b^3$

$= (4)^3-3x(4)^2x5+3x4x(5)^2-(5)^3$

= 64-3x16x5+3x4x25-125

= 64-240+300-125

$(a-b)^3 = 1$

22. If a=2, b=3, find a^3-b^3?

    Solution:

    a=2, b=3

    $a^3-b^3=(a-b)\ (a^2+ab+b^2)$

    $= (2-3)\ ((2)^2+2x3+(3)^2$

    = (-1) (4+6+9)

    = (-1)x19

    $a^3-b^3=19$

23. a=3, b=2, find the a^3+b^3=?

    Solution:

    a = 3

    b = 2

    $a^3+b^3= (a+b)\ (a^2-ab+b^2)$

    $= (3+2)\ ((3)^2-3x2+(2)^2)$

    = (5) (9-6+4)

    = 5x7

    $a^3+b^3=35$

EXERCISE:

1. Solve for n : 4x = 80
2. Solve for x : 5x-2=33
3. Evaluate p-q when p=-3, q=8
4. Evaluate b+8, when b=-3
5. Evaluate $5a^3+7a-5$ when a=-4
6. Given m=-5 and n=-6, evaluate m+n?
7. If a=-2, b=5 find the $(a-b)^2$?

8. If a=4, b=-2, c=5, find the $(a-b-c)^2$=?
9. If a=3, b=5 find a3-b3?
10. If a=7, b=6 find the $(a+b)^3$

UNIT - 13

ROMAN NUMERALS

Introduction:

Like our Hindu - Arabic System of numeration another ancient system of numeration is the Roman System. The Romans used a different set of symbols as their numbers. There are **Seven Basic Roman Numerals**.

Roman symbol I V X L C D M
Meaning 1 5 10 50 100 500 1000

There is no symbol for zero in the Roman system and also it does not use the concept of place value. 'K' is used as a symbol for 1000 JK denotes the number 5000 when a letter is used more than once we add its value each time to get the Numerals.

III = 1 + 1 + 1 = 3
XXX = 10 + 10 + 10 = 30
CC = 100 + 100 = 200
CCC = 100 + 100 + 100 = 300
MM = 1000 + 1000 = 2000

Note that:

1. The same symbol, is not repeated more than 3 times together.
2. The symbols V,L and D are never repeated.

When a symbol of smaller value is written to the right of the symbol of larger value, its value gets added to the value of the larger symbol.

VI = 5 + 1 = 6
XI = 10 + 1 = 11
XXXVII = 10 + 10 + 10 + 5 + 5 + 1 = 37

When a symbol of smaller value is written to the left of a symbol of larger value, the smaller value is subtracted from the larger value.

IV = 5-1 = 4

IX = 10-1 = 9
XL = 50-10 = 40
XC = 100-10 = 90
CD = 500-100 = 400
CM = 1000-100 = 900

ONES:

Tindy - Arabic System	1	2	3	4	5	6	7	8	9
Roman System	I	II	III	IV	V	VI	VII	VIII	IX

TENS:

Hindu Arabic System	10	20	30	40	50	60	70	80
Roman System	X	XX	XXX	XL	L	LX	LX X	LXXX

TENS:

Hind Arabic System	90	100
Roman System	XC	C

Write the following in Roman Numbers:

1. 52

   Solution:

   52 = 50+2

   = L+II

   52 = LII

2. 44

   Solution:

   44 = 40+4

   44 = XL+IV

   44 = XLIV

3. 85

   Solution:

   85 = 80+5

   = LXXX + V

   85 = LXXX V

4. 49

   Solution:

   49 = 40+9

   = XL+IX

   = XLIX

5. 99

   Solution:

   99 = 90+9

   = XC+IX

   99 = XCIX

1. **Write the following in Hindu Arabic Numerals**

1. XLV

   Solution:

   XLV = 40+5 (or) (50-1)+5

   XLV = 45

2. LXIII

   Solution:

   LXIII = L+X+III

   = 50+10+3

   LXIII = 63

3. XXXVIII

   Solution:

   XXX + VIII = (3x10) + 8

   = 30+8

   XXXVIII = 38

EXERCISE :

1. Worth out what numbers these Roman Numerals represent
   XV = ?
2. Write the number in Roman numerals:
   90 = ?
3. ……. writing the Roman numerals as number.
   X XVIII = ?
4. Writ the year in number.
   MCMXC = ?
5. Write the year in number.
   MCDL = ?

UNIT - 14

FACTORIZATION

Definition :

Factorization : The process of expressing any polynomial as a product of its factors is called factorization.

Factorization by using Identities :

$(a + b)^2 = a^2 + 2ab + b^2$

$(a - b)^2 = a^2 + 2ab + b^2$

$(a + b)(a - b) = a^2 - b^2$

Expression	Factors
$a^2 + 2ab + b^2$	(a + b) and (a + b)
$a^2 - 2ab + b^2$	(a - b) and (a - b)
$a^2 - b^2$	(a + b) and (a - b)

FACTORIZE :

1. $x^2 + 6x + 9$

   Comparing $x^2 + 6x + 9$ with

   $a^2 + 2ab + b^2$

   We see that a = X, b = 3

   $x^2 + 6x + 9 = x^2 + 2(x)(3) + 3^2$

   $a^2 + 2ab + b^2 = (a + b)^2$ a = x and b = 3,

   $x2 + 6x + 9 = (x + 3)^2$

   ∴ The factors of $x^2 + 6x + 9$ are (x+3) (x+3)

2. Factorize : $x^2 - 10x + 25$

   comparing $x^2 - 10x + 25$

   $a^2 - 2ab + b^2$

   We see that a = x, b = 5

$x^2 - 10x + 25 = x^2 - 2\,(x)(5)$

Using $a^2 - 2ab + b^2 = (a-b)^2$

We got $x^2 - 10x + 25 = (x-5)^2$

∴ The factors of $x^2 - 10x + 25$ (x-5) and (x-5)

3. Factorize : $x^2 - 64$

   Solution :

   Comparing $x^2 - 64$ with a^2-b^2, we see that a = x and b = 8

   Using $a^2 - b^2 = (a + b)\,(a - b)$

   $x^2 - 64 = x^2 - 8^2$

   $= (x + 8)\,(x - 8)$

   ∴ The factors of $x^2 - 64$ are (x + 8) and (x - 8)

FACTORIZATION BY TAKING OUT THE COMMON FACTOR

4. Factorize : 3x + 9

   Solution :

   $3x + 9 = 3x + (3 \times 9)$

   $= 3x + 9 = 3\,(x + 3)$

   Note : '3' is common to both terms

5. Factorize : $5x^2 + 20xy$

   $= (5 \times x \times x) + (4 \times 5 \times x \times y)$

   $= 5x\,(x + 4y$ (Taking out the common factor 5 x)

6. Factorize : $3x^2 + 15xy$

   $= (5 \times x \times x) - (3 \times 5 \times x \times y)$

   $= 3x\,(x - 5y)$ (Taking out the common factor $3x$)

7. Factorize : $a^2b - ab^2$

   $= (a \times a \times b) - (a \times b \times b)$

   $= ab\,(a - b)$

   (Taking out the common factor ab)

FACTORIZATION BY GROUPING THE TERMS

8. Factorize : $x^3 - 3x^2 + x - 3$

   Solution :

   $x^3 - 3x^2 + x-3 = x^2 (x-3)+1(x-3)$

   x3 - 3x2 + x - 3 = (x2 + 1) (x-3)

9. Factorize :

   $2m^2 - 10mn - 2m + 10n$

   $= 2m (m - 5n) -2 (m-5n)$

   $2m^2 - 10mn - 2m+ 10n = (2m-2) (m-5n)$

10. Factorize : $2xy - 3ab + 2bx - 3ay = 2xy + 2bx - 3ab - 3ay$

    $= 2x (y + b) - 3 a (y + b)$

    $= (2x - 3a) (y + b)$

EXERCISE :

1. Factorize the following expressions :
   i) 3x - 48 ii) 7x - 21y
2. Factorize : 2ab + 2b + 3a
3. Factorize : $a^2 + 14a + 49$
4. Factorize : $x^2 - 12x + 36$
5. Factorize : $P^2 - 6 P + 8$

UNIT – 15

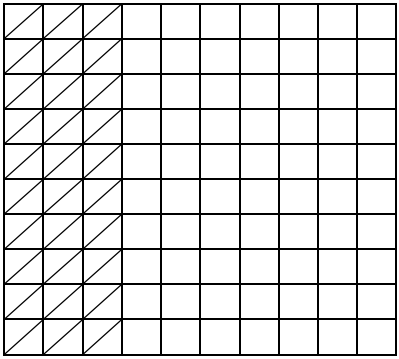
PERCENTAGE AND ITS APPLICATIONS

PERCENTAGE :

The phrase 'Percent' is a short form of the Latin. ' Per Centum' meaning 'by the hundred'. The symbol '%' is used for percentage. percent means per hundred. The symbol '%' its used for percentage. It compares a number to 100.

Percent means per hundred. The symbol for percent is %

Example :



There are 100 squares on the grid. The shaded squares represent $\frac{30}{100}$ (or) 30% of the grid. The ratio $\frac{100}{100}$ represents the entire grid.

$\frac{100}{100}$ = 100%

The part of the grid that is not shaded = 100% - 30% = 70%

The ratio $\frac{70}{100}$ represents un shaded

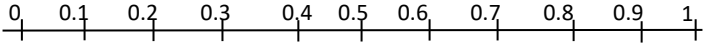
Part $\frac{70}{100}$ = 70%

A fraction that has 100 as denominate is called a percentage, and its written

$\frac{49\ \frac{1}{2}}{100} = 49\ \ \frac{1}{2}\ \%$

$= \frac{27}{100} = 27\%$

TO CONVERT FRACTIONS, DECIMALS AND PERCENTAGE FROM ONE FROM TO THE OTHER

Decimal : 

Fraction :

Fraction with denominated 100

Percent

For example :
Find the percentage of children of different weights for the following date.

S.No.	weight	Number of children	As fraction	As percentage
1.	38 kg	26	$\frac{26}{100}$	26%
2.	40 kg	23	$\frac{23}{100}$	23%
3.	45 kg	21	$\frac{21}{100}$	21%
4.	50 kg	30	$\frac{30}{100}$	30%
	Total	100		

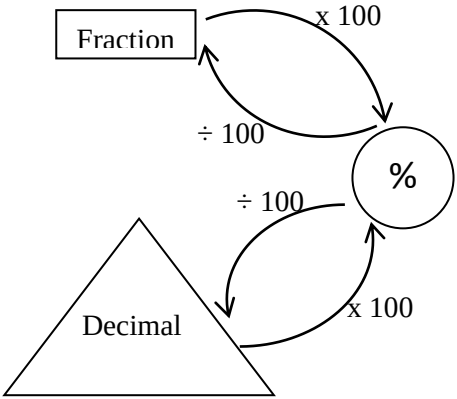
RULE 1 : To convert a fraction or a decimal to a percentage multiply by 100.

RULE 2 : To convert a percentage to a fraction or a decimal divide by 100.

Each ratio can also be expressed as a percent.

Ratio	Fraction	Decimal	Percent
3:4	$\frac{3}{4}$	0.75	75%
4 : 5	$\frac{4}{5}$	0.80	80%

Hint :



Example 1

Express the following as percentage

a) $\frac{3}{4}$

Solution :

25

$= \left(\frac{3}{4} \times \frac{\cancel{100}}{1}\right)\%$

$= (3 \times 25)\%$

$= 75\%$

b) $7\frac{2}{4}$

Solution :

$= \left(7\frac{2}{4} \times 100\right)\%$

$= \left(\frac{\cancel{30}}{\cancel{4}_{1}} \times \frac{\overset{25}{\cancel{100}}}{1}\right)\%$

$= (30 \times 25)\%$

$= 750\%$

25 x 30

0 0

7 5 (1)

7 5 0

2. Convert each of the following into a percentage

a) 0.7

Solution :

$0.7 = (0.7 \times 100)\%$

$= 70\%$

b) 0.08

Solution :

$= (0.08 \times 100)\%$

$= 8\%$

Shift the decimal point two places to the right.

c) 0.027

Solution :

$= (0.027 \times 100)\%$

$= 2.7\%$

3. Express each of the following as a fraction.

a) 55 %

$= \frac{\cancel{55}^{11}}{\cancel{100}_{20}}$ Divide by 100

$= \frac{11}{20}$

b) $14\frac{3}{8}$ %

$= \frac{115}{8}$ %

$= \frac{\cancel{115}^{23}}{8} \times \frac{1}{\cancel{100}_{20}}$

$= \frac{23}{8} \times \frac{1}{20}$

$= \frac{23}{160}$

4. Express each of the following as a decimal

a) 65%

Solution :

$= \frac{65}{100}$

= 0.65

Divide by 100. shift the decimal point 2 places to the left

b) 6.8%

Solution :

6.8 % $= \frac{6.8}{100}$

= 0.068

5. Express 15% as a fraction

   Solution :

   $15\% = \frac{\cancel{15}^{3}}{\cancel{100}_{20}}$

   $= \frac{3}{20}$

6. Express 15% as a decimal

   Solution :

   $15\% = \frac{15}{100}$

   $= 0.15\ \%$

7. Express 15% as a fraction

   Solution :

   $15\% = \frac{\cancel{15}^{3}}{\cancel{100}_{20}}$

   $= \frac{3}{20}$

   $= 3 : 20$

TO FIND PERCENTAGE OF A GIVEN NUMBER OF QUANTITY

8. Find 25% of 115

   $25\%\ \text{of}\ 115 = \frac{25}{100}\ \text{of}\ 115$

   $= \frac{\cancel{25}^{1}}{\cancel{100}_{4}} \times 115$

   $= \frac{1\ X\ 115}{4}$

   $25\ \%\ \text{of}\ 115 = \frac{115}{4}$

$$
\begin{array}{r|l}
 & 27 \\
\hline
4 & 1\,1\,5 \\
 & \underline{8} \\
 & 3\,5 \\
 & \underline{2\,8} \\
 & 7
\end{array}
$$

9. Find 9% of 120

$= \frac{9}{100}$ of 120

$= (\cancel{120}^{6} \times \frac{9}{\cancel{100}_{5}})$

$= \frac{\cancel{54}}{5}$ 10.8

= 10.8

$$\begin{array}{r|l} & 10.8 \\ 5 & 54 \\ & 50 \\ \hline & \ \ 40 \\ & \ \ 40 \\ \hline \end{array}$$

TO EXPRESS A QUANTITY AS A PERCENTAGE OF ANOTHER

10. Express 4 as a fraction of 20

Solution :

4 as a fraction of 20 is $\frac{4}{\cancel{20}} \times \cancel{100}^{5}$

$= (\cancel{120}^{6} \times \frac{9}{\cancel{100}_{5}})$

= 20 %

11. Express $\frac{3}{6}$ as a percentage of $\frac{1}{2}$

Solution :

$= \frac{3}{6}$ as a percentage of $\frac{1}{2}$

$= (\frac{\frac{3}{6}}{\frac{1}{2}} \times 100) \%$

$= (\frac{\cancel{3}^{1}}{\cancel{6}_{\cancel{3}}} \times \frac{\cancel{2}^{1}}{1} \times 100) \%$

$\frac{3}{6}$ as a percentage 100 % of $\frac{1}{2}$

12. Write 38 paise as a percentage of 1

Solution :

1 - 100 paise

∴ Required percentage =($\frac{38}{\cancel{100}}$ x $\cancel{100}$) %

= 38 %

13. Write 50m as a percentage of 1km

Solution :

1km - 1000 m

∴ Required percentage =($\frac{50}{\cancel{1000}}$ x $\cancel{100}$) %

= 5.0 %

14. Write 27 as a percentage of 35

Solution :

∴ Required percentage =($\frac{\cancel{7}^{1}}{\cancel{35}_{1}}$ x $\cancel{100}^{20}$)

= 20 %

EXERCISE :

1. Convert into a Percentage = 0.9
2. Convert into a Percentage = 0.029
3. Convert into a fraction = 75%
4. Convert into a fraction = 25%
5. Convert into a decimal = 35%
6. Express 65% as a ratio?
7. Find 8% of 140
8. Write 78 paise as a percentage of 1
9. Write 8 as a percentage of 250
10. Express 8 as a fraction of 40

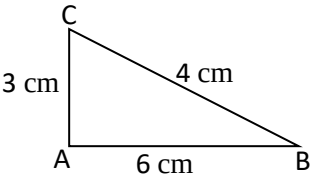
UNIT - 16

PERIMETER AND AREA

What is Perimeter ?

The distance all around a shape is called its perimeter.

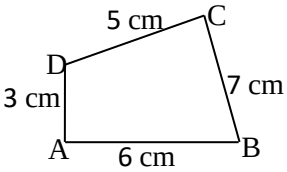
GIVEN DIAGRAMS



PERIMETER OF TRAINGLE

PERIMETER = Δ ABC
= 3cm + 4cm + 6cm
= 13CM

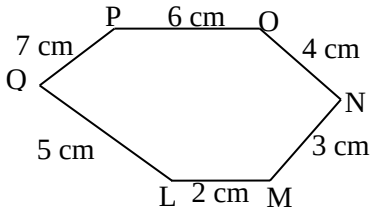
PERIMETE OF QUADRILATERAL



PERIMETER OF QUADRILATERAL ABCD

= 4cm + 7cm + 5cm + 3cm
= 19 cm

PERIMETER OF HEXAGON



PERIMETER OF HEXAGON L M N O P Q

= 2cm + 3cm + 4cm + 6cm + 7cm + 5cm

= 27cm

FORMULAE :

1. Perimeter of a square = 4 x length of a side
2. Perimeter of a Rectangle = 2 x (length + breadth)
3. Perimeter of a triangle = Sum of the three sides

Therefore from the above formulas it follows

Side of a square = $\frac{1}{4}$ (its perimeter)

length of a rectangle = $\frac{1}{2}$ (perimeter - breadth)

breadth of a rectangle = $\frac{1}{2}$ (perimeter - length)

1. Find the perimeter of a square of side 2.5m

   Solution :

   Perimeter of the square = 4 x side

   = (4 x 2.5)m

Perimeter of a square = 10m

2. Find the Perimeter of a rectangle of length (l) = 2cm, breadth (b) = 5cm

   Solution :

   Perimeter of the rectangle = 2 x (length + breadth)

   = 2 (2 + 5)

   = 2 x (7) cm

Perimeter of a rectangle = 14 cm

3. Find the perimeter of a Triangle of AB = 4.5cm, BC = 5cm, CA = 6cm

   Solution :

   Given that

   AB = 4.5 cm

   BC = 5 cm

   CA = 6 cm

   Perimeter of the triangle = sum of the three

   = (4.5 + 5 + 6) cm

Perimeter of a triangle = 15.5 cm

AREA

What is Area?

Area is the amount of surface covered by any shape.

The square is called a centimeter square

The area of this square is 1 square centimeter ($1cm^2$)

The diagonal divides the centimeter square into two equal triangle. The area of each triangle is $\frac{1}{2}$ cm^2

Larger units of area are M^2, Km^2, etc

FORMULAE :

Area of a rectangle = length x breadth A = lb

Area of Square = $Side^2$ A = S x S = S^2

Also, We have,

Length = $\frac{Area}{breadth}$

Breadth = $\frac{Area}{length}$

MEASURES OF AREA

1. 1cm = 10mm
2. 10mm x 10mm = 100mm^2
3. 1dm x 10cm $\Longrightarrow$ 1dm^2
4. 10 cm x 10cm $\Longrightarrow$ 1dm^2
5. 1m = 100cm $\Longrightarrow$ 1m^2
6. 100 cm x 100 cm = 10,000 cm^2
7. 1 dam = 10m $\Longrightarrow$ 1 dam^2
8. 10m x 10m = 100m^2
9. 1 KM = 1000 m $\Longrightarrow$ 1 KM^2
10. 1000m x 1000m = 10,00,000m^2
11. 1 Are = 10 m x 10m = 100m^2
12. 1 hectare (1 ha) = 100m x 100m = 10,000 m^2

1. Find the area of a rectangular garden which is 40m long and 20m wide.

   Solution :

   Length of the garden = 40m

   Its breadth = 20m

   Area of the garden = length x breadth

   = (40 x 40) m^2

   Area of the garden = 800m^2

2. Find out the area of a square class room which side is 10m.

   Solution :

   Side of the class room = 10m

   Area of the class room (Square) = S^2

   (side x side)

$= (10)^2$

Area of the class room = 100 m^2

(Square)

3. A room measures 12m x 9m. The floor of the room is to be covered by marble tiles measuring 45cm by 30cm. How many tiles are needed?

   Solution :

   Number of tiles needed = $\frac{Area\ of\ the\ Floor}{Area\ of\ the\ tile}$

   $= \frac{12 \times 9}{0.45 \times 0.3}$

   $= \frac{12 \times 9 \times 1000}{45 \times 3}$

   $= 800$

   [45 cm = $\frac{45}{100}$ m $= 0.45$m]

   [30 cm = $\frac{30}{100}$ m $= 0.30$m]

   There are 3 dp's in the denominator so multiply numerator by 1000 to remove decimal points.

EXERCISE :

1. Find the perimeter of a square of side 4cm?
2. Find the perimeter of a rectangle of length (l) = 3.5cm, breadth (b) = 4.5cm?
3. Find the perimeter of a triangle of PQ = 5cm, QR = 5.5 cm, RP = 6.5cm?
4. Find the area of a rectangular garden which is 60cm long and 25cm wide.
5. Find the area of square box which side is 20m.

UNIT- 17

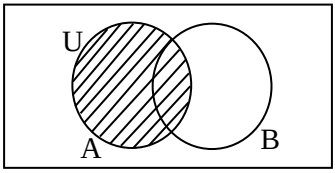
SET THEORY - VENN DIAGRAMS

What is a venn diagram?

* A venn diagram is a pictorial representation of the relationships between sets.
* In a venn diagram, the sets are represented by shapes, usually circles or ovals. The elements of a set are labeled within the circle.

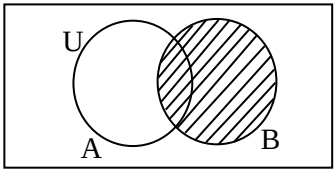
SET OPERATIONS AND VENN DIAGRAMS

SET A



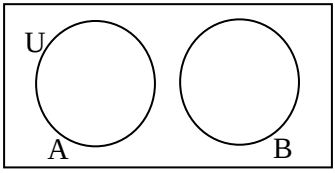
SET A

SET B



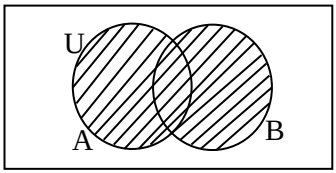
SET B

A and B disjoint Set

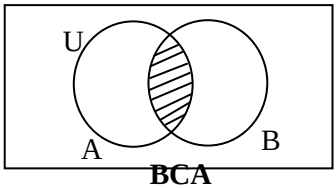


A and B disjoint sets

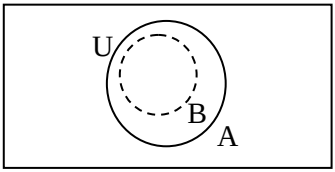
A∪B



A∩B



BCA



SIMPLE EXAMPLES

1. Given the set P is the set of venn even numbers between 15 and 25 draw and label a venn diagram to represent the set P and indicate all the elements of set P in the venn diagram.

   Solution:

   Let out the elements of P

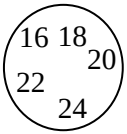
   P = {16,18,20,22,24}

   'between' does not include 15 and 25 became them are odd number.

   Put elements in P

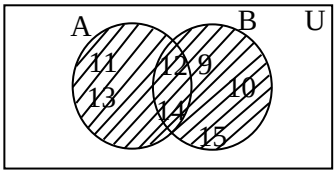
   Venn Diagram

   P

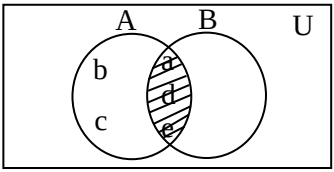


2. Draw and Label a venn diagram to represent the set
   R = {Monday, Tuesday, Wednesday}
   Solution:
   Draw a circle or oval Label it R put the elements in R
   R

3. Example :
   A = {11,12,13,14} and B = {9,10,12,14,15} find A∪B?
   Solution:
   Given that:
   A = {11,12,13,14}
   B = {9,10,12,14,15}
   A∪B = {9,10,11,12,13,14,15}
   Venn Diagram:



4. A = {a,b,c,d,e} and B = {a,b,d,e,f} find A∩B = {a,d,e} using venn diagram.
   Solution:
   A = {a,b,c,d,e}
   B = {a,d,e,f}



ANB

5. A = {10,11,12,13}
   B = {12,13,14,15} ANB?
   Solution:
   A = {10,11,12,13}
   B = {12,13,14,15}
   A and B Common Numbers
   A∩B = {12,13}
6. A = {2,5,7,11}
   B = {5,7,9,11,13}
   Find A-B?
   Solution:
   A = {2,5,7,11}
   B = {5,7,9,11,13}
   A-B = {2}
7. A = {-3,-3,0,3,4}
   B = {-1,3,5}
   A-B = ?
   B-A = ?
   Solution:
   A = {-3,-1,0,3,4}
   B = {-1,3,5}
   A-B = {-3,0,4}
   A = {-3,-1,0,3,0,4} B = {-1,3,5}
   B-A = {5}
8. n (A) = 12, n (B) = 17 and n (A∪B) = 21 find n (A∩B)?
   Solution:
   n (A) = 12
   n (B) = 17
   n (A∪B) = 21
   n = (A∪B) = n (A)+n(B) - n (A∩B)
   n (A∩B) 12+17-21
   = 29-21
   n (A∩B) = 8

PROPERTIES OF SET OPERATIONS

1. **Commutative property**
   i) A∪B = B∪A
   ii) A∩B = B∩A
2. **Associative Property:**
   i) A∪ (B∪C) = (A∪B) ∪C
   ii) A∩ (B∩C) = (A∩B) ∩C
3. **Destructive Property:**
   i) A∩ (B∪C) = (A∩B) ∪ (A∩C)
   ii) A∪ (B∩C) = (A∪B) ∪ (A∪C)

9. A = {1,2,3,4,5} B {3,4,5,6} C = {5,6,7,8} find A∪ (B∪C) = (A∪B) ∪C
   Solution:
   A = {1,2,3,4,5}
   B = {3,4,5,6} C = {5,6,7,8}
   B∪C = {3,4,5,5,6,7,8}
   A∪ (B∪C) = {1,2,3,4,5} ∪ {3,4,5,6,7,8}
   ∴ A∪ (B∪C) = {1,2,3,4,5,6,7,8}- 1
   A∪B = {1,2,3,4,5} U {3,4,5,6}
   A∪B = {1,2,3,4,5,6}
   (A∪B) ∪C = {1,2,3,4,5,6} ∪ {5,6,7,8}- 2
   A∪ (B∪C) = (A∪B) ∪C Verified
10. A = {a,b,c,d}, B = {a,c,e} and C = {a,e}
    find A∩ (B∩C) = (A∩B) NC?
    Solution:
    L.H.S
    (B∩C) = {a,c,e} N {a,e}?
    B∩C = {a,e}
    A∩ (BNC) = {a,b,e,d} N {a,e}
    A∩ (BNC) = {a} – 1
    R.H.S
    (A∩B) = {a,b,c,d} ∩ {a,c,e}
    A∩B = {a,c}

(A∩B) ∩C = {a,c} ∩ {a,e}

(A∩B) ∩C = {a} - 2

1 & 2 equation (A∩B) AC = AN (B∩C) proved

11. A = {0,1,2,3,4,} B = {1,-2,3,4,5,6} and C = {2,4,6,7}

A∪ (B∩C) = (A∪B) N (A∪C) = ?

Solution:

L.H.S= AU (B∩C)

B∩C = {1,-2,3,4,5,6} ∩ {2,4,6,7}

B∩C = {4,6}

A∪ (B∩C) = {0,1,2,3,4} ∪ (4,6)

A∪ (B∩C) = {0,1,2,3,4,6} - 1

R.H.S = (A∪B) ∩ (A∪C)

A∪B = {0,1,2,3,4} ∪ {1,-2,3,4,5,6}

A∪B = {0,1,-2,2,3,4,5,6}

A∪C = {0,1,2,3,4} ∪ {2,4,5,6}

A∪C = {0,1,-2,2,3,4,5,6}

∩ {0,1,2,3,4,6,7}

(A∪B) ∩ (A∪C) = {0,1,2,3,4,6} - 2

equation 1 & 2 A∪ (B∩C) = (A∪B) ∩ A∪B (A∪C) proved

De Morgan's Laws for set Difference

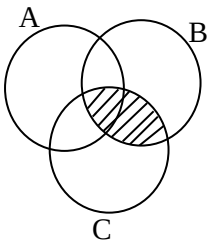
1. A/ (B∪C) = (A/B) ∩ (A/C)
2. A/ (B∩C) = (A/B) ∪ (A/C)

De Morgan's Laws for Complementation

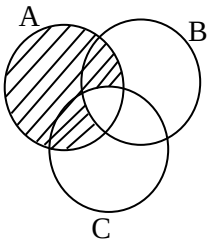
1. $(A \cup B)^1 = A^1 \cap B^1$
2. $(A \cap C)^1 = A^1 \cup B^1$

1. Using venn diagram A/ (B∪C) = (A/B)∪ (A/C)

LHS

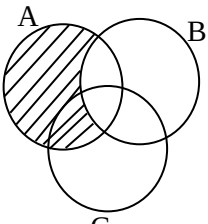


B∩C - 1

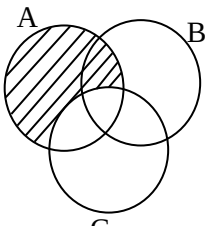


RHS

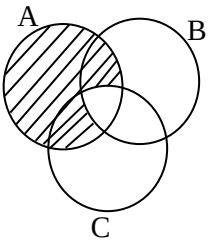
A/(B∩C) - 2



A/B - 3



A/C - 4

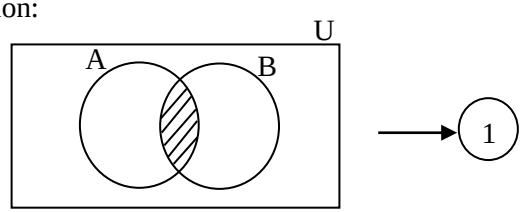


A/B ∪ (A/C) - 5

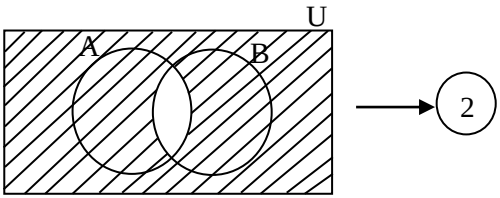
equation 2 and 5 A/(B∩C) = (A/B) ∪ (A/C) Verified

2. Using venn diagram $(A \cap B)^1 = A^1 \cup B^1$

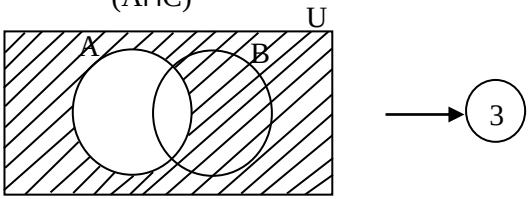
Solution:

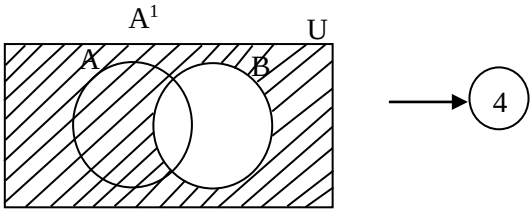


A∪B - 1

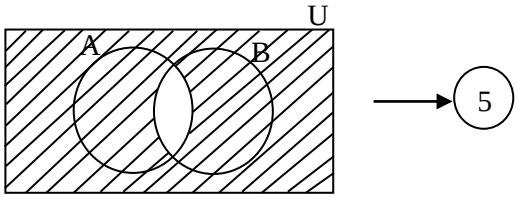


$(A \cap C)^1$





B^1



$A^1 \cup B^1$

equation 2 & 5 $(A \cap B)^1 = A^1 \cup B^1$ Verified

EXERCISE:

1. If A = {1,2,3,4,5,6}, B = {1,3,5,7,9} find A∩B?
2. If X = {a,b,c,d,e} Y = {c,e,f,g}find X∪Y? and X∩Y?
3. If A and B are two sets such that n (A) = 15, n (B) = 21 and n (A∪B) = 36 find n (A∩B)
4. If A and B are two sets such that A has 35 elements, A∪B has 80 elements and A∩B has 10 elements how many elements does B hare?
5. Find the sets from the disjoint sets P∪Q If P = {0,4,5,6,8,10,13} and Q = {m,n,o,x,y,z}

UNIT - 18

BASIC GEOMETRY & GRAPH

Introduction to Geometry

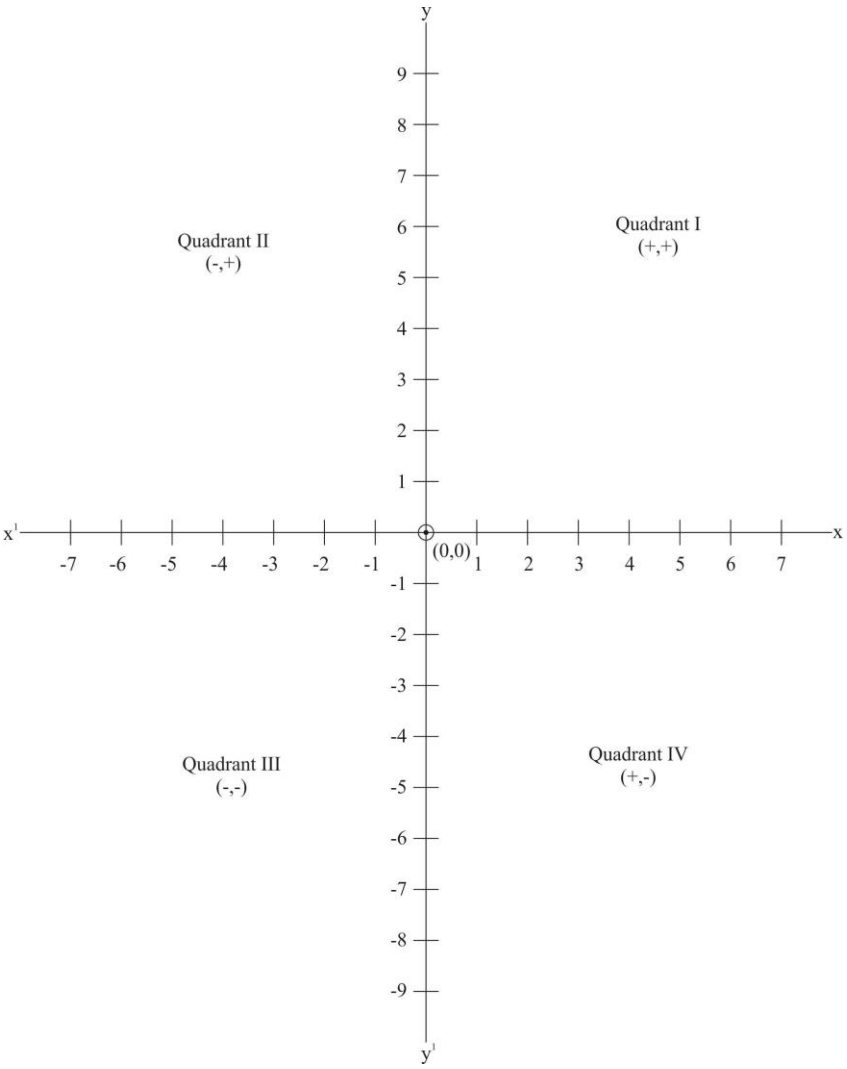
- Geometry is a subject in mathematics that focuses on the study of shapes, sizes, relative configurations, and spatial proportion derived from the Greek word meaning 11 earth measurement.
- Geometry is one of the oldest sciences. If was first formally organized by the Greek mathematician Euclid around 300 BC.

Applications of Geometry:

- Common Application of Geometry
- Advanced Application of Geometry
- Biochemical Modeling
- Typography
- Timber Processing
- Computer Graphics
- Textile Layout
- Space
- Agriculture

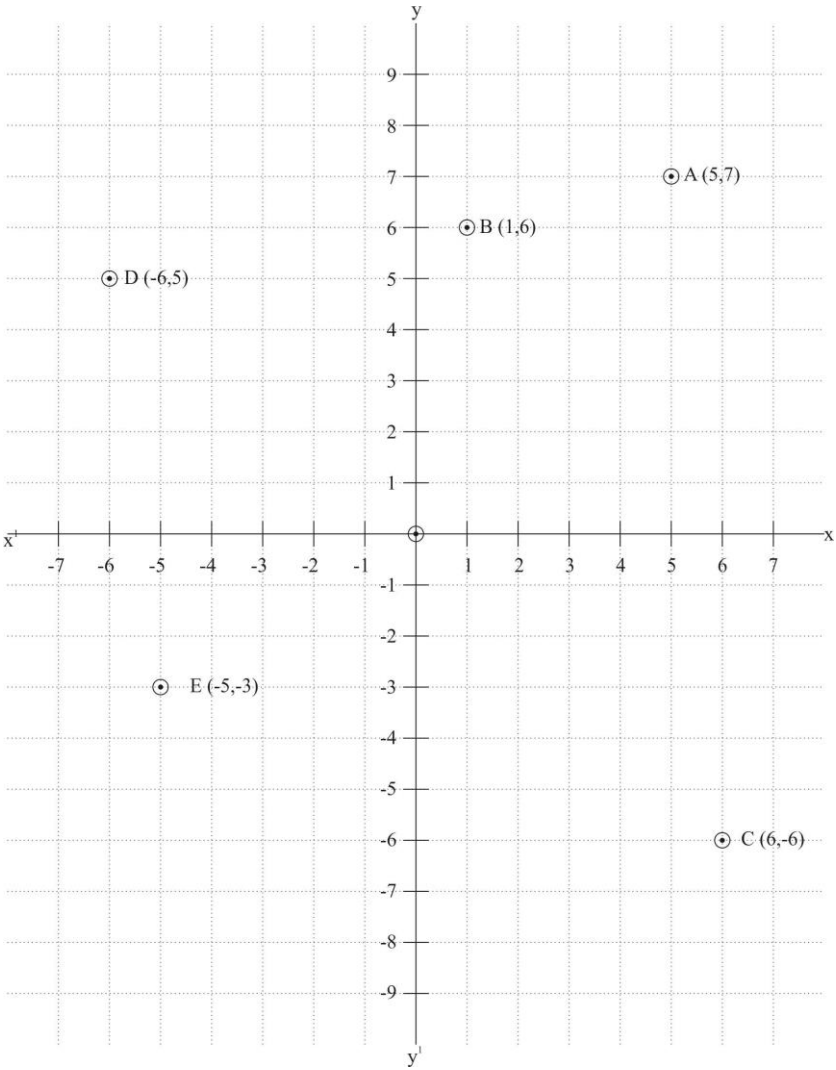
Quadrant	x Coordinate	y coordinate
1^{st}	Positive	Positive
2^{nd}	Negative	Positive
3^{rd}	Negative	Negative
4^{th}	Positive	Negative

THE QUADRANTS OF THE CARTESIAN PLANE

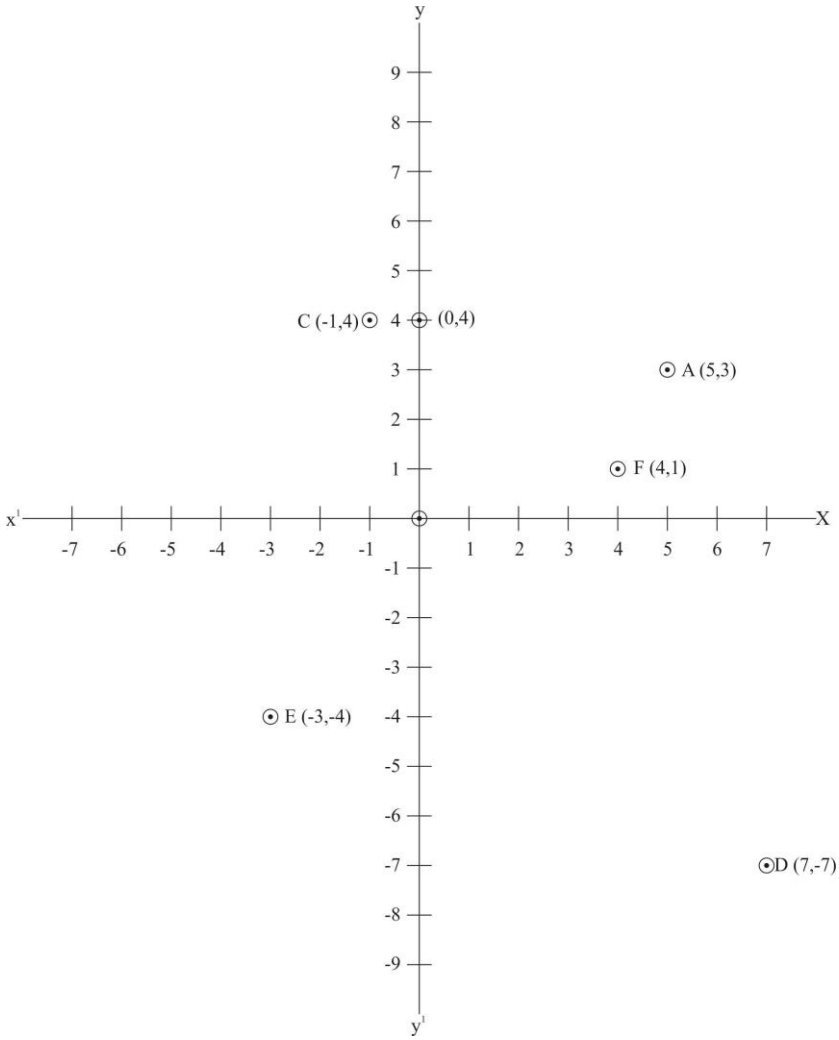


POINTS IN THE COORDINATE PLANE

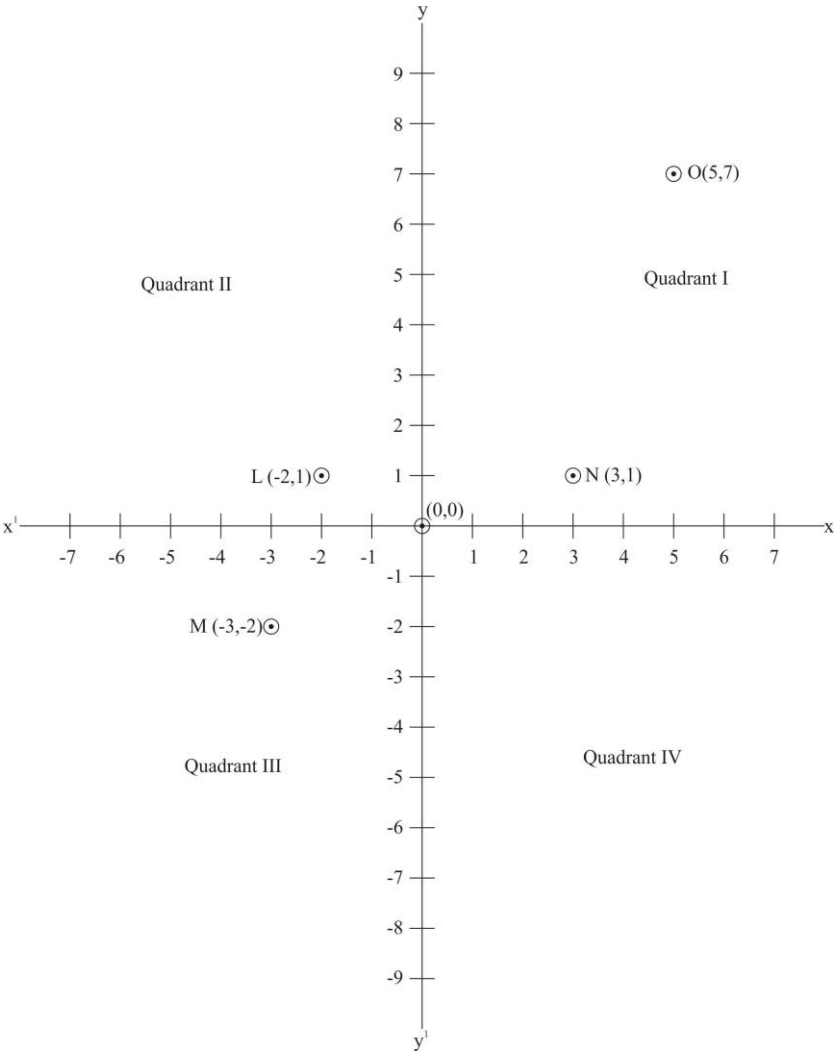
1. Plot each point:
   A (5,7), B (1,6), C (6,-6) D (-6,5) E (-5,-3)



2. Plot each point:
   A (5,3), B (0,4), C (4,1), D (7,-7), E (-3,-4), F (4,1)



3. Plot each point:
   L (-2,1), M (-3,-2), N (3,1), O (5,7)



GRAPHING LINEAR EQUATIONS

1. Graph the equation 1x+2y = 7

   Solution:

   When x = 0

   x +2y = 7

   0+2y = 7

   $y = \frac{7^{3.5}}{2}$

   = y = 3.5

   When y = 0

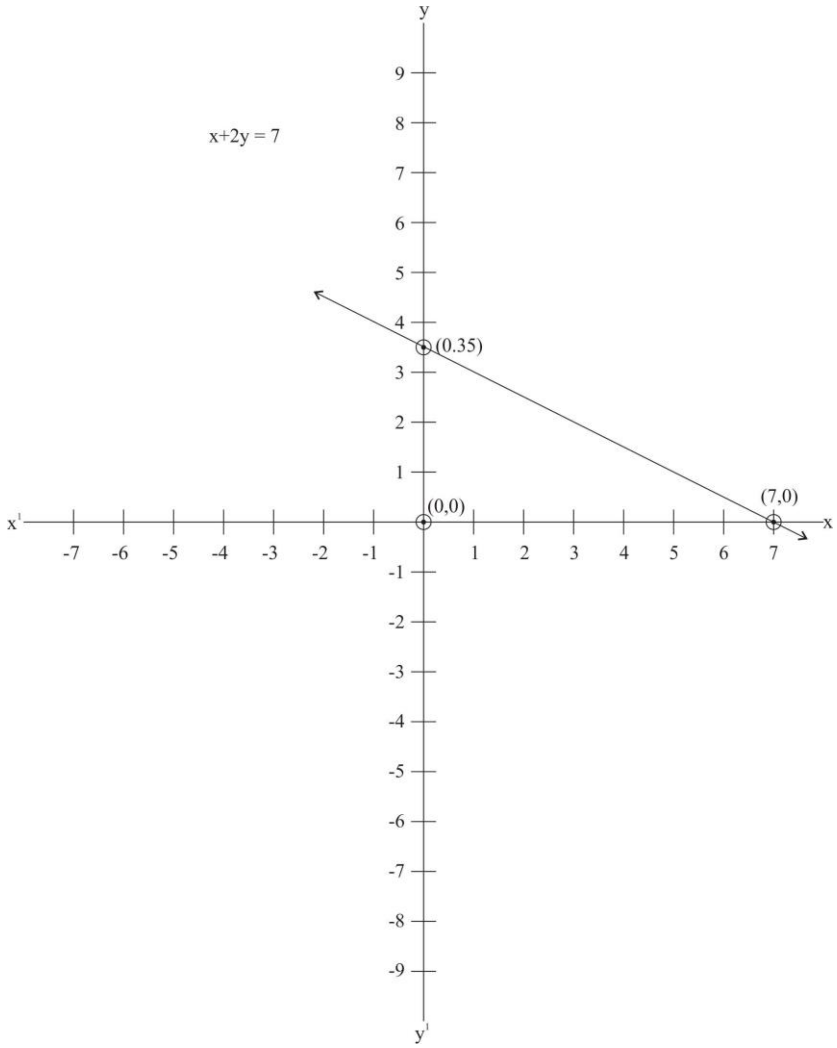
   x + 2y = 7

   x + 2(0) = 7

   x + 0 = 7

   x = 7

   so the two points are (0,3.5,7,0)


x+2y = 7
y
x
x'
y'
(0.35)
(0,0)
(7,0)

2. Graph the Line y = 3x+1

   Solution:

   When x = 0

   y = 3x + 1

   y = 3 (0) + 1

   y = 0 + 1

   y = 1 → (0,1)

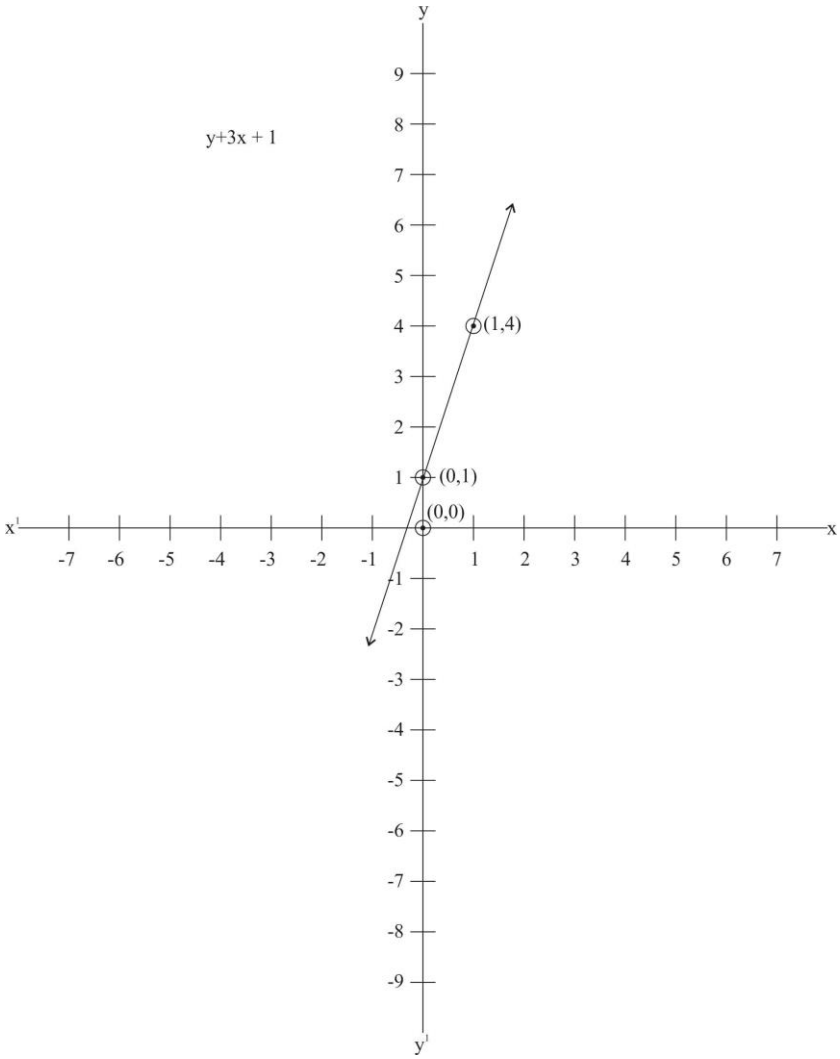
   When x = 1

   y = 3x + 1

   y =3 (1) + 1

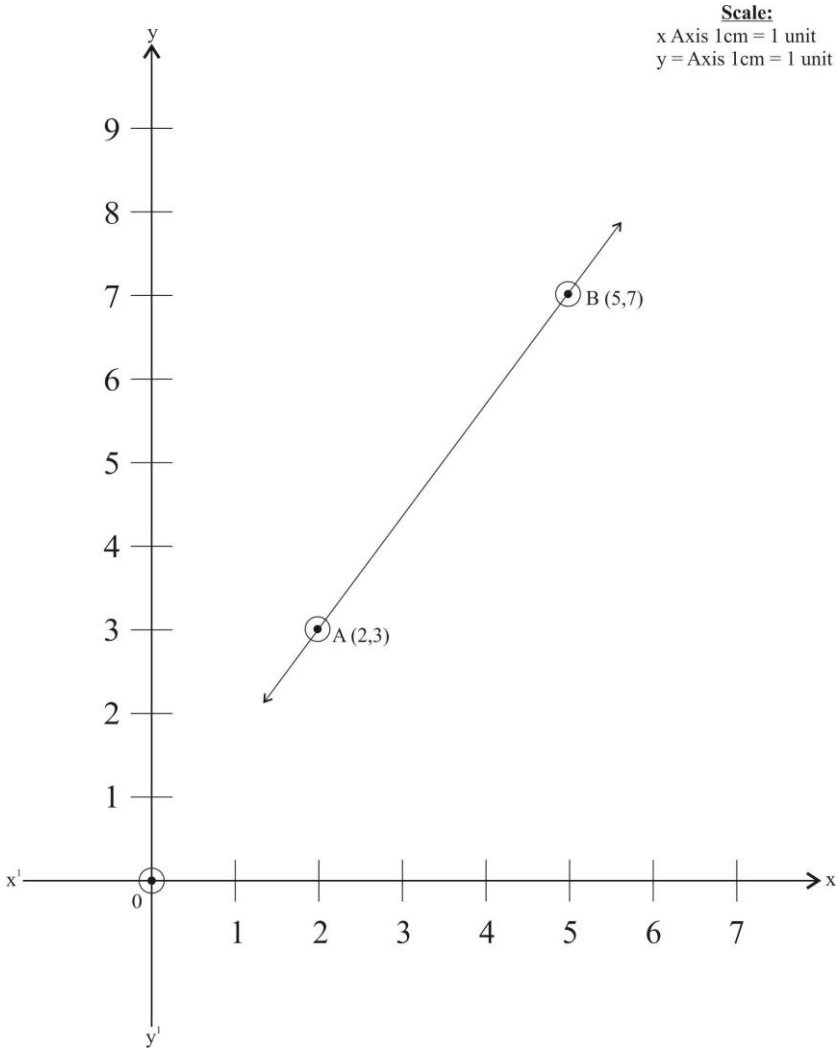
   y = 3 + 1

   y = 4 (1,4)


y+3x + 1
y
x
x'
y'
(1,4)
(0,1)
(0,0)

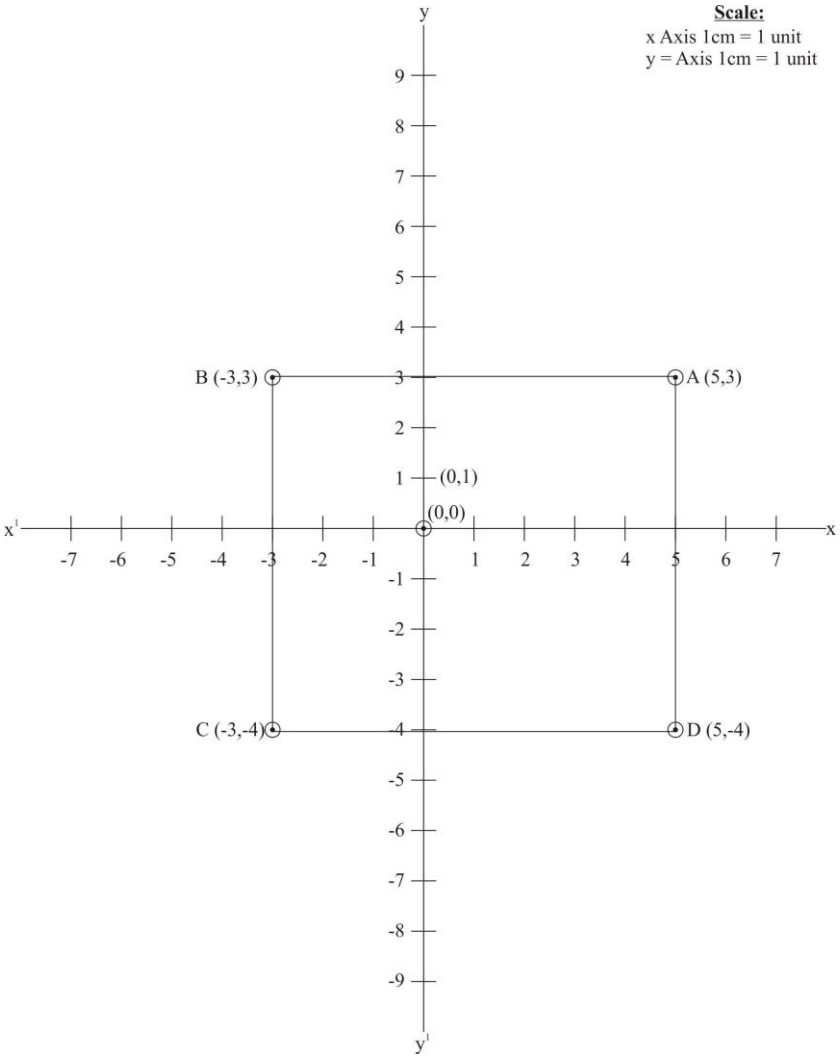
LINE JOINING TWO GIVEN POINTS

1. Draw the Line joining the following point
   (i) A (2,3) (ii) B (5,7)



AREA OF PLANE FIGURES

2. Plot points A (5,3), BC (-3,3), C (-3,-4) D (5,-4) and find the area of ABCD enclosed by the figure.



EXERCISE:

1. Plot each point:
   A (9,6) B (-5,7) C (-8,-6) D (5,0) E (0,7)
2. Plot each point:
   P (6,7) Q (-7,8) R (-9,0) S (2,0)
3. Graph the equation $2x + 9y = 18$
4. Graph the Line $y = 6x + 1$
5. Plot points P (5,5) Q (-4,5) R (-4,-5) S (5,-5)

UNIT-19

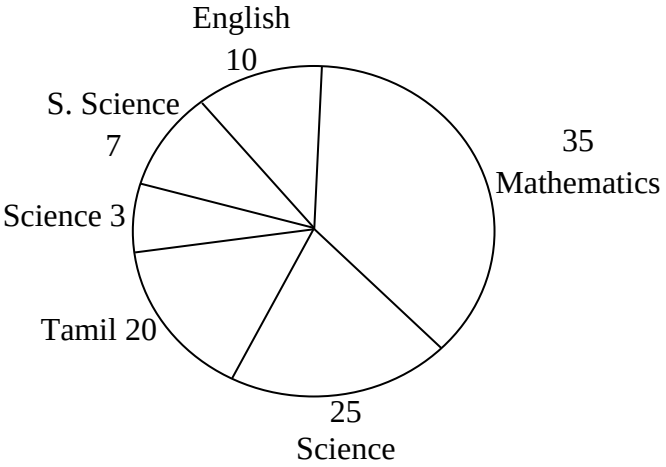
STATISTICS

DEFINITION OF STATISTICS :

Statistics is a branch of a applied mathematics concerned with collecting , organizing and interpreting data the data are represented by means of graphs.

Example of Statistics :

A survey conducted to find the favorite subject of 100 students the circle graph before show the results.



Definition Of Data :

Data can be defined as a collection of facts or information from which conclusion may be drawn.

Example Of Data :

The data shown before are marks scores on five maths tests conducted in 5 weeks.

45,23,67,82,70.

Definition of mean :

Mean of a set of numbers is the sum of the numbers divided by the numbers of items in the list.

$$\textbf{Mean} = \frac{\text{Sum of values}}{\text{Number of items}}$$

1.EXAMPLE:

In order to find the mean of 4,5,6,3 and 7 first we have to add the number of items.

Solution:

4+5+6+3+7=25

No. of items =5

$$\textbf{Mean} = \frac{\text{Sum of values}}{\text{Number of items}}$$

$$= \frac{4+5+6+3+7}{5}$$

$$\textbf{Mean} = \frac{25^{5}}{\cancel{5}}$$

Mean = 5

MEDIAN

Median:

Another measure of central tendency is the median

1. Find the median of 8,10,17,15,13,21,25,

Solution: Arrange the values in the ascending order.

8,10,13,15,17,21,25

Here, n=7 (odd number)

Median = middle value

$= \left(\frac{n+1}{2}\right)^{th}$ value

$= \left(\frac{7+1}{2}\right)^{th}$ value

$= \frac{\cancel{8}^{4}}{\cancel{2}} = 4^{th}$ value

Hence, Median is 15

2. Find the median of the following set of values.

   Find the median of 83,66,86,30,81

   Solution:

   Arrange the values in the ascending order

   30,66,83,86,81

   Here, n=5 (odd number)

   Median = middle value

   $= \left(\frac{h+1}{2}\right)^{th}$ value

   $= \left(\frac{5+1}{2}\right)^{th}$ value

   $= \left(\frac{6}{2}\right) 3^{th}$ value

   $= 3^{rd}$ value

   Hence, Median is = 83

3. Find the median of 70,71,70,68,67,69,70

   Solution:

   Arrange the values in the ascending order

   67,68,69,70,70,70,71

   Here : n=7 (odd number)

   Median = middle value

   $= \left(\frac{h+1}{2}\right)^{th}$ value

   $= \left(\frac{7+1}{2}\right)^{th}$ value

   $= \left(\frac{8^{4}}{2}\right)^{4th}$ value

   $= 4^{th}$ value

   Hence, Median is 70

MODE

Definition:

Mode is also a measure of central tendency

1. Find the mode of 2,4,5,2,1,3,4,4,6,2,5,5,6,8,9,5

   Solutions:

   In the above example the number 5 occurs maximum number of times i,e 4 time. Hence mode = 5

2. Find the mode of 15,22,33,44,55,68

   Solution:

   Each value occurs exactly one time in the series. Hence there is no mode for this data.

EXERCISE :

1. Find the mean of 3,6,9,12,15,186
2. Find the mean of 5,10,15,20,25?
3. Find the median of 60,65,59,42,30,22?
4. Find the mode of 6,7,4,6,9,10,6?
5. Find the mode of 3,4,6,3,9,11,3?

UNIT - 20

PROFIT AND LOSS

Definition :

Cost Price : C.P is the price at which one buys anything.

Selling Price : S.P is the price at which one sells anything

Profit /Loss : This is the difference between the selling price and the cost price. If the difference is positive it is called the profit and negative it is called as Loss.

Profit / Loss% : This is profit / loss as a percentage the C.P.

Margin : Normally is in % terms only. This is the profit as a percentage of S.P.

Marked price : This is the price of the product as displayed on the label.

Discount : This is the reduction given on the marked price before selling is to a customer, If the trader wants to make a loss he can offer a discount on the cost price as well.

Markup : This is the increment on the cost price before being sold to a customer.

Formulae :

1. Gain = (S.P - C.P)
2. Loss = (C.P - S.P)
3. Gain % = (Gain x 100) / C.P
4. Loss % = (Loss x 100) / C.P
5. Given the cost and the gain percent, S.P = (100 + gain %) x C.P / 100
6. Given the cost and the loss percent S.P = (100 - Loss %) x C.P / 100
7. Given the market price and the discount, C.P = (100 - discount %) x m.p / (100 + gain %)

8. Given the M.P and the discount C.P = (100 - Discount %) x M.P / (100-Loss)

Simple Examples :

1. A person sells 36 oranges for one rupee and suffer a loss of 4%. find how many orange per rupee to be sold to have to gain of 8%.
   Solution :
   Let 'X' is the cost price of each orange.
   Since he is giving 36 apples for one rupee, the selling price of an orange is $\frac{1}{36}$ Rupee.
   Since he got 4% Loss, the S.P of each orange is 0.96 x = $\frac{1}{36}$
   To get 8% gain he has to sell it for
   1.08 x = $\frac{1.08}{0.96}$ x $\frac{1}{36}$
   = $\frac{1}{32}$ Rupee
   So for one rupee, he has to give 32 oranges to get a gain of 8%
2. The price of a trouser is marked 50% more than its cost price and discount of 25% is offered on the marked price of the trouser by the shopkeeper. Find the percentage of profit / Loss?
   Solution :
   M.P = 1.5 C.P
   S.P = 0.75 x 1.5 C.P
   = 1.125 C.P
   So profit percentage = 12.5 %

Example : 3

After allowing discount of 11.11% a trader still makes a profit of 14.28% at how much percent above the cost price does he mark on his goods.

Solution :

Discount of 11.11% mean a discount of $\frac{1}{9}$ and 14.28% means $\frac{1}{7}$

So selling price = (1 + $\frac{1}{7}$) C.P

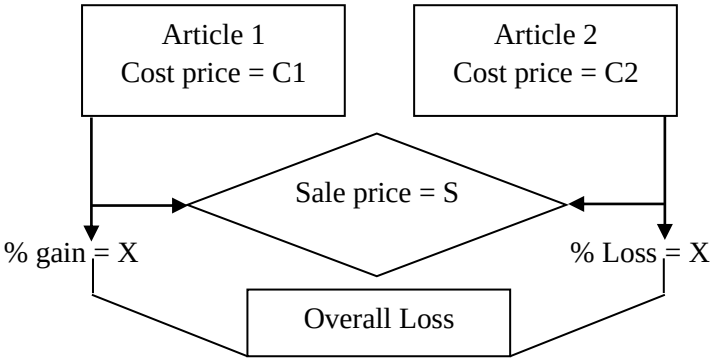
= $(1 + \frac{1}{9})$ M.P

So M.P = $\frac{9}{7}$ C.P

So its $\frac{2}{7}$ x 100

= 28.56% more than C.P

TWO DIFFERENT ARTICLES SOLD AT SAME SELLING PRICE



Overall % loss = - $\left(\frac{x}{10}\right)^2$, where X is the percent profit or loss on the transaction.

4. A cloth merchant allows 25% discount on a saree and still makes 20% profit. By selling a saree, he gains Rs.160. what is the market price of that saree?

   Solution :

   He makes a profit of 20% and it given as Rs.160.

   20% of C.P = 160

   So, C.P = Rs.800

   S.P = 800 + 160

   Rs.960

   And 0.75 M.P = 960 (Since he is giving 25% discounts)

   M.P = Rs. 1280

5. Mr.L.Ramesh purchased an article and sold it to Mr.V.Asaithambi at 20% profit. Mr.v.Asaithami sold it to Mr.R.N.Manoshsai at 20% profit. If Mr.R.N.Manoshsai paid Rs.2880 to Mr.V.Asaithambi, what is the profit in rupees earned by Mr.L.Ramesh?

   Solution :

   Assume that Mr.L.Ramesh

   Purchased that article for Rs. X

   Then he sold it to Mr.V.Asaithambi for Rs.1.2 X and Mr.V.Asaithami sold it to Mr.R.N.Manoshsai for Rs.1.2 X 1.2 X = 1.44X

   This is given as Rs.2880, So X = Rs.2000 profit earned by Mr.L.Ramesh is 20% of X = Rs.400

EXERCISE :

1. An article is purchased for Rs.450 and sold for Rs.500. Find the gain percent?
2. A man sold a fan for Rs.465. Find the cost price if the incurred a loss of 7%.
3. If selling price is doubled, the profit triples. What is the profit percent.
4. The cost price of 20 articles is the same as the selling price of X article. If the profit is 25%. Find the value of X.
5. If the cost price of a book is Rs.150 and selling price is 137.50, then calculate the loss and percentage loss on the books.

EXERCISE SUMS EXPALANATION

UNIT – 1 EXERCISE

1. Add (-15) + (-9)

   Solution:

   -15
   -9
   Ans = -24

2. Add (+8) + (-20)

   Solution:

   -20
   +8
   Ans = -12

3. Subtraction -5,10

   Solution:

   10
   +5
   Ans = 15

4. Subtraction 57,70

   Solution:

   70
   -57
   Ans = 13

5. Multiplication: -20 x -5 x -10

   Ans = - 600

6. Multiplication: 12 x -7 x -3

   Ans = 252

7. Divide: -75 ÷ 5

   Ans = -15

8. Divide : 105 ÷ -5

   Ans = -21

9. Simplify: -20 - (-3)

Solution:

= -20 + 3

= -17

10. Find -15 - (-46)

Solution:

= -15 - (-46)

= -15 + 46

Ans = +31

UNIT – 2 EXERCISE

1. Add 1750.50, 196.8, 5683.589

Solution:

1750.500
196.800
5683.589
Ans : 7630.889

2. Add 192.568, 52.5, 363.90

Solution:

1750.500
196.800
5683.589
Ans : 7630.889

3. Subtract : 0.896 from 1

Solution:

1.000
8.896
Ans : 0.104

4. Subtract : 0.0090 from 0.0098

Solution:

0.0098
(-) 0.0090
Ans : 0.0008

5. Multiplication :

Solution:

-289.6 x 50.20

Ans : -1453.792

Ans : -1453.792

6. Multiply:

-5280.10 x -10.20

Solution:

-5280.10 x -10.20

Ans : 53857.02

7. Divide

-420.40÷25

Ans : -16.816

8. Divide :

-150.45÷10

Solution:

Ans : -15.045

9. Simplify:

-2568.18 + 1996.10-11.876

Solution:

Step - 1

-2568.180

- 11.876

-2580.056

Step - 2

-2580.056

+1996.100

- 638.956

10. Simplify:

1246.14-22296+1568.50-416.5

Solution:

Step 1:

1246.14

(+) 1568.50

2814.64

Step 2:

-22296.0

(-) -416.5

-22712.5

Step 3:

- -22712.50

2814.64

Ans : -19897.86

UNIT – 3 EXERCISE

1. Add the fraction $\frac{-7}{6} + \frac{8}{6}$

Solution:

$= \frac{-7}{6} + \frac{8}{6}$

$= \frac{-7+8}{6}$

Ans : $= \frac{1}{6}$

2. Add the fraction $\frac{-9}{10} + \frac{(-2)}{10}$

Solution:

$= \frac{-9}{10} + \frac{(-2)}{10}$

$= \frac{-9-2}{10}$

Ans : $= \frac{-11}{10}$

$= -1\frac{1}{10}$ x

3. Simplify : $\frac{5}{6} + \frac{7}{13} + \frac{8}{15}$

Solution:

$= \frac{5}{6} + \frac{7}{13} + \frac{8}{15}$

= L.C.M of 6,13,15

2x13x3x5 = 390

$\frac{5}{6}$ x $\frac{65}{65} = \frac{325}{390}$

$\frac{7}{13}$ x $\frac{30}{30} = \frac{210}{390}$

$\frac{8}{15}$ x $\frac{26}{26} = \frac{208}{390}$

$= \frac{325+210+208}{390}$

$= \frac{753}{390}$

Ans: $= 1\frac{363}{390}$

4. Simplify: $\frac{-2}{10} + \frac{6}{12} + \frac{4}{16}$

Solution :

$\frac{-2}{10} + \frac{6}{12} + \frac{4}{16}$

L.C.M of 10,12,16

2x2x3x2x2x5 = 240

$\frac{-2}{10}$ x $\frac{24}{24} = \frac{-48}{240}$

$\frac{6}{12}$ x $\frac{20}{20} = \frac{120}{240}$

$\frac{4}{16}$ x $\frac{15}{15} = \frac{60}{240}$

$= \frac{-48}{240} + \frac{120}{240} + \frac{60}{240}$

$= \frac{-48+120+60}{240}$

$= \frac{-48+180}{240}$

$= \frac{\cancel{132}\ \cancel{66}\ \cancel{33}^{11}}{\cancel{240}\ \cancel{120}\ \cancel{60}_{20}}$

= 11/20

5. Simplify: $4\frac{2}{3}$ -$5\frac{6}{9}$ +$1\frac{4}{5}$

Solution:

$= 4\frac{2}{3}$ -$5\frac{6}{9}$ +$1\frac{4}{5}$

$= \frac{14}{3} - \frac{51}{9} + \frac{9}{5}$

L.C.M of 3,9,5 = 3x3x5= 45

$\frac{14}{3}$ x $\frac{15}{15} = \frac{210}{45}$

$\frac{51}{9}$ x $\frac{5}{5} = \frac{255}{45}$

$\frac{9}{5}$ x $\frac{9}{9} = \frac{81}{45}$

$= \frac{210}{45} - \frac{255}{45} + \frac{81}{45}$

$= \frac{\cancel{36}\ \cancel{12}^{4}}{\cancel{45}\ \cancel{15}_{5}}$

= 4/5

6. Subtract the fraction : $\frac{5}{9} - \frac{10}{2}$

Solution:

$\frac{8}{9} - \frac{10}{12}$

L.C.M of 9,12

3x3x2x2 = 36

$\frac{5}{9}$ x $\frac{4}{4} = \frac{20}{36}$

$\frac{10}{12}$ x $\frac{3}{3} = \frac{20}{36}$

$= \frac{20}{36} - \frac{30}{36}$

$= \frac{20-30}{36}$

$= \frac{\cancel{10}^{5}}{\cancel{36}_{18}}$

Ans = $\frac{-5}{8}$

7. Find 6 x $\frac{5}{7}$

$= \frac{30}{7}$

Ans: = $4\frac{2}{7}$

8. Find $\frac{16}{18}$ x 8

$= \frac{16}{\cancel{18}_{9}}$ x $\cancel{8}^{4}$

$= \frac{16x4}{9} = \frac{64}{9}$

Ans: = $7\frac{1}{9}$

9. Multiplication : $\frac{8}{10}$ of 100

Solution:

$= \frac{8}{\cancel{10}} \times 100^{10}$

$= 8 \times 10$

Ans : 80

10. Find $1\frac{5}{6} \div 20$

Solution:

$= 1\frac{5}{6} \div 20$

$= 1\frac{11}{6} \div 20 = \frac{11}{6} \times \frac{1}{20}$

$= \frac{11}{6} \div \frac{20}{1}$

Ans = $\frac{11}{120}$

UNIT – 4 EXERCISE

1. Simplify $(-5)^6 \times (-5)^7 \times (-5)^8$

$a^m \times a^n = a^{m+n}$

Solution:

$= (-5)^6 \times (-5)^7 \times (-5)^8$

$= (-5)^{6+7+8}$

Ans = $(-5)^{21}$

2. Simplify $(3)^8 \div (3)^{10}$

$a^m \div a^n = a^{m-n}$

Solution :

$= (3)^8 \div (3)^{10}$

$= (3)^{8-10}$

Ans : 3-2

3. Simplify: $((5)^2)^3$

Solution:

$((5)^2)^3$

$= ((5)^2)^3$ $(a^m)^n = a^{mn}$

$= 5^{2x3}$

Ans : = 5^6

4. Using exponents, write -6x -6x -6

Solution:

= -6x-6x-6

Ans : = $(-6)^3$

5. Express in power notation $\frac{81}{64}$

Solution:

$= \frac{81}{64}$

Ans : = $\frac{9^2}{8_2}$

6. Find the value of $7^o+8^o+9^o$ = ?

Solution:

$= 7^o+8^o+9^o$ $\quad$ $a^o = 1$

= 1+1+1

Ans : = 3

7. Find the value of (11^o-6^o) x (9+3)?

Solution:

$= (11^o-6^o)$ x (9+3) $\quad$ $a^o = 1$

= (1-1) x (12)

= (0x12)

Ans = 0

8. Simplify: $\frac{7^6}{7_4}$

Solution:

$= \frac{7^6}{7_4}$ $\quad$ $\frac{a^m}{a^n} = a^{m-n}$

$= 7^{6-4}$

Ans = 7^2

9. Simplify : $\left(\frac{6}{10}\right)^4 \div \left(\frac{6}{10}\right)^4$ $a^m \div a^n = a^{m-n}$

Solution:

$= \left(\frac{6}{10}\right)^4 \div \left(\frac{6}{10}\right)^4$

$= \left(\frac{6}{10}\right)^{4-4} = \left(\frac{6}{10}\right)^0 = 1$

10. Expand $(5x4)^3$

Solution:

$(5x4)^3$ = (5x4) x (5x4) x (5x4)

$= (5x5x5) \times (4x4x4)$
$= 5^3 x 4^3$

UNIT – 5 EXERCISE

1. Add ₹ 640.50 + ₹ 50.50 + ₹ 672.50

   Solution:

   ₹ 640.50
   ₹ 50.50
   (+) ₹ 672.50
   ₹ 1363.50

2. Add: ₹ 555.50 + ₹ 65.50 + ₹ 50

   Solution:

   ₹ 555.50
   ₹ 65.50
   ₹ 50.00
   ₹ 671.00

3. Add: ₹ 679.50 + ₹ 79.50 + ₹ 69

   Solution:

   ₹ 679.50
   ₹ 79.50
   ₹ 69.50
   ₹ 828.00

4. Subtraction : ₹ 6992.50 - ₹ 555

   Solution:

   ₹ 6992.50
   ₹ 555.00
   ₹ 6437.50

5. Subtraction : ₹ 77.50 - ₹ 29.50

   Solution:

   ₹ 77.50
   ₹ 29.50
   ₹ 48.00

6. Subtraction ₹ 89.20 - ₹ 50.50

Solution:

₹ 89.20
(-) ₹ 50.20
₹ 38.70

7. Multiply ₹ 245.50x12

Solution:

₹ 245.50
₹ x12
₹ 49100
24550
₹ 2946.00

8. Multiply: 250.50x17

Solution:

250.50x17
175350
25050
₹ 4258.50

9. Multiply : ₹ 970x15

Solution:

₹ 970
X15
4850
970
₹ 14550

10. Multiply 575x13

Solution:

575
x13
1725
575
7475

UNIT – 6 EXERCISE

1. Add: 85l 300ml and 70l 150ml

Solution:

	l	ml
	85	300
(+)	70	150
Ans :	155 l	450 ml

2. Add : 55l 700ml and 80 l 200ml

Solution:

	l	ml
	55	700
(+)	80	200
Ans :	135l	900 ml

3. Subtraction : 35l 300ml from 84l 600ml

	l	ml
	84	600
(-)	35	300
Ans :	49l	300ml

4. Multiply 5l 100ml by 5

Solution:

5lx100ml
x 5

Ans : 25l 500ml

5. Divide : 42l 980ml ÷ 14

Solution:

	3	62
14	42	980
	42	94↓
	0	40
		28
		12

Ans : 3l 62ml

UNIT – 7 EXERCISE

1. Find the L.C.M of 5,10?

Solution:

5	5,10
2	1,2
	1,1

L.C.M of 5,10 = 5x2

Ans = 10

2. Find the L.C.M of 10,15,30?

Solution:

5	10,15,30
2	2,3,6
3	1,3,3
	1,1,1

L.C.M of 10,15,30 = 5x2x3

Ans = 30

3. Find the L.C.M of 18,20,25,32?

Solution:

2	18,20,25,32
2	9,10,25,16
2	9,5,25,8
2	9,5,25,4
2	9,5,25,2
3	9,5,25,1
3	3,5,25,1
5	1,5,25,1
5	1,1,5,1
	1,1,1,1

L.C.M of 18,20,25,32

= 2x2x2x2x2x3x3x5x5

Ans = 7200

4. Find the L.C.M of 5,7,20,13,18?

Solution:

5	5,7,20,13,18
4	1,7,4,13,18
7	1,7,1,13,18
13	1,1,1,13,18
2	1,1,1,1,10
3	1,1,1,1,9
3	1,11,1,1,3
	1,1,1,1,1

L.C.M of 5,7,20,13,18

= 5x4x7x13x2x3x3

Ans = 32760

5. Find the L.C.M of 3,10,18?

Solution:

2	3,20,18
2	3,10,9
3	3,5,9
5	1,5,3
3	1,1,3
	1,1,1

L.C.M of 3,20,18

= 2x2x3x5x3

Ans = 180

UNIT – 8 EXERCUSE

1. Find the HCF of 40 and 90

Solution:

2	40	2	90
2	20	5	45
2	10	3	9
5	5	3	3
	1		1

40 = 2 x 2 x 2 x 5
90 = 2 x 3 x 3 x 5

The Common factors are 2 and 5

HCF = 2x5 = 10

2. Find the HCF of 140,150,190 using prime factorization method.

Solution:

2	140	2	150	2	190
2	70	5	75	5	95
5	35	5	15	19	19
7	7	3	3		1
	1		1		

140 = 2 x 2 x 5 x 7
150 = 2 x 5 x 5 x 3
190 = 2 x 5 x 19

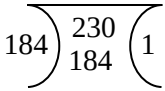
The Common factors are 2 and 5 HCF = 2x5

HCF = 10

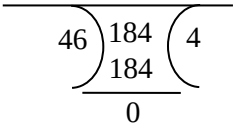
3. Find the HCF of 184, 230 and 276 by using continuous division method.

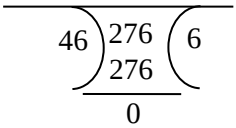
Solution:

Step :1



Step : 2



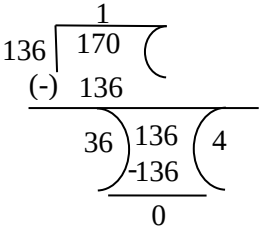


HCF of 184, 230 and 276 is 46

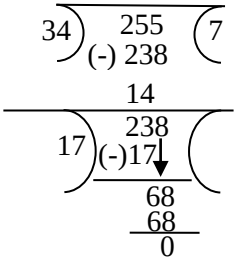
4. Find HCF of 136, 170 and 255 by using division method.

Solution:

Let us find HCF of 136 and 170



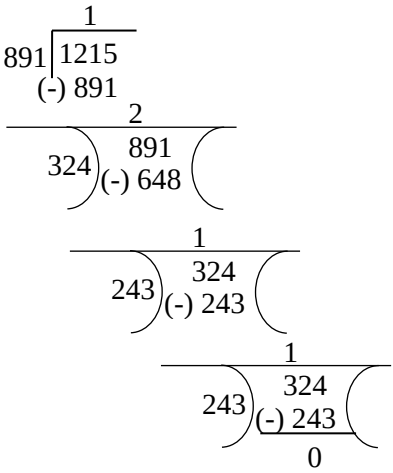
HCF of 136 and 170 = 34



The HCF of 136, 170 and 255 is 17

5. Find the HCF of 891, 1215 and 1377 using long division method.

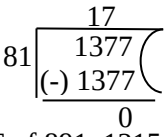
Solution:



HCF of 891 and 1215 is = 81

Find HCF of 81 and 377

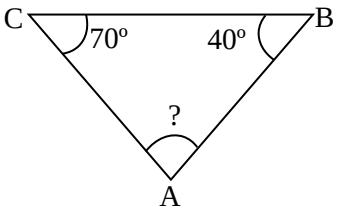
Step : 2



∴ HCF of 891, 1215 and 1377 is 81

UNIT – 9 EXERCISE

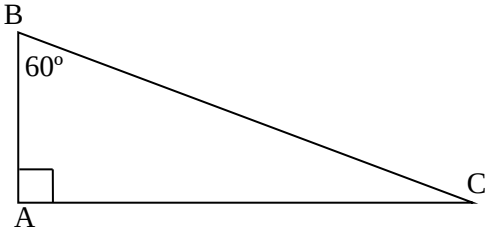
1. Find the measure of each angle indicated.



Solution:

A + B + C = 180º
A + 40º + 70º = 180º
A + 110º = 180º
A = 180º -110º
A = 70º

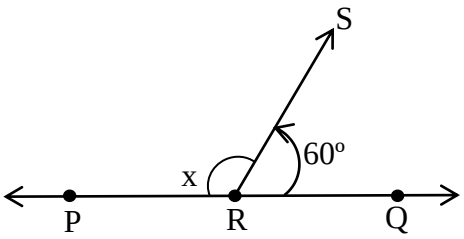
2. Find the measure of each angle indicated.



Solution:

A + B + C = 180º
90º + 60º + C = 180º
150º + C = 180º
C = 180º -150º
C = 30º

3. Find the value of x in the given figure.



Solution:

x = 60º = 180º

x = 180º = -60º

x = 120º

4. Two Complementary angles are in the ratio 6:9 find the angles.

Solution:

Let the angles be $6x^o$ and $9x^o$ the given angles are complementary

∴ 6x + 9x = 90º

15x = 90º

$x = \frac{90^{18\ 6}}{15_{3\ 1}}$

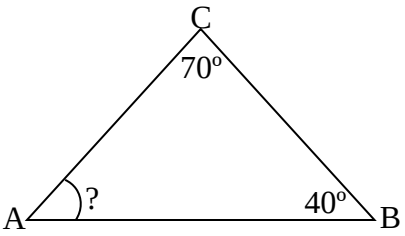
x = 6º

Take : 6x 6 (6º) = 36

Take 9x 9 (9) = 54

The Required angles are 36º and 54º

5. Find the measure of each angle indicated



Solution:

Triangle three sides are 180º

So

A + B C = 180º

A + 40º + 70º = 180º

A + 110º = 180º

A = 180º - 110º

A = 70º

UNIT – 10 EXERCISE

1. Solve the equation x+5 = 9

   Solution:

   x + 5 = 9

   x = 9-5

   x = 4

2. Solve the equation a + 10 = 12

   Solution:

   a + 10 = 12

   a = 12-10

   a = 2

3. Solve the equation x-7 = 4

   Solution:

   x-7 = 4

x = 4+7

x = 11

4. Solve equation check your Answer 3y = 9

Solution:

3y = 9

$y = \frac{\cancel{9}^{3}}{\cancel{3}}$

y = 3

Check:

3y = 9

3 (3) = 9

9 = 9 Verified

5. Solve the equation 5x+2 = 3x+12

Solution:

5x + 2 = 3x + 12

5x = 3x + 12-2

5x = 3x + 10

5x = 3x + 10

5x -3x = 10

2x = 10

$x = \frac{\cancel{10}^{5}}{\cancel{2}}$

x = 5

6. Solve the equation 2a-5 = 8a + 1

Solution:

2a-5 = 8a + 1

2a = 8a + 1 + 15

2a = 8a + 6

2a - 8a = 6

-6a = 6

$a = \frac{\cancel{6}^{1}}{-\cancel{6}}$

a = -1

11. Solve the equation $6x+14=16$

Solution :

$6x+14=16$

$6x=16-14$

$6x=2$

$x=\frac{\cancel{2}^{1}}{\cancel{6}_{3}}$

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

12. Solve the equation $6(5x-2)+12=30$

Solution:

$6(5x-2)+12=30$

$30x-12+20=30$

$30x+8=30$

$30x=30-8$

$x=\frac{\cancel{22}^{11}}{\cancel{30}_{15}}$

$x=\frac{11}{15}$

13. Solve $2m-10=7m-15+5$

Solution:

$2m-10=7m-15+5$

$2m-10=7m-10$

$2m=7m-10+10$

$2m=7m$

$2m-7m=0$

$-5m=0$

14. If $\frac{5m-2}{2}$ = -11 find the value of 2m+3

Solution:

$\frac{5m-2}{2}$ = -11

$5m-2=-11x2$

$5m-2=22$

$5m=-22+2$

$5m=-20$

$m=\frac{-2\not{0}^{4}}{\not{5}_{1}}$

m= -4

2m+3

= 2(-4)+3

= -8+3

= -5

UNIT – 11 EXERCISE

1. Add : $(8P^2 - 5) + (-6P^2) + 2P^2 + 7$

Solution:

$8P^2$	$-6P^3$	+7
$+2P^2$		-5
$10P^2$		+2

Ans : $-6P^3+10P^2+2$

2. Add : $(9+4x^3+5y^2)\ (9y^2-5+5x^3)$

Solution:

	$4x^3$	+	$5y^2$	+	9
	$5x^3$	+	$9y^2$	-	5
Ans:	$9x^3$	+	$14y^2$	+	4

3. Subtract : $(-5a^3-2a^2) - (9a^2+7a^3)$

Solution:

$= -5a^3-2a^2-9a^2-7a^3$

Ans $= -12a^3-11a^2$

4. Subtract : $(7h-4h^2) - (6h^2+9h)$

Solution:

$= (7h-4h^2) - (6h^2+9h)$

$= 7h-4h^2-6h^2-9h$

$= -2h-10h^2$

Ans $= -10h^2-2h$

5. Multiply : 5x(5y-9)

Solution:

= 5x(5y-9)

Ans =25xy-45x

6. Multiply : 9(-8x+15)

Solution:

= 9 (-8x+15)

Ans = -72x+15x9

7. Multiply : (2x+5) (5x-2)

= (2x+5) (5x-2)

= $25x-10+10x^2-4x$

= $21x-10+10x^2$

Ans = $10x^2+21x-10$

8. Multiply: (-4k+7) (-2k+8)

Solution:

= (-4k+7) (-2k+8)

= $-14k+56+8k^2-32k$

= $-46k+56+8k^2$

Ans = $8k^2-46k+56$

9. Divide : $2x^3+7x^2+2x+9 \div 2x+3$

Solution:

$$
\begin{array}{r|l}
2x+3 & x^2+2x-2 \\
\hline
 & 2x^3+7x^2+2x+9 \\
 & 2x^3+3x^2 \\
 & (-)\quad(-) \\
\hline
 & 4x^2+2x+9 \\
 & 4x^2+6x \\
 & (-)\quad(-) \\
\hline
 & -4x+9 \\
 & 4x-6 \\
 & (+)\quad(+) \\
\hline
 & 15
\end{array}
$$

Ans = $x^2+2x=^2$

10. Divide $x2+3x+5 \div x+1$

Solution:

$x + 1 \quad x + 3$

$x^2 + 3x + 5$

$(-) \quad x2$

$3x + 5$

$3x + 3$

$(-) \quad (-)$

2

Ans = $x+3$

UNIT – 12 EXERCISE

1. Solve for x : $4x = 80$

   Solution: $4x = 80$

   $x = \frac{\cancel{80}^{20}}{\cancel{4}}$

   $x = 20$

2. Solve for $x = 5x - 2 = 33$

   Solution:

   $5x - 2 = 33$

   $x5 = 33+2$

   $x = 35$

   $x = \frac{\cancel{35}^{7}}{\cancel{5}}$

   $x = 7$

3. Evaluate p-q when p = 3, and q = 8

   Solution:

   given p = -3, q = 8

   = p-q

   = -3-8

   p-q = -11

4. Evaluate b+8, when b =-3

   Solution:

   = b + 8

   = -3 + 8

   Ans = 5

5. Evaluate : $5a^3+7a-5$ when a = -4

   Solution:

   $= 5a^3 + 7a-5$

   $= 5(-4)^3 + 7(-4)-5$

   = 5x-4x-4-28-5

   = -320-28-5

   Ans = -353

6. Given m = -5 and n = -6, evaluate m+n?

   Solution:

   m = -5

   n = -6

   m+n = -5 + (-6)

   = -5-6

   M+n = -11

7. If a=-2, b=5 find the $(a-b)^2$=? $(a-b)^2$

   Solution:

   a = -2

   b = 5

   $(a-b)^2 = a^2-2ab+b^2$

   $= (-2)^2-2x-2x5+(5)^2$

   = 4-20+25

   = 4+5

   $(a-b)^2 = 9$

8. If a = 4, b = -2, c = 5 find the $(a-b-c)^2$

   Solution:

   a = 4, b = -2, c = 5

   $(a-b-c)^2 = a^2 + b^2 + c2 -2ab – 2ac – 2bc$

   = (4)2 + (-2)2 + (5)2 -2x4x-2-2xx4x5-2x-2x5

= 16+4+25_16-40+20

= 45+16-40+20

= 81-40

$(a-b-c)^2 = 41$

9. If a=3, b=5, find a^3-b^3 ?

Solution:

A = 3, b = 5

$a3 – b^3 = (a-b)(a^2+ab+b^2)$

$= (3-5)(3^2+3x5+(5)^2)$

= (-2)(9+15+25

= (-2)(49)

$a^3-b^3 = -98$

10. If a = 7, b = 6, find the $(a+b)^3$?

Solution:

a = 7, b = 6

$(a+b)^3 = a^3+3a^2b+3ab^2+b^3$

$= (7)^3+3x7^2x6+3x7x(6)^2+(6)^3$

= 343+3x49x6+3x7x36+6x6x6

= 343+882+756+216

$(a+b)^3 = 2197$

UNIT – 13 EXERCISE

1. Work out what numbers these Roman Numerals represent XV=?

Solution:

XV = 10+5

XU = 15

2. Write the number in Roman Numerals 90 = ?

Solution:

Hindu Arabic System = 90

Roman System - XC

3. Try writing the Roman Numerals as number XXVIII = ?

Solution:

XXVIII = 10+10+8

XXVIII = 28

4. Write the year in number

   MCMXC = 7

   MCMXC = 1990

5. Write the year in number

   MCDL = ?

   MEDL = 1450

UNIT – 14 EXERCISE

1. Factorize the following expressions.

   i) $3x$-48 ii) $7x$-21y

   i) $3x$-48

   Solution:

   $3(x$-48)

   ii) $7x$-21y

   $7(x$-3y)

2. Factorize: 2ab+2b+3a

   Solution:

   2b (a+1) + 3a

3. Factorize : a2+14a+4a

   Solution:

   a2+2ab+b2

   We see that a^2+2 (a) (b) + $(7)^2$

   using $(a-b)^2$

   $(a+7)^2 = (a+7)(a+7)$

4. Factorize:

   x^2-12x+36

   Comparing x^2-12x+36

   a^2-2ab+b^2

   We see that a = x, b = 6

   x^2-12x+36 = x^2-2 (x) (6) + $(6)^2$

using $a^2-2ab+b^2 = (a-b)^2$

$= (a-6)^2$

$= (a-6)(a-6)$

5. Factorize :

p^2-6p+8

Comparing $a^2-2ab+b^2$

We see that $= p^2-2p-4p+8$

$= p(p2) -4(p-2)$

$= (p-2)(p-4)$

UNIT – 15 EXCRCISE

1. Convert into a percentage 0.9

Solution:

$0.9 = (0.9 \times 100)\%$

$= 90\%$

2. Convert into a percentage 0.029

Solution:

$0.029 = (0.029 \times 100)\%$

$= 2.9\%$

3. Convert into a fraction 75%

Solution:

$= \frac{\cancel{75}^{\cancel{15}\,3}}{\cancel{100}_{\cancel{20}\,4}}$

Divide by 100

$= \frac{3}{4}$

4. Convert into a fraction 25%

Solution:

$= \frac{\cancel{25}^{1}}{\cancel{100}_{4}}$

$= \frac{1}{4}$

5. Convert into a decimal 35%

Solution:

$35\% = \frac{35}{100}$

$= 0.35\%$

6. Express 65% as a ratio?

Solution:

$65\% = \frac{\cancel{65}^{13}}{\cancel{100}_{20}}$

$= \frac{13}{20}$

$= 13.20$

7. Find 8% of ₹140

Solution:

8% of ₹140 = $\left(\frac{8}{\cancel{100}_{\cancel{10}\,5}}\ x \cancel{140}\right)^{\cancel{14}\,7}$

$=$ ₹ $\frac{8x7}{5}$

$=$ ₹ $\frac{\cancel{56}}{\cancel{5}}$ 11.2

$=$ ₹ 11.2

8. Write 78 paise as a percentage of ₹1

Solution:

₹1 = 100 Paise

∴ Required percentage $\left(\frac{\cancel{78}}{\cancel{100}}\ x\ 100\right)\%$

$= 78\%$

9. Write ₹8 as a percentage of ₹50

Solution:

₹1 = 100 Paise

∴ Required percentage $\left(\frac{8}{\cancel{50}}\ x\ \cancel{100}^{2}\right)$

$= 16\%$

10. Express 8 as a fraction of 40

Solution:

8 as a fraction of 40 is $\left(\frac{\cancel{8}^{4}}{\cancel{40}_{\cancel{4}\,\cancel{2}\,1}}\ x\ \cancel{100}^{\cancel{10}\,5}\right)$

$= 20\%$

UNIT – 16 EXERCISE

1. Find the perimeter of a square of side 4cm?

   Solution:

   Perimeter of the square = 4 x side

   = (4x4) cm

   Perimeter of the square = 16cm

2. Find the perimeter of a rectangle of length (l) = 3.5cm, breadth (b) = 4.5cm?

   Solution:

   l = 3.5cm, b = 4.5cm

   Perimeter of a rectangle = 2 (l+b)

   = 2x (3.5+4.5) cm

   = 2x8 cm

   Perimeter of a rectangle = 16cm

3. Find the perimeter of a triangle of PQ = 5cm, QR = 5.5cm, RP = 6.5cm

   Solution:

   PQ = 5cm

   QR = 5.5cm

   RP = 6.5cm

   Perimeter of a triangle = Sum of the three sides

   = 5cm + 5.5cm + 6.5cm

   Perimeter of a triangle = 17cm

4. Find the area of a rectangular garden which is 60cm long and 25cm wide.

   Solution:

   Length = 60cm

   Wide = 25cm

   Area of a rectangular garden = l x b

   = (60x25) cm

   Area of a rectangular garden = $1500cm^2$

5. Find the area of square box which side is 20cm

Solution:

Side of the square box = 20cm

Area of square box = S^2

= Side x Side

= $(20)^2$

Area of the square box = $400cm^2$

UNIT – 17 EXERCISE

1. If A = {1, 2, 3, 4, 5, 6} B = {1, 3, 5, 7, 9} Find A∪B? and A∩B ?

   Solution :

   A = {1, 2, 3, 4, 5, 6}

   B = {1, 3, 5, 7, 9}

   A∪B = {1, 2, 3, 4, 5, 6, 7}

   A∩B = {1, 3, 5}

2. If X = {a, b, c, d, e} Y = {c, e, f, g} Find X∪Y? and X∩Y ?

   Solution :

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

   Y = {c, e, f, g}

   X∪Y = {a, b, c, d, e, f, g }

   X∩Y = {c, e}

3. If A and B are two sets such that n(A) = 15, n(B)=21 and n(A∪B) = 36. Find n (A∩B)

   Solution :

   n (A) = 15,

   n (B)=21

   n (A∪B) = 36

   n (A∪B) = n(A) + n(B) - n(A∩B)

   n (A∩B) = 15 + 21 = 36

   = 26 - 36

   n(A∩B) = -10

4. If A and B are two sets such that A has 35 elements, A∪B has 80 elements and A∩B has 10 elements, How many elements does B have?

Solution :

n(A) = 35,

n(A∪B) = 80

n(A∩B) = 10

n(A∪B) = n(A) + n(B) - n(A∩B)

n(A∪B) = 35 + n(B) - 10

80 - 35 + 10 = n(B)

55 = n(B)

n(B)= 55

5. Find the sets from the disjoint sets P∪Q, If P = {0, 4, 5, 6, 8, 10, 13} and Q = { m, n, o, x, y, z}

Solution :

P = {0, 4, 5, 6, 8, 10, 13}

Q = { m, n, o, x, y, z}

UNIT – 19 EXERCISE

1. Find the mean of 3, 6, 9, 12, 15, 18 ?

Solution :

First we have to add the numbers and then divide the sum by the number of items.

3+6+9+12+15+18

No. of items = 63

$$\text{Mean} = \frac{\text{Sum of values}}{\text{Number of items}}$$

$$= \frac{3+6+9+12+15+18}{6}$$

$$= \frac{63}{6}$$

Mean = 10.5

2. Find the mean of 5, 10, 15, 20, 25 ?

Solution :

First we have to add the numbers and then divide the sum by the numbers of items

5+10+15+20+25

No. of items = 5

Mean = $\frac{\text{Sum of values}}{\text{Number of items}}$

$= \frac{5+10+15+20+25}{5}$

$= \frac{75}{5}$ 15

Mean = 15

3. Find the median of 60, 65, 59, 42, 30, 22, 19

Solution :

19, 22, 30, 42, 59, 60, 65

Here, n=6+1 (odd number)

Median = middle value

Median = $\left(\frac{n+1}{2}\right)^{th}$ value

= $\left(\frac{7+1}{2}\right)^{th}$ value

= $\left(\frac{8}{2}\right)^{th}$ value

= 4^{th} Value = Median = 42

4. Find the mode of 6,7,4,6,9,10,6?

Solution:

In the above series the number 6 occurs maximum number of times i,e 3 time Hence.

Mode = 6

5. Find the mode of 3,4,6,3,9,11,3?

Solution:

In the above series the number 3 occurs maximum number of times i,e 3 time Hence.

Mode = 3

UNIT – 20 EXERCISE

1. An article is purchased for Rs.450 and sold for Rs.500. Find the gain percent?

   Solution :

   SP - CP = 500 - 450

   Gain = 50

   Gain % = $(50/450)_9$ x 100

   = $\frac{1}{9}$ x 100

   Gain % = $\frac{100}{9}$ %

2. A man sold a fan Rs.465 find the cost price if he incurred a loss of 7%.

   Solution:

   CP = [100/(100-Loss%)] x SP

   Cost price of the fan = [100/100-7%] x SP

   = [100/93] x 465

   Rs. = 450

3. If selling price is doubled, the profit triples, what is the profit percent?

   Solution:

   Let C.P be Rs. x and S.P be Rs. y

   3 (y-x) = (2y-x)

   = y = 2x

   Profit = Rs. (y-x) = Rs (2x-x) = Rs. x Profit % = (x100)% = 100%

4. The cost price of 20 articles is the same as the selling price of x articles. If the profit is 25% find the value of x.

   Solution:

   Let C.P of each article be Rs 1

   C.P of x articles = Rs x

   S.P of x articles = Rs.20

   Profit = Rs (20-x)

$\therefore \left(\frac{20-x}{x}\ x\ 100\right) = 25$

= 2000 - 100x = 25x

125x = 2000

$x = \frac{\cancel{2000}^{16}}{\cancel{125}}$

x = 16

5. If the cost price of a book is Rs.150 and selling price is 137.50, then calculate the loss and percentage loss on the book.

Solution:

Here Cost Price = Rs.150

Selling Price = Rs.137.50

Loss = Cost Price - Selling Price

= Rs. (150-137.50)

= Rs.(12.50)

Percentage Loss = $\frac{Loss\ x\ 100}{Cost\ Price}$ %

Percentage Loss = 8.33% $\frac{12.50x100^{2}}{150_{3}}$ %

$= \frac{12.50x2}{3}$

$= \frac{\cancel{25}}{\cancel{3}} = 8.33$

ANSWER KEY

EXERCISE - 1

Q.No.	1	2	3	4	5	6	7	8	9	10
Ans	-24	-12	15	13	-600	252	-15	-21	-17	31

EXERCISE - 2

Q.No.	1	2	3	4	5
Ans	7630.889	508.968	0.104	0.0008	-14537.92

Q.No.	6	7	8	9	10
Ans	53857.02	-16.816	-15.045	-683.950	-1987.86

EXERCISE - 3

Q.No.	1	2	3	4	5	6	7	8	9	10
Ans	1/6	-11/10	$1\frac{11}{20}$	11/20	4/5	-5/8	$1\frac{2}{7}$	$7\frac{1}{9}$	80	11/20

EXERCISE - 4

Q.No.	1	2	3	4	5	6	7	8	9	10
Ans	$(-5)^{21}$	3^{-2}	5^6	$(-6)^3$	$\frac{9^2}{8^2}$	3	0	7^2	1	5^3x4^3

EXERCISE - 5

Q.No.	1	2	3	4	5
Ans	₹1363.50	₹671.00	828.00	₹6437.50	₹48.00

Q.No.	6	7	8	9	10
Ans	₹3870	₹2946.00	₹4258.50	₹14550	7475

EXERCISE - 6

Q.No.	1	2	3	4	5
Ans	155l 450ml	135l 900ml	49l 300ml	25l 500ml	3l 62ml

EXERCISE - 7

Q.No.	1	2	3	4	5
Ans	10	30	7200	32760	180

EXERCISE - 8

Q.No.	1	2	3	4	5
Ans	10	10	46	17	81

EXERCISE - 9

Q.No.	1	2	3	4	5
Ans	A = 70º	C = 30º	X = 120º	36º and 54º	A = 70º

EXERCISE - 10

Q.No.	1	2	3	4	5	6	7	8	9	10
Ans	x=4	a=2	x=11	y=3	x=5	a=1	x=1/3	x=11/15	0	-5

EXERCISE - 11

Q.No.	1	2	3	4	5
Ans	$-6p^3+10p^2+^2$	$9\,x^3+14y^2+^4$	$-12a^3-11a^2$	$-10n^2-^2n$	$25xy-45x$

Q.No.	6	7	8	9	10
Ans	$-72x+135$	$10x^3+21x-10$	$8k^2-46k+56$	x^2+2x-2	$X2$

EXERCISE - 12

Q.No.	1	2	3	4	5	6	7	8	9	10
Ans	x=20	x=20	p-q=-11	5	-353	-1	9	41	-98	2197

EXERCISE - 13

Q.No.	1	2	3	4	5
Ans	XV = 15	XC	28	1940	1450

EXERCISE - 14

Q.No.	1	2	3	4	5
Ans	i) $3(x\text{-}18)$ ii) $7\ (x\text{-}3y)$	$2b(a+1)+3a$	$(a+7)\ (a+7)$	$(a\text{-}6)\ (a\text{-}6)$	$(p\text{-}2)\ (p\text{-}4)$

EXERCISE - 15

Q.No.	1	2	3	4	5	6	7	8	9	10
Ans	90%	2.9%	$\frac{3}{4}$	$\frac{1}{4}$	0.35%	13.20	₹11.2	78%	16%	20%

EXERCISE - 16

Q.No.	1	2	3	4	5
Ans	16cm	16cm	17cm	$1500cm^2$	$400cm^2$

EXERCISE - 17

Q.No.	1	2	3	4	5
Ans	$A \cap B$ = {1,3,5}	i) $X \cup Y$ = {a,b,c,d,e} $X \cap Y$ = {c,e}	n $(A \cap B)$ = -10	(B)= 55	P = {0,4,5,6,8,10,13} Q = {m,n,o,x,y,z}

EXERCISE - 19

Q.No.	1	2	3	4	5
Ans	Mean =10.5	Mean =15	Median =42	Mode =6	Mode =3

EXERCISE - 20

Q.No.	1	2	3	4	5
Ans	Gain% = $\frac{100}{9}$ %	Rs.450	100%	x=16	8.33%

ADDRESS OF THE COMUNICATION

Dr.L.RAMESH

Contact No: +91 99621 45082

Email ID: rameshnethaji2012@gmail.com