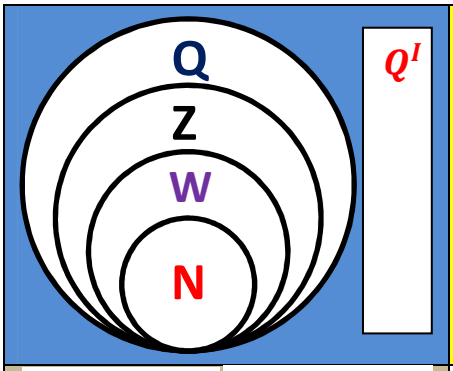
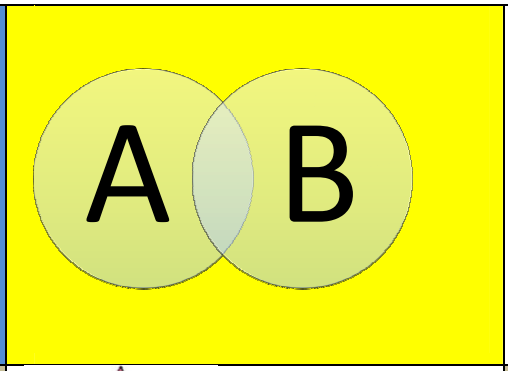
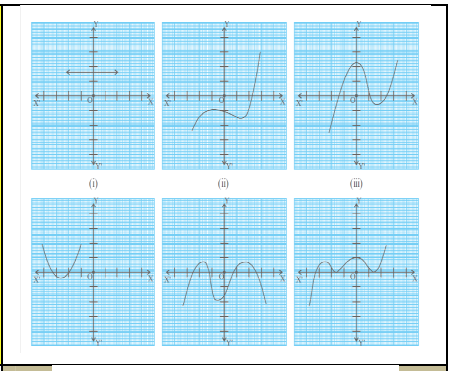
MATHEMATICS

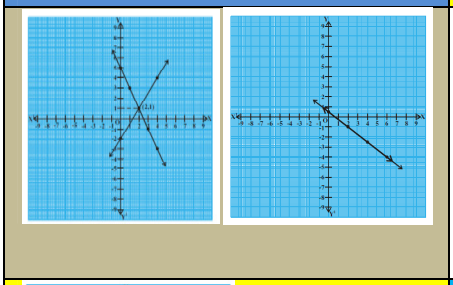
WORK SHEETS S.S.C

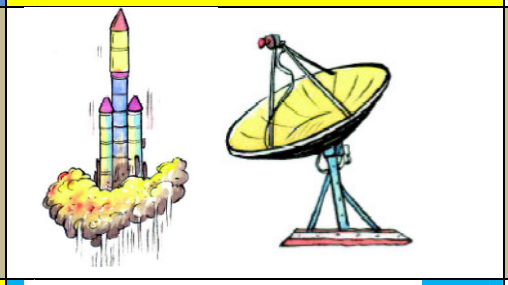
Z.P.H.SCHOOL

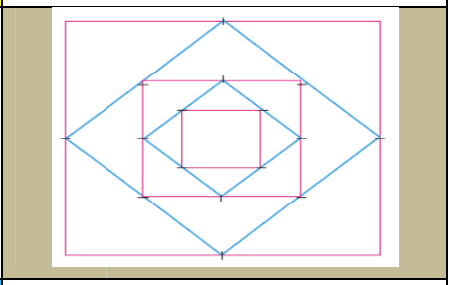


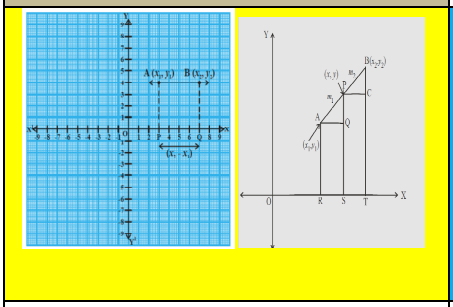


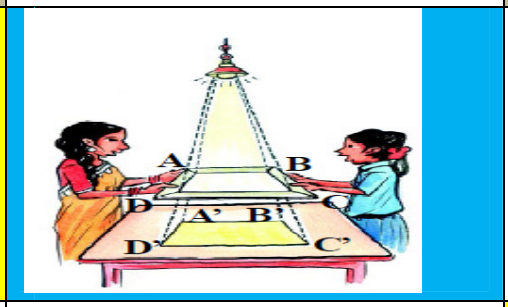


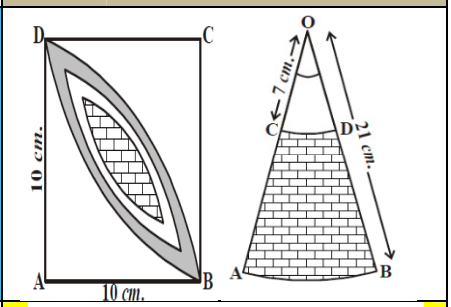


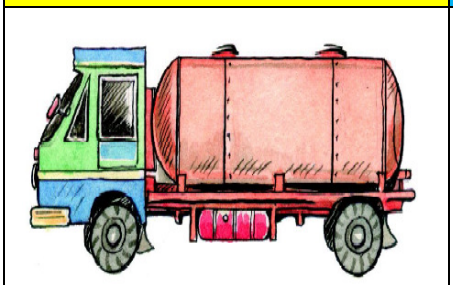


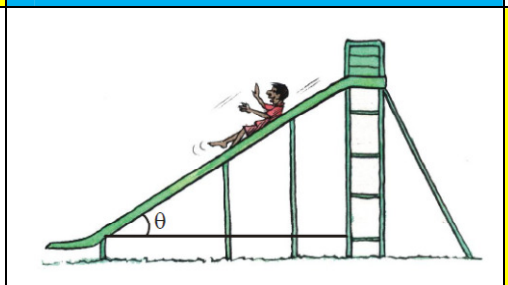


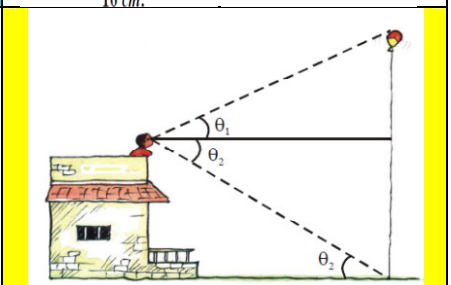


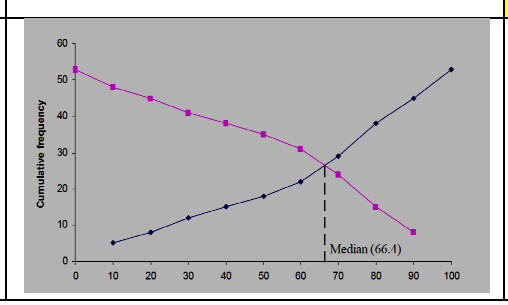












NAME:

VILLAGE:

PAPER I : REAL NUMBERS, SETS, POLYNAMIALS, LINEAR EQUATIONS TWO VARIABLES, QUADRATIC EQUATIONS, PROGRESSION, MENSURATION.

PAPER II: CO-ORDINATE GEOMETRY, SIMILAR TRIANGLES, TANGENTS AND SECANT OF CIRCLES, TRIGONOMETRY, APPLICATION OF TRIGONAMETRY, PROBABILITY, STATISTICS

These rules let you test if one number is divisible by another, without having to do too much calculation

Divisible by:	If:	Examples:
2	The last (UNIT)digit is even (0,2,4,6,8)	128 is 129 is not
3	The sum of the digits is divisible by 3	381 (3+8+1=12, and 12÷3 = 4) Yes 217 (2+1+7=10, and 10÷3 = $3\ ^{1}/_{3}$) No
4	The last 2 digits are divisible by 4	1312 is (12÷4=3) 7019 is not
5	The last digit is 0 or 5	175 is 809 is not
6	The number is divisible by both 2 *and* 3	114 (it is even, and 1+1+4=6 and 6÷3 = 2)Yes 308 (it is even, but 3+0+8=11 and 11÷3 = $3\ ^{2}/_{3}$) No
7	If you double the last digit and subtract it from the rest of the number and the answer is: 0, or divisible by 7 (Note: you can apply this rule to that answer again if you want)	672 (Double 2 is 4, 67-4=63, and 63÷7=9)Yes 905 (Double 5 is 10, 90-10=80, and 80÷7=$11\ ^{3}/_{7}$) No
8	The last three digits are divisible by 8	109816 (816÷8=102) Yes 216302 (302÷8=$37\ ^{3}/_{4}$) No
9	The sum of the digits is divisible by 9 (Note: you can apply this rule to that answer again if you want)	1629 (1+6+2+9=18, and again, 1+8=9) Yes 2013 (2+0+1+3=6) No
10	The number ends in 0	220 is 221 is not
11	If you sum every second digit and then subtract all other digits and the answer is: • 0, or • divisible by 11	1364 ((3+4) - (1+6) = 0) Yes 3729 ((7+9) - (3+2) = 11) Yes 25176 ((5+7) - (2+1+6) = 3) No
12	The number is divisible by both 3 *and* 4	648 (*By 3?* 6+4+8=18 and 18÷3=6 Yes. *By 4?* 48÷4=12 Yes) Yes 524 (*By 3?* 5+2+4=11, 11÷3= $3\ ^{2}/_{3}$ No. Don't need to check by 4.) No

Which number is divisible or not by **2,3,4,5,6,7,8,9,10,11,12**

If divisible by number put yes or √ / No or X

S.NO	Number	Divisibility										
		2	3	4	5	6	7	8	9	10	11	12
1	128											
2	275											
3	990											
4	1,586											
5	2,856											
6	3,060											
7	6,686											
8	4,06,839											
9	4,29,714											
10	6,39,210											
11	2,104											
12	1,416											
13	1,273											
14	2,621											
15	3,974											
16	26,346											
17	4,32,765											
18	61,809											
19	16,049											
20	14,723											
21	14,560											
22	21,084											
23	5,31,048											
24	7,26,352											
25	26,72,032											
26	71,38,965											
27	2,13,401											
28	2,22,222											
29	98,76,543											
30	2,34,32,422											

EXPRESS EACH OF THE FOLLOWING NUMBERS AS APRODUCT OF ITS PRIME FACTORS

PRIME NUMBERS (2,3,5,7,11,13,17,19,23,29,31, ,.....

S.NO	PROBLEM	solution	S.NO	PROBLEM	solution
1	128	2x2x2x2x2x2x2 = 2^7	1	140	
2	512		2	156	
3	1024		3	3825	
4	256		4	5005	
5	64		5	7429	
6	243		6	21252	
7	625		7	1771	
8	343		8	5313	
9	900		9	10626	
10	270		10	8232	
11	196		11	21252	
12	12	2 x 2 x 3 = 2^2 x 3^1	12	27300	
13	18		13	2000	
14	66		14	15000	
15	455		15	3025	
16	400		16	4225	
17	600		17	7225	
18	100		18	1225	
19	1000		19	729	
20	108		20	676	
21	657		21	1728	
22	306		22	729	
23	375		23	525	
24	875		24	2025	
25	3125		25	2048	
26	441		26	4096	
27	961		27	8192	
28	196		28	3120	
29	256		29	1234	
30	112		30	6555	

Euclid's Division Lemma: Given positive integers a and b, there exist unique pair of integers q and r satisfying a = bq +r , 0≤ r<b

Euclid's Division Lemma algorithm is a technique to compute the Highest Common Factror (H.C.F/G.C.D) of two given integers.

S.NO	a	b	a = b q +r	q	r	H.C.F
1	a= 13	b =3	13= 3 x 4 + 1	4	1	
	4	1	3= 1x3 + 0	1	0	1
2	a= 80	b =8	80 = 8 x 10+ 0	10	0	8
3	a= 96	b =8	96= 8 X 12 + 0	12	0	8
4	a= 125	b =5				
5	a= 132	b =11				
6	a= 60	b =40				
7	a= 100	b =60				
	60	40				
	40	20				
8	70	50				
	50	20				
	20	10				
9	96	72				
10	550	300				
11	2015	1860				
12	900	270				
13	38220	196				
14	2032	1651				

Express fraction in decimal form

$\frac{1}{2}$	0.5	$\frac{7}{16}$		$\frac{1}{10}$		$\frac{1}{2}$	
$\frac{1}{3}$		$\frac{2}{3}$		$\frac{3}{10}$		$\frac{1}{4}$	
$\frac{1}{4}$	0.25	$\frac{10}{7}$		$\frac{27}{25}$		$\frac{1}{8}$	
$\frac{1}{5}$	0.20	$\frac{1}{17}$		$\frac{7}{6}$		$\frac{1}{16}$	
$\frac{1}{6}$		$\frac{1}{19}$		$\frac{5}{12}$		$\frac{1}{32}$	
$\frac{1}{7}$		$\frac{1}{2}$		$\frac{3}{5}$		$\frac{1}{5}$	
$\frac{1}{8}$		$\frac{1}{2^2}$		$\frac{11}{10}$		$\frac{1}{25}$	
$\frac{1}{9}$		$\frac{1}{5\ X\ 2}$		$\frac{13}{10}$		$\frac{1}{125}$	

Irrational numbers are denoted by 'S' or 'Q'.

irrational numbers are can't be represented in p/q form. That is $\sqrt{2} \neq p/q$ (for any integers p and q, $q \neq 0$).

$\sqrt{3}$ = 1.7320508075689..... $\sqrt{5}$ = 2.2360679774998..... These are non-terminating, non-recuring decimals

Examples of irrational numbers (1) $\sqrt{2.1356217528...}$, (2) $\sqrt{2}$, $\sqrt{3}$, π, etc.

If 'n' is a natural number other than a perfect square then $\sqrt{n}$ is an irrational number

➡ The 5th Century BC the Pythagorean in Greece, the follower of the famous mathematician and philosopher Pythagoras, were the first to discover the numbers which were not rationals. These numbers are called irrational numbers. The Pythagoreans proved that $\sqrt{2}$ is irrational number.

➡ Later Theodorus of Cyrene showed that $\sqrt{3}$, $\sqrt{5}$, $\sqrt{6}$, $\sqrt{10}$, $\sqrt{11}$, $\sqrt{12}$, $\sqrt{13}$, $\sqrt{14}$, $\sqrt{15}$ and $\sqrt{17}$ are also irrational numbers.

➡ There is a reference of irrationals in calculation of square roots in Sulba Sutra (800 BC).

$\sqrt{1}$ =1	$\sqrt{2}$	$\sqrt{3}$	$\sqrt{4}$=2	$\sqrt{5}$	$\sqrt{6}$	$\sqrt{7}$	$\sqrt{8}$	$\sqrt{9}$ = 3	$\sqrt{10}$
rational	Irrational	Irrational	rational	Irrational	Irrational	Irrational	Irrational	rational	Irrational
$\sqrt{11}$	$\sqrt{12}$	$\sqrt{13}$	$\sqrt{14}$	$\sqrt{15}$	$\sqrt{16}$	$\sqrt{17}$	$\sqrt{18}$	$\sqrt{19}$	$\sqrt{20}$
$\sqrt{21}$	$\sqrt{22}$	$\sqrt{23}$	$\sqrt{24}$	$\sqrt{25}$	$\sqrt{26}$	$\sqrt{27}$	$\sqrt{28}$	$\sqrt{29}$	$\sqrt{30}$
$\sqrt{31}$	$\sqrt{32}$	$\sqrt{33}$	$\sqrt{34}$	$\sqrt{35}$	$\sqrt{36}$	$\sqrt{37}$	$\sqrt{38}$	$\sqrt{39}$	$\sqrt{40}$
$\sqrt{41}$	$\sqrt{42}$	$\sqrt{43}$	$\sqrt{44}$	$\sqrt{45}$	$\sqrt{46}$	$\sqrt{47}$	$\sqrt{48}$	$\sqrt{49}$	$\sqrt{50}$
$\sqrt{51}$	$\sqrt{52}$	$\sqrt{53}$	$\sqrt{54}$	$\sqrt{55}$	$\sqrt{56}$	$\sqrt{57}$	$\sqrt{58}$	$\sqrt{59}$	$\sqrt{60}$
$\sqrt{61}$	$\sqrt{62}$	$\sqrt{63}$	$\sqrt{64}$	$\sqrt{65}$	$\sqrt{66}$	$\sqrt{67}$	$\sqrt{68}$	$\sqrt{69}$	$\sqrt{70}$
$\sqrt{71}$	$\sqrt{72}$	$\sqrt{73}$	$\sqrt{74}$	$\sqrt{75}$	$\sqrt{76}$	$\sqrt{77}$	$\sqrt{78}$	$\sqrt{79}$	$\sqrt{80}$
$\sqrt{81}$	$\sqrt{82}$	$\sqrt{83}$	$\sqrt{84}$	$\sqrt{85}$	$\sqrt{86}$	$\sqrt{87}$	$\sqrt{88}$	$\sqrt{89}$	$\sqrt{90}$
$\sqrt{91}$	$\sqrt{92}$	$\sqrt{93}$	$\sqrt{94}$	$\sqrt{95}$	$\sqrt{96}$	$\sqrt{97}$	$\sqrt{98}$	$\sqrt{99}$	$\sqrt{100}$

Rational can write Q , Irrational can write Q' or S

Find the LCM and HCF of 12 and 18 by the prime factorization method.

Number	Prime factorization	*Product of powers of primes.*	
12	2 x 2 x 3	2^2 x 3^1	
18	2 x 3 x 3	2^1 x 3^2	
	HCF (12, 18)	2^1 x 3^1 = 6	Product of the smallest power of each common prime factors in the numbers.
	LCM (12, 18)	2^2 x 3^2 = 36	Product of the greatest power of each prime factors, in the numbers.

HCF (12, 18) x LCM (12, 18) = 12 x 18, 6 x 36 = 12 x 18 = 216

For any two positive integers a and b HCF (a,b) x LCM (a, b) = a x b.

Find the LCM and HCF of the following integers by applying the prime factorization method.

(i) 12, 15 and 21

Number	Prime factorization	*Product of powers of primes.*	
12	2 x 2 x 3	2^2 x 3^1	
15	3 x 5	3^1 X 5^1	
21	3 x 7	3^1 X 7^1	
	HCF (12,15, 21)	3^1 = 3	Product of the smallest power of each common prime factors in the numbers.
	LCM (12,15, 21)	2^2 x 3^1 x5^1x7^1 = 420	Product of the greatest power of each prime factors, in the numbers.

(ii) 17, 23, and 29

Number	Prime factorization	*Product of powers of primes.*	
			Product of the smallest power of each common prime factors in the numbers.
			Product of the greatest power of each prime factors, in the numbers.

(iii) 8, 9 and 25

Number	Prime factorization	*Product of powers of primes.*	
			Product of the smallest power of each common prime factors in the numbers.
			Product of the greatest power of each prime factors, in the numbers.

(iv) 72 and 108

Number	Prime factorization	*Product of powers of primes.*	
			Product of the smallest power of each common prime factors in the numbers.
			Product of the greatest power of each prime factors, in the numbers.

(v) 306 and 657

Number	Prime factorization	*Product of powers of primes.*	
			Product of the smallest power of each common prime factors in the numbers.
			Product of the greatest power of each prime factors, in the numbers.

RATIONAL NUMBERS AND THEIR DECIMAL EXPANSIONS

Let us consider the following terminating decimal expressions of some rational numbers:

Terminating decimal		Rational numbers	prime factorize the numerator and denominator	simplest rational form
0.375	$0.375 \times \frac{1000}{1000} = \frac{375}{1000}$	$\frac{375}{10^3}$	$\frac{375}{10^3} = \frac{3X5^3}{2^3x5^3}$	$\frac{3}{2^3} = \frac{3}{8}$
1.04	$1.04 \times \frac{100}{100} = \frac{104}{100}$	$\frac{104}{10^2}$	$\frac{104}{10^2} = \frac{2^3X\,13}{2^2X5^2} = \frac{2^1X\,13}{5^2}$	$\frac{2^1X\,13}{5^2} = \frac{26}{25}$
0.0875	$0.0875 \times \frac{10000}{10000} = \frac{0875}{10000}$	$\frac{875}{10^4}$	$\frac{875}{10^4}$	
12.5	$12.5 \times \frac{10}{10} = \frac{125}{10}$	$\frac{125}{10^1}$	$\frac{125}{10^1}$	
0.00025	$0.00025 \times \frac{100000}{100000} = \frac{25}{100000}$	$\frac{25}{10^5}$	$\frac{25}{10^5}$	
15.265				
0.1255				
0.4				
23.34				
1215.8				
0.7				
0.84				
0.875				
0.75				
0.175				
0.275				
0.575				
0.775				

With out actual division, state whether the following rational numbers are terminating or non-terminating, repeating decimals.

x =p/q be a rational number, such that the prime factorization of q is of the form $2^n\ 5^m$, where n, m are non-negative integers. Then x has a decimal expansion which terminates. Other wise non terminating decimal.

(i)	$\frac{16}{125} = \frac{16}{5X5X5} = \frac{16}{5^3}$ = Terminating decimal.
(ii)	$\frac{25}{32} = \frac{25}{2X2X2X2X2} = \frac{25}{2^5}$ = Terminating decimal.
(iii)	$\frac{100}{81} = \frac{100}{3X3X3X3} = \frac{100}{3^4}$ = Non-terminating, repeating decimal.
(iv)	$\frac{41}{75} = \frac{41}{3X5X5} = \frac{41}{3\ X5^2}$ = Non-terminating, repeating decimal.
(v)	$\frac{13}{3125}$ =
(vi)	$\frac{11}{12}$ =
(vii)	$\frac{64}{455}$ =
(viii)	$\frac{15}{1600}$ =
(ix)	$\frac{29}{343}$ =
(x)	$\frac{23}{2^3.5^2}$ =
(xi)	$\frac{129}{2^2.5^7.7^5}$ =
(xii)	$\frac{9}{15}$ =
(xiii)	$\frac{36}{100}$ =
(xiv)	$\frac{77}{210}$ =
(xv)	3/4 =
(xvi)	7/25 =
(xvii)	51/64=
(xviii)	14/23=
(xix)	80/81=

Logarithm: if $N, a\ (\neq 1)$ are any two positive real numbers and for some real x $a^x = N$ then x is said to be the logarithm of N to the base a. It is written as $x = \log_a N$.

EXPONENTIONAL FORM ⇔ LOGARITHAM FORM $a^x = N \Leftrightarrow x = \log_a N$

S.NO	EXPONENTIONAL FORM	LOGARITHAM FORM	S.NO	EXPONENTIONAL FORM	LOGARITHAM FORM	S.NO	EXPONENTIONAL FORM	LOGARITHAM FORM
1	$2^2 = 4$	$2 = \log_2 4$	1		$\log_{13} 169 = 2$	1	$2^0 = 1$	
2	$2^3 = 8$	$3 = \log_2 8$	2		$\log_{12} 144 = 2$	2	$3^0 = 1$	
3	$2^4 = 16$		3		$\log_{11} 121 = 2$	3	$4^0 = 1$	
4	$2^5 = 32$		4		$\log_{10} 1000 = 3$	4	$5^0 = 1$	
5	$2^6 = 64$		5		$\log_{10} 100 = 2$	5	$6^0 = 1$	
6	$2^7 = 128$		6		$\log_9 729 = 3$	6	$7^0 = 1$	
7	$2^8 = 256$		7		$\log_9 81 = 2$	7	$8^0 = 1$	
8	$2^9 = 512$		8	$8^3 = 512$	$\log_8 512 = 3$	8	$9^0 = 1$	
9	$2^{10} = 1024$		9		$\log_8 64 = 2$	9	$10^0 = 1$	
10	$3^2 = 9$		10		$\log_7 343 = 3$	10	$11^0 = 1$	
11	$3^3 = 27$		11		$\log_7 49 = 2$	11	$12^0 = 1$	
12	$3^4 = 81$		12		$\log_6 216 = 3$	12	$13^0 = 1$	
13	$3^5 = 243$		13		$\log_6 36 = 2$	13	$14^0 = 1$	
14	$4^2 = 16$		14		$\log_5 625 = 4$	14	$15^0 = 1$	
15	$4^3 = 64$		15		$\log_5 125 = 3$	15	$16^0 = 1$	
16	$4^4 = 256$		16		$\log_5 25 = 2$	16		$\log_2 2 = 1$
17	$5^2 = 25$		17		$\log_4 256 = 4$	17		$\log_3 3 = 1$
18	$5^3 = 125$		18		$\log_4 64 = 3$	18		$\log_4 4 = 1$
19	$5^4 = 625$		19		$\log_4 16 = 2$	19		$\log_5 5 = 1$
20	$6^2 = 36$		20		$\log_3 243 = 5$	20		$\log_6 6 = 1$
21	$6^3 = 216$		21		$\log_3 81 = 4$	21		$\log_7 7 = 1$
22	$7^2 = 49$		22		$\log_3 27 = 3$	22		$\log_8 8 = 1$
23	$7^3 = 343$		23		$\log_3 9 = 2$	23		$\log_9 9 = 1$
24	$8^2 = 64$		24		$\log_2 1024 = 10$	24		$\log_{10} 10 = 1$
25	$8^3 = 512$		25		$\log_2 512 = 9$	25		$\log_{11} 11 = 1$
26	$9^2 = 81$		26		$\log_2 256 = 8$	26		$\log_{12} 12 = 1$
27	$9^3 = 729$		27		$\log_2 128 = 7$	27		$\log_{13} 13 = 1$
28	$10^2 = 100$		28		$\log_2 64 = 6$	28		$\log_{14} 14 = 1$
29	$10^3 = 1000$		29		$\log_2 32 = 5$	29		$\log_{15} 15 = 1$
30	$11^2 = 121$		30		$\log_2 16 = 4$	30		$\log_a a = 1$

LAWS OF LOGARITHMS

1.The first law of logarithms $\log_a(x.y) = \log_a(x \times y) = \log_a x + \log_a y$

$x.y$ and a are positive real numbers a ≠1

(NOTE : A NUMBER CAN WRITE PRODUCT OF PRIME FACTORES)

1	$\log_a(x.y)$	$\log_a(x \times y)$	$\log_a x + \log_a y$
2	$\log_a 15$	$\log_a (3 \times 5)$	$\log_a 3 + \log_a 5$
3	$\log_a 25$		
4	$\log_3 35$		
5	$\log_{10} 77$		
6			$\log_{10} 3 + \log_{10} 19$
7			$\log_a 7 + \log_a 7$
8			$\log_{10} 7 + \log_{10} 13$
9			$\log_a 11 + \log_a 13$
10			$\log_a 13 + \log_b 19$
11	$\log_x(a.b)$		
12	$\log_2(x.y)$		
13	$\log_a(xyz)$	$\log_a(x.y.z)$	$\log_a x + \log_a y + \log_a z$
14	$\log_a(30)$	$\log_a(2.3.5)$	$\log_a 2 + \log_a 3 + \log_a 5$
15	$\log_a(42)$		
16	$\log_a(105)$		
17	$\log_a(165)$		
18	$\log_a(pqr)$		
19	$\log_{10}(pqr)$		
20			$\log_a 3 + \log_a 7 + \log_a 11$
21			$\log_{10} 5 + \log_{10} 7 + \log_{10} 11$
22			$\log_a 11 + \log_a 13 + \log_a 7$
23			$\log_4 7 + \log_4 3 + \log_4 5$
24			$\log_a 3 + \log_a 13 + \log_a 5$
25			$\log_a 2 + \log_b 3 + \log_c 5$

2. The second law of logarithms $\log_a\left(\frac{x}{y}\right) = \log_a x - \log_a y$

x, y and a are positive real numbers $a \neq 1$

1	$\log_a\left(\frac{x}{y}\right)$	$\log_a x - \log_a y$	1	$\log_x\left(\frac{a}{b}\right)$	$\log_x a - \log_x b$
2	$\log_a\left(\frac{5}{7}\right)$		2		$\log_x 11 - \log_x 13$
3	$\log_a\left(\frac{11}{7}\right)$		3		$\log_x 13 - \log_x 17$
4	$\log_a\left(\frac{13}{2}\right)$		4		$\log_x 23 - \log_x 29$
5	$\log_a\left(\frac{2}{17}\right)$		5		$\log_{10} a - \log_{10} b$
6	$\log_a\left(\frac{11}{17}\right)$		6		$\log_{10} 11 - \log_{10} 2$
7	$\log_a\left(\frac{23}{34}\right)$		7		$\log_{10} 17 - \log_{10} 3$
8	$\log_7\left(\frac{21}{29}\right)$		8		$\log_7 17 - \log_7 3$
9	$\log_7\left(\frac{1}{29}\right)$		9		$\log_2 17 - \log_2 3$
10	$\log_7\left(\frac{23}{11}\right)$		10		$\log_7 17 - \log_2 3$
11	$\log_a\left(\frac{xz}{y}\right)$	$\log_a x + \log_a z - \log_a y$	11	$\log_x\left(\frac{ab}{cd}\right)$	$\log_x a + \log_x b - \log_x c - \log_x d$
12	$\log_a\left(\frac{zy}{x}\right)$				
13	$\log_x\left(\frac{ab}{c}\right)$		12	$\log_y\left(\frac{ac}{bd}\right)$	
14	$\log_y\left(\frac{ac}{b}\right)$				
15		$\log_a 2 + \log_a 3 - \log_a 7$	13	$\log_{10}\left(\frac{ad}{bc}\right)$	
16		$\log_a 3 + \log_a 7 - \log_a 2$			
17		$\log_2 x + \log_2 z - \log_2 y$	14	$\log_x\left(\frac{cd}{ab}\right)$	
18		$\log_a 2 + \log_a 11 - \log_a 7$			
19		$\log_5 2 + \log_5 11 - \log_5 13$	15	$\log_x\left(\frac{ab}{cd}\right)$	
20	$\log_y\left(\frac{a}{bc}\right)$				
21	$\log_a\left(\frac{x}{yz}\right)$		16		$\log_x 7 + \log_x 11 - \log_x 3 - \log_x 5$
22		$\log_a x - \log_a z - \log_a y$			
23		$\log_a 19 - \log_a 2 - \log_a 3$	17		$\log_x 3 + \log_x 11 - \log_x 5 - \log_x 2$
24		$-\log_7 x + \log_7 z + \log_7 y$			
25		$\log_a x - \log_b z - \log_c y$	18		$\log_x 2 + \log_x 9 - \log_x 5 - \log_x 2$

3. The third law of logarithms $\log_a x^m = m \cdot \log_a x$

x, y and a are positive real numbers $a \neq 1$

1	$\log_a x^m$	$m \cdot \log_a x$	1	$\log_x a^m$	$m \cdot \log_x a$
2	$\log_2 3^m$		2	$\log_x a^n$	
3	$\log_a x^5$		3	$\log_{10} a^n$	
4	$\log_a z^7$		4	$\log_7 b^n$	
5	$\log_{10} 5^7$		5	$\log_2 d^n$	
6	$\log_a y^{10}$		6	$\log_3 10^n$	
7		$5 \cdot \log_a z$	7		$m \cdot \log_a(xy)$
8		$2 \cdot \log_a y$	8		$2 \cdot \log_a(xyz)$
9		$4 \cdot \log_a 2$	9		$5 \cdot \log_a(\frac{x}{y})$
10		$3 \cdot \log_a 5$	10		$3 \cdot \log_a(\frac{a}{bc})$

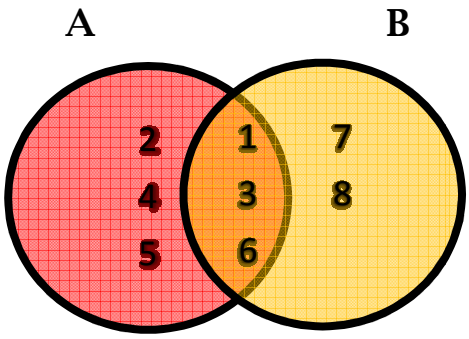
Expand the following.

1	$\log \frac{343}{125}$	log 343 – log 125 (by 2nd law)	$\log 7^3 - \log 5^3$	3 log 7 – 3log 5 (by 3rd law)
2	$\log \frac{128}{625}$			
3	$\log x^2y^3z^4$			
4	$\log \frac{p^2q^3}{r}$			
5	log 1000			
6	$\log \sqrt{\frac{x^3}{y^2}}$			
7				log 10 + 2 log 3 - log 2
8				2 log 3 - 3 log 2
9				2log3 + 2 log5 – 5log2
10				2log3 + 3 log5 – 5log2
11	$a^x = N \Rightarrow x = \log_a N$ $a^{\log_a N} = N$		$2^{\log_2 5} =$	$5^{\log_5 A} =$
12	$2^{2+\log_2 5} = 2^2 \times 2^{\log_2 5}$ $= 4 \times 5 = 20$		$2^{2+\log_2 3} =$	

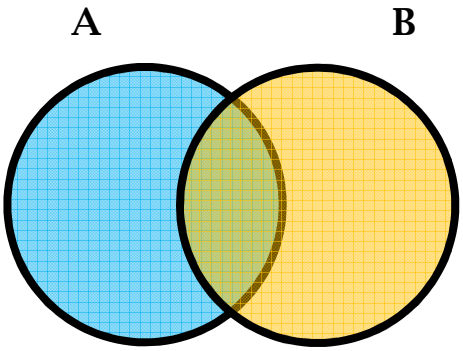
Roster form = LIST FORM, **Set Builder form = RULE FORM**

	Problem	Roster form	Set Builder form
1	A= The set of all natural numbers which divide 42	A = {1, 2, 3, 6, 7, 14, 21,42}	A = {x : x is a natural number which divides 42}
2	B= The set of natural numbers which are less than 10.	B = {1, 2, 3, 4, 5, 6, 7, 8, 9}	B= {x : x is a natural number which is less than 10}
3	C= the set of all months in a year having 30 days		
4	D is the set of all prime numbers less than 10.		
5	X The colours of the rainbow		
6	letter of the word PRINCIPAL	{P, R, I, N, C, A, L}	{x : x is a letter of the word PRINCIPAL}
7	positive integer and is a divisor of 18	{1, 2, 3, 6, 9, 18}	{x : x is a positive integer and is a divisor of 18}
8			B = {x : x is a natural number less than 6}
9			{x : x is a two-digit natural number such that the sum of its digits is 8}.
10			{x : x is a prime number which is a divisor of 60}.
11			{ x : x the set of all letters in the word BETTER}.
12		{3, 6, 9, 12}	
13		{2, 4, 8, 16, 32}	
14		{5, 25, 125, 625}	
15		{1, 4, 9, 25, ... 100}	
16		{1, 2, 3, 6}	
17			{x : x is an odd natural number less than 10}
18			{x : x is a letter of the word MATHEMATICS}
19			{x : x is a natural number and divisor of 6}
20		V = {a, e, i, o, u}.	
21		C = {2, 3, 5, 7, 11}	
22	The set of even numbers which are less than 15		
23	The set of all natural numbers which divide	B = {1, 2, 3, 6, 7, 14, 21, 42}	B = {x : x is a natural number which divides 42}
24	The set of natural numbers which are less than 10	A = {1, 2, 3, 4, 5, 6, 7, 8, 9}	A = {x : x is a natural number which is less than 10}.
25		{1, 2, 3, 4, 5, 6}.	{x : x is a natural number and $x^2 < 40$}

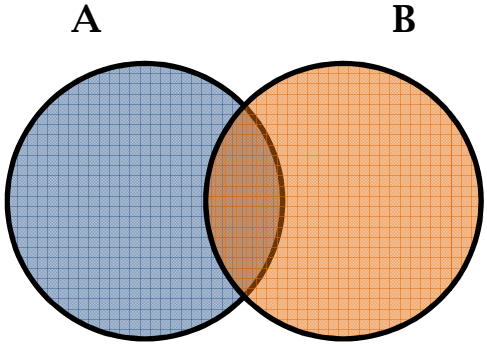
SETS



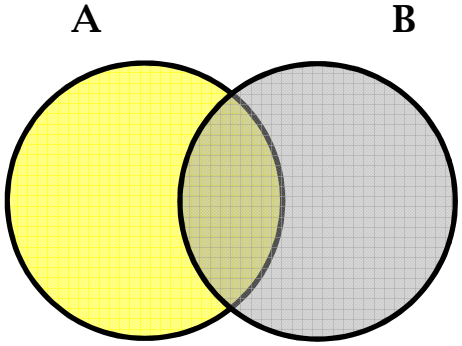
	A = { 1,2,3,4,5,6 }	B= { 1,3,6,7,8 }
A∪B	{	}
B∪A	{	}
A∩B	{	}
B∩A	{	}
A - B	{	}
B - A	{	}



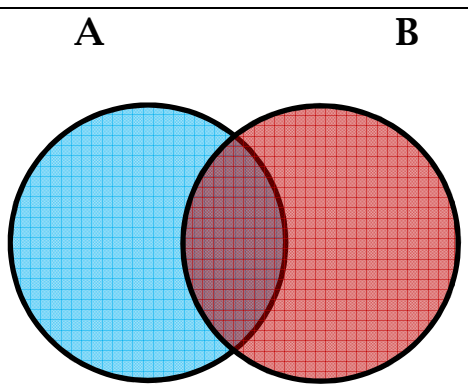
	A = { a,b,c,d,e,f }	B= { e,f,g,h }
A∪B	{	}
B∪A	{	}
A∩B	{	}
B∩A	{	}
A - B	{	}
B - A	{	}



	A = { }	B= { }
A∪B	{	}
B∪A	{	}
A∩B	{	}
B∩A	{	}
A - B	{	}
B - A	{	}



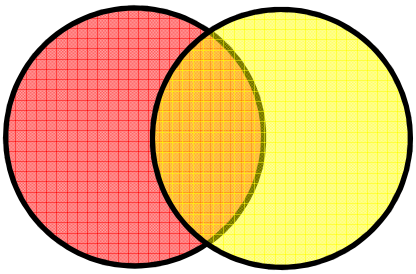
	A = { }	B= { }
A U B	{	}
B U A	{	}
A ∩ B	{	}
B ∩ A	{	}
A - B	{	}
B - A	{	}



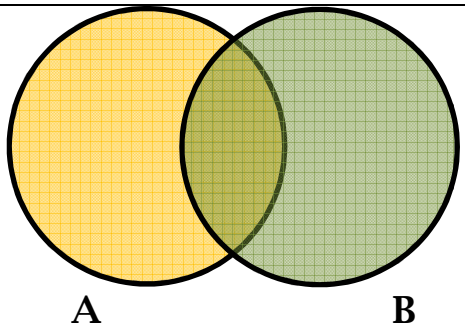
	A = { }	B= { }
A U B	{	}
B U A	{	}
A ∩ B	{	}
B ∩ A	{	}
A - B	{	}
B - A	{	}

NOTE : write elements in your own numbers or alphabet

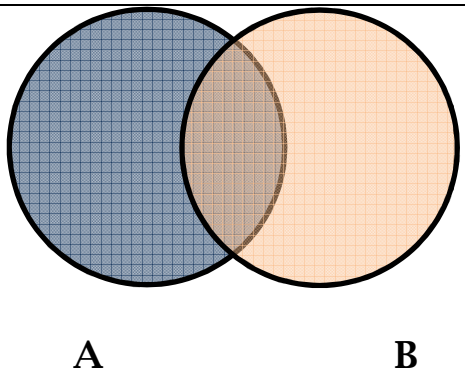
SETS



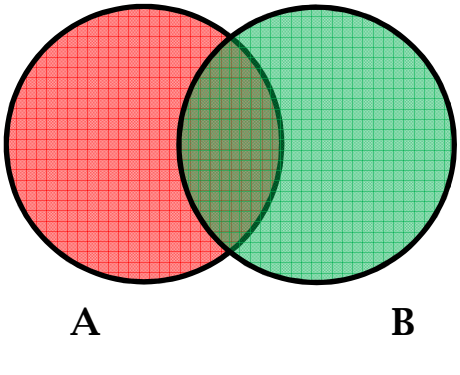
	A = { 1,2,3,4 }	B= { 1,3,6,7}
A∪B	{	}
B∪A	{	}
A∩B	{	}
B∩A	{	}
A - B	{	}
B - A	{	}



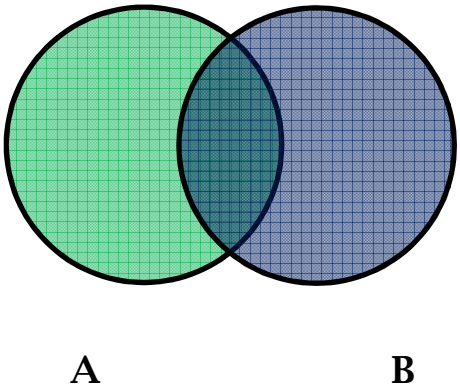
	A = { a,b,c,d,e }	B= { e,f,g }
A∪B	{	}
B∪A	{	}
A∩B	{	}
B∩A	{	}
A - B	{	}
B - A	{	}



	A = {	}	B= {	}
A∪B	{		}	
B∪A	{		}	
A∩B	{		}	
B∩A	{		}	
A - B	{		}	
B - A	{		}	



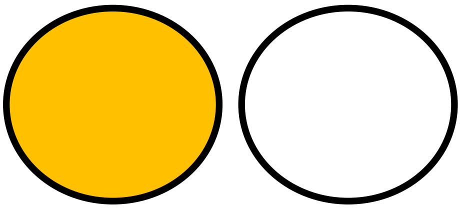
	A = {	}	B= {	}
A U B	{		}	
B U A	{		}	
A ∩ B	{		}	
B ∩ A	{		}	
A - B	{		}	
B - A	{		}	



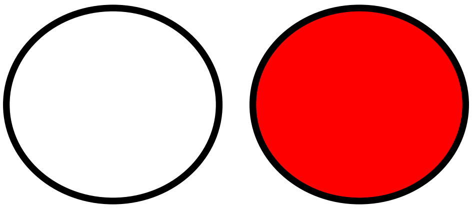
	A = {	}	B= {	}
A U B	{		}	
B U A	{		}	
A ∩ B	{		}	
B ∩ A	{		}	
A - B	{		}	
B - A	{		}	

NOTE : write elements in your own numbers or alphabet

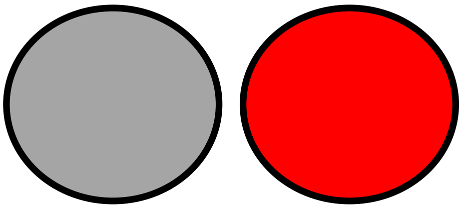
Disjoint sets and subsets



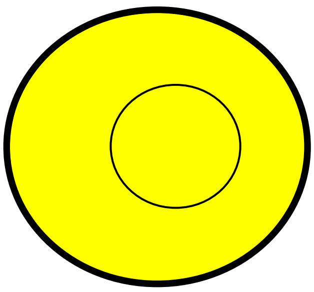
	A = { 2,4,6,8,10 }	B= { 1,3,5,7,9 }
A∪B	{ }	
B∪A	{ }	
A∩B	{ }	
B∩A	{ }	
A - B	{ }	
B - A	{ }	



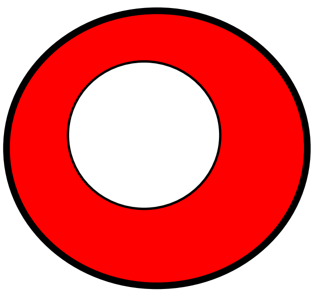
	A = {2,3,5,7,11 }	B= { 4,6,8,9,10 }
A∪B	{ }	
B∪A	{ }	
A∩B	{ }	
B∩A	{ }	
A - B	{ }	
B - A	{ }	



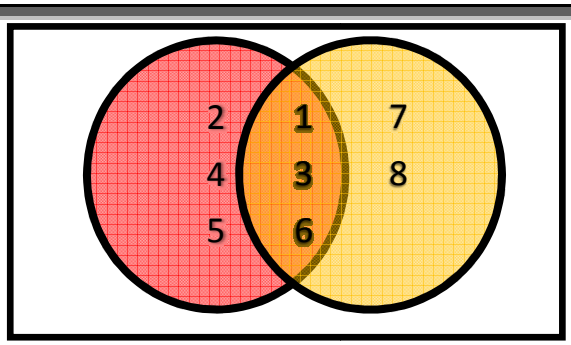
	A = { }	B= { }
A∪B	{ }	
B∪A	{ }	
A∩B	{ }	
B∩A	{ }	
A - B	{ }	
B - A	{ }	

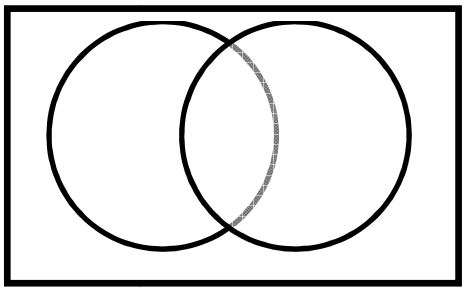


	A = { }	B= { }
A∪B	{ }	
B∪A	{ }	
A∩B	{ }	
B∩A	{ }	
A - B	{ }	
B - A	{ }	

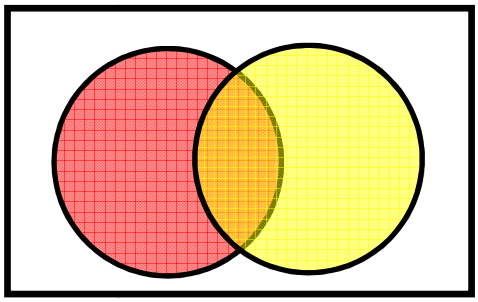


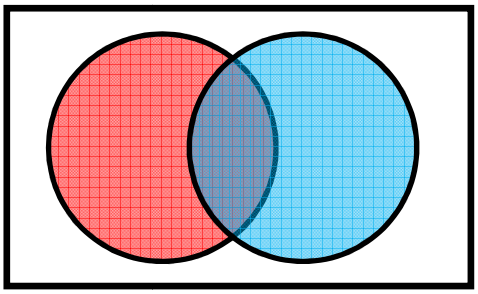
	A = { }	B= { }
A∪B	{ }	
B∪A	{ }	
A∩B	{ }	
B∩A	{ }	
A - B	{ }	
B - A	{ }	





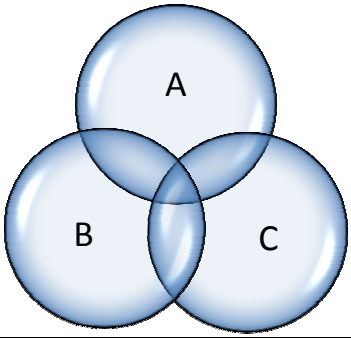
	A = { }	B= { }	A = { }	B= { }
A U B				
B U A				
A ∩ B				
B ∩ A				
A - B				
B - A				
A U A				
μ				
A′=μ-A				
B′=μ-B				
A′ U B′				
B′ U A′				
A′∩B′				
B′∩ A′				
μ′				
ϕ′				
n (A)				
n (B)				
n (A U B)				
n (B U A)				
n (A ∩ B)				
n (B ∩ A)				
n (A – B)				
n (B – A)				
n (A′)				
n (B′)				
n (A′ U B′)				
n (B′ U A′)				
n (A′ ∩ B′)				
n (B′ ∩ A′)				
n (A′ – B′)				
n (B′ – A′)				
n (μ′)				
n (ϕ′)				





	A = { }	B= { }	A = { }	B= { }
A U B				
B U A				
A ∩ B				
B ∩ A				
A - B				
B - A				
A U A				
μ				
A′=μ-A				
B′=μ-B				
A′ U B′				
B′ U A′				
A′∩B′				
B′∩ A′				
μ′				
ϕ′				
n (A)				
n (B)				
n (A U B)				
n (B U A)				
n (A ∩ B)				
n (B ∩ A)				
n (A – B)				
n (B – A)				
n (A′)				
n (B′)				
n (A′ U B′)				
n (B′ U A′)				
n (A′ ∩ B′)				
n (B′ ∩ A′)				
n (A′ – B′)				
n (B′ – A′)				
n (μ′)				
n (ϕ′)				

NOTE : write elements in your own numbers or alphabet



	A = { 1,2,3, 4 }	B= { 3, 4 ,5,6 }	C = { 1,6,7,8 }
A U B			
B U A			
B U C			
C U B			
A U C			
C U A			
A ∩ B			
B ∩ A			
B ∩ C			
C ∩ B			
A∩C			
C ∩ A			
A - B			
B - A			
B - C			
C - B			
A - C			
C - A			
(AUB)UC			
AU(BUC)			
(A ∩ B) ∩ C			
A ∩ (B ∩ C)			
A U (B ∩ C)			
(A U B) ∩ (A U C)			
A ∩ (B U C)			
(A ∩ B)U (A ∩ C)			
A – (B U C)			
(A - B) ∩ (A - C)			
A - (B ∩ C)			
(A - B) U (A - C)			
A ∩ (B U C)			
(A ∩ B)U (A ∩ C)			
(A U B) – (A ∩ B)			

NOTE : write elements in your own numbers or alphabet

OBOVE DIAGRAM

n (A)			
n (B)			
n (C)			
n (B U C)			
n (C U B)			
n (A U C)			
n (C U A)			
n (A ∩ B)			
n (B ∩ A)			
n (B ∩ C)			
n (C ∩ B)			
n (A∩C)			
n (C ∩ A)			
n (A – B)			
n (B - A)			
n (B - C)			
n (C – B)			
n (A - C)			
n (C - A)			
n (AUBUC)			
n (A ∩ B ∩ C)			
n [A U (B ∩ C)]			
n (A U B) ∩ (A U C)]			
n [A ∩ (B U C)]			
n[(A ∩ B)U (A ∩ C)]			
n [A – (B U C)]			
n[(A - B) ∩ (A - C)]			
n [A - (B ∩ C)]			
n[(A - B) U (A - C)]			
n [A ∩ (B U C)]			
n [(A ∩ B)U (A ∩ C)			
n [(A U B) – (A ∩ B)]			

μ= {1,2,3,4,5,6,7,8.9,10 } A={1,2,6,8,9 } B={3,4,5,7,10 }

U	A	B	ϕ	μ	∩	A	B	ϕ	μ	_	A	B	ϕ	μ
A					A					A				
B					B					B				
ϕ					ϕ					ϕ				
μ					μ					μ				

μ= {a,b,c,d,e,f,g,h,I } A={a,c,e,g,I } B={b,d,f,h }

U	A	B	ϕ	μ	∩	A	B	ϕ	μ	_	A	B	ϕ	μ
A					A					A				
B					B					B				
ϕ					ϕ					ϕ				
μ					μ					μ				

μ= {1,2,3,4,5,6,7,8.9,10 } A={1,2,3,5,6} B={3,4,5,7,10 }

U	A	B	ϕ	μ
A				
B				
ϕ				
μ				

∩	A	B	ϕ	μ
A				
B				
ϕ				
μ				

-	A	B	ϕ	μ
A				
B				
ϕ				
μ				

write the like terms against given term

S.NO	Problems					Sum of the like terms	Product of the like terms
1	$7x$						
2	$8y$						
3	$5z$						
4	$3xy$						
5	$9xyz$						
6	$3a$						
7	$4b$						
8	$5c$						
9	$3ab$						
10	$4bc$						
11	$2abc$						
12	x^2						
13	x^2y						
14	x^2y^2						
15	x^2y^2z						
16	$x^2y^2z^2$						
17	$2xy^2z^3$						
18	$-x^3y^2z$						
19	x^2y^3z						
20	$3x^3y^2z^3$						
21	$x^2y^2z^3$						
22	$7x^2y^2z^3$						
23	$-x^2y^3$						
24	-7						
25	$-2prs$						
26	$-4bc$						
27	$-7x^2y^2z^3$						
28	$-x^2y^2z^3$						
29	$-x^2y^2$						
30	$-x^2y^3z^3$						

FIND THE VALUES OF THE FOLLOWING

S.NO	P (X) OR Polynomial	X= 0	X= 1	X= 2	X= 3	X= 4	X= -1	X= -2	X= -3
1	$x^2 -x-6$								
2	$x^2 +4x+3$								
3	$6-x-x^2$								
4	$x^2 -x-12$								
5	$x^2 -6x+9$								
6	$x^2 -4x+5$								
7	$x^2 +3x-4$								
8	$x^2 -1$								
9	$x^2 +5x+ 4$								
10	$4x^2 -3x+ 7$								
11	$3x^2 +5x-7$								
12	$x^2 -x+1$								
13	$x^2 -3x+2$								
14	$x^3 -4x$								
15	x^3								
16	$x^3 -x^2$								
17	x^3								
18	x^2-x^3								
19	$x^3 -5x^2+6x$								
20	$x^2 -2x-3$								
21	$x^2 -5x-6$								
22	$m^2 -3m+1$								
23	$t^3 -1$								
24	$3x$								
25	$x^2 +5x+ 6$								
26	x^4-16								
27	$4x^2 +3x-1$								
28	$x^2 -4$								
29	$x^2 +2x+1$								
30	$x^2 +7x+10$								

Remainder theorem: - if $f(x)$ is divided by $(x-a)$ then $f(a)$ is the remainder.

Factor theorem: - if $f(x)$ is function and $f(a)=0$, then $(x-a)$ is the factor of $f(x)$.

General form of quadratic expression is ax^2+bx+c

General form of quadratic equation is $ax^2+bx+c=0$

Roots of $ax^2+bx+c=0$ are $x=\frac{-b\pm\sqrt{b^2-4ac}}{2a}$.

Roots $\alpha=\frac{-b+\sqrt{b^2-4ac}}{2a}$, $\beta=\frac{-b-\sqrt{b^2-4ac}}{2a}$.

Sum of the roots $\alpha+\beta=\frac{-b}{a}=-\left(\frac{coefficient\ of\ x}{coefficent\ of\ x^2}\right)$.

Product of the roots $\alpha\beta=\frac{c}{a}=\left(\frac{constant\ term}{coefficent\ of\ x^2}\right)$.

$\Delta\ (delta) is\ called\ discriminant.$

$\Delta = b^2 - 4ac.$

Nature of roots

If $\Delta>0$ then roots are real and distinct.

If $\Delta<0$ then roots are complex and distinct.

If $\Delta=0$ then roots are real and equal.

The quadratic equation with roots α, β is $x^2-(\alpha+\beta)x+\alpha\beta=0$.

If the sum of the roots=0 of $ax^2+bx+c=0$, then $b=0$

If the roots reciprocal to each other of $ax^2+bx+c=0$, then $a=c$.

General form of Cubic polynomials is ax^3+bx^2+cx+d,

General form of Cubic equation is $ax^3+bx^2+cx+d=0$

If α, β, γ are the zeroes of a cubic polynomial $f(x)=ax^3+bx^2+cx+d$, $a\neq0$ then

$$\alpha+\beta+\gamma=\frac{-coefficeent\ of\ x^2}{coefficeent\ of\ x^3}=\frac{-b}{a} \quad \text{and}$$

$$\alpha\beta+\beta\gamma+\gamma\alpha=\frac{coefficeent\ of\ x}{coefficeent\ of\ x^3}=\frac{c}{a}$$

$$\alpha\beta\gamma=\frac{-constant}{coefficeent\ of\ x^2}=-\frac{d}{a}$$

Find the values of the following Quadratic polynamials

1	p (x) =x^2+3x +2	P(-2) =	P(-1) =	P(-3) =	P(-4) =	P(0) =
2	p (x) = x^2+4x +4	P(-2) =	P(-1) =	P(-3) =	P(-4) =	P(0) =
3	p (x) =x^2+5x +6	P(-2) =	P(-1) =	P(-3) =	P(-3) =	P(0) =
4	p (x) =x^2+7x +12	P(-4) =	P(-1) =	P(-3) =	P(-3) =	P(0) =
5	p (x) =x^2+9x +18	P(-6) =	P(-1) =	P(-3) =	P(-4) =	P(0) =
6	p (x) =x^2+11x +18	P(-2) =	P(-1) =	P(-3) =	P(-4) =	P(0) =
7	p (x) =x^2+7x +6	P(-6) =	P(-1) =	P(-9) =	P(-3) =	P(0) =
8	p (x) =x^2+6x +9	P(-2) =	P(-1) =	P(-3) =	P(3) =	P(0) =
9	p (x) =x^2+15x +50	P(-10) =	P(-1) =	P(-3) =	P(-5) =	P(0) =
10	p (x) =x^2+13x +30	P(-2) =	P(-10) =	P(-3) =	P(3) =	P(0) =
11	p (x) =x^2-3x +2	P(2) =	P(-1) =	P(-3) =	P(-1) =	P(0) =
12	p (x) =x^2+x -20	P(-4) =	P(1) =	P(-3) =	P(5) =	P(0) =
13	p (x) =x^2-x - 2	P(-2) =	P(-1) =	P(-3) =	P(1) =	P(0) =
14	p (x) =x^2-x - 6	P(2) =	P(-1) =	P(-3) =	P(3) =	P(0) =
15	p (x) =x^2-3x -4	P(-4) =	P(-1) =	P(-3) =	P(1) =	P(0) =
16	p (x) =x^2+3x -4	P(4) =	P(-1) =	P(-3) =	P(-2) =	P(0) =
17	p (x) =x^2-1	P(-2) =	P(-1) =	P(-3) =	P(1) =	P(0) =
18	p (x) =x^2-x -30	P(-6) =	P(-1) =	P(-3) =	P(5) =	P(0) =
19	p (x) =x^2-2x -8	P(-4) =	P(2) =	P(-3) =	P(1) =	P(0) =
20	p (x) =x^2-4x +3	P(2) =	P(-1) =	P(-2) =	P(-3) =	P(0) =
21	p (x) =x^2-x- 2	P(-2) =	P(-1) =	P(-3) =	P(1) =	P(0) =
22	p (x) =x^2-x -6	P(2) =	P(-1) =	P(-4) =	P(-3) =	P(0) =
23	p (x) =x^2-5x -6	P(-2) =	P(-1) =	P(-4) =	P(-3) =	P(0) =
24	p (x) =x^2-4x-21	P(7) =	P(-1) =	P(-3) =	P(3) =	P(0) =
25	p (x) =x^2+48x -324	P(54) =	P(-1) =	P(-3) =	P(6) =	P(0) =

Find the values of the following Quadratic polynamials

26	p (x) =x^2+5x -1800	P(45) =	P(-1) =	P(-3) =	P(-40) =	P(0) =
27	p (x) =x^2+6x -216	P(-12) =	P(-1) =	P(-3) =	P(18) =	P(0) =
28	p (x) =x^2-8x-180	P(-18) =	P(-1) =	P(-3) =	P(10) =	P(0) =
29	p (x) =x^2-12x +20	P(-10) =	P(-1) =	P(-2) =	P(-3) =	P(0) =
30	p (x) =x^2+2x -288	P(18) =	P(-1) =	P(-3) =	P(-16) =	P(0) =
31	p (x) =x^2-4x +3	P(1) =	P(-1) =	P(-3) =	P(5/3) =	P(0) =
32	p (x) =4x^2+4x -3	P(-3/2) =	P(-1) =	P(-3) =	P(1/2) =	P(0) =
33	p (x) =3x^2-8x + 4	P(2/3) =	P(-1) =	P(-3) =	P(2) =	P(0) =
34	p (x) =5x^2-8x +4	P(2) =	P(-1) =	P(-3) =	P(-2/5) =	P(0) =
35	p (x) =4x^2-5x - 6	P(2) =	P(-1) =	P(-3) =	P(-3/4) =	P(0) =
36	p (x) =4x^2-x -4	P(1/4) =	P(-1) =	P(2) =	P(-3) =	P(0) =
37	p (x) =x^2-16	P(4) =	P(-1) =	P(-4) =	P(-3) =	P(0) =
38	p (x) =9x^2-9x +2	P(2/3) =	P(-1) =	P(-3) =	P(1/3) =	P(0) =
39	p (x) =x^2-35x +306	P(17) =	P(-1) =	P(-3) =	P(18) =	P(0) =
40	p (x) =x^2-3	P(√3) =	P(-1) =	P(-3) =	P(-√3) =	P(0) =
41	p (x) =5x^2-7x -6	P(-2) =	P(-1) =	P(-3/5) =	P(2) =	P(0) =
42	p (x) =x^2+32x -273	P(-7) =	P(-1) =	P(-3) =	P(39) =	P(0) =
43	p (x) =x^2+2x -120	P(-10) =	P(-1) =	P(12) =	P(-3) =	P(0) =
44	p (x) =x^2+2x -143	P(13) =	P(-1) =	P(-3) =	P(-11) =	P(0) =
45	p (x) =x^2+4x -96	P(12) =	P(-1) =	P(-8) =	P(-3) =	P(0) =
46	p (x) =x^2-27x +182	P(13) =	P(-1) =	P(-3) =	P(14) =	P(0) =
47	p (x) =x^2+10x +25	P(5) =	P(-1) =	P(-5) =	P(-3) =	P(0) =
48	p (x) =x^2+12x +36	P(-6) =	P(-1) =	P(-3) =	P(6) =	P(0) =
49	p (x) =x^2+19x +60	P(15) =	P(-1) =	P(-3) =	P(4) =	P(0) =
50	p (x) =x^2+27x +140	P(20) =	P(-1) =	P(-3) =	P(7) =	P(0) =

FILL IN THE BLANKS

S.NO	NUMBER	NUMBER	SUM	PRODUCT	S.NO	NUMBER	NUMBER	SUM	PRODUCT	S.NO	NUMBER	NUMBER	SUM	PRODUCT
1	5	6	11	30	1			9	-10	1	-1			1
2	9	3			2			7	-18	2	-2			4
3	1	9			3			5	-24	3	-3			9
4	7	9			4			3	-28	4	-4			16
5	3	12			5			1	-30	5	-5			25
6	4	15			6			-1	-30	6	-6			36
7	7	9			7			-3	-28	7	-7			49
8	11	2			8			-5	-24	8	-8			64
9	19	3			9			-7	-18	9	-9			81
10	21	3			10			-9	-10	10	-10			100
11	2	-3			11			11	30	11		6		30
12	4	-5			12			12	27	12		3		27
13	6	-7			13			10	9	13		9		9
14	8	-9			14			16	63	14		9		63
15	10	-1			15			15	36	15		12		36
16	1	-2			16			19	60	16		15		60
17	3	-4			17			16	63	17		9		63
18	5	-6			18			13	22	18		2		22
19	7	-8			19			22	57	19		3		57
20	9	-1			20			24	63	20		3		63
21	-1	10			21			-2	1	21	-1	10		-10
22	-2	9			22			-4	4	22	-2	9		-18
23	-3	8			23			-6	9	23	-3	8		-24
24	-4	7			24			-8	16	24	-4	7		-28
25	-5	6			25			-10	25	25	-5	6		-30
26	-6	5			26			-12	36	26	-6	5		-30
27	-7	4			27			-14	49	27	-7	4		-28
28	-8	3			28			-16	64	28	-8	3		-24
29	-9	2			29			-18	81	29	-9	2		-18
30	-10	1			30			-20	100	30	-10	1		-10
31	-1	-1			31			11	30	31	2		-1	
32	-2	-2			32			12	27	32	4		-1	
33	-3	-3			33			10	9	33	6		-1	
34	-4	-4			34			16	63	34	8		-1	
35	-5	-5			35			15	36	35	10		9	
36	-6	-6			36			19	60	36	1		-1	
37	-7	-7			37			16	63	37	3		-1	
38	-8	-8			38			13	22	38	5		-1	
39	-9	-9			39			22	57	39	7		-1	
40	-10	-10			40			24	63	40	9		8	

α and β are the zeroes of a quadratic polynomial $f(x) = ax^2 + bx + c$, $a \neq 0$ then

$$\alpha + \beta = \frac{-\text{coefficient of } x}{\text{coefficient of } x^2} = \frac{-b}{a} \quad \text{and} \quad \alpha\beta = \frac{\text{constant}}{\text{coefficient of } x^2} = \frac{c}{a}$$

				$\alpha + \beta = \frac{-\text{coefficient of } x}{\text{coefficient of } x^2} = \frac{-b}{a}$	$\alpha\beta = \frac{\text{constant}}{\text{coefficient of } x^2} = \frac{c}{a}$
$ax^2 + bx + c$	a	b	c	$\frac{-\text{coefficient of x}}{\text{coefficient of x}^2} = \frac{-b}{a}$	$\frac{\text{constant}}{\text{coefficient of x}^2} = \frac{c}{a}$
$x^2 - x - 12$					
$x^2 - 6x + 9$					
$x^2 - 4x + 5$					
$x^2 + 3x - 4$					
$x^2 - 1$					
$2x^2 - 8x + 6.$					
$3x^2 + 5x - 2.$					
$x^2 - x - 6$					
$x^2 - 4x + 3$					
$x^2 - 4$					
$x^2 + 2x + 1$					
$x^2 + 7x + 10$					
$x^2 - 3$					
$x^2 - 2x - 8$					
$4x^2 - 4s + 1$					
$6x^2 - 3 - 7x$					
$4x^2 + 8u$					
$x^2 - 15$					
$3x^2 - x - 4$					

CUBIC POLYNOMIALS

If α, β, γ are the zeroes of a cubic polynomial $f(x) = ax^3 + bx^2 + cx + d$, $a \neq 0$ then

$$\alpha + \beta + \gamma = \frac{-\text{coefficient of } x^2}{\text{coefficient of } x^3} = \frac{-b}{a} \quad \text{and} \quad \alpha\beta + \beta\gamma + \gamma\alpha = \frac{\text{coefficient of } x}{\text{coefficient of } x^3} = \frac{c}{a} \quad , \quad \alpha\beta\gamma = \frac{-\text{constant}}{\text{coefficient of } x^2} = -\frac{d}{a}$$

	a	b	c	d	$\alpha + \beta + \gamma = \frac{-\text{coefficient of } x^2}{\text{coefficient of } x^3} = \frac{-b}{a}$	$\alpha\beta + \beta\gamma + \gamma\alpha = \frac{\text{coefficient of } x}{\text{coefficient of } x^3} = \frac{c}{a}$	$\alpha\beta\gamma = \frac{-\text{constant}}{\text{coefficient of } x^2} = -\frac{d}{a}$
$ax^3 + bx^2 + cx + d$					$\frac{-\text{coefficient of } x^2}{\text{coefficient of } x^3} = \frac{-b}{a}$	$\frac{\text{coefficient of } x}{\text{coefficient of } x^3} = \frac{c}{a}$	$\frac{-\text{constant}}{\text{coefficient of } x^2} = -\frac{d}{a}$
$2x^3 - 5x^2 - 14x + 8.$							
$x^3 + 3x^2 - x - 2$							
$4x^3 + 8x^2 - 6x - 2$							
$x^3 + 4x^2 - 5x - 2$							
$x^3 + 5x^2 + 4$							
$3x^3 - 5x^2 - 11x - 3,$							
$x^3 + 3x^2 - x - 3$							

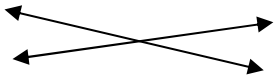
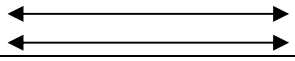
Find the values of the following Quadratic polynamials						
	POLYNAMIAL	a	b	c	$\alpha+\beta = -b/a$	$\alpha \times \beta = c/a$
					sum of roots	product of roots
	$p(x) = ax^2+bx+c$	a	b	c	$-b/a$	c/a
1	$p(x) = x^2+3x+2$					
2	$p(x) = x^2+4x+4$					
3	$p(x) = x^2+5x+6$					
4	$p(x) = x^2+7x+12$					
5	$p(x) = x^2+9x+18$					
6	$p(x) = x^2+11x+18$					
7	$p(x) = x^2+7x+6$					
8	$p(x) = x^2+6x+9$					
9	$p(x) = x^2+15x+50$					
10	$p(x) = x^2+13x+30$					
11	$p(x) = x^2-3x+2$					
12	$p(x) = x^2+x-20$					
13	$p(x) = x^2-x-2$					
14	$p(x) = x^2-x-6$					
15	$p(x) = x^2-3x-4$					
16	$p(x) = x^2+3x-4$					
17	$p(x) = x^2-1$					
18	$p(x) = x^2-x-30$					
19	$p(x) = x^2-2x-8$					
20	$p(x) = x^2-4x+3$					
21	$p(x) = x^2-x-2$					
22	$p(x) = x^2-x-6$					
23	$p(x) = x^2-5x-6$					
24	$p(x) = x^2-4x-21$					
25	$p(x) = x^2+48x-324$					

Find the values of the following Quadratic polynamials						
	POLYNAMIAL	a	b	c	$\alpha+\beta = -\frac{b}{a}$	$\alpha \times \beta = \frac{c}{a}$
					sum of roots	product of roots
	$p(x) = ax^2+bx+c$	a	b	c	$-\frac{b}{a}$	$\frac{c}{a}$
26	$p(x) = x^2+5x-1800$					
27	$p(x) = x^2+6x-216$					
28	$p(x) = x^2-8x-180$					
29	$p(x) = x^2-12x+20$					
30	$p(x) = x^2+2x-288$					
31	$p(x) = x^2-4x+3$					
32	$p(x) = 4x^2+4x-3$					
33	$p(x) = 3x^2-8x+4$					
34	$p(x) = 5x^2-8x+4$					
35	$p(x) = 4x^2-5x-6$					
36	$p(x) = 4x^2-x-4$					
37	$p(x) = x^2-16$					
38	$p(x) = 9x^2-9x+2$					
39	$p(x) = x^2-35x+306$					
40	$p(x) = x^2-3$					
41	$p(x) = 5x^2-7x-6$					
42	$p(x) = x^2+32x-273$					
43	$p(x) = x^2+2x-120$					
44	$p(x) = x^2+2x-143$					
45	$p(x) = x^2+4x-96$					
46	$p(x) = x^2-27x+182$					
47	$p(x) = x^2+10x+25$					
48	$p(x) = x^2+12x+36$					
49	$p(x) = x^2+19x+60$					
50	$p(x) = x^2+27x+140$					

SOLUTIONS OF PAIRS OF LINEAR EQUATIONS IN TWO VARIABLE

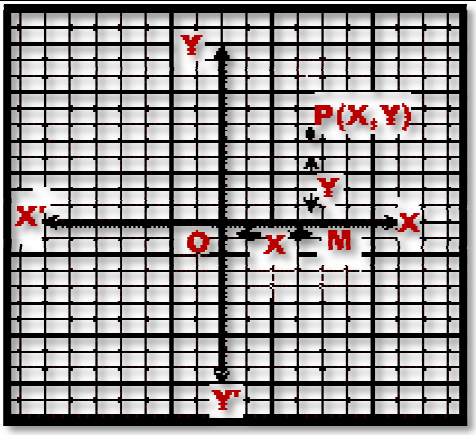
Let: $a_1x + b_1y + c_1 = 0, (a_1^2 + b_1^2 \neq 0)$ and $a_2x + b_2y + c_2 = 0\ (a_2^2 + b_2^2 \neq 0)$ form a pair of linear equation in two variables.

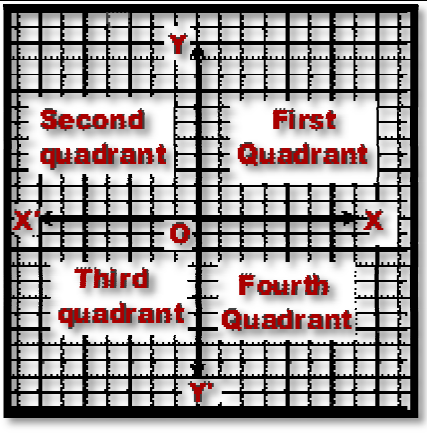
The graph of a linear equation in two variables is a straight line
Ordered pairs of real numbers (x, y) representing points on the line are solutions of the equation and ordered pairs of real numbers (x, y) that do not represent points on the line are not solutions.

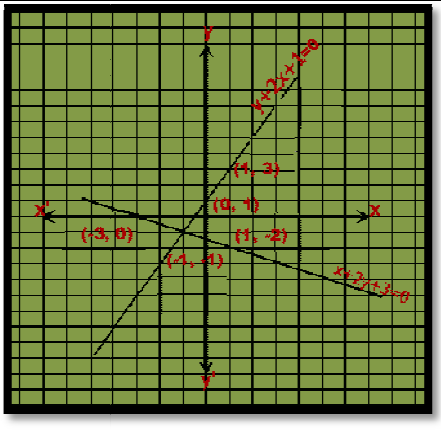
S.N.	Compare the Ratio	Graphic representation	Algebraic interpretation	Linear equations
1		Intersection lines at one point	Exactly one solution or unique solution	Consistent
2		Coincident line	Infinity solution or many solutions	Dependent and consistent
3		Parallel lines	No solution	Inconsistent

Graph

1. The horizontal line in the graph is called X- axis.
2. The vertical line in the graph is called Y- axis.
3. The intersecting point of horizontal and vertical lines is called origin (O). It is represented by (0, 0).
4. X and Y axes divide the plane into four regions.
5. Four regions are called quadrants. They are denoted by Q_1, Q_2, Q_3, Q_4.
6. Every point in the plane is denoted by a unique ordered pair (x, y).
7. In (x, y), x is called x coordinate or abscissa.
8. In (x, y), y is called y coordinate or ordinate.
9. The y coordinates of $X-$ axis is zero. The x coordinates of Y- axis is zero.
10. The equation of $X-$ axis is $y = 0$. The equation of $Y-$ axis is $x = 0$.
11. If $x > 0, y > 0$ then (x, y) lies in Q_1. If $x < 0, y > 0$ then (x, y) lies in Q_2.
12. If $x < 0, y < 0$ then (x, y) lies in Q_3. If $x > 0, y < 0$ then (x, y) lies in Q_4.
13. If $x = 0, y > 0$ then (x, y) lies on positive $Y-$ axis.
14. If $x = 0, y < 0$ then (x, y) lies on negative $Y-$ axis.
15. If $x > 0, y = 0$ then (x, y) lies on positive $X-$ axis.
16. If $x < 0, y = 0$ then (x, y) lies on negative $X-$ axis.
17. If $x = 0, y \neq 0$ then (x, y) lies on $Y-$ axis. If $x \neq 0, y = 0$ then (x, y) lies on $X-$ axis.







In graph the scale is important

SCALE : ON X –AXIS 1CM = ____UNITS, ON Y –AXIS 1CM = ___ UNITS

GEOMETRICAL MEANING OF THE ZEROES OF A POLYNOMIAL GRAPHICAL REPRESENTATION OF A LINEAR POLYNOMIAL (LINE IS FORMED ,ECH AND EVERY POINT IS SOLUTION

1.

x	– 2	-1	0	1	2	3	4	5
y = 2x + 3								
(x, y)								

2

x	– 2	-1	0	1	2	3	4	5
y = 2x + 5								
(x, y)								

3.

x	– 2	-1	0	1	2	3	4	5
y = 2x - 5								
(x, y)								

4.

x	– 2	-1	0	1	2	3	4	5
y = y = 2x								
(x, y)								

5.

x	– 2	-1	0	1	2	3	4	5
y = 3x + 5								
(x, y)								

6.

x	– 2	-1	0	1	2	3	4	5
y = 5 x								
(x, y)								

7.

x	– 2	-1	0	1	2	3	4	5
y = 2x + 3								
(x, y)								

8

x	– 2	-1	0	1	2	3	4	5
y = 4x + 3								
(x, y)								

9.

x	– 2	-1	0	1	2	3	4	5
y = 2x + 1								
(x, y)								

10.

x	– 2	-1	0	1	2	3	4	5
y = 2x - 1								
(x, y)								

GEOMETRICAL MEANING OF THE ZEROES OF A POLYNOMIAL

GRAPHICAL REPRESENTATION OF A QUADRATIC POLYNOMIA L (curves are called *Parabolas)*

1

x	– 2	-1	0	1	2	3	4	5
$y = x^2 - 3x - 4$								
(x, y)								

2

x	– 2	-1	0	1	2	3	4	5
$y = x^2 - x - 12$								
(x, y)								

3.

x	– 2	-1	0	1	2	3	4	5
$Y = x^2 - 6x + 9$								
(x, y)								

4.

x	– 2	-1	0	1	2	3	4	5
$Y = x^2 - 4x + 5$								
(x, y)								

5.

x	– 2	-1	0	1	2	3	4	5
$Y = x^2 + 3x - 4$								
(x, y)								

6.

x	– 2	-1	0	1	2	3	4	5
$y = x^2 - 1$								
(x, y)								

7.

x	– 2	-1	0	1	2	3	4	5
$Y = x^2 - x - 6$								
(x, y)								

8

x	– 2	-1	0	1	2	3	4	5
$y = x^2 - 4x + 3$								
(x, y)								

9.

x	– 2	-1	0	1	2	3	4	5
$y = x^2 + 2x + 1$								
(x, y)								

10.

x	– 2	-1	0	1	2	3	4	5
$y = x^2 + 7x + 10$								
(x, y)								

RELATION BETWEEN COEFFICIENTS AND NATURE OF SYSTEM OF EQUATIONS

Let a_1, b_1, c_1 and a_2, b_2, c_2 denote the coefficients of a given pair of linear equations in two variables. Then, let us write and compare the values

Pair of lines	$\frac{a_1}{a_2}$	$\frac{b_1}{b_2}$	$\frac{c_1}{c_2}$	Comparison of ratios	Graphical representation	Algebraic interpretation
$3x+2y-80=0$ $4x+3y-110=0$	$\frac{3}{4}$	$\frac{2}{3}$	$\frac{-80}{-110}$	$\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$	Intersecting lines	Unique solution
$1x+2y-30=0$ $2x+4y-66=0$	$\frac{1}{2}$	$\frac{2}{4}=\frac{1}{2}$	$\frac{-30}{-66}$	$\frac{a_1}{a_2}=\frac{b_1}{b_2} \neq \frac{c_1}{c_2}$	Parallel lines	No solution
$3x+6y=3900$ $x+2y=1300$	$\frac{3}{1}$	$\frac{6}{2}=\frac{3}{1}$	$\frac{3900}{1300}=\frac{3}{1}$	$\frac{a_1}{a_2}=\frac{b_1}{b_2}=\frac{c_1}{c_2}$	Coincident lines (Dependent lines)	Infinite number of solutions
$2x + y - 5 = 0$ $3x - 2y - 4 = 0$						
$3x + 4y = 2$ $6x + 8y = 4$						
$4x-6y - 9 = 0$ $2x-3y - 5 = 0$						
$2x+3y = 1$ $3x-y = 7$						
$x + 2y = 6$ $2x + 4y = 12$						
$3x - 2y = 6$ $6x+4y = 18$						
$5x- 4y + 8 = 0$ $7x+6y-9 = 0$						
$9x+3y + 12 = 0$ $18x+6y + 24 = 0$						
$6x - 3y + 10 = 0$ $2x - y + 9 = 0$						
$3x+2y=5$ $2x - 3y=7$						
$2x - 3y = 8$ $4x - 6y = 9$						
$\frac{3}{2}x+\frac{5}{3}y=7$ $9x - 10y=14$						
$5x-3y = 11$ $-10x+6y = -22$						
$\frac{4}{3}x+2y = 8$ $2x+3y = 12$						
$x + y = 5$ $2x+2y = 10$						
$x - y = 8$ $3x-3y = 16$						
$2x + y-6 = 0$ $4x-2y- 4 = 0$						
$2x-2y - 2 = 0$ $4x-4y- 5 = 0$						
$2x + y +5 = 0$ $3x +2y - 4 = 0$						
$2x + y +5 = 0$ $4x + 2y +15 = 0$						
$4x + 2y +5 = 0$ $2x + y +5 = 0$						
$4x - 2y +5 = 0$ $2x - y +5 = 0$						

1. *The equations are* $3x + 6y = 80$ *and* $4x + 3y = 110$ **Graph 1**

For the equation $3x + 2y = 80$				*For the equation* $4x + 3y = 110$		
x	$y = \frac{80-3x}{2}$	(x, y)		x	$y = \frac{110-4x}{3}$	(x, y)
0	$y = \frac{80-3(0)}{6} = \frac{80}{2} = 40$	(0, 40)		-10		(,)
10		(,)		20		(,)
20		(,)		50		(,)
30		(,)				(,)

2. (ii)The equations $1x+2y=30$ and $2x+4y = 66$. **Graph 2**

For the equation $1x+2y=30$				For the equation $2x+4y = 66$		
x	$y = \frac{30-x}{2}$	(x, y)		x	$y = \frac{66-2x}{4}$	(x, y)
0		(,)		1		(,)
2		(,)		3		(,)
4		(,)		5		(,)
6		(,)		7		(,)

(3) The equations as $3x + 6y = 3900$ and $x + 2y = 1300$. **Graph 3**

For the equation $3x + 6y = 3900$				For the equation $x + 2y = 1300$		
x	$y = \frac{3900-3x}{6}$	(x, y)		x	$y = \frac{1300-x}{2}$	(x, y)
100		(,)		100		(,)
200		(,)		200		(,)
300		(,)		300		(,)
400		(,)		400		(,)

4. Solve the following systems of equations : i) $x - 2y = 0$; $3x + 4y = 20$ **Graph 4**

For the equation $x - 2y = 0$				For the equation $3x + 4y = 20$		
x	$y = \frac{x}{2}$	(x, y)		x	$y = \frac{20-3x}{4}$	(x, y)
0		(,)		0		(,)
2		(,)		2		(,)
4		(,)		4		(,)
6		(,)		6		(,)

5) $x + y = 2$; $2x + 2y = 4$ **Graph 5**

For the equation $x + y = 2$			For the equation $2x + 2y = 4$		
x	$y = 2 - x$	(x, y)	x	$y = \frac{4 - 2x}{2}$	(x, y)
0		(,)	0		(,)
1		(,)	2		(,)
2		(,)	4		(,)
3		(,)	6		(,)

6) $2x - y = 4$; $4x - 2y = 6$ **Graph 6**

For the equation $2x - y = 4$			For the equation $4x - 2y = 6$		
x	$y = 2x - 4$	(x, y)	x	$y = \frac{4x-6}{2}$	(x, y)
0		(,)	0		(,)
2		(,)	1		(,)
4		(,)	2		(,)
-1		(,)	3		(,)

7) $x + 2y - 4 = 0$ and $2x + 4y - 12 = 0$. Represent this situation graphically. **Graph 7**

For the equation $x + 2y - 4 = 0$			For the equation $2x + 4y - 12 = 0$		
x	$y = \frac{4-x}{2}$	(x, y)	x	$y = \frac{12-2x}{4}$	(x, y)
0		(,)	0		(,)
2		(,)	1		(,)
4		(,)	2		(,)
-1		(,)	3		(,)

8. $2x + y - 5 = 0$, $3x - 2y - 4 = 0$

For the equation $2x + y - 5 = 0$			For the equation ; $3x - 2y - 4 = 0$		
x	$y = 5 - 2x$	(x, y)	x	$y = \frac{3x - 4}{2}$	(x, y)
0		(,)	0		(,)
1		(,)	2		(,)
2		(,)	4		(,)
3		(,)	6		(,)

9) $3x + 4y - 2 = 0, 6x+8y - 4 = 0$

For the equation $3x + 4y - 2 = 0$			For the equation ; $6x+8y - 4 = 0$		
x	$y = \frac{2-3x}{4}$	(x, y)	x	$y = \frac{4-6x}{8}$	(x, y)
0		(,)	0		(,)
2		(,)	2		(,)
4		(,)	4		(,)
6		(,)	6		(,)

10) $4x-6y - 9 = 0, 2x-3y - 5 = 0$

For the equation $4x-6y - 9 = 0$			For the equation ; $2x-3y - 5 = 0$		
x	$y = \frac{4x-9}{6}$	(x, y)	x	$y = \frac{2x-5}{3}$	(x, y)
0		(,)	1		(,)
3		(,)	3		(,)
6		(,)	6		(,)

11) $2x+3y = 1,\ 3x-y = 7$

For the equation $2x+3y = 1$			For the equation $3x-y = 7$		
x		(x, y)	x		(x, y)
		(,)			(,)
		(,)			(,)
		(,)			(,)
		(,)			(,)

12) $x + 2y = 6, 2x + 4y = 12$

For the equation $x + 2y = 6$			For the equation $2x + 4y = 12$		
x		(x, y)	x		(x, y)
		(,)			(,)
		(,)			(,)
		(,)			(,)
		(,)			(,)

13) $3x - 2y = 6, 6x+4y = 18$

For the equation $3x - 2y = 6$			For the equation $6x+4y = 18$		
x		(x, y)	x		(x, y)
		(,)			(,)
		(,)			(,)
		(,)			(,)
		(,)			(,)

14) $x - y - 1 = 0, x - 2y + 2 = 0$

For the equation $x - y - 1 = 0$			For the equation $x - 2y + 2 = 0$		
x		(x, y)	x		(x, y)
0		(,)	0		(,)
1		(,)	2		(,)
2		(,)	4		(,)
3		(,)	6		(,)
4		(,)	8		(,)

15) $l + b - 16 = 0, l - 2b + 2 = 0$

For the equation $l + b - 16 = 0$			For the equation $l - 2b + 2 = 0$		
x		(x, y)	x		(x, y)
6		(,)	6		(,)
8		(,)	8		(,)
10		(,)	10		(,)
12		(,)	12		(,)
14		(,)	14		(,)

16) For the equation $3x + 2y = 5$			For the equation $2x - 3y = 7$		
x	$3x + 2y = 5$	(x, y)	x	$2x - 3y = 7$	(x, y)
		(,)			(,)
		(,)			(,)
		(,)			(,)
		(,)			(,)
		(,)			(,)

17) For the equation $2x - 3y = 8$;

x		(x, y)
		(,)
		(,)
		(,)
		(,)
		(,)

For the equation $4x - 6y = 9$

x		(x, y)
		(,)
		(,)
		(,)
		(,)
		(,)

18) For the equation $3/2x + 5/3\, y = 7$

x		(x, y)
		(,)
		(,)
		(,)
		(,)
		(,)

For the equation $9x - 10y = 14$

x		(x, y)
		(,)
		(,)
		(,)
		(,)
		(,)

19) For the equation $5x - 3y = 11$

x		(x, y)
		(,)
		(,)
		(,)
		(,)
		(,)

For the equation $10x + 6y = -22$

x		(x, y)
		(,)
		(,)
		(,)
		(,)
		(,)

20) For the equation $4/3x + 2y = 8$

x		(x, y)
		(,)
		(,)
		(,)
		(,)
		(,)

For the equation $2x + 3y = 12$

x		(x, y)
		(,)
		(,)
		(,)
		(,)
		(,)

21)	For the equation x + y = 5			For the equation 2x + 2y = 10	
x		(x, y)	x		(x, y)
		(,)			(,)
		(,)			(,)
		(,)			(,)
		(,)			(,)
		(,)			(,)

22)	For the equation x + y -5			For the equation 2 x + 2 y -10 = 0	
x		(x, y)	x		(x, y)
		(,)			(,)
		(,)			(,)
		(,)			(,)
		(,)			(,)
		(,)			(,)

23)	For the equation x – y = 8			For the equation 3x – 3y = 16	
x		(x, y)	x		(x, y)
		(,)			(,)
		(,)			(,)
		(,)			(,)
		(,)			(,)
		(,)			(,)

24)	For the equation 2x + y – 6 = 0			For the equation 4x – 2y – 4 = 0	
x		(x, y)	x		(x, y)
		(,)			(,)
		(,)			(,)
		(,)			(,)
		(,)			(,)
		(,)			(,)

25) For the equation 2x – 2y – 2			For the equation 4x – 4y – 5 = 0		
x		(x, y)	x		(x, y)
		(,)			(,)
		(,)			(,)
		(,)			(,)
		(,)			(,)
		(,)			(,)

26) For the equation x + y = 10			For the equation y = x + 4		
x		(x, y)	x		(x, y)
		(,)			(,)
		(,)			(,)
		(,)			(,)
		(,)			(,)
		(,)			(,)

27) For the equation 5x + 7y = 50			For the equation 7 x + 5 y = 46		
x		(x, y)	x		(x, y)
		(,)			(,)
		(,)			(,)
		(,)			(,)
		(,)			(,)
		(,)			(,)

28) For the equation x – y = 4			For the equation x + y = 36		
x		(x, y)	x		(x, y)
		(,)			(,)
		(,)			(,)
		(,)			(,)
		(,)			(,)
		(,)			(,)

find the roots of the following problems

1	x (x + 3) + 5 (x + 3) = 0	(x + 3)(x + 5) =0	x + 3 = 0 $\Rightarrow$ x = -3	x + 5 = 0 $\Rightarrow$ x = -5	x= -3,-5
2	x (x + 3) +2 (x + 3) = 0				
3	x (x + 3) + 7 (x + 3) = 0				
4	x (x + 8) + 6 (x + 8) = 0				
5	x (x + 3) + 3 (x + 3) = 0				
6	x (x + 2) +4 (x + 2) = 0				
7	x (x + 3) + 8 (x + 3) = 0				
8	x (x + 8) + 9 (x + 8) = 0	(x + 8) (x + 9)=0	x + 8 = 0 $\Rightarrow$ x = -8	x + 9 = 0 $\Rightarrow$ x = -9	x= -8,-9
9	x (x + 3) + 10 (x + 3) = 0				
10	2x (x + 3) + 5 (x + 3) = 0				
11	3x (x + 3) + 5 (x + 3) = 0				
12	x (x + 7) + 5 (x + 7) = 0				
13	x (x -2) + 5 (x -2) = 0				
14	7x (x -5) + 5 (x -5) = 0				
15	x (x + 3) - 5 (x + 3) = 0				
16	2x (x + 8) - 5 (x + 8) = 0				
17	3x (x + 3) -5 (x + 3) = 0				
18	7x (x + 3) - 5 (x + 3) = 0				
19	x (x - 3) + 5 (x - 3) = 0				
20	2x (x - 3) + 5 (x -3) = 0				
21	3x (x - 3) + 5 (x -3) = 0				
22	3x (x + 3) - 5 (x + 3) = 0				
23	4x (x - 3) + 5 (x - 3) = 0				
24	x (2x + 3) + 5 (2x + 3) = 0				
25	x (2x + 5) + 5 (2x + 5) = 0				
26	2x (7x + 3) + 5 (7x + 3) = 0				
27	2x (7x - 3) + 5 (7x- 3) = 0				
28	3x (4x + 3) -5 (4x + 3) = 0				
29	x (4x - 3) - 5 (4x - 3) = 0				
30	x (x -7) -4 (x -7) = 0				

Find the factors(roots) of the following Quadratic equations				
1	$x^2+3x+2=0$	$x^2+2x+1x+2=0$	$x(x+2)+1(x+2)=0$	$(x+1)\ (x+2)=0$
		$(x+1)=0 \Rightarrow x=-1$	$(x+2)=0 \Rightarrow x=-2$	$X=-1\ ,-2$
2	$x^2+4x+4=0$			
3	$x^2+5x+6=0$			
4	$x^2+7x+12=0$			
5	$x^2+9x+18=0$			
6	$x^2+11x+18=0$			
7	$x^2+7x+6=0$			
8	$x^2+6x+9=0$			
9	$x^2+15x+50=0$			
10	$x^2+13x+30=0$			
11	$x^2-3x+2=0$			
12	$x^2+x-20=0$			
13	$x^2-x-2=0$			
14	$x^2-x-6=0$			
15	$x^2-3x-4=0$			
16	$x^2+3x-4=0$			
17	$x^2-1=0$			
18	$x^2-x-30=0$			
19	$x^2-2x-8=0$			
20	$x^2-4x+3=0$			

Find the factors(roots) of the following Quadratic equations

21	x^2-x- 2=0			
22	x^2-x -6=0			
23	x^2-5x -6=0			
24	x^2-4x-21=0			
25	x^2+48x -324=0			
26	x^2+5x -1800=0			
27	x^2+6x -216=0			
28	x^2-8x-180=0			
29	x^2-12x +20=0			
30	x^2+2x -288=0			
31	x^2-4x +3=0			
32	$4x^2$+4x -3=0			
33	$3x^2$-8x + 4=0			
34	$5x^2$-8x +4=0			
35	$2x^2$-5x +6=0			
36	$4x^2$-x -4=0			
37	x^2-16=0			
38	$9x^2$-9x +2=0			
39	x^2-35x +306=0			
40	x^2-3=0			

Find the nature of the roots following Quadratic equations

a) Two distinct real roots, if $b^2-4ac > 0$, b) two equal roots (coincident roots), if $b^2-4ac = 0$,
c) no real roots, if $b^2-4ac < 0$.

	Quadrtic equations	a	b	c	Discriminant= b^2-4ac	Nature of roots
1	$x^2+3x+2=0$	1	3	2	$9-(4x1x2) = 9-8=1$	$b^2-4ac > 0$ Two D Roots (a)
2	$x^2+4x+4=0$					
3	$x^2+5x+6=0$					
4	$x^2+7x+12=0$					
5	$x^2+9x+18=0$					
6	$x^2+11x+18=0$					
7	$x^2+7x+6=0$					
8	$x^2+6x+9=0$					
9	$x^2+15x+50=0$					
0	$x^2+13x+30=0$					
11	$x^2-3x+2=0$					
12	$x^2+x-20=0$					
13	$x^2-x-2=0$					
14	$x^2-x-6=0$					
15	$x^2-3x-4=0$					
16	$x^2+3x-4=0$					
17	$x^2-1=0$					
18	$x^2-x-30=0$					
19	$x^2-2x-8=0$					
20	$x^2-4x+3=0$					
21	$x^2-x-2=0$					
22	$x^2-x-6=0$					
23	$x^2-5x-6=0$					
24	$x^2-4x-21=0$					
25	$x^2+48x-324=0$					

	Quadratic equations	*a*	*b*	*c*	*Discriminant= b^2-4ac*	*Nature of roots*
26	$x^2+5x-1800=0$					
27	$x^2+6x-216=0$					
28	$x^2-8x-180=0$					
29	$x^2-12x+20=0$					
30	$x^2+2x-288=0$					
31	$x^2-4x+3=0$					
32	$4x^2+4x-3=0$					
33	$3x^2-8x+4=0$					
34	$5x^2-8x+4=0$					
35	$2x^2-5x+6=0$					
36	$4x^2-x-4=0$					
37	$x^2-16=0$					
38	$9x^2-9x+2=0$					
39	$x^2-35x+306=0$					
40	$x^2-3=0$					
41	$5x^2-7x-6=0$					
42	$x^2+32x-273=0$					
43	$x^2+2x-120=0$					
44	$x^2+2x-143=0$					
45	$x^2+4x-96=0$					
46	$x^2-27x+182=0$					
47	$x^2+10x+25=0$					
48	$x^2+12x+36=0$					
49	$x^2+19+60=0$					
50	$x^2+27x+140=0$					

Find the roots following Quadratic equations						
	Quadrtic equations	a	b	c	b^2-4ac	roots = $(-b\pm\sqrt{b^2-4ac})/2a$
1	$x^2+3x+2=0$					
2	$x^2+4x+4=0$					
3	$x^2+5x+6=0$					
4	$x^2+7x+12=0$					
5	$x^2+9x+18=0$					
6	$x^2+11x+18=0$					
7	$x^2+7x+6=0$					
8	$x^2+6x+9=0$					
9	$x^2+15x+50=0$					
10	$x^2+13x+30=0$					
11	$x^2-3x+2=0$					
12	$x^2+x-20=0$					
13	$x^2-x-2=0$					
14	$x^2-x-6=0$					
15	$x^2-3x-4=0$					
16	$x^2+3x-4=0$					
17	$x^2-1=0$					
18	$x^2-x-30=0$					
19	$x^2-2x-8=0$					
20	$x^2-4x+3=0$					
21	$x^2-x-2=0$					
22	$x^2-x-6=0$					
23	$x^2-5x-6=0$					
24	$x^2-4x-21=0$					
25	$x^2+48x-324=0$					

	Quadratic equations	*a*	*b*	*c*	b^2-4ac	roots = $(-b\pm\sqrt{b^2-4ac})/2a$
26	$x^2+5x-1800=0$					
27	$x^2+6x-216=0$					
28	$x^2-8x-180=0$					
29	$x^2-12x+20=0$					
30	$x^2+2x-288=0$					
31	$x^2-4x+3=0$					
32	$4x^2+4x-3=0$					
33	$3x^2-8x+4=0$					
34	$5x^2-8x+4=0$					
35	$2x^2-5x+6=0$					
36	$4x^2-x-4=0$					
37	$x^2-16=0$					
38	$9x^2-9x+2=0$					
39	$x^2-35x+306=0$					
40	$x^2-3=0$					
41	$5x^2-7x-6=0$					
42	$x^2+32x-273=0$					
43	$x^2+2x-120=0$					
44	$x^2+2x-143=0$					
45	$x^2+4x-96=0$					
46	$x^2-27x+182=0$					
47	$x^2+10x+25=0$					
48	$x^2+12x+36=0$					
49	$x^2+19+60=0$					
50	$x^2+27x+140=0$					

PROGRESSIONS

ARITHMETIC PROGRESSION

							DIFFERENCE					Difference	is it
	a_1	a_2	a_3	a_4	a_5	a_6	$a_2 - a_1$	$a_3 - a_2$	$a_4 - a_3$	$a_5 - a_4$	$a_6 - a_5$	Equal/or not	A.P
1	1	2	3	4	5	6							
2	3	6	9	12	15	18							
3	7	14	21	28	35	42							
4	9	7	5	3	1	-1							
5	1	5	9	13	17	21							
6	5	7	5	5	8	5							
7	8	3	-2	-7	-12	-17							
8	-2	4	10	16	22	28							
9	-8	1	10	19	28	37							
10	-2	-2	-2	-2	-2	-2							
11	-3	-1	1	3	5	7							
12	-6	3	0	3	6	9							
13	8	-3	-14	-25	-36	-47							
14	2	6	10	14	18	22							
15	5	1	-3	-7	-11	-15							
16	9	6	3	0	-3	-6							
17	1	3	5	7	9	11							
18	7	4	0	-2	-5	-8							
19	10	3	-4	-11	-18	-25							
20	15	11	7	3	-1	-5							
21	25	22	19	16	13	10							
22	36	30	24	18	12	6							
23	36	18	0	-18	-36	-54							
24	50	35	20	15	-10	-25							
25	99	87	75	63	51	39							
26	111	100	89	78	67	56							
27	19	38	57	76	95	114							
28	21	42	63	84	105	126							
29	-2	-4	-6	-8	-10	-12							
30	-5	2	7	16	23	30							
31	-4	-6	-8	-10	-12	-14							
32	-7	-3	1	5	9	13							
33	-5	3	11	19	27	35							
34	-1	-2	-3	-4	-5	-6							
35	-4	-7	-10	-13	-16	-19							

PROGRESSIONS

ARITHMETIC PROGRESSION

	a_1	difference	a_2	a_3	a_4	a_5	a_6	a_7	a_8	a_9
	a	d	a+d	a+2d	a+3d	a+4d	a+5d	a+6d	a+7d	a+8d
1	1	2								
2	2	4								
3	3	6								
4	1	7								
5	3	5								
6	5									69
7	7		5	3						
8		9	14							
9		1						7		
10			170							660
11						-20	-50			
12					0					5
13									-4.5	-5
14				6	8					
15				-11		-15				
16							1.5	1.6		
17									10.5	12
18	2									2
19	10						60			
20								-2	-2	
21	4							-14		
22				0						3
23					-2		-2.5			
24							-7			-13
25					7	11				
26									8.3	9.4
27	7									31
28	-18							-6		
29	46									22
30	-18.9	2.5								
31	3.5									3.5
32	10							-8		
33		13								106
34		-10		3						
35								14		17
36						22			37	
37					14					34

PROGRESSIONS

ARITHMETIC PROGRESSION

	a_1	difference	a_2	a_5	a_7	a_9	a_8	a_{10}	a_{12}	a_{11}
	a	d	a+d	a+4d	a+6d	a+8d	a+7d	a+9d	a+11d	a+10d
1	1	2								
2	2	4								
3	3	6								
4	1	7								
5	3	5								
6	5		13							
7		-2								-13
8	5					77				
9	1								12	
10	100						590			
11									-230	-200
12					3					7
13	-1					-5				
14					14			20		
15	-7	-2								
16	1									2
17	0						10.5			
18									2	2
19	10		20							
20	-2	0								
21								-23	-29	
22				1	2					
23	-1.25								-4	-3.75
24						-13	-11			
25				11	19					
26				5			8.3			
27					25			34		
28				-10					4	
29	46	-3								
30							-1.4			6.1
31									3.5	3.5
32							-11			-20
33	2									132
34									-87	-77
35							15.5	18.5		
36					32				57	
37					26	34				

PROGRESSIONS

ARITHMETIC PROGRESSION

	a_1	Difference	Term	a_n = n^{th} term	S_n = sum of n^{th} terms
	a	d	n	a + (n -1)d	$\frac{n}{2}$ +[2a + (n -1)d]
1	1	2	10	19	
2	2	4	12	46	
3	3	6	8	45	
4	1	7	16	106	
5	3	5	11	53	
6	5	8	8	61	
7	7	-2	6	-3	
8	5	9	9	77	
9	1	1	10	10	
10	2	8	15	114	
11	5	-4	10	-31	
12	21	-3	35	-81	
13	3	1	20	22	
14	5	6	22	131	
15	7	3	8	28	
16	-18		10	0	
17		-3	18	-5	
18	-18.9	2.5		3.6	
19	3.5	0	105		
20	10	-3	30	-77	
21	1	1	50	50	
22	1	1	100	100	
23	1	1	1000	1000	
24	16	-5	23	-94	
25	10		14		1050
26	21	-3			78
27	2	5	10	47	
28	-37	4	12	7	
29	0.6	1.1	100	109.5	
30	5	3		50	
31	7		13	35	
32		3	12		
33	4	3	12	37	
34			10		125
35	4	8	12		

PROGRESSIONS

GEOMETRIC PROGRESSION

S.NO	a_1	a_2	a_3	a_4	a_5	Ratio $\frac{a_2}{a_1}$	Ratio $\frac{a_3}{a_2}$	Ratio $\frac{a_4}{a_3}$	Ratio $\frac{a_5}{a_4}$	Ratio Equal	is it G.P
1	2	4	8	16	32						
2	3	9	27	81	243						
3	5	25	125	625	3125						
4	4	16	64	256	1024						
5	-2	4	-8	16	-32						
6	-3	9	-27	81	-243						
7	-5	25	-125	625	-3125						
8	1	1	1	1	1						
9	6	36	216	1296	7776						
10	-6	36	-216	1296	-7776						
11	7	49	343	2401	16807						
12	-7	49	-343	2401	-16807						
13	8	64	512	4096	32768						
14	-4	16	-64	256	-1024						
15	9	81	729	6561	59049						
16	10	100	1000	10000	100000						
17	-9	81	-729	6561	-59049						
18	-10	100	-1000	10000	-100000						
19	$\sqrt{2}$	2	$2\sqrt{2}$	4	$4\sqrt{2}$						
20	$\sqrt{3}$	3	$3\sqrt{3}$	9	$9\sqrt{3}$						
21	12	144	1728	20736	248832						
22	-12	144	-1728	20736	-248832						
23	14	196	2744	38416	537824						
24	16	256	4096	65536	1048576						
25	18	324	5832	104976	1889568						
26	20	400	8000	160000	3200000						
27	13	169	2197	28561	371293						
28	15	225	3375	50625	759375						
29	17	289	4913	83521	1419857						
30	19	361	6859	130321	2476099						

PROGRESSIONS

GEOMETRIC PROGRESSION

	a_1	Ratio	a_2	a_3	a_4	a_5	a_6
	a	r	a . r	$a.r^2$	$a.r^3$	$a.r^4$	$a.r^5$
1	1	2					
2	2	4					
3	3	6					
4	1	7					
5	3	5					
6	5	8					
7	7	-2					
8	5	9					
9	1	1					
10	2	8					
11	1	9					
12	1	0.5					
13	0.5	2					
14	3	1					
15	6	2					
16	1	-1					
17	-4	5					
18	3	2					
19	256	-0.5					
20	25	-0.2					
21	3	2					
22	64	-0.5					
23	6	3					
24	4	2					
25	-1	3					
26	2	-3					
27	2	4					
28	9	-4					
29	8	0.5					
30	12	-6					
31	9	3					
32	3	9					
33	-2	-2					
34	8	2.5					
35	7	3					

PROGRESSIONS

GEOMETRIC PROGRESSION

	a_1	Ratio	a_2	a_3	a_4	a_5	a_6
	a	r	a . r	$a.r^2$	$a.r^3$	$a.r^4$	$a.r^5$
1	2						2
2	2					32	
3		3			81		
4						256	1024
5				75		1875	
6		8					131072
7				20	-40		
8	5		20				
9						625	3125
10			14	98			
11	1						59049
12	1	0.5					
13	0.5						16
14	3	1					
15					32		128
16	1			1			
17	-4					-2500	
18	3					48	
19	256					16	
20	25					0.04	
21	9				72	144	
22	64					4	
23					162		
24	3				24		
25				-9			-243
26				18			-486
27			8		128		
28	9				-576		
29		0.5		1.75			
30	12		-72				
31				81	243		
32				243	2187		
33		-2	4				
34				6.25	15.625		
35	7						1701

Coordinate Geometry — Distance between two points

S.NO	Points	Distance between two points	ANS
	(x_1, y_1) ,(x_2, y_2)	$\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$	
1	(3,8) (6,8)		
2	(-4,-3) (-8,-3)		
3	(3,4) (3,8)		
4	(-5,-8) (-5,-12)		
5	(2,0) (0,4)		
6	(0,5) (12,0)		
7	(0,0) (7,4)		
8	(0,0) (x,y)		
9	(4,3) (8,6)		
10	(7,8) (-2,3)		
11	(-8,6) (2,0)		
12	(5,2) (-4,-1)		
13	(1,-3) (-4,4)		
14	(4,2) (7,5)		
15	(7,5) (9,7)		
16	(4,2) (9,7)		
17	(3,2) (-2,-3)		
18	(-2,-3) (2,3)		
19	(3,2) (2,3)		
20	(1,7) (4,2)		
21	(4,2) (-1,-1)		
22	(-1,-1) (-4,4)		
23	(-4,4) (1,7)		
24	(1,7) (-1,-1)		
25	(3,1) (6,4)		
26	(6,4) (8,6)		
27	(2,3) (4,1)		
28	(-5,7) (-1,3)		
29	(-2,-3) (3,2)		
30	(a,b) (-a,-b)		

S.NO	Points	Distance between two points	ANS
	(x_1, y_1) ,(x_2, y_2)	$\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$	
1	(1,5) (2,3)		
2	(2,3) (-2,-1)		
3	(-2,-1) (1,5)		
4	(5,-2) (7,-2)		
5	(2,0) (0,4)		
6	(5,-2) (6,4)		
7	(5,-2) (7,2)		
8	(6,4) (7,-2)		
9	(a,0) (-a,0)		
10	(-a,0) (0,a√3)		
11	(a,0) (0,a√3)		
12	(-7,-3) (5,10)		
13	(5,10) (15,8)		
14	(15,8) (3,-5)		
15	(-7,-3) (3,-5)		
16	(-7,-3) (15,8)		
17	(5,10) (3,-5)		
18	(-4,-7) (-1,2)		
19	(-1,2) (8,5)		
20	(8,5) (5,-4)		
21	(5,-4) (-4,-7)		
22	(-4,-7) (8,5)		
23	(-1,2) (5,-4)		
24	(1,7) (-1,-1)		
25	(-1,-2) (1,0)		
26	(1,0) (-1,2)		
27	(-1,2) (-3,0)		
28	(-3,0) (-1,-2)		
29	(-1,-2) (-1,2)		
30	(1,0) (-3,0)		

Coordinate Geometry Distance between two points

S.NO	Points	Distance between two points	ANS
	(x_1, y_1) ,(x_2, y_2)	$\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$	
1	(-3,5) (1,10)		
2	(1,10) (3,1)		
3	(3,1) (-1,-4)		
4	(-1,-4) (-3,5)		
5	(1,10) (-1,-4)		
6	(-3,5) (3,1)		
7	(5,-2) (7,-2)		
8	(6,4) (7,-2)		
9	(a,0) (-a,0)		
10	(-a,0) (0,a√3)		
11	(a,0) (0,a√3)		
12	(-7,-3) (5,10)		
13	(5,10) (15,8)		
14	(15,8) (3,-5)		
15	(-7,-3) (3,-5)		
16	(-7,-3) (15,8)		
17	(5,10) (3,-5)		
18	(-4,-7) (-1,2)		
19	(-1,2) (8,5)		
20	(8,5) (5,-4)		
21	(5,-4) (-4,-7)		
22	(-4,-7) (8,5)		
23	(-1,2) (5,-4)		
24	(1,7) (-1,-1)		
25	(-1,-2) (1,0)		
26	(1,0) (-1,2)		
27	(-1,2) (-3,0)		
28	(-3,0) (-1,-2)		
29	(-1,-2) (-1,2)		
30	(1,0) (-3,0)		

Coordinate Geometry FIND THE **SLOPE** OF THE FOLLOWING

S.NO	Points	SLOPE	ANS
	(x_1, y_1) ,(x_2, y_2)	**SLOPE (m)** = $\frac{y_2 - y_1}{x_2, - x_1,}$	
1	(3,8) (6,8)		
2	(-4,-3) (-8,-3)		
3	(3,4) (3,8)		
4	(-5,-8) (-5,-12)		
5	(2,0) (0,4)		
6	(0,5) (12,0)		
7	(0,0) (7,4)		
8	(0,0) (x,y)		
9	(4,3) (8,6)		
10	(7,8) (-2,3)		
11	(-8,6) (2,0)		
12	(5,2) (-4,-1)		
13	(1,-3) (-4,4)		
14	(4,2) (7,5)		
15	(7,5) (9,7)		
16	(4,2) (9,7)		
17	(3,2) (-2,-3)		
18	(-2,-3) (2,3)		
19	(3,2) (2,3)		
20	(1,7) (4,2)		
21	(4,2) (-1,-1)		
22	(-1,-1) (-4,4)		
23	(-4,4) (1,7)		
24	(1,7) (-1,-1)		
25	(3,1) (6,4)		
26	(6,4) (8,6)		
27	(2,3) (4,1)		
28	(-5,7) (-1,3)		
29	(-2,-3) (3,2)		
30	(a,b) (-a,-b)		

Coordinate Geometry FIND THE SLOPE OF THE FOLLOWING

S.NO	Points	SLOPE	S.NO	Points	
	(x_1, y_1) ,(x_2, y_2)	SLOPE (m) = $\frac{y_2-y_1}{x_2,-x_1,}$		(x_1, y_1) ,(x_2, y_2)	SLOPE (m) = $\frac{y_2-y_1}{x_2,-x_1,}$
1	(1,5) (2,3)		1	(-3,5) (1,10)	
2	(2,3) (-2,-1)		2	(1,10) (3,1)	
3	(-2,-1) (1,5)		3	(3,1) (-1,-4)	
4	(5,-2) (7,-2)		4	(-1,-4) (-3,5)	
5	(2,0) (0,4)		5	(1,10) (-1,-4)	
6	(5,-2) (6,4)		6	(-3,5) (3,1)	
7	(5,-2) (7,2)		7	(5,-2) (7,-2)	
8	(6,4) (7,-2)		8	(6,4) (7,-2)	
9	(a,0) (-a,0)		9	(a,0) (-a,0)	
10	(-a,0) (0,a√3)		10	(-a,0) (0,a√3)	
11	(a,0) (0,a√3)		11	(a,0) (0,a√3)	
12	(-7,-3) (5,10)		12	(-7,-3) (5,10)	
13	(5,10) (15,8)		13	(5,10) (15,8)	
14	(15,8) (3,-5)		14	(15,8) (3,-5)	
15	(-7,-3) (3,-5)		15	(-7,-3) (3,-5)	
16	(-7,-3) (15,8)		16	(-7,-3) (15,8)	
17	(5,10) (3,-5)		17	(5,10) (3,-5)	
18	(-4,-7) (-1,2)		18	(-4,-7) (-1,2)	
19	(-1,2) (8,5)		19	(-1,2) (8,5)	
20	(8,5) (5,-4)		20	(8,5) (5,-4)	
21	(5,-4) (-4,-7)		21	(5,-4) (-4,-7)	
22	(-4,-7) (8,5)		22	(-4,-7) (8,5)	
23	(-1,2) (5,-4)		23	(-1,2) (5,-4)	
24	(1,7) (-1,-1)		24	(1,7) (-1,-1)	
25	(-1,-2) (1,0)		25	(-1,-2) (1,0)	
26	(1,0) (-1,2)		26	(1,0) (-1,2)	
27	(-1,2) (-3,0)		27	(-1,2) (-3,0)	
28	(-3,0) (-1,-2)		28	(-3,0) (-1,-2)	
29	(-1,-2) (-1,2)		29	(-1,-2) (-1,2)	
30	(1,0) (-3,0)		30	(1,0) (-3,0)	

Coordinate Geometry

Find the mid point of the following.

S.NO	Points	MID POINT	ANS
	(x_1, y_1) ,(x_2, y_2)	MID POINT= $\left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right)$	
1	(3,8) (6,8)		
2	(-4,-3) (-8,-3)		
3	(3,4) (3,8)		
4	(-5,-8) (-5,-12)		
5	(2,0) (0,4)		
6	(0,5) (12,0)		
7	(0,0) (7,4)		
8	(0,0) (x,y)		
9	(4,3) (8,6)		
10	(7,8) (-2,3)		
11	(-8,6) (2,0)		
12	(5,2) (-4,-1)		
13	(1,-3) (-4,4)		
14	(4,2) (7,5)		
15	(7,5) (9,7)		
16	(4,2) (9,7)		
17	(3,2) (-2,-3)		
18	(-2,-3) (2,3)		
19	(3,2) (2,3)		
20	(1,7) (4,2)		
21	(4,2) (-1,-1)		
22	(-1,-1) (-4,4)		
23	(-4,4) (1,7)		
24	(1,7) (-1,-1)		
25	(3,1) (6,4)		
26	(6,4) (8,6)		
27	(2,3) (4,1)		
28	(-5,7) (-1,3)		
29	(-2,-3) (3,2)		
30	(a,b) (-a,-b)		

Coordinate Geometry

Find the mid point of the following.

S.NO	Points (x_1, y_1) (x_2, y_2)	MID POINT $(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2})$	S.NO	Points (x_1, y_1) (x_2, y_2)	MID POINT $(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2})$
1	(1,5) (2,3)		1	(-3,5) (1,10)	
2	(2,3) (-2,-1)		2	(1,10) (3,1)	
3	(-2,-1) (1,5)		3	(3,1) (-1,-4)	
4	(5,-2) (7,-2)		4	(-1,-4) (-3,5)	
5	(2,0) (0,4)		5	(1,10) (-1,-4)	
6	(5,-2) (6,4)		6	(-3,5) (3,1)	
7	(5,-2) (7,2)		7	(5,-2) (7,-2)	
8	(6,4) (7,-2)		8	(6,4) (7,-2)	
9	(a,0) (-a,0)		9	(a,0) (-a,0)	
10	(-a,0) (0,a√3)		10	(-a,0) (0,a√3)	
11	(a,0) (0,a√3)		11	(a,0) (0,a√3)	
12	(-7,-3) (5,10)		12	(-7,-3) (5,10)	
13	(5,10) (15,8)		13	(5,10) (15,8)	
14	(15,8) (3,-5)		14	(15,8) (3,-5)	
15	(-7,-3) (3,-5)		15	(-7,-3) (3,-5)	
16	(-7,-3) (15,8)		16	(-7,-3) (15,8)	
17	(5,10) (3,-5)		17	(5,10) (3,-5)	
18	(-4,-7) (-1,2)		18	(-4,-7) (-1,2)	
19	(-1,2) (8,5)		19	(-1,2) (8,5)	
20	(8,5) (5,-4)		20	(8,5) (5,-4)	
21	(5,-4) (-4,-7)		21	(5,-4) (-4,-7)	
22	(-4,-7) (8,5)		22	(-4,-7) (8,5)	
23	(-1,2) (5,-4)		23	(-1,2) (5,-4)	
24	(1,7) (-1,-1)		24	(1,7) (-1,-1)	
25	(-1,-2) (1,0)		25	(-1,-2) (1,0)	
26	(1,0) (-1,2)		26	(1,0) (-1,2)	
27	(-1,2) (-3,0)		27	(-1,2) (-3,0)	
28	(-3,0) (-1,-2)		28	(-3,0) (-1,-2)	
29	(-1,-2) (-1,2)		29	(-1,-2) (-1,2)	
30	(1,0) (-3,0)		30	(1,0) (-3,0)	

Coordinate Geometry

Find the AREA of the following.

S.NO	(x_1, y_1) ,$(x_2, y_2)(x_3, y_3)$	AREA OF A TRIANGLE= $\frac{1}{2}\|x_1(y_2-y_3)+\|x_2(y_3-y_1)+x_3(y_1-y_2)$	ANS SQ UNITS
1	(1,-1),(-4,6),(-3,-5)		
2	(5,2),(4,7),(7,-4)		
3	(5,2),(3,-5),(-5,-1)		
4	(6,-6),(3,-7),(3,3)		
5	(-5,7),(-4,-5),(-1,-6)		
6	(-5,7), (-1,-6)(4,5)		
7	(0,-1),(2,1),(0,3)		
8	(0,-1) ,(0,3), (-2,1)		
9	(2,0),(1,2),(1,6)		
10	(3, 1),(5,0),(1,2)		
11	(1,-1),(-4,6),(-3,-5)		
12	(-1.5,3),(6,2),(-3,4)		
13	(1,-1),(4,1),(-2,-3)		
14	(1,-1),(2,3),(2,0)		
15	(1,-6),(3,-4),(4,-3)		

Coordinate Geometry

Find the AREA of the following.

S.NO	(x_1, y_1) ,$(x_2, y_2)(x_3, y_3)$	AREA OF A TRIANGLE= $\frac{1}{2}\|x_1(y_2-y_3)+\|x_2(y_3-y_1)+x_3(y_1-y_2)$	ANS SQ UNITS
1	(1,2),(-1,-1),(-3,-4)		
2	(2,3),(-1,0),(2,-4)		
3	(-5,-1),(3,-5),(5,2)		
4	(0,0),(3,0),(0,2)		
5	(7,-2),(5,1),(3,4)		
6	(8,1), (3,-4)(2,-5)		
7	(5,0),(0,0),(6,0)		
8	(-5,0),(0,0),(-6,0)		
9	(-5,0),(0,0),(6,0)		
10	(5,0),(0,0),(-6,0)		
11	(a,0),(0,0),(b,0)		
12	(x,0),(0,0),(y,0)		
13	(8,0),(0,0),(4,0)		
14	(-8,0),(0,0),(-4,0)		
15	(8,0),(0,0),(-4,0)		

Coordinate Geometry

Find the CENTROID of the following.

S.NO	(x_1, y_1) ,$(x_2, y_2)(x_3, y_3)$	CENTROID (x,y)= $\left(\frac{x_1+x_2+x_3}{3}, \frac{y_1+y_2+y_3}{3}\right)$	ANS
1	(1,-1),(-4,6),(-3,-5)		
2	(5,2),(4,7),(7,-4)		
3	(5,2),(3,-5),(-5,-1)		
4	(6,-6),(3,-7),(3,3)		
5	(-5,7),(-4,-5),(-1,-6)		
6	(-5,7), (-1,-6)(4,5)		
7	(0,-1),(2,1),(0,3)		
8	(0,-1) ,(0,3), (-2,1)		
9	(2,0),(1,2),(1,6)		
10	(3, 1),(5,0),(1,2)		
11	(1,-1),(-4,6),(-3,-5)		
12	(-1.5,3),(6,2),(-3,4)		
13	(1,-1),(4,1),(-2,-3)		
14	(1,-1),(2,3),(2,0)		
15	(1,-6),(3,-4),(4,-3)		

Coordinate Geometry

Find the CENTROID of the following.

S.NO	(x_1, y_1) ,$(x_2, y_2)(x_3, y_3)$	CENTROID = (x,y) = ($\frac{x_1+x_2+x_3}{3}$, $\frac{y_1+y_2+y_3}{3}$)	ANS
1	(1,2),(-1,-1),(-3,-4)		
2	(2,3),(-1,0),(2,-4)		
3	(-5,-1),(3,-5),(5,2)		
4	(0,0),(3,0),(0,2)		
5	(7,-2),(5,1),(3,4)		
6	(8,1), (3,-4)(2,-5)		
7	(5,0),(0,0),(6,0)		
8	(-5,0),(0,0),(-6,0)		
9	(-5,0),(0,0),(6,0)		
10	(5,0),(0,0),(-6,0)		
11	(a,0),(c,0),(b,0)		
12	(x,0),(0,0),(y,0)		
13	(8,0),(6,0),(4,0)		
14	(-8,0),(0,0),(-4,0)		
15	(8,0),(0,0),(-4,0)		

Coordinate Geometry Section formula.

Find the point which divides the line segment joining the points internally in the ratio given below.

S.NO	Coordinates (x_1, y_1) ,(x_2, y_2)	Ratio $m_1 : m_2$	P(x,y) = ($\frac{m_1 x_2 + m_2 x_1}{m_1 + m_2}$, $\frac{m_1 y_2 + m_2 y_1}{m_1 + m_2}$)	P(x,y)
1	$(4, -3)$,$(8, 5)$	3:1		
2	$(3, 0)$,$(-1, 4)$	1:1		
3	$(3, 5)$,$(8, 10)$	2:3		
4	$(2, 7)$,$(12, -7)$	1:1		
5	$(4, 2)$,$(6, 5)$	2:1		
6	$(6, 5)$,$(1, 4)$	2:1		
7	$(1, 4)$,$(4, 2)$	2:1		
8	$(-6, 10)$,$(3, -8)$	2:7		
9	$(2, -2)$,$(-7, 4)$	2:1		
10	$(2, -2)$,$(-7, 4)$	1:2		
11	$(2, 6)$,$(-4, 8)$	2:1		
12	$(2, 6)$,$(-4, 8)$	1:2		
13	$(-3, -5)$,$(-6, -8)$	2:1		
14	$(-3, -5)$,$(-6, -8)$	1:2		
15	$(-1, 7)$,$(4, -3)$	2:3		

Coordinate Geometry Section formula.

Find the point which divides the line segment joining the points internally in the ratio given below.

S.NO	Coordinates (x_1, y_1) ,(x_2, y_2)	Ratio $m_1:m_2$	P(x,y) = $\left(\frac{m_1 x_2 + m_2 x_1}{m_1 + m_2}, \frac{m_1 y_2 + m_2 y_1}{m_1 + m_2}\right)$	P(x,y)
1	$(4, -1)$,$(-2, -3)$	2:1		
2	$(4, -1)$,$(-2, -3)$	1:2		
3	$(-3, 10)$,$(6, -8)$	2:7		
4	$(-2, -2)$,$(2, -4)$	3:4		
5	$(-2, -2)$,$(2, -4)$	4:3		
6	$(-4, 0)$,$(0, -6)$	1:1		
7	$(-4, 0)$,$(0, -6)$	2:2		
8	$(-4, 0)$,$(0, -6)$	3:3		
9	$(-2, 2)$,$(2, 8)$	1:1		
10	$(2, -2)$,$(-7, 4)$	2:2		
11	$(a + b, a - b)$,$(a - b, a - b)$	3:2		
12	$(2, 6)$,$(-4, 8)$	3:2		
13	$(-3, -5)$,$(-6, -8)$	2:3		
14	$(-3, -5)$,$(-6, -8)$	5:2		
15	$(-1, 7)$,$(4, -3)$	2:5		

Coordinate Geometry FIND THE SLOPE OF THE FOLLOWING

S.NO	Points	y-coordinates		$y_2 - y_1$	x-coordinates		$x_2 - x_1$	Slope(m) = $\frac{y_2 - y_1}{x_2 - x_1}$
		y_1	y_2		x_1,	x_2,		
	(x_1, y_1) ,(x_2, y_2)	y_1	y_2	$y_2 - y_1$	x_1,	x_2,	$x_2 - x_1$	$\frac{y_2 - y_1}{x_2 - x_1}$
1	(3,8) (6,8)							
2	(-4,-3) (-8,-3)							
3	(3,4) (3,8)							
4	(-5,-8) (-5,-12)							
5	(2,0) (0,4)							
6	(0,5) (12,0)							
7	(0,0) (7,4)							
8	(0,0) (x,y)							
9	(4,3) (8,6)							
10	(7,8) (-2,3)							
11	(-8,6) (2,0)							
12	(5,2) (-4,-1)							
13	(1,-3) (-4,4)							
14	(4,2) (7,5)							
15	(7,5) (9,7)							
16	(4,2) (9,7)							
17	(3,2) (-2,-3)							
18	(-2,-3) (2,3)							
19	(3,2) (2,3)							
20	(1,7) (4,2)							
21	(4,2) (-1,-1)							
22	(-1,-1) (-4,4)							
23	(-4,4) (1,7)							
24	(1,7) (-1,-1)							
25	(3,1) (6,4)							
26	(6,4) (8,6)							
27	(2,3) (4,1)							
28	(-5,7) (-1,3)							
29	(-2,-3) (3,2)							
30	(a,b) (-a,-b)							

Coordinate Geometry FIND THE SLOPE OF THE FOLLOWING

S.NO	Points (x_1, y_1) ,(x_2, y_2)	SLOPE SLOPE (m) = $\frac{y_2-y_1}{x_2-x_1}$	S.NO	Points (x_1, y_1) ,(x_2, y_2)	SLOPE SLOPE (m) = $\frac{y_2-y_1}{x_2-x_1}$
1	(1,5) (2,3)		1	(-3,5) (1,10)	
2	(2,3) (-2,-1)		2	(1,10) (3,1)	
3	(-2,-1) (1,5)		3	(3,1) (-1,-4)	
4	(5,-2) (7,-2)		4	(-1,-4) (-3,5)	
5	(2,0) (0,4)		5	(1,10) (-1,-4)	
6	(5,-2) (6,4)		6	(-3,5) (3,1)	
7	(5,-2) (7,2)		7	(5, 2) (7,-2)	
8	(6,4) (7,-2)		8	(6,4) (7, 2)	
9	(a,0) (-a,0)		9	(a,0) (a,0)	
10	(-a,0) (0,a√3)		10	(a,0) (0,a√3)	
11	(a,0) (0,a√3)		11	(-a,0) (0,a√3)	
12	(-7,-3) (5,10)		12	(-7, 3) (5,10)	
13	(5,10) (15,8)		13	(-5,10) (15,8)	
14	(15,8) (3,-5)		14	(15,8) (-3,-5)	
15	(-7,-3) (3,-5)		15	(-7,-3) (-3,-5)	
16	(-7,-3) (15,8)		16	(-7,-3) (-15,8)	
17	(5,10) (3,-5)		17	(5,10) (-3,-5)	
18	(-4,-7) (-1,2)		18	(-4, 7) (-1,2)	
19	(-1,2) (8,5)		19	(-1,2) (-8,5)	
20	(8,5) (5,-4)		20	(8,5) (-5,-4)	
21	(5,-4) (-4,-7)		21	(-5,-4) (-4,-7)	
22	(-4,-7) (8,5)		22	(-4,-7) (-8,5)	
23	(-1,2) (5,-4)		23	(-1,2) (-5,-4)	
24	(1,7) (-1,-1)		24	(-1,7) (-1,-1)	
25	(-1,-2) (1,0)		25	(-1,-2) (-1,0)	
26	(1,0) (-1,2)		26	(-1,0) (-1,2)	
27	(-1,2) (-3,0)		27	(-1,-2) (-3,0)	
28	(-3,0) (-1,-2)		28	(3,0) (-1,-2)	
29	(-1,-2) (-1,2)		29	(-1, 2) (-1,2)	
30	(1,0) (-3,0)		30	(1,0) (3,0)	

Similar Triangles 8

Two polygons of the same number of sides are similar if their corresponding angles are equal **and their corresponding sides are in the same ratio or proportion.**

A polygon in which all sides and angles are equal is called a regular polygon.

All squares are similar, all equalateral triangles are similar

Circles with same radius are congruent and those with different radii are not congruent.

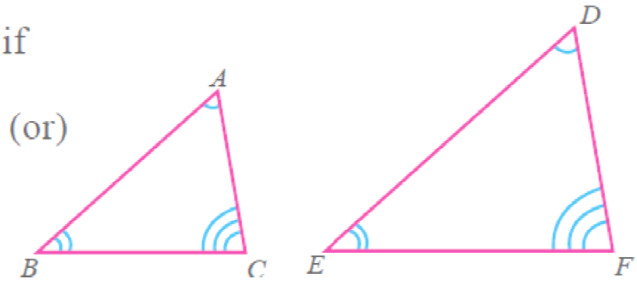
But, as all circles have same shape, they are all similar.

We can say that all congruent figures are similar but all similar figures need not be congruent.

two triangles $\triangle ABC$ and $\triangle DEF$ are similar if

(i) $\angle A = \angle D,\ \angle B = \angle E,\ \angle C = \angle F$ (or)

(ii) $\frac{AB}{DE} = \frac{BC}{EF} = \frac{CA}{FD}$.

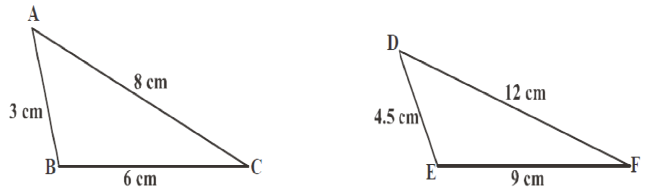


A, B and C correspond to the vertices D, E and F respectively.

Symbolically, we write the similarity of these two triangles as $\Delta ABC \sim \Delta DEF$ and read it

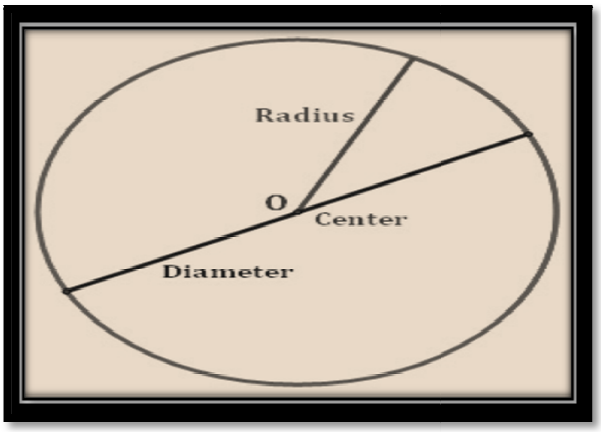
as ΔABC is similar to ΔDEF. The symbol '~' stands for 'is similar to'

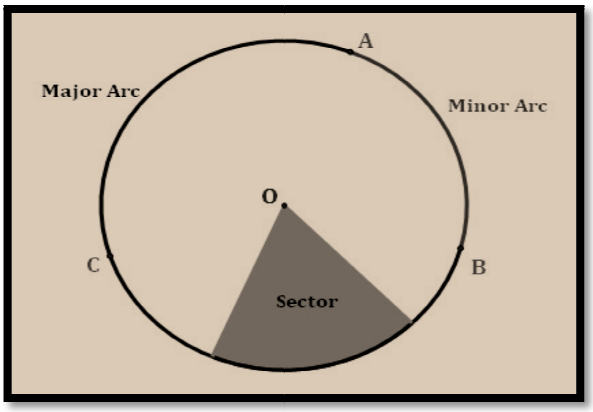
SIMILARITY OF TRIANGLES

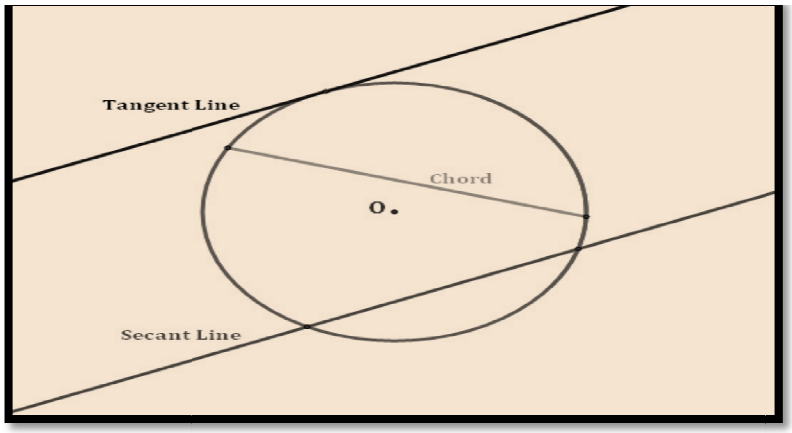
1	ABC and DEF such that AB = 3 cm, BC = 6 cm, CA = 8 cm, DE = 4.5 cm, EF = 9 cm and FD = 12 cm. 	$\frac{AB}{DE} = \frac{3}{4.5} = \frac{2}{3}$ $\frac{BC}{EF} = \frac{6}{9} = \frac{2}{3}$ $\frac{AC}{DF} = \frac{8}{12} = \frac{2}{3}$ $\frac{AB}{DE} = \frac{BC}{EF} = \frac{AC}{DF}$ The triangles are similar
2	ABC and DEF such that AB = 9 cm, BC = 6 cm, CA = 8 cm, DE = 4.5 cm, EF = 9 cm and FD = 12 cm	

3	ABC and DEF such that AB = 9 cm, BC = 6 cm, CA = 8 cm, DE = 4.5 cm, EF = 3 cm and FD = 4 cm	
4	XYZ and DEF such that XY = 9 cm, YZ = 6 cm, XZ= 8 cm, DE = 4.5 cm, EF = 5 cm and FD = 4 cm	
5		
6		

Parts of Circles







Center – the middle of the circle. All points on the circle bare the same distance from the center.

Radius – A line segment with one endpoint at the center and the other endpoint on the circle. The term "radius" is also used to refer to the distance from the center to the points on the circle.

Diameter – A line segment with endpoints on the circle that passes through the center.

Arc – A path along a circle.

Minor Arc – A path along the circle that is less than 180^{o}.

Major Arc – A path along the circle that is greater than 180^{o}.

Semicircle – A path along a circle that equals 180^{o}.

Sector – A region inside a circle that is bounded by two radii and an arc.

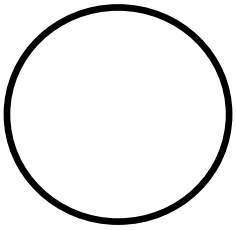
Secant Line – A line that intersects the circle in exactly two points.

Tangent Line– A line that intersects the circle in exactly one point.

Chord – A line segment with endpoints on the circle that does not pass through the center.

CIRCLE

r = Radius = d = Diameter = ; $r = \frac{d}{2}$ (or) d =2 r



Area of a Circle = π r ²

Circumference of a Circle = 2 π r (or) π d

S.NO	r = Radius cm	d=2r =Diameter cm	Circumference of a Circle = 2 π r (or) π d cm	Area of a Circle = π r ² Sq cm
1	14			
2	7			
3	21			
4		7		
5	3.5			
6	9			
7		4		
8	5			
9		12		
10	7			
11	8			
12		20		
13	9			
14	12			
15		22		
16	13			
17		28		
18	15			
19	16			
20		32		
21	20			
22		36		
23	15			
24	14			
25		56		

SEMI CIRCLE

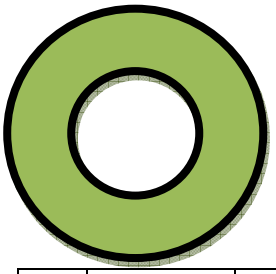
r = Radius = d = Diameter =

Area of a Semi Circle = $\frac{\pi r^2}{2}$

Circumference of a Semi Circle = $\pi r + 2 r$ (or) $\frac{36}{7} r$

	r Radius cm	d Diameter cm	Circumference of a Circle = 2 π r (or) π d cm	Area of a Circle = π r ² Sq cm
1	14			
2	7			
3	21			
4	7.7			
5	3.5			
6	9			
7	4			
8	5			
9	6			
10	77			
11	8			
12		20		
13	9			
14	12			
15	11			
16	13			
17	14			
18	15			
19		32		
20	16			
21	20			
22	18			
23	15			
24		28		
25	28			

Area of a Circular Path or Area of a ring

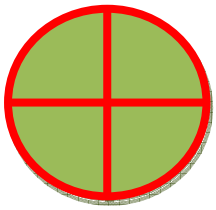


The Area of the circular path is the difference of Area of outer circle and inner circle

Area of the circular path = Area of outer circle – Area of inner circle

$$= \Pi R^2 - \Pi r^2 = \Pi (R^2 - r^2) = \Pi (R+r)(R-r)$$

	R Radius cm	r Radius cm	Area of the circular path= $\Pi (R^2 - r^2)$ Sq cm	Area of the circular path= $\Pi (R+r)(R-r)$ Sq cm
1	14	7		
2	21	14		
3	35	28		
4	28	14		
5	X	y		
6	70	7		
7	70	42		
8	7	3.5		
9	14	10.5		
10	21	17.5		
11	8	1		
12	16	2		
13	16	9		
14	9	2		
15	19	5		



Length of the arc $(l) = \frac{x}{360^0} \times 2\pi r$

Area of Sector $= \frac{x}{360^0} \times \pi r^2$

where x° is the angle subtended by the arc of the sector

Surface Areas and Volumes

	x°	r	**Length of the arc** $(l) = \frac{x}{360^0} \times 2\pi r$	**Area of Sector** $= \frac{x}{360^0} \times \pi r^2$
1	60°	21		
2	90°	14		
3	120°	21		
4	180°	7		
5	360°	7		
6	45°	28		
7	270°	14		
8	30°	42		
9				
10				

Surface Areas and Volumes

1. Cuboid and cube are regular prisms having six faces and of which four are lateral faces and the base and top.
2. If length of **cuboid** is ***l,*** breadth is '***b***' and height is '***h***' then,

Total surface area of a cuboid $= 2(lb + bh + lh)$

Lateral surface area of a cuboid $= 2h(l + b)$

Volume of a cuboid $= lbh$

3. If the length of the edge of a **cube** is '*l*' units, then

Total surface area of a cube $= 6l^2$

Lateral surface area of a cube $= 4l^2$

Volume of a cube $= l^3$

4. The volume of a **pyramid** is $\frac{1}{3}$ rd volume of a right prism if both have the same base and same height.
5. A cylinder is a solid having two circular ends with a curved surface area. If the line segment joining the centres of base and top is perpendicular to the base, it is called right circular cylinder.
6. If the radius of right circular **cylinder** is **'r'** and height is '**h**' then;

Curved surface area of a cylinder $= 2\pi r h$

Total surface area of a cylinder $= 2\pi r (r + h)$

Volume of a cylinder $= \pi r^2 h$

7. Cone is a geometrical shaped object with circle as base, having a vertext at the top If the line segment joining the vertex to the centre of the base is perpendicular to the base, it is called right circular cone.
8. The length joining the vertex to any point on the circular base of the cone is called slant height (*l*) $l^2 = h^2 + r^2$
9. If **'r'** is the radius, **'h'** is the height, **'*l*'** is the slant height of a **cone**, then

Curved surface area of a cone $= \pi r l$

Total surface area of a cone $= \pi r (r + l)$

10. The volume of a cone is $\frac{1}{3}$ rd the volume of a cylinder of the same base and same height volume of a cone $= \frac{1}{3}\pi r^2 h$
11. A sphere is an geometrical object formed where the set of points are equidistant from the fixed point in the space. The fixed point is called centre of the sphere and the fixed distance is called radius of the sphere.
12. If the radius of **sphere** is 'r' then,

Surface area of a sphere $= 4\pi r^2$

Volume of a sphere $= \frac{4}{3}\pi r^3$

13. A plane through the centre of a sphere divides it into two equal parts, each of which is called a **hemisphere**.

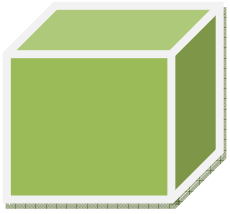
Curved surface area of a hemisphere $= 2\pi r^2$

Total surface area of a hemisphere $= 3\pi r^2$

Volume of a hemisphere $= \frac{2}{3}\pi r^3$

CUBE

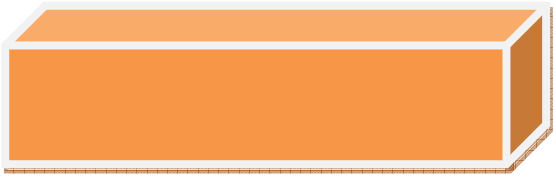
No of Vertices = 8	Lateral Surface Area = $4 S^2$
No of Edges = 12	Total surface Area = $6 S^2$
No of Faces = 6	Volume = S^3



side

S.NO	Side In CM	Lateral Surface Area $4 S^2$	Total surface Area $6 S^2$	Volume S^3
1	4			
2	5			
3	6			
4	7			
5	8			
6		324		
7		400		
8		484		
9		576		
10		676		
11			1176	
12			1350	
13			1536	
14			1734	
15			1944	
16				6859
17				8000
18				9261
19				10648
20				12167
21		2304		
22		2500		
23		2704		
24	27			
25	28			
26			5046	
27			5400	
28			5766	
29				32768
30				35937

CUBOID

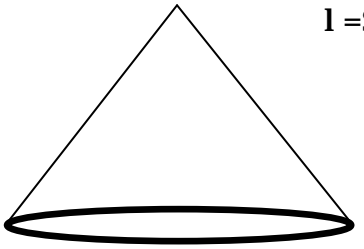


l = Length
b = Breadth
h = Height

No of Vertices = 8	Lateral Surface Area = 2 h (l + b)
No of Edges = 12	Total surface Area = 2 (lb + b h + h l)
No of Faces = 6	Volume = l x b x h = lbh

S. NO	Length	Breadth	Height	Lateral Surface Area	Total surface Area	Volume
	in CM	in CM	in CM	2 h (l + b)	2 (lb + b h + h l)	l x b x h
	l	b	h	Area in Sq cm (or) cm²	Area in Sq cm (or) cm²	Area in Cubic cm (or) cm³
1	2	3	4			
2	3	2	4			
3	4	5	6			
4	1	3	5			
5	2	5	4			
6	3	6		90		
7	4	7		44		
8	7	4		44		
9	7	6		130		
10	8	2		120		
11	9		5	110		
12	2		9	144		
13	1		5	100		
14	5		8	112		
15	2		8	176		
16		10	6			60
17	10		10			500
18	15	12				1800
19	5		15			750
20		6	9			162
21		8	12			384
22	6	12				1296
23	7	14				2058
24	8		24			3072
25	10		30			6000

CONE



l =Slant= h = height= r = radius= ; $\pi = \frac{22}{7}$

Slant Height of the cone l $= \sqrt{h^2 + r^2}$

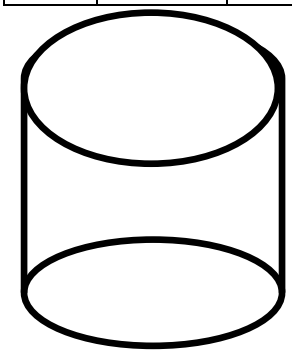
Curved Surface area of the cone = A = π r l

Total Surface area of the cone = π r (l + r)

Volume v = $\frac{1}{3}$ π r² h

S.NO	l Slant	h height	r radius	Curved Surface area A = π r l	Total Surface area π r (l + r)	Volume $\frac{1}{3}$ π r² h
	C.M	C.M	C.M	C.M²/ Square C.M	C.M²/ Square C.M	C.M³/ Cubic C.M
1	14	6	7			
2	7	9	14			
3	21	3	7			
4	7	6	21			
5	3.5	6	3.5			
6	9	12	14			
7	4	3	21			
8	5	3	14			
9	6	6	7			
10	7	6	28			

CYLINDER



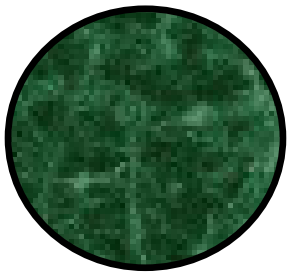
r = radius = ;h = height= ; $\pi = \frac{22}{7}$

Curved Surface area of a Cylinder = 2 π r h

Total Surface area of a Cylinder = 2 π r (r + h)

Volume of a Cylinder = π r ² h

S.NO	RADIUS	Height	Curved Surface area of a Cylinder = 2 π r h	Total Surface area of a Cylinder = 2 π r (r + h)	Volume of a Cylinder = π r ² h
1	7	6			
2	9	7			
3	14	7			
4	7	14			
5	21	14			
6	14	21			
7	7	12			
8	12	7			
9	14	11			
10	11	14			



SPHERE

r = radius = $\pi = \frac{22}{7}$

Surface area of a sphere $= 4\pi r^2$

Volume of a sphere $= \frac{4}{3}\pi r$

S.NO	r = radius	Surface area of a sphere $= 4\pi r^2$	Volume of a sphere $= \frac{4}{3}\pi r^3$
	C.M	C.M²/ Square C.M	C.M³/ Cubic C.M
1	14		
2	7		
3	21		
4	7		
5	3.5		
6	9		
7	4		
8	5		
9	6		
10	7		

HEMISPHERE

r = radius = $\pi = \frac{22}{7}$

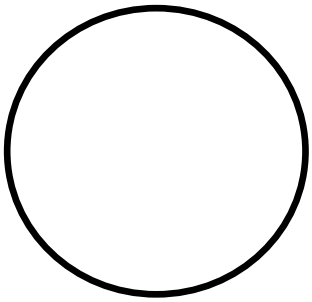
Surface area of a hemisphere $= 2\pi r^2$

Total Surface area of a hemisphere $= 3\pi r^2$

Volume of a hemisphere $= \frac{2}{3}\pi r^3$

S.NO	r=radius	Surface area of a hemisphere $= 2\pi r^2$	Surface area of a sphere $= 3\pi r^2$	Volume of a sphere $= \frac{2}{3}\pi r^3$
	C.M	C.M²/ Square C.M	C.M²/ Square C.M	C.M³/ Cubic C.M
1	14			
2	7			
3	21			
4	7			
5	3.5			
6	9			
7	4			
8	5			
9	6			
10	7			

CIRCLE



r = Radius d = Diameter = r ; $r = \frac{d}{2}$ (or) d =2 r

Area of a Circle = πr^2

Circumference of a Circle = $2 \pi r$ (or) πd

S.NO	r = Radius cm	d=2r =Diameter cm	Circumference of a Circle = $2 \pi r$ (or) πd = cm	Area of a Circle = πr^2 Sq cm
1	14			
2	7			
3	21			
4	7			
5	3.5			
6	9			
7	4			
8	5			
9	6			
10	7			

SEMI CIRCLE

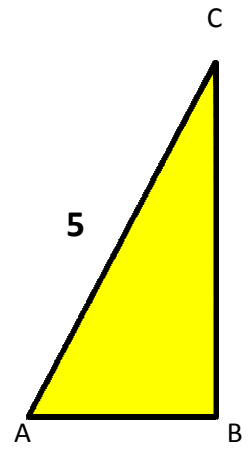
r = Radius = d = Diameter =

Area of a Semi Circle = $\frac{\pi r^2}{2}$

Circumference of a Semi Circle = $\pi r + 2 r$ (or) $\frac{36}{7} r$

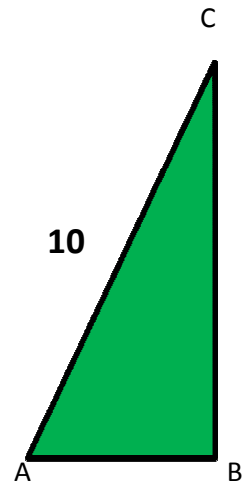
S.NO	r Radius cm	d Diameter cm	Circumference of a Circle = $2 \pi r$ (or) πd cm	Area of a Circle = πr^2 Sq cm
1	14			
2	7			
3	21			
4	7			
5	3.5			
6	9			
7	4			
8	5			
9	6			
10	7			

Trigonometry



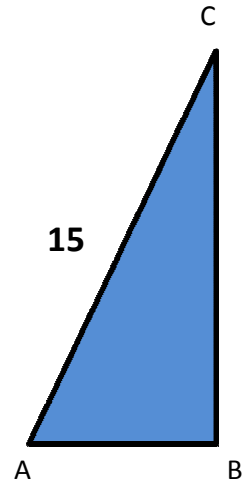
ANGLE θ AT A

SIN θ	Opposite side	Hypotenuse
COS θ	Adjacent side	Hypotenuse
TAN θ	Opposite side	Adjacent side
COSEC θ	Hypotenuse	Opposite side
SEC θ	Hypotenuse	Adjacent side
COT θ	Adjacent side	Opposite side



ANGLE θ AT A

SIN θ	Opposite side	Hypotenuse
COS θ	Adjacent side	Hypotenuse
TAN θ	Opposite side	Adjacent side
COSEC θ	Hypotenuse	Opposite side
SEC θ	Hypotenuse	Adjacent side
COT θ	Adjacent side	Opposite side

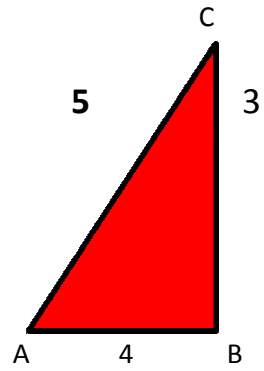


ANGLE θ AT A

SIN θ	Opposite side	Hypotenuse
COS θ	Adjacent side	Hypotenuse
TAN θ	Opposite side	Adjacent side
COSEC θ	Hypotenuse	Opposite side
SEC θ	Hypotenuse	Adjacent side
COT θ	Adjacent side	Opposite side

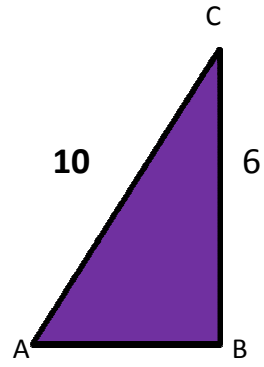
NOTE : PUT A,B,C OR X,Y,Z OR P,Q,R NAME OF THE VERTICES

Trigonometry



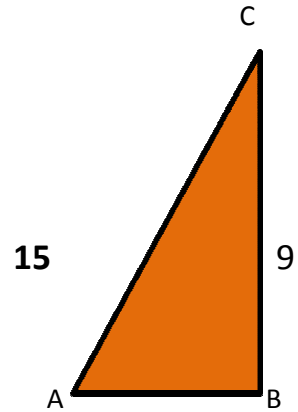
ANGLE θ AT A

SIN θ	Opposite side	
	Hypotenuse	
COS θ	Adjacent side	
	Hypotenuse	
TAN θ	Opposite side	
	Adjacent side	
COSEC θ	Hypotenuse	
	Opposite side	
SEC θ	Hypotenuse	
	Adjacent side	
COT θ	Adjacent side	
	Opposite side	



ANGLE θ AT A

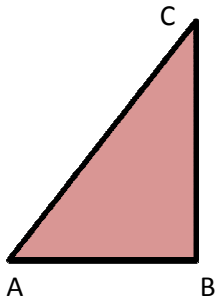
SIN θ	Opposite side	
	Hypotenuse	
COS θ	Adjacent side	
	Hypotenuse	
TAN θ	Opposite side	
	Adjacent side	
COSEC θ	Hypotenuse	
	Opposite side	
SEC θ	Hypotenuse	
	Adjacent side	
COT θ	Adjacent side	
	Opposite side	



ANGLE θ AT A

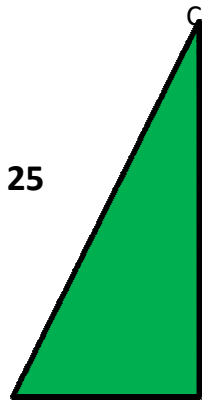
SIN θ	Opposite side	
	Hypotenuse	
COS θ	Adjacent side	
	Hypotenuse	
TAN θ	Opposite side	
	Adjacent side	
COSEC θ	Hypotenuse	
	Opposite side	
SEC θ	Hypotenuse	
	Adjacent side	
COT θ	Adjacent side	
	Opposite side	

Trigonometry



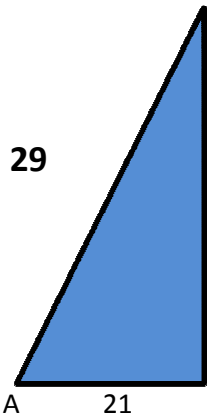
ANGLE θ AT A

SIN θ	Opposite side	
	Hypotenuse	
COS θ	Adjacent side	
	Hypotenuse	
TAN θ	Opposite side	
	Adjacent side	
COSEC θ	Hypotenuse	
	Opposite side	
SEC θ	Hypotenuse	
	Adjacent side	
COT θ	Adjacent side	
	Opposite side	



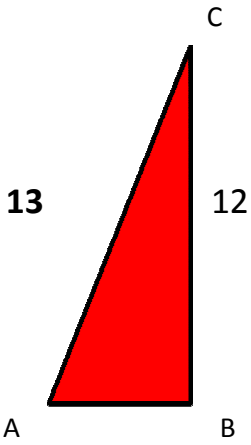
ANGLE θ AT A

SIN θ	Opposite side	
	Hypotenuse	
COS θ	Adjacent side	
	Hypotenuse	
TAN θ	Opposite side	
	Adjacent side	
COSEC θ	Hypotenuse	
	Opposite side	
SEC θ	Hypotenuse	
	Adjacent side	
COT θ	Adjacent side	
	Opposite side	



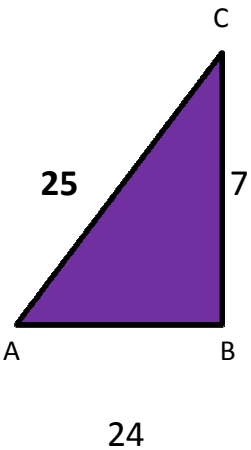
ANGLE θ AT A

SIN θ	Opposite side	
	Hypotenuse	
COS θ	Adjacent side	
	Hypotenuse	
TAN θ	Opposite side	
	Adjacent side	
COSEC θ	Hypotenuse	
	Opposite side	
SEC θ	Hypotenuse	
	Adjacent side	
COT θ	Adjacent side	
	Opposite side	



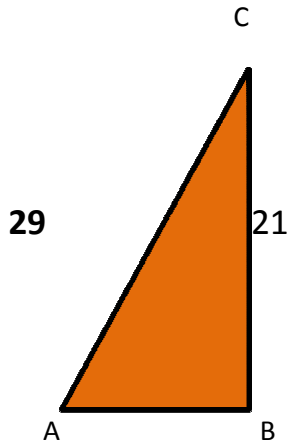
ANGLE θ AT A

SIN θ	Opposite side	Hypotenuse
COS θ	Adjacent side	Hypotenuse
TAN θ	Opposite side	Adjacent side
COSEC θ	Hypotenuse	Opposite side
SEC θ	Hypotenuse	Adjacent side
COT θ	Adjacent side	Opposite side



ANGLE θ AT A

SIN θ	Opposite side	Hypotenuse
COS θ	Adjacent side	Hypotenuse
TAN θ	Opposite side	Adjacent side
COSEC θ	Hypotenuse	Opposite side
SEC θ	Hypotenuse	Adjacent side
COT θ	Adjacent side	Opposite side



ANGLE θ AT A

SIN θ	Opposite side	Hypotenuse
COS θ	Adjacent side	Hypotenuse
TAN θ	Opposite side	Adjacent side
COSEC θ	Hypotenuse	Opposite side
SEC θ	Hypotenuse	Adjacent side
COT θ	Adjacent side	Opposite side

Trigonometry

Opposite side	Adjacent side	Hypotenuse	SIN θ	O.S / HY	COS θ	A.S / HY	TAN θ	O.S / A.S	COSEC θ	HY / O.S	SEC θ	HY / A.S	COT θ	A.S / O.S
3	4	5	SIN θ	_ / _	COS θ	_ / _	TAN θ	_ / _	COSEC θ	_ / _	SEC θ	_ / _	COT θ	_ / _
4	3	5	SIN θ	_ / _	COS θ	_ / _	TAN θ	_ / _	COSEC θ	_ / _	SEC θ	_ / _	COT θ	_ / _
6	8	10	SIN θ	_ / _	COS θ	_ / _	TAN θ	_ / _	COSEC θ	_ / _	SEC θ	_ / _	COT θ	_ / _
8	6	10	SIN θ	_ / _	COS θ	_ / _	TAN θ	_ / _	COSEC θ	_ / _	SEC θ	_ / _	COT θ	_ / _
5	12	13	SIN θ	_ / _	COS θ	_ / _	TAN θ	_ / _	COSEC θ	_ / _	SEC θ	_ / _	COT θ	_ / _
12	5	13	SIN θ	_ / _	COS θ	_ / _	TAN θ	_ / _	COSEC θ	_ / _	SEC θ	_ / _	COT θ	_ / _
9	12	15	SIN θ	_ / _	COS θ	_ / _	TAN θ	_ / _	COSEC θ	_ / _	SEC θ	_ / _	COT θ	_ / _
12	9	15	SIN θ	_ / _	COS θ	_ / _	TAN θ	_ / _	COSEC θ	_ / _	SEC θ	_ / _	COT θ	_ / _
7	24	25	SIN θ	_ / _	COS θ	_ / _	TAN θ	_ / _	COSEC θ	_ / _	SEC θ	_ / _	COT θ	_ / _
24	7	25	SIN θ	_ / _	COS θ	_ / _	TAN θ	_ / _	COSEC θ	_ / _	SEC θ	_ / _	COT θ	_ / _
20	21	29	SIN θ	_ / _	COS θ	_ / _	TAN θ	_ / _	COSEC θ	_ / _	SEC θ	_ / _	COT θ	_ / _
21	20	29	SIN θ	_ / _	COS θ	_ / _	TAN θ	_ / _	COSEC θ	_ / _	SEC θ	_ / _	COT θ	_ / _
15	20	25	SIN θ	_ / _	COS θ	_ / _	TAN θ	_ / _	COSEC θ	_ / _	SEC θ	_ / _	COT θ	_ / _
20	15	25	SIN θ	_ / _	COS θ	_ / _	TAN θ	_ / _	COSEC θ	_ / _	SEC θ	_ / _	COT θ	_ / _

Opposite side ^{2}+ Adjacent side^2= Hypotenuse^2 **K.SREENIVASA RAJU**

Trigonometry

Opposite side ^{2} + Adjacent side^2 = Hypotenuse^2

Opposite side^2 = Hypotenuse^2 - Adjacent side^2

Adjacent side^2= Hypotenuse^2 - Opposite side ^{2}

Opposite side	Adjacent side	Hypotenuse	SIN θ	Opposite side / Hypotenuse	COS θ	Adjacent side / Hypotenuse	TAN θ	Opposite side / Adjacent side
3		5		_		_		_
				_		_		_
4	3			_		_		_
				_		_		_
	8	10		_		_		_
				_		_		_
	6	10		_		_		_
				_		_		_
5	12			_		_		_
				_		_		_
12	5	13		_		_		_
				_		_		_
9	12			_		_		_
				_		_		_
12		15		_		_		_
				_		_		_
7		25		_		_		_
				_		_		_
24	7			_		_		_
				_		_		_
20		29		_		_		_
				_		_		_
21	20			_		_		_
				_		_		_
15	20			_		_		_
				_		_		_
	15	25		_		_		_
				_		_		_

Trigonometry

Opposite side ^{2} + Adjacent side^2 = Hypotenuse^2

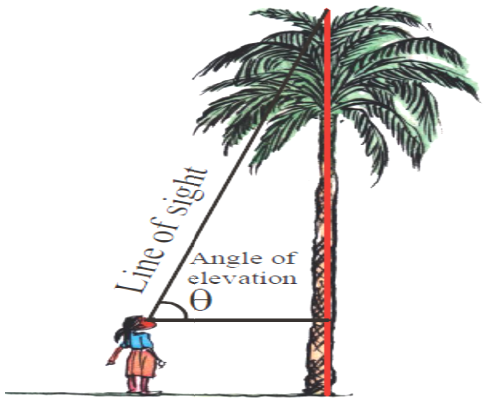
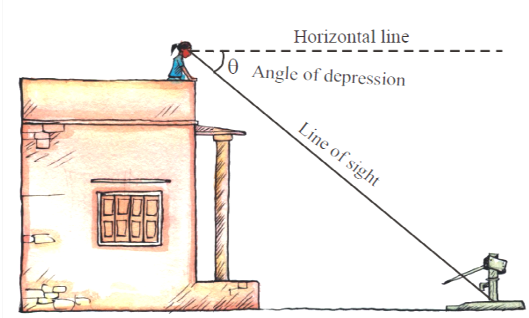
Opposite side^2 = Hypotenuse^2 - Adjacent side^2

Adjacent side^2= Hypotenuse^2 - Opposite side ^{2}

Opposite side	Adjacent side	Hypotenuse	COSEC θ	Hypotenuse / Opposite side	SEC θ	Hypotenuse / Adjacent side	COT θ	Adjacent side / Opposite side
3		5						
4	3							
	8	10						
	6	10						
5	12							
12	5	13						
9	12							
12		15						
7		25						
24	7							
20		29						
21	20							
15	20							
	15	25						

12 Some Applications of Trigonometry

Draw the diagrams for given data.

1	**Line of sight :**When an observer looks from a point O at an object P, then the line OP is **called the *line of sight.*** **The angle of elevation of an object viewed, is the angle formed by the line of sight with the horizontal when it is above the horizontal level. i.e. the case when we raise our head to look the object.** **Line of sight** **Angle of elevation** **Horizontal line**	
2	**The angle of depression of an object viewed, is the angle formed by the line of sight with the horizontal when it is below the horizontal level. i.e., the case when we lower our head to look at the object.** **Horizontal line Angle of depression** **Horizontal line** **Angle of depression** **Line of sight**	
3	**The top of a clock tower is observed at angle of elevation of $\alpha°$ and the foot of the tower is at the distance, of d meters from the observer. Draw the diagram for this data.**	
4	**Rinky observes a flower on the ground from the balcony of the first floor of a building at an angle of depression, $\beta°$. The height of the first floor of the building is x meters. Draw the diagram for this data**	
5	**A large balloon has been tied with a rope and it is floating in the air. A person has observed the balloon from the top of a building at angle of elevation of θ_1 and foot of the rope at an angle of depression of θ_2. The height of the building is h feet. Draw the diagram for this data**	
6	**A boy observed the top of an electric pole to be at an angle of elevation of 60º when the observation point is 8 meters away from the foot of the pole. Find the height of the pole.**	

7	**Rajender observes a person standing on the ground from a helicopter at an angle of depression 45º. If the helicopter flies at a height of 50 meters from the ground, what is the distance of the person from Rajender?**	
8	**Two men on either side of a temple of 30 meter height observe it at the angles of elevation 30º and 60º respectively. Find the distance between the two men.**	
9	**A straight highway leads to the foot of a tower. A man standing at the top of the tower observes a car at an angle of depression 30º. The car is approaching the foot of the tower with a uniform speed. Six seconds later, the angle of depression of the car is found to be 60º. Find the time taken by the car to reach the foot of the tower from this point.**	
10	**A tower stands vertically on the ground. From a point which is 15 meter away from the foot of the tower, the angle of elevation of the top of the tower is 45º. What is the height of the tower?**	
11	**A tree breaks due to storm and the broken part bends so that the top of the tree touches the ground by making 30º angle with the ground. The distance between the foot of the tree and the top of the tree on the ground is 6m. Find the height of the tree before falling down.**	
12	**. A contractor wants to set up a slide for the children to play in the park. He wants to set it up at the height of 2 m and by making an angle of 30º with the ground. What should be the length of the slide?**	
13	**Length of the shadow of a 15 meter high pole is $5\sqrt{3}$ meters at 7 o'clock in the morning. Then, what is the angle of elevation of the Sun rays with the ground at the time?**	
14	**You want to erect a pole of height 10 m with the support of three ropes. Each rope has to make an angle 30º with the pole. What should be the length of the rope?**	

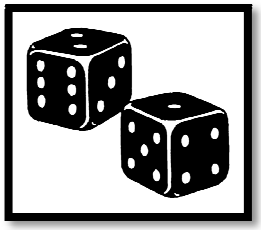
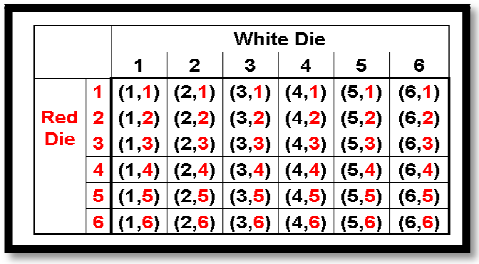
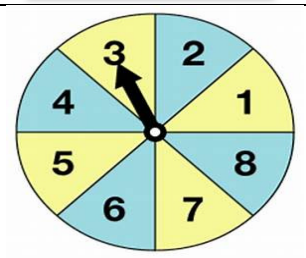
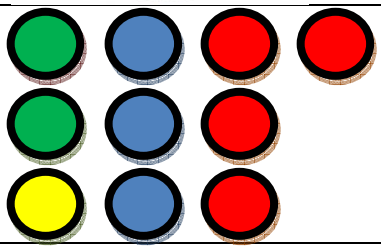
15	**Suppose you are shooting an arrow from the top of a building at an height of 6 m to a target on the ground at an angle of depression of 60º. What is the distance between you and the object?**	
16	**An electrician wants to repair an electric connection on a pole of height 9 m. He needs to reach 1.8 m below the top of the pole to do repair work. What should be the length of the ladder which he should use, when he climbs it at an angle of 60º with the ground? What will be the distance between foot of the ladder and foot of the pole?**	
17	**A boat has to cross a river. It crosses the river by making an angle of 60º with the bank of the river due to the stream of the river and travels a distance of 600m to reach the another side of the river. What is the width of the river?**	
18	**An observer of height 1.8 m is13.2 m away from a palm tree. The angle of elevation of the top of the tree from his eyes is 45º. What is the height of the palm tree?**	
19	**A TV tower stands vertically on the side of a road. From a point on the other side directly opposite to the tower, the angle of elevation of the top of tower is 60°. From another point 10 m away from this point, on the line joining this point to the foot of the tower, the angle of elevation of the top of the tower is 30º. Find the height of the tower and the width of the road**	
20	**A 1.5 m tall boy is looking at the top of a temple which is 30 meter in height. The angle of elevation from his eye to the top of the crown of the temple increases from 30º to 60º as he walks towards the temple. Find the distance he walked towards the temple.**	
21	**A statue stands on the top of a 2m tall pedestal. From a point on the ground, the angle of elevation of the top of the statue is 60º and from the same point, the angle of elevation of the top of the pedestal is 45º. Find the height of the statue.**	
22	**From the top of a building, the angle of elevation of the top of a cell tower is 60º and the angle of depression to its foot is 45º. If distance of the building from the tower is 7m, then find the height of the tower**	

23	**A wire of length 18 m had been tied with electric pole at an angle of elevation 30º with the ground. Because it was covering a long distance, it was cut and tied at an angle of elevation 60º with the ground. How much length of the wire was cut?**	
24	**The angle of elevation of the top of a building from the foot of the tower is 30º and the angle of elevation of the top of the tower from the foot of the building is 60º. If the tower is 30 m high, find the height of the building.**	
25	**Two poles of equal heights are standing opposite to each other on either side of the road, which is 120 feet wide. From a point between them on the road, the angles of elevation of the top of the poles are 60º and 30º respectively. Find the height of the poles and the distances of the point from the poles.**	
26	**The angles of elevation of the top of a tower from two points at a distance of 4 m and 9 m, from the base of the tower and in the same straight line with it are complementary. Prove the height of the tower is 6 m.**	
27	**The angle of elevation of a jet plane from a point A on the ground is 60º. After a flight of 15 seconds, the angle of elevation changes to 30º. If the jet plane is flying at a constant height of 1500 3 meter, find the speed of the jet plane. ($\sqrt{3}$ =1.732)**	
28	**A circus artist is climbing a 20 m long rope, which is tightly stretched and tied from the top of a vertical pole to the ground. Find the height of the pole, if the angle made by the rope with the ground level is 30º.**	
29	**As observed from the top of a 75 m high lighthouse from the sea-level, the angles of depression of two ships are 30º and 45º. If one ship is exactly behind the other on the same side of the lighthouse, find the distance between the two ships**	
30	**A 1.2 m tall girl spots a balloon moving with the wind in a horizontal line at a height of 88.2 m from the ground. The angle of elevation of the balloon from the eyes of the girl at any instant is 60º. After some time, the angle of elevation reduces to 30º. Find the distance travelled by the balloon during the interval.**	

PROBABILITY

Probability theory is nothing but common sense reduced to calculation.

$P(E) + P(\bar{E}) = 1$

SINGLE COIN 	**Total Possible Out comes/ SAMPLE SPACE** { H ,T }	**Number of total Possible out comes** 2
TWO COINS 	{HH,TH ,HT,TT}	$2^2 = 4$
THREE COINS 	{ HHH,HHT,HTH,THH, TTT,TTH,THT,HTT}	$2^3 = 8$
SINGLE DIE 	{1,2,3,4,5,6}	6
TWO DIES 		$6^2 = 36$
	{1,2,3,4,5,6,7,8}	8
	{ 1 YELLOW, 2 GREEN,3 BLUE, 4 RED}	10

	White Die					
	1	2	3	4	5	6
Red Die 1	(1,1)	(2,1)	(3,1)	(4,1)	(5,1)	(6,1)
Red Die 2	(1,2)	(2,2)	(3,2)	(4,2)	(5,2)	(6,2)
Red Die 3	(1,3)	(2,3)	(3,3)	(4,3)	(5,3)	(6,3)
Red Die 4	(1,4)	(2,4)	(3,4)	(4,4)	(5,4)	(6,4)
Red Die 5	(1,5)	(2,5)	(3,5)	(4,5)	(5,5)	(6,5)
Red Die 6	(1,6)	(2,6)	(3,6)	(4,6)	(5,6)	(6,6)

Find the probability of each event when a COIN is roll once

Event	Total Possible outcomes	Number of total possible outcomes	Favourable Out come(s)	Number of favourable outcome(s)	Probability = Number of favourable outcomes / Number of total possible outcomes
PROBABILITY OF HEAD					
PROBABILITY OFTAIL					
PROBABILITY OF NOT HEAD					
PROBABILITY OF NOT TAIL					

Find the probability of each event when two COINS is roll once

PROBABILITY OF 3 HEADS					
PROBABILITY OF 3 TAILS					
PROBABILITY OF AT LEAST ONE HEAD					
PROBABILITY OF AT LEAST TWO HEADS					
PROBABILITY OF AT LEAST ONE TAIL					
PROBABILITY OF AT LEAST TWO TAIL					
A NUMBER LYING BETWEEN 2 AND 6					
A NUMBER LYING BETWEEN 3 AND 6					
A NUMBER LYING BETWEEN 4 AND 6					
A NUMBER LYING BETWEEN 2 AND 6 AND INCLUDIND 2 AND 6					
A NUMBER LYING BETWEEN 1 AND 4 AND INCLUDIND 1 AND 4					

SINGLE DIE **Find the probability of each when ONE dice are rolled.**

SAMPLE SPACE {1,2,3,4,5,6}

Event	Total Possible outcomes	Number of total possible outcomes	Favourable Out come(s)	Number of favourable outcome(s)	Probability = $\frac{\text{Number of favourable outcomes}}{\text{Number of total possible outcomes}}$
Getting a even number on the top face					
Getting a odd number on the top face					
Getting a prime number on the top face					
Getting a composite number on the top face					
Getting a even prime number on the top face					
Getting a more than 6 number on the top face					
Getting a less than 6 number on the top face					
Getting a less than or equal 6 number on the top face					
Getting a 5number on the top face					
Getting a number more than 3 on the top face					
Getting a less than or equal 4 on the top face					
A number less than 5 on the top face					
A number that is factor of 6 on the top face					
A number more than 7on the top face					
A number Multiple of 3 on the top face					
Getting a number 4 or less than 4 on the top face					

SINGLE DIE

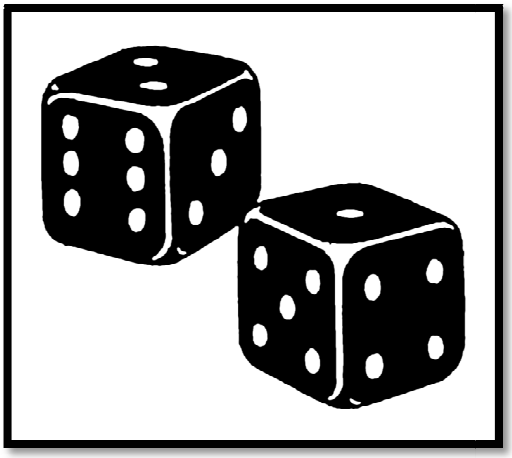
Find the probability of each when ONE dice are rolled.

SAMPLE SPACE {1,2,3,4,5,6}

1	P(1)		1	P(>1)		1	P(<2)		1	P(≥1)		1	P(≤2)	
2	P(2)		2	P(>2)		2	P(<3)		2	P(≥2)		2	P(≤3)	
3	P(3)		3	P(>3)		3	P(<4)		3	P(≥3)		3	P(≤4)	
4	P(4)		4	P(>4)		4	P(<5)		4	P(≥4)		4	P(≤5)	
5	P(5)		5	P(>5)		5	P(<6)		5	P(≥5)		5	P(≤6)	
6	P(6)		6	P(>6)		6	P(<7)		6	P(≥6)		6	P(≤7)	

1	P(EVEN)		1	P(1 MULTIPLES)	
2	P(ODD)		2	P(2 MULTIPLES)	
3	P(PRIME)		3	P(3 MULTIPLES)	
4	P(COMPOSITE)		4	P(4 MULTIPLES)	
5	P(EVEN PRIME)		5	P(5 MULTIPLES)	
6	P(EVEN COMPOSITE)		6	P(6MULTIPLES)	
7	P(ODD COMPOSITE)		7	P(1 FACTORS)	
8	P(ODD PRIME)		8	P(2 FACTORS)	
9	P(NOT EVEN)		9	P(3 FACTORS)	
10	P(NOT ODD)		10	P(4 FACTORS)	
11	P(NOT PRIME)		11	P(5 FACTORS)	
12	P(NOT COMPOSITE)		12	P(6 FACTORS)	
13	P(NOT EVEN PRIME)		13	P(2 PRIME FACTORS)	
14	P(NOT EVEN COMPOSITE)		14	P(3 PRIME FACTORS)	
15	P(NOT ODD COMPOSITE)		15	P(4 PRIME FACTORS)	
16	P(NOT ODD PRIME)		16	P(5 PRIME FACTORS)	
17	P(NOT 1 MULTIPLES)		17	P(6 PRIME FACTORS)	
18	P(NOT 2 MULTIPLES)		18	P(NOT 3 FACTORS)	
19	P(NOT 3 MULTIPLES)		19	P(NOT 4 FACTORS)	
20	P(NOT 4 MULTIPLES)		20	P(NOT 5 FACTORS)	

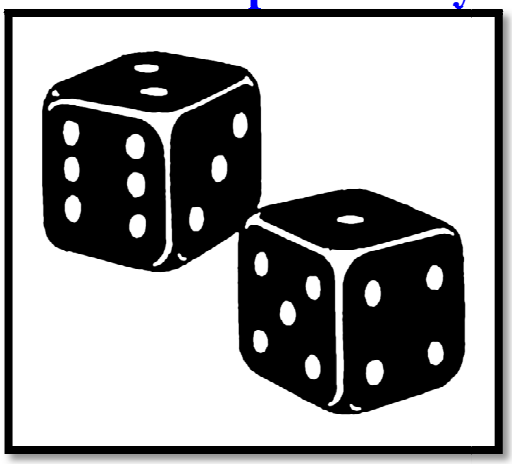
Find the probability of each sum when TWO dice are rolled



		White Die					
		1	2	3	4	5	6
Red Die	1	(1,1)	(2,1)	(3,1)	(4,1)	(5,1)	(6,1)
	2	(1,2)	(2,2)	(3,2)	(4,2)	(5,2)	(6,2)
	3	(1,3)	(2,3)	(3,3)	(4,3)	(5,3)	(6,3)
	4	(1,4)	(2,4)	(3,4)	(4,4)	(5,4)	(6,4)
	5	(1,5)	(2,5)	(3,5)	(4,5)	(5,5)	(6,5)
	6	(1,6)	(2,6)	(3,6)	(4,6)	(5,6)	(6,6)

Event	Total Possible outcomes	Number of total possible outcomes	Favourable Out come(s)	Number of favourable outcome(s)	Probability = $\frac{\text{Number of favourable outcomes}}{\text{Number of total possible outcomes}}$
Sum of appearing on the top of the dice is 8					
Sum of appearing on the top of the dice is 13					
Sum of appearing on the top of the dice is less than equal to 12					
Sum on 2 dice is 2					
Sum on 2 dice is 3					
Sum on 2 dice is 4					
Sum on 2 dice is 5					
Sum on 2 dice is 6					
Sum on 2 dice is 7					
Sum on 2 dice is 8					
Sum on 2 dice is 9					
Sum on 2 dice is 10					
Sum on 2 dice is 11					
Sum on 2 dice is 12					
5 will not come up either time					
5 will come up at least once					

Find the probability of each sum when TWO dice are rolled



		White Die					
		1	2	3	4	5	6
Red Die	1	(1,1)	(2,1)	(3,1)	(4,1)	(5,1)	(6,1)
	2	(1,2)	(2,2)	(3,2)	(4,2)	(5,2)	(6,2)
	3	(1,3)	(2,3)	(3,3)	(4,3)	(5,3)	(6,3)
	4	(1,4)	(2,4)	(3,4)	(4,4)	(5,4)	(6,4)
	5	(1,5)	(2,5)	(3,5)	(4,5)	(5,5)	(6,5)
	6	(1,6)	(2,6)	(3,6)	(4,6)	(5,6)	(6,6)

1	P(1)		1	P(>1)		1	P(<2)		1	P(≥2)		1	P(≤2)	
2	P(2)		2	P(>2)		2	P(<3)		2	P(≥3)		2	P(≤3)	
3	P(3)		3	P(>3)		3	P(<4)		3	P(≥4)		3	P(≤4)	
4	P(4)		4	P(>4)		4	P(<5)		4	P(≥5)		4	P(≤5)	
5	P(5)		5	P(>5)		5	P(<6)		5	P(≥6)		5	P(≤6)	
6	P(6)		6	P(>6)		6	P(<7)		6	P(≥7)		6	P(≤7)	
7	P(7)		7	P(>7)		7	P(<8)		7	P(≥8)		7	P(≤8)	
8	P(8)		8	P(>8)		8	P(<9)		8	P(≥9)		8	P(≤9)	
9	P(9)		9	P(>9)		9	P(<10)		9	P(≥10)		9	P(≤10)	
10	P(10)		10	P(>10)		10	P(<11)		10	P(≥11)		10	P(≤11)	
11	P(11)		11	P(>11)		11	P(<12)		11	P(≥12)		11	P(≤12)	
12	P(12)		12	P(>12)		12	P(<13)		12	P(≥13)		12	P(≤13)	

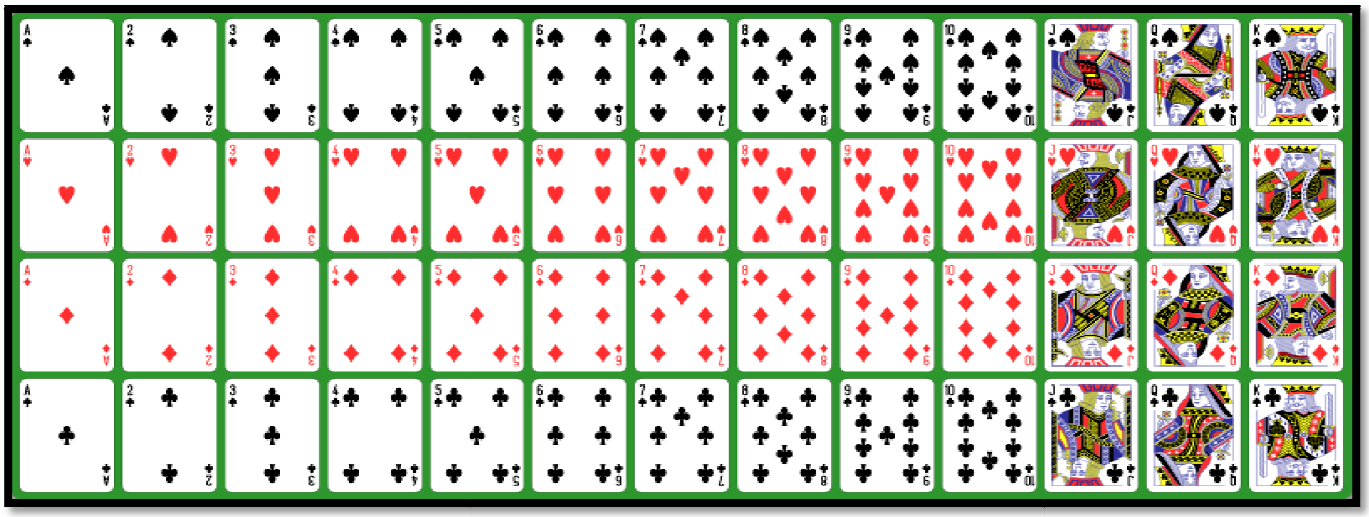
P(BOTH EVEN)		P(4 WILL NOT COME UP EITHER TIME)	
P(BOTH ODD)		P(4 WILL COME UP AT LEAST ONCE)	
P(BOTH PRIME)		P(PRIME,COMPOSITE)	
P(BOTH COMPOSITE)		P(COMPOSITE , PRIME)	
P(BOTH EITHER EVEN OR PRIME)		P(ODD, EVEN)	
P(BOTH NEITHER EVEN NOR PRIME)		P(EVEN, ODD)	
P(5 WILL NOT COME UP EITHER TIME)		P(NEITHER PRIME NOR COMPOSITE)	
P(5 WILL COME UP AT LEAST ONCE)		P(PRIME,EVEN)	
P(SAME NO COME UP EITHER TIME)		P(EVEN ,PRIME)	
P(SAME NO NOT COME UP EITHER TIME)			

DECK OF CARDS

Example set of 52 poker playing cards

Suit	Ace	2	3	4	5	6	7	8	9	10	Jack	Queen	King
Clubs													
Diamonds													
Hearts													
Spades													

DECK OF CARDS



The standard 52-card deck of French playing cards (54 counting jokers) is the most common deck of playing cards used today. It includes thirteen ranks in each of the four French suits:

clubs (♣), diamonds (♦), hearts (♥) and spades (♠)

Face cards or court cards – jacks, queens, and kings are called "face cards".

"2" cards are also known as deuces. "3" cards are also known as treys

Deck of Cards Questions - There are 52 cards in a standard deck of cards –
There are 4 of each card (4 Aces, 4 Kings, 4 Queens, etc.) –
There are 4 suits (Clubs, Hearts, Diamonds, and Spades) and there are
13 cards in each suit (Clubs/Spades are black, Hearts/Diamonds are red) –
Without replacement means the card IS NOT put back into the deck.
With replacement means the card IS put back into the deck.

Clubs/Spades are black **Hearts/Diamonds are red**

clubs (♣) ,spades (♠) **Diamonds (♦), hearts (♥)**

DECK OF CARDS Find the probability of each event

Event	Total Possible outcomes	No of total possible outcomes	Favourable Out come(s)	No of favourable outcome(s)	Probability = Number of favourable outcomes / Number of total possible outcomes
PROBABILITY OF AN ACE CARD					
PROBABILITY OF NOT BE AN ACE CARD					
PROBABILITY OF QUEEN CARD					
PROBABILITY OF FACE CARD					
PROBABILITY OF SPADE CARD					
PROBABILITY OF FACE CARD SPADES					
PROBABILITY OF NOT FACE CARD					
PROBABILITY OF NOT FACE CARD SPADES					
PROBABILITY OF A KING OF RED COLOUR					
PROBABILITY OF A RED FACE CARD					
PROBABILITY OF THE JACK OF HEARTS					
PROBABILITY OF THE QUEEN OF DIAMONDS					
PROBABILITY OF HEARTS					
PROBABILITY OF THE QUEEN OF CLUBS					
PROBABILITY OF THE KING OF CLUBS					
PROBABILITY OF AN ALPHABET CARD					
PROBABILITY OF NOT AN ALPHABET CARD					
PROBABILITY OF NUMERICAL CARD					
PROBABILITY OF NOT NUMERICAL CARD					
PROBABILITY OF EVEN NUMBER CARD					
PROBABILITY OF ODD NUMBER CARD					
PROBABILITY OF PRIME NUMBER CARD					
PROBABILITY OF COMPOSITE NUMBER CARD					
PROBABILITY OF 2 MULTIPLE CARD					
PROBABILITY OF NOT 2 MULTIPLE CARD					
PROBABILITY OF 8 FACTORS CARD					
PROBABILITY OF NOT 8 FACTORS CARD					
PROBABILITY OF NOT KING CARDS					
PROBABILITY OF WHITE CARD					
PROBABILITY OF 1 CARD					

DECK OF CARDS

P(Black cards)		P (Red cards)		P (Clubs *King*)	
P (Black kin*g*)		*P(Red king)*		P (Clubs queen)	
P (Black queen)		P (Red queen)		P (Clubs ace)	
P (Black ace)		P (Red ace)		P (Clubs jack)	
P (Black jack)		P (Red jack)		P (Clubs 10)	
P (Black 10)		P (*Red* 10)		P (Clubs 9)	
P (Black 9)		P (Red 9)		P (Clubs 8)	
P (Black 8)		P (*Red* 8)		P (Clubs 7)	
P (Black 7)		P (Red 7)		P (Clubs 6)	
P (Black 6)		P (*Red* 6)		P (Clubs 5)	
P (Black 5)		P (Red 5)		P (Clubs 4)	
P (Black 4)		P (*Red* 4)		P (Clubs 3)	
P (Black 3)		P (Red 3)		P (Clubs 2)	
P (Black 2)		P (*Red* 2)		P (not Black cards)	
P (Black face cards)		P (Red face cards)		P (not Red cards)	
P(spade king)		*P(Red king)*		*P(Red king)*	
P (*spa*de queen)		P (Hearts queen)		P (Diamonds queen)	
P (*spa*de ace)		P (Hearts ace)		P (Diamonds ace)	
P (*spa*de jack)		P (Hearts jack)		P (Diamonds jack)	
P (*spade* 10)		P (Hearts 10)		P (Diamonds 10)	
P (*spade* 9)		P (Hearts 9)		P (Diamonds 9)	
P (*spade* 8)		(Hearts 8)		P (Diamonds 8)	
P (*spade* 7)		P (Hearts 7)		P (Diamonds 7)	
P (*spade* 6)		P (Hearts 6)		P (Diamonds 6)	
(*spade* 5)		P (Hearts 5)		P (Diamonds 5)	
P (*spade* 4)		P (Hearts 4)		P (Diamonds 4)	
P (*spade* 3)		P (Hearts 3)		P (Diamonds 3)	
P (*spade* 2)		P (Hearts 2)		P (Diamonds 2)	

P (not Black cards)		P (not Red cards)		P (not Club k*ing*)	
P (not Black *king*)		P (not *g*)		P (not Club queen)	
P (not Black queen)		P (not Red queen)		P (not Club ace)	
P (not Black ace)		P (not ace)		P (not Club jack)	
P (not Black jack)		P (not Red jack)		P (not Club 10)	
P (not Black 10)		P (not *Red* 10)		P (not Club 9)	
P (not Black 9)		*P* (not Red 9)		P (not Club 8)	

P (not Black 8)		P (not *Red* 8)		P (not Club 7)	
P (not Black 7)		P (not Red 7)		P (not Club 6)	
(not Black 6)		P (not *Red* 6)		P (not Club 5)	
P (not Black 5)		P (not Red 5)		P (not Clubs 4)	
P (not Black 4)		P (not *Red* 4)		P (not Club 3)	
P (not Black 3)		P (not Red 3)		P (not Club 2)	
P (not Black 2)		P (not *Red* 2)		P (not Black cards)	
P (not Black face card)		P (not Red face cards)		P (not Red cards)	
P(spade king)		P (not *g*)		P (not *king*)	
P (not *spad*queen)		P (not Hearts queen)		P (not Diamonds queen)	
P (not *spad*e ace)		P (not Hearts ace)		P (not Diamond ace)	
P (not *spad*e jack)		P (not Hearts jack)		P (not Diamond jack)	
P (not *spade* 10)		P(not Heart 10)		P(not Diamond 10)	
P(not *spade* 9)		P(not Heart 9)		P(not Diamond 9)	
P(not *spade* 8)		P(not Hearts 8)		P(not Diamond 8)	
P(not *spade* 7)		P(not Heart 7)		P(not Diamond 7)	
P(not *spade* 6)		P(not Hearts 6)		P(not Diamond 6)	
P(not *spade* 5)		P(not Heart 5)		P(not Diamond 5)	
P(not *spade* 4)		P(not Heart 4)		P(not Diamond 4)	
P(not *spade* 3)		P(not Hearts 3)		P(not Diamond 3)	
P(*spade* 2)		P(not Heart 2)		P(not Diamond 2)	

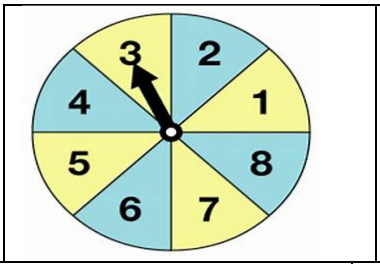
There are 12 red balls, 18 blue balls and 6 white balls in a box. When a ball is drawn at random from the box, what is the probability of

P(Event)	Total Possible outcomes	No of total possible outcomes	Favourable Out come(s)	No of favourable outcome(s)	Probability = $\frac{\text{Number of favourable outcomes}}{\text{Number of total possible outcomes}}$
P(red ball)					
P(blue ball)					
P(white ball)					
P(not getting a red ball)					
P(not getting a blue ball)					
P(not getting a white ball)					
P(Black ball)					
P(not getting a black ball)					
What is the probability of a number picked from first 20 natural numbers					
P(even number)					
P(Not even number)					
P(composite number)					
P(Not composite number)					
P(Prime number)					
P(Not Prime number)					
P(Odd number)					
P(Not Odd number)					

What is the probability of a number picked from first 90 natural numbers

P(even number)					
P(Not even number)					
P(composite number)					
P(Not composite number)					
P(Prime number)					
P(Not Prime number)					
P(Odd number)					
P(Not Odd number)					
P(5 MULTIPLES)					
P(Not 5 MULTIPLES)					
P(3 MULTIPLES)					
P(Not 3 MULTIPLES)					
P(4 MULTIPLES)					
P(Not 4 MULTIPLES)					
P(6 MULTIPLES)					
P(Not 6 MULTIPLES)					
P(7 MULTIPLES)					
P(Not 7 MULTIPLES)					
P(8 MULTIPLES)					
P(Not 8 MULTIPLES)					
P(9 MULTIPLES)					
P(Not 9 MULTIPLES)					
P(10 MULTIPLES)					
P(Not 10 MULTIPLES)					
P(Perfect squares)					
P(Not Perfect squares)					

SPINNER



Total Possible Out comes/ SAMPLE SPACE

{1,2,3,4,5,6,7,8}

Number of total Possible out comes

8

P(Event)	Total Possible outcomes	No of total possible outcomes	Favourable Out come(s)	No of favourable outcome(s)	Probability = $\frac{\text{Number of favourable outcomes}}{\text{Number of total possible outcomes}}$
P(even number)					
P(Not even number)					
P(composite number)					
P(Not composite number)					
P(Prime number)					
P(Not Prime number)					
P(Odd number)					
P(Not Odd number)					

P(3 MULTIPLES)					
P(Not 3 MULTIPLES)					
P(4 MULTIPLES)					
P(Not 4 MULTIPLES)					
P(3 FACTORS)					
P(Not 3 FACTORS)					
P(4 FACTORS)					
P(Not 4 FACTORS)					
P(5 FACTORS)					
P(Not 5 FACTORS)					
P(6 FACTORS)					
P(Not 6 FACTORS)					
P(7 FACTORS)					
P(Not 7 FACTORS)					
P(8 FACTORS)					
P(Not 8 FACTORS)					
P(Perfect squares)					
P(Not Perfect squares)					
P(Perfect CUBES)					
P(Not Perfect CUBES)					

P (E) + P($\bar{E}$) = 1			P($\bar{E}$) = 1 - P (E)			P (E) = 1 - P($\bar{E}$)		
P (E)	P($\bar{E}$)	1	P (E)	P($\bar{E}$)	1	P (E)	P($\bar{E}$)	1
0.1		1		0.11	1			1
0.5		1		0.51	1			1
0.9		1		0.91	1			1
0.25		1		0.251	1			1
0.11		1		0.111	1			1
0.76		1		0.761	1			1
0.62		1		0.621	1			1
0.38		1		0.138	1			1
0.55		1		0.515	1			1
0.95		1		0.915	1			1
0.99		1		0.919	1			1
0.975		1		0.97	1			1
0.9215		1		0.915	1			1

STATISTICS								
S.No	Class interval	C.I TYPE	Limits		Bounds		Mid Value	length of the Class Interval
			Lower Limit	Upper Limit	Lower Bound	Upper Bound		
1	0--2							
2	2--4							
3	4--6							
4	6--8							
5	8--10							
6	10--12							
7	200--250							
8	250--300							
9	300--350							
10	350--400							
11	400--450							
12	11--13							
13	13--15							
14	15--17							
15	17--19							
16	19--21							
17	21--23							
18	65--68							
19	68--71							
20	71--74							
21	74--77							
22	77--80							
23	80--83							
24	10--14							
25	15--19							
26	20--24							
27	25--29							
28	30--34							
29	100--150							
30	150--200							
31	200--250							
32	250--300							
33	300--350							
34	0.00-0.04							
35	0.04--0.08							
36	0.08--0.12							
37	0.12--0.16							
38	0.16--0.20							
39	0.20--0.24							
40	35--38							
41	38--41							
42	41--44							
43	44--47							
44	47--50							
45	50--53							

1. **Arithmetic mean of 26,24,10,32,6,8,6 is----**
2. **If the Arithmetic mean of 3,4,5,7,10,x is 5 then=------**
3. **Arithmetic mean of 24,40,41,42,24 scores is ----**
4. **If the Arithmetic mean of 8,6,4,0,6,3,x is 4 then x =------**
5. **If the A.M of 1,5,9,7,13 is x then x=-----**
6. **Mean of 9,11,13,p,18,19 is p then p=------**
7. **Mean of 2/5,5/3,1/3,5/6,1/6 is-----**
8. **A.M of k+2,k,k-2 is -----**
9. **A.M of a + d, a , a-d is -----**
10. **A.M of a+3d,a+2d,a+d,a,a-d,a-2de,a-3d is ----**
11. **Find the Mean of 7,6,5,9,8,0,7 -----**
12. **Find the Mean of 1/3,3/4,5/6,1/2,7/12 is -----**
13. **The A.M of 1,2,3,4,5,6,7,8,9,10 is-----**
14. **Median of 47,52,57,62,67,72,77,78 is -----**
15. **The Median of 136,130,125,130,135,120,124,127 is-----**
16. **Median of 10,20,30,15,35,42 is ------**
17. **Median of scores 17,31,12,27,15,19,23 is-----**
18. **Median of 3/4,1/2,2/3,1/6,7/12 is-----**
19. **Median of 12,11,15,11,12,15,12,9,12 is ---**
20. **Median of observation 17,31,12,27,15,19,23 -----**
21. **Median 6,49,14,46,16,42,26,32,28,----**
22. **Median of 3,18,6,16,12,10 ,-----**
23. **Median of 19,1,3,17,6,12,11,8 -----**
24. **Median of 1.8,4.0,2.7,1.2,4.5,2.3,3.7,3.1 -----**
25. **Median of 10,20,15,29,35,42 is ----**
26. **Find the Median of 15.666,15.o3,15,15.333.15.3**
27. **Find the Median of -3,-5,-8,0,3,2,-10 -----**
28. **Mode of 1,2,3,2,4,5,2,6,2 is -----**
29. **Mode of 10,11,14,12,14,9,12,14,11,14 is -----**
30. **Mode of 23,20,23,16,27,23 is ------**
31. **Mode of 12,11,15,11,12,15,12,9,12 is -----**
32. **Empirical relation among A.M, Median and Mode is -----**
33. **If A.M =39,Median =37.5, then Mode =-----**
34. **If A.M =53.8,Median =53.5, then Mode =-----**
35. **For some quantities Mode = 29,A.M = 32 Then Median is ----**
36. **If A.M =72.5,,Median =73.9, then Mode =-----**
37. **Mode of 1,2,3,4,5,6,7,8,9,10 is -----**
38. **Mode of 100 Natural numbers is -----**
39. **The observation which occurs most frequently in a data is called --**
40. **Range of first 100 natural numbers is ------**
41. **Mid value of class 1-10 is -----**
42. **Class interval of the class 1-10 is ----**
43. **Mid value of class 20-29 is ----- Mid value of class 20-30 is ----**
44. **Range ------ Father of statistics is -------**
45. **The A.M of 67,79,15,0,93,44,17 is-----**
46. **The A.M of 30,20,32,16,27is ----**
47. **The mid-value of the class 10-19 is ----**
48. **The mid-value of the class is used to calculate -----**
49. **The mode of 32,20,32,26,27,32 is -----**
50. **The arithmetic mean of first "n" natural numbers is ---**
51. **The Mode in the data is 12,11,15,12,11,15,12,9,12 is -----**
52. **For some quantities Median= 38,A.M = 39 Then Mode is ----**
53. **Data with one mode is called -----**

Find the Arithmetic Mean with Direct Method

Class interval	10--25	25--40	40--55	55--70	70--85	85--100
Number of student (f_i)	2	3	7	6	6	6

Class interval C.I	Number of student f_i	Class Marks xi	f_i . xi
10--25	2	17.5	35.0
25--40	3	32.5	97.5
40--55	7	47.5	332.5
55--70	6	62.5	375.0
70--85	6	77.5	465.0
85--100	6	92.5	555.0
Total	Σf_i = 30		Σf_i xi = 1860.0

Arithmetic Mean = X = $\frac{\Sigma f_i \text{ xi}}{\Sigma f_i}$

= $\frac{1860}{30}$

Arithmetic Mean = 62.

Deviation Method [or]

Assumed Mean Method.

Class interval C.I	Number of student f_i	Class Marks xi	di = xi - a	f_i . di
10--25	2	17.5	-30	-60
25--40	3	32.5	-15	-45
40--55	7	47.5 [a]	0	0
55--70	6	62.5	15	90
70--85	6	77.5	30	180
85--100	6	92.5	45	270
	Σf_i = 30			Σf_i . di = 435

Arithmetic Mean (Deviation Method [or] Assumed Mean Method)

X = a + $\frac{\Sigma f_i \text{ di}}{\Sigma f_i}$

Assumed Mean = a =47.5

Σ fi . di = 435, Σ fi = Arithmetic Mean

= X= 47.5 + $\frac{435}{30}$ =

47.5 + 145 = 62.0.

Step- deviation method

Class interval C.I	Number of student f_i	Class Marks xi	di = xi - a	$u_i = \frac{x_i - a}{h}$	f_i . u_i
10--25	2	17.5	-30	-2	-4
25--40	3	32.5	-15	-1	-3
40--55	7	47.5 [a]	0	0	0
55--70	6	62.5	15	1	6
70--85	6	77.5	30	2	12
85--100	6	92.5	45	3	18
	Σf_i = 30				Σf_i . u_i = 29

Step- deviation method = $\bar{x} = a + \frac{\Sigma f_i u_i}{\Sigma f_i} \times h$

a is the assumed mean = 47.5 , Σf_i . u_i = 29, Σf_i = 30

Step- deviation method = $\bar{x} = a + \frac{\Sigma f_i u_i}{\Sigma f_i} \times h = 47.5 + \frac{29}{30} \times 15$

= 47.5 + 14.5 = 62

Direct Method , Deviation Method [or] Assumed Mean Method, Step- deviation method

Class interval C.I	Number of student f_i	Class Marks Xi	di = xi - a = xi - 50	$u_i = \frac{x_i - a}{h}$	f_i . xi	f_i . di	f_i . u_i
15--25	6	20	-30	-3	120	-180	-18
25--35	11	30	-20	-2	330	-220	-22
35--45	7	40	-10	-1	280	-70	-7
45--55	4	50 [a]	0	0	200	0	0
55--65	4	60	10	1	240	40	4
65--75	2	70	20	2	140	40	4
75--85	1	80	30	3	80	30	3
	$\sum f_i$ = 35				$\sum f_i$ xi = 1390	$\sum f_i$. di = -360	$\sum f_i$. u_i = -36

Direct Method Arithmetic Mean = $X = \frac{\sum f_i \text{ xi}}{\sum f_i} = \frac{1860}{30}$

Arithmetic Mean = 62.

Deviation Method [or] Assumed Mean Method.

Arithmetic Mean (Deviation Method [or] Assumed Mean Method) $X = a + \frac{\sum f_i \text{ di}}{\sum f_i}$

Assumed Mean = a =47.5 $\sum$ fi . di = 435, $\sum$ fi = 30

Arithmetic Mean $X = 47.5 + \frac{435}{30} = 47.5 + 14.5 = 62.0$

Step- deviation method

Step- deviation method Arithmetic Mean $\bar{x} = a + \frac{\sum f_i u_i}{\sum f_i} \times h$

a is the assumed mean = 47.5 $\sum f_i \cdot u_i$ = 29, $\sum f_i$ = 30

Step- deviation method Arithmetic Mean = $\bar{x} = a + \frac{\sum f_i u_i}{\sum f_i} \times h$

$= 47.5 + \frac{29}{30} \times 15$

= 47.5 + 14.5 = 62

Direct Method

Class interval C.I	Number of student f_i	Class Marks Xi	f_i . xi
10--25	2		
25--40	3		
40--55	7		
55--70	6		
70--85	6		
85--100	6		
	$\sum f_i$ =		$\sum f_i$ xi =

A.M = Arithmetic Mean

$= X = \frac{\Sigma f_i \text{ xi}}{\Sigma f_i} =$

=

Arithmetic Mean =

Number of plants C.I	Number of houses f_i	Class Marks Xi	f_i . xi
0--2	1		
2--4	2		
4--6	1		
6--8	5		
8--10	6		
10--12	2		
12--14	3		
	$\sum f_i$ =		$\sum f_i$ xi =

Arithmetic Mean = $X = \frac{\Sigma f_i \text{ xi}}{\Sigma f_i}$

=

Arithmetic Mean =

Daily wages in Rupees C.I	Number of workers f_i	Class Marks Xi	f_i . xi
200--250	12		
250--300	14		
300--350	8		
350--400	6		
400--450	10		
	$\sum f_i$ =		$\sum f_i$ xi =

Arithmetic Mean = $X = \frac{\Sigma f_i \text{ xi}}{\Sigma f_i}$

=

Arithmetic Mean =

Daily pocket allowance in Rupees C.I	Number of children f_i	Class Marks Xi	f_i . xi
11--13	7		
13--15	6		
15--17	9		
17--19	13		
19--21	20		
21--23	5		
23--25	4		
	$\sum f_i$ =		$\sum f_i$ xi =

Arithmetic Mean = $X = \frac{\Sigma f_i \text{ xi}}{\Sigma f_i}$

=

Arithmetic Mean =

Number of heart beats/minute C.I	Number of women f_i	Class Marks Xi	f_i . xi
65--68	2		
68--71	4		
71--74	3		
74--77	8		
77--80	7		
80--83	4		
83--86	2		
	$\sum f_i$ =		$\sum f_i$ xi =

Arithmetic Mean = X = $\frac{\sum f_i \text{ xi}}{\sum f_i}$

=

Arithmetic Mean =

Number of oranges C.I	Number of baskets f_i	Class Marks Xi	f_i . xi
10--14	15		
15--19	110		
20--24	135		
25--29	115		
30--34	25		
	$\sum f_i$ =		$\sum f_i$ xi =

Arithmetic Mean = X = $\frac{\sum f_i \text{ xi}}{\sum f_i}$

=

Arithmetic Mean =

Daily expenditure in Rupees C.I	Number of house holds f_i	Class Marks Xi	f_i . xi
100--150	4		
150--200	5		
200--250	12		
250--300	2		
300--350	2		
	$\sum f_i$ =		$\sum f_i$ xi =

Arithmetic Mean = X = $\frac{\sum f_i \text{ xi}}{\sum f_i}$

=

Arithmetic Mean =

Concentration of SO_2 in ppm C.I	Frequency f_i	Class Marks Xi	f_i . xi
0.00-0.04	4		
0.04--0.08	9		
0.08--0.12	9		
0.12--0.16	2		
0.16--0.20	4		
0.20--0.24	2		
	$\sum f_i$ =		$\sum f_i$ xi =

Arithmetic Mean = X = $\frac{\sum f_i \text{ xi}}{\sum f_i}$

=

Arithmetic Mean =

Number of days C.I	Number of students f_i	Class Marks Xi	f_i . xi
35--38	1		
38--41	3		
41--44	4		
44--47	4		
47--50	7		
50--53	10		
53--56	11		
	$\sum f_i$ =		$\sum f_i$ xi =

Arithmetic Mean = X = $\frac{\sum f_i \text{ xi}}{\sum f_i}$

=

Arithmetic Mean =

Literacy rate in % C.I	Number of cities f_i	Class Marks Xi	f_i . xi
45--55	3		
55--65	10		
65--75	11		
75--85	8		
85--95	3		
	$\sum f_i$ =		$\sum f_i$ xi =

Arithmetic Mean = X = $\frac{\sum f_i \text{ xi}}{\sum f_i}$

=

Arithmetic Mean =

Age (in years) C.I	Number of patients f_i	Class Marks Xi	f_i . xi
5--15	6		
15--25	11		
25--35	21		
35--45	23		
45--55	14		
55--65	5		
	$\sum f_i$ =		$\sum f_i$ xi =

ArithmeticMean = X = $\frac{\sum f_i \text{ xi}}{\sum f_i}$

=

Arithmetic Mean=

Expenditure C.I	Number of families f_i	Class Marks Xi	f_i . xi
1000-1500	24		
1500-2000	40		
2000-2500	33		
2500-3000	28		
3000-3500	30		
3500-4000	22		
4000-4500	16		
4500-5000	7		
	$\sum f_i$ =		$\sum f_i$ xi =

Arithmetic Mean = X = $\frac{\sum f_i \text{ xi}}{\sum f_i}$

=

Arithmetic Mean =

Number of students C.I	Number of States f_i	Class Marks Xi	f_i . xi
15--20	3		
20--25	8		
25--30	9		
30-35	10		
35--40	3		
40--45	0		
45--50	0		
50--55	2		
	$\sum f_i$ =		$\sum f_i$ xi =

Arithmetic Mean = X = $\frac{\sum f_i \text{ xi}}{\sum f_i}$

=

Arithmetic Mean =

Monthly consumption C.I	Number of consumers f_i	Class Marks Xi	f_i . xi
65--85	4		
85--105	5		
105--125	13		
125--145	20		
145--165	14		
165--185	8		
185--205	4		
	$\sum f_i$ =		$\sum f_i$ xi =

Arithmetic Mean = X = $\frac{\sum f_i \text{ xi}}{\sum f_i}$

=

Arithmetic Mean =

Number of letters C.I	Number of surnames f_i	Class Marks Xi	f_i . xi
1--4	6		
4--7	30		
7--10	40		
10--13	16		
13--16	4		
16--19	4		
	$\sum f_i$ =		$\sum f_i$ xi =

Arithmetic Mean = X = $\frac{\sum f_i \text{ xi}}{\sum f_i}$

=

Arithmetic Mean =

Class interval C.I	Number of student f_i	Class Marks Xi	f_i . xi
10--25	2		
25--40	3		
40--55	7		
55--70	6		
70--85	6		
85--100	6		
Total	$\sum f_i$ =		$\sum f_i$ xi =

Arithmetic Mean = X = $\frac{\sum f_i \text{ xi}}{\sum f_i}$

=

Arithmetic Mean =

Class interval C.I	Number of student f_i	Class Marks Xi	f_i . xi
10--25	2		
25--40	7		
40--55	9		
55--70	7		
70--85	6		
85--100	9		
Total	$\sum f_i$ =		$\sum f_i$ xi =

Arithmetic Mean = X = $\frac{\sum f_i \text{ xi}}{\sum f_i}$

=

Arithmetic Mean =

Class interval C.I	Number of student f_i	Class Marks Xi	f_i . xi
10--25	2		
25--40	3		
40--55	7		
55--70	8		
70--85	4		
85--100	6		
Total	$\sum f_i$ =		$\sum f_i$ xi =

Arithmetic Mean = X = $\frac{\sum f_i \text{ xi}}{\sum f_i}$

=

Arithmetic Mean =

DEVIATION METHOD [OR] ASSUMED MEAN METHOD

Class interval C.I	Number of student f_i	Class Marks xi	di = xi - a	f_i . di
10--25	2			
25--40	3			
40--55	7			
55--70	6			
70--85	6			
85--100	6			
	$\sum f_i$ =			$\sum f_i$ .di =

Arithmetic Mean (Deviation Method [or] Assumed Mean Method) $X = a + \frac{\sum f_i \, di}{\sum f_i}$

Assumed Mean = a = ----------

$\sum$ fi . di = ---------- $\sum$ fi = ----------

Arithmetic Mean = $X = a + \frac{\sum f_i \, di}{\sum f_i}$ =

Number of plants C.I	Number of houses f_i	Class Marks xi	di = xi - a	f_i . di
0--2	1			
2--4	2			
4--6	1			
6--8	5			
8--10	6			
10--12	2			
12--14	3			
	$\sum f_i$ =			$\sum f_i$. di =

Arithmetic Mean (Deviation Method [or] Assumed Mean Method) $X = a + \frac{\sum f_i \, di}{\sum f_i}$

Assumed Mean = a = ---------

$\sum$ fi . di = ---- $\sum$ fi = ------

Arithmetic Mean = X

= a + $\frac{\sum f_i \, di}{\sum f_i}$ =

Daily wages in Rupees C.I	Number of workers f_i	Class Marks xi	di = xi - a	f_i . di
200--250	12			
250--300	14			
300--350	8			
350--400	6			
400--450	10			
	$\sum f_i$ =			$\sum f_i$. di =

Arithmetic Mean
(Deviation Method [or] Assumed Mean Method)

$X = a + \frac{\sum f_i \, di}{\sum f_i}$

Assumed Mean = a = -----

$\sum$ fi . di = ------ $\sum$ fi = ---

Arithmetic Mean = $X = a + \frac{\sum f_i \, di}{\sum f_i}$ =

Class interval C.I	Number of student f_i	Class Marks xi	di = xi - a	f_i . di
11--13	7			
13--15	6			
15--17	9			
17--19	13			
19--21	20			
21--23	5			
23--25	4			
	$\sum f_i$ =			$\sum f_i$. di =

Arithmetic Mean (Deviation Method [or] Assumed Mean Method) $X = a + \frac{\sum f_i \, di}{\sum f_i}$

Assumed Mean = a = ----------

$\sum$ fi . di = ---------- $\sum$ fi = ----------

Arithmetic Mean = $X = a + \frac{\sum f_i \, di}{\sum f_i}$ =

Number of heart beats/minute C.I	Number of women f_i	Class Marks xi	di = xi - a	f_i . di
65--68	2			
68--71	4			
71--74	3			
74--77	8			
77--80	7			
80--83	4			
83--86	2			
	$\sum f_i$ =			$\sum f_i$. di =

Arithmetic Mean (Deviation Method [or] Assumed Mean Method) $X = a + \frac{\sum f_i d_i}{\sum f_i}$

Assumed Mean = a = ----------

$\sum f_i . d_i$ = ---------- $\sum f_i$ = ----------

Arithmetic Mean = $X = a + \frac{\sum f_i d_i}{\sum f_i}$ =

Number of oranges C.I	Number of baskets f_i	Class Marks xi	di = xi - a	f_i . di
10--14	15			
15--19	110			
20--24	135			
25--29	115			
30--34	25			
	$\sum f_i$ =			$\sum f_i$. di =

Arithmetic Mean (Deviation Method [or] Assumed Mean Method) $X = a + \frac{\sum f_i d_i}{\sum f_i}$

Assumed Mean = a = ----------

$\sum f_i . d_i$ = ---------- $\sum f_i$ = ------

Arithmetic Mean = $X = a + \frac{\sum f_i d_i}{\sum f_i}$ =

Daily expenditure in Rupees C.I	Number of house holds f_i	Class Marks xi	di = xi - a	f_i . di
100--150	4			
150--200	5			
200--250	12			
250--300	2			
300--350	2			
	$\sum f_i$ =			$\sum f_i$. di =

Arithmetic Mean (Deviation Method [or] Assumed Mean Method) $X = a + \frac{\sum f_i d_i}{\sum f_i}$

Assumed Mean = a = ----------

$\sum f_i . d_i$ = ---------- $\sum f_i$ = ----------

Arithmetic Mean = $X = a + \frac{\sum f_i d_i}{\sum f_i}$ =

Concentration of SO_2 in ppm C.I	Frequency f_i	Class Marks xi	di = xi - a	f_i . di
0.00-0.04	4			
0.04--0.08	9			
0.08--0.12	9			
0.12--0.16	2			
0.16--0.20	4			
0.20--0.24	2			
	$\sum f_i$ =			$\sum f_i$. di =

Arithmetic Mean (Deviation Method [or] Assumed Mean Method) $X = a + \frac{\sum f_i d_i}{\sum f_i}$

Assumed Mean = a = ----------

$\sum f_i . d_i$ = ---------- $\sum f_i$ = ------

Arithmetic Mean = $X = a + \frac{\sum f_i d_i}{\sum f_i}$ =

Number of days C.I	Number of students f_i	Class Marks x_i	$d_i = x_i - a$	$f_i \cdot d_i$
35--38	1			
38--41	3			
41--44	4			
44--47	4			
47--50	7			
50--53	10			
53--56	11			
	$\sum f_i$ =			$\sum f_i \cdot d_i$ =

Arithmetic Mean (Deviation Method [or] Assumed Mean Method) $X = a + \frac{\sum f_i d_i}{\sum f_i}$

Assumed Mean = a = ----------

$\sum f_i \cdot d_i$ = ---------- $\sum f_i$ = -----

Arithmetic Mean = $X = a + \frac{\sum f_i d_i}{\sum f_i}$

=

Literacy rate in % C.I	Number of cities f_i	Class Marks x_i	$d_i = x_i - a$	$f_i \cdot d_i$
45--55	3			
55--65	10			
65--75	11			
75--85	8			
85--95	3			
	$\sum f_i$ =			$\sum f_i \cdot d_i$ =

Arithmetic Mean (Deviation Method [or] Assumed Mean Method) $X = a + \frac{\sum f_i d_i}{\sum f_i}$

Assumed Mean = a = ----------

$\sum f_i \cdot d_i$ = ---------- $\sum f_i$ = -----

Arithmetic Mean = $X = a + \frac{\sum f_i d_i}{\sum f_i}$

=

Age (in years) C.I	Number of patients f_i	Class Marks x_i	$d_i = x_i - a$	$f_i \cdot d_i$
5--15	6			
15--25	11			
25--35	21			
35--45	23			
45--55	14			
55--65	5			
	$\sum f_i$ =			$\sum f_i \cdot d_i$ =

Arithmetic Mean (Deviation Method [or] Assumed Mean Method)

$X = a + \frac{\sum f_i d_i}{\sum f_i}$

Assumed Mean = a = ----------

$\sum f_i \cdot d_i$ = ------ $\sum f_i$ = -----

Arithmetic Mean =

$X = a + \frac{\sum f_i d_i}{\sum f_i}$

=

Expenditure C.I	Number of families f_i	Class Marks x_i	$d_i = x_i - a$	$f_i \cdot d_i$
1000-1500	24			
1500-2000	40			
2000-2500	33			
2500-3000	28			
3000-3500	30			
3500-4000	22			
4000-4500	16			
4500-5000	7			
	$\sum f_i$ =			$\sum f_i \cdot d_i$ =

Arithmetic Mean (Deviation Method [or] Assumed Mean Method) $X = a + \frac{\sum f_i d_i}{\sum f_i}$

Assumed Mean = a = ----------

--

$\sum f_i \cdot d_i$ = ------ $\sum f_i$ = ----

Arithmetic Mean = X

$= a + \frac{\sum f_i d_i}{\sum f_i}$

=

Number of students C.I	Number of States f_i	Class Marks Xi	di = xi - a	f_i . di
15--20	3			
20--25	8			
25--30	9			
30-35	10			
35--40	3			
40--45	0			
45--50	0			
50--55	2			
	$\sum f_i$ =			$\sum f_i$. di =

Arithmetic Mean (Deviation Method [or] Assumed Mean Method)

$X = a + \frac{\sum f_i \, di}{\sum f_i}$

Assumed Mean = a = ----------

$\sum$ fi . di = ------- $\sum$ fi = ----------

Arithmetic Mean = X

$= a + \frac{\sum f_i \, di}{\sum f_i}$

=

Monthly consumption C.I	Number of consumers f_i	Class Marks Xi	di = xi - a	f_i . di
65--85	4			
85--105	5			
105--125	13			
125--145	20			
145--165	14			
165--185	8			
185--205	4			
	$\sum f_i$ =			$\sum f_i$. di =

Arithmetic Mean (Deviation Method [or] Assumed Mean Method)

X =

a +

$\frac{\sum f_i \, di}{\sum f_i}$

Assumed Mean = a = ----------

$\sum$ fi . di = ---------- $\sum$ fi =

Arithmetic Mean = X= a + $\frac{\sum f_i \, di}{\sum f_i}$ =

Number of letters C.I	Number of surnames f_i	Class Marks Xi	di = xi - a	f_i . di
1--4	6			
4--7	30			
7--10	40			
10--13	16			
13--16	4			
16--19	4			
	$\sum f_i$ =			$\sum f_i$. di =

Arithmetic Mean (Deviation Method [or] Assumed Mean Method)

X =

a + $\frac{\sum f_i \, di}{\sum f_i}$

Assumed Mean = a = ----------

$\sum$ fi . di = ---------- $\sum$ fi =

Arithmetic Mean = X= a + $\frac{\sum f_i \, di}{\sum f_i}$ =

Step-deviation method

Class interval	10--25	25--40	40--55	55--70	70--85	85--100
Number of student	2	3	7	6	6	6

Class interval C.I	Number of student f_i	Class Marks xi	di = xi - a	$u_i = \frac{x_i - a}{h}$	$f_i \cdot u_i$
10--25	2	17.5	-30	-2	-4
25--40	3	32.5	-15	-1	-3
40--55	7	47.5 [a]	0	0	0
55--70	6	62.5	15	1	6
70--85	6	77.5	30	2	12
85--100	6	92.5	45	3	18
	$\sum f_i$ = 30				$\sum f_i \cdot u_i$ = 29

a = 47.5 , h = Length of the class interval =15 , $\sum f_i$ = 30, $\sum f_i \cdot u_i$ = 29

Arithmetic Mean $\bar{x} = a + \frac{\sum f_i u_i}{\sum f_i} \times h = 47.5 + \frac{29}{30} \times 15$ = 47.5 +14.5= 62

Number of plants C.I	Number of houses f_i	Class Marks xi	di = xi - a	$u_i = \frac{x_i - a}{h}$	$f_i \cdot u_i$
0--2	1				
2--4	2				
4--6	1				
6--8	5				
8--10	6				
10--12	2				
12--14	3				
	$\sum f_i$ =				$\sum f_i \cdot u_i$ =

a = , h = Length of the class interval = , $\sum f_i$ = , $\sum f_i \cdot u_i$ =

Arithmetic Mean $\bar{x} = a + \frac{\sum f_i u_i}{\sum f_i} \times h$ =

Daily wages in Rupees C.I	Number of workers f_i	Class Marks xi	di = xi - a	$u_i = \frac{x_i - a}{h}$	$f_i \cdot u_i$
200--250	12				
250--300	14				
300--350	8				
350--400	6				
400--450	10				
	$\sum f_i$ =				$\sum f_i \cdot u_i$ =

a = , h = Length of the class interval = , $\sum f_i$ = , $\sum f_i \cdot u_i$ = ,

Arithmetic Mean = $\bar{x} = a + \frac{\sum f_i u_i}{\sum f_i} \times h$ =

Class interval C.I	Number of student f_i	Class Marks xi	di = xi - a	$u_i = \frac{x_i - a}{h}$	$f_i \cdot u_i$
11--13	7				
13--15	6				
15--17	9				
17--19	13				
19--21	20				
21--23	5				
23--25	4				
	$\sum f_i$ =				$\sum f_i \cdot u_i$ =

a = , h = Length of the class interval = , $\sum f_i$ = , $\sum f_i \cdot u_i$ =

Arithmetic Mean = $\bar{x} = a + \frac{\sum f_i u_i}{\sum f_i} \times h$ =

Number of heart beats/minute C.I	Number of women f_i	Class Marks xi	di = xi - a	$u_i = \frac{x_i - a}{h}$	$f_i \cdot u_i$
65--68	2				
68--71	4				
71--74	3				
74--77	8				
77--80	7				
80--83	4				
83--86	2				
	$\sum f_i$ =				$\sum f_i \cdot u_i$ =

a = , h = Length of the class interval = , $\sum f_i$ = , $\sum f_i \cdot u_i$ =

Arithmetic Mean $\bar{x} = a + \frac{\sum f_i u_i}{\sum f_i} \times h$ =

Number of oranges C.I	Number of baskets f_i	Class Marks xi	di = xi - a	$u_i = \frac{x_i - a}{h}$	$f_i \cdot u_i$
10--14	15				
15--19	110				
20--24	135				
25--29	115				
30--34	25				
	$\sum f_i$ =				$\sum f_i \cdot u_i$ =

a = , h = Length of the class interval = , $\sum f_i$ = , $\sum f_i \cdot u_i$ =

Arithmetic Mean $\bar{x} = a + \frac{\sum f_i u_i}{\sum f_i} \times h$ =

Daily expenditure in Rupees C.I	Number of house holds f_i	Class Marks Xi	di = xi - a	$u_i = \frac{x_i - a}{h}$	$f_i \cdot u_i$
100--150	4				
150--200	5				
200--250	12				
250--300	2				
300--350	2				
	$\sum f_i$ =				$\sum f_i \cdot u_i$ =

a = , h = Length of the class interval = , $\sum f_i$ = , $\sum f_i \cdot u_i$ =

Arithmetic Mean =

Concentration of SO_2 in ppm C.I	Frequency f_i	Class Marks Xi	di = xi - a	$u_i = \frac{x_i - a}{h}$	$f_i \cdot u_i$
0.00-0.04	4				
0.04--0.08	9				
0.08--0.12	9				
0.12--0.16	2				
0.16--0.20	4				
0.20--0.24	2				
	$\sum f_i$ =				$\sum f_i \cdot u_i$ =

a = , h = Length of the class interval = , $\sum f_i$ = , $\sum f_i \cdot u_i$ =

Arithmetic Mean =

Number of days C.I	Number of students f_i	Class Marks Xi	di = xi - a	$u_i = \frac{x_i - a}{h}$	$f_i \cdot u_i$
35--38	1				
38--41	3				
41--44	4				
44--47	4				
47--50	7				
50--53	10				
53--56	11				
	$\sum f_i$ =				$\sum f_i \cdot u_i$ =

a = , h = Length of the class interval = , $\sum f_i$ = , $\sum f_i \cdot u_i$ =

Arithmetic Mean $\bar{x} = a + \frac{\sum f_i u_i}{\sum f_i} \times h$ =

Literacy rate in % C.I	Number of cities f_i	Class Marks xi	di = xi - a	$u_i = \frac{x_i - a}{h}$	$f_i \cdot u_i$
45--55	3				
55--65	10				
65--75	11				
75--85	8				
85--95	3				
	$\sum f_i$ =				$\sum f_i . u_i$ =

a = , h = Length of the class interval = , $\sum f_i$ = , $\sum f_i . u_i$ =

Arithmetic Mean $\bar{x} = a + \frac{\sum f_i u_i}{\sum f_i} \times h$ =

Age (in years) C.I	Number of patients f_i	Class Marks Xi	di = xi - a	$u_i = \frac{x_i - a}{h}$	$f_i \cdot u_i$
5--15	6				
15--25	11				
25--35	21				
35--45	23				
45--55	14				
55--65	5				
	$\sum f_i$ =				$\sum f_i . u_i$ =

a = , h = Length of the class interval = , $\sum f_i$ = , $\sum f_i . u_i$ =

Arithmetic Mean $\bar{x} = a + \frac{\sum f_i u_i}{\sum f_i} \times h$ =

Expenditure C.I	Number of families f_i	Class Marks Xi	di = xi - a	$u_i = \frac{x_i - a}{h}$	$f_i \cdot u_i$
1000-1500	24				
1500-2000	40				
2000-2500	33				
2500-3000	28				
3000-3500	30				
3500-4000	22				
4000-4500	16				
4500-5000	7				
	$\sum f_i$ =				$\sum f_i . u_i$ =

a = , h = Length of the class interval = , $\sum f_i$ = , $\sum f_i . u_i$ =

Arithmetic Mean $\bar{x} = a + \frac{\sum f_i u_i}{\sum f_i} \times h$ =

Number of students C.I	Number of States f_i	Class Marks x_i	di = xi - a	$u_i = \frac{x_i - a}{h}$	$f_i \cdot u_i$
15--20	3				
20--25	8				
25--30	9				
30-35	10				
35--40	3				
40--45	0				
45--50	0				
50--55	2				
	$\sum f_i$ =				$\sum f_i . u_i$ =

a = , h = Length of the class interval = , $\sum f_i$ = , $\sum f_i . u_i$ =

Arithmetic Mean $\bar{x} = a + \frac{\sum f_i u_i}{\sum f_i} \times h$ =

Monthly consumption C.I	Number of consumers f_i	Class Marks x_i	di = xi - a	$u_i = \frac{x_i - a}{h}$	$f_i \cdot u_i$
65--85	4				
85--105	5				
105--125	13				
125--145	20				
145--165	14				
165--185	8				
185--205	4				
	$\sum f_i$ =				$\sum f_i . u_i$ =

a = , h = Length of the class interval = , $\sum f_i$ = , $\sum f_i . u_i$ =

Arithmetic Mean $\bar{x} = a + \frac{\sum f_i u_i}{\sum f_i} \times h$ =

Number of letters C.I	Number of surnames f_i	Class Marks xi	di = xi - a	$u_i = \frac{x_i - a}{h}$	$f_i \cdot u_i$
1--4	6				
4--7	30				
7--10	40				
10--13	16				
13--16	4				
16--19	4				
	$\sum f_i$ =				$\sum f_i . u_i$ =

a = , h = Length of the class interval = , $\sum f_i$ = , $\sum f_i . u_i$ =

Arithmetic Mean $\bar{x} = a + \frac{\sum f_i u_i}{\sum f_i} \times h$ =

$$\text{MODE} = l + \left(\frac{f_1 - f_0}{2f_1 - f_0 - f_2}\right) \times h$$

l = lower boundary of the modal class , h =size of the class interval (assuming all class sizes to be equal),
f_1 = frequency of the modal class , f_0 =frequency of the class preceding the modal class
f_2 =frequency of the class succeeding the modal class.

. A survey conducted on 20 households in a locality by a group of students resulted in the following frequency table for the number of family members in a household. Find the mode of this data

Family size *C.I*	*Number of States* f_i
1-3	7 ($f0$)
3-5 Modal	Class 8 ($f1$)
5-7	2 ($f2$)
7-9	2
9-11	1
	$\sum f_i$ =

Solution : $\text{MODE} = l + \left(\frac{f_1 - f_0}{2f_1 - f_0 - f_2}\right) \times h$

Here the maximum class frequency is 8, and the class corresponding to this frequencyis 3-5. So, the modal class is 3-5.

←The modal class = 3-5
lower boundary of modal class (l) = 3
class size (h) = 2
frequency of the modal class ($f1$) = 8
frequency of class preceding the modal class ($f0$) = 7
frequency of class succeeding the modal class ($f2$) = 2

$$\text{MODE} = l + \frac{f_1 - f_0}{2f_1 - f_0 - f_2} \times h = 3 + \frac{8-7}{2 \times 8 - 7 - 2} \times 2 =$$
$$3 + \frac{1}{7} \times 2 = 3 + \frac{2}{7} = 3 + 0.286 = 3.286$$

The mode of the data above is 3.286.

The marks distribution of 30 students in a mathematics examination are given in the adjacent table. Find the mode of this data. Also compare and interpret the mode and the mean.

Class interval C.I	Number of students f_i	Class Marks xi	f_i . xi
10-25	2	17.5	35.0
25-40	3 (f_0)	32.5	97.5
40-55	7(f_1)	47.5	332.5
55-70	6(f_2)	62.5	375.0
70-85	6	77.5	465.0
85-100	6	92.5	555.0
	$\sum f_i$ = 30		$\sum f_i$ xi = 1860.0

Solution :Arithmetic Mean = $\bar{X} = \frac{\sum f_i x_i}{\sum f_i} = \frac{1860}{30} = 62$

$$\text{MODE} = l + \left(\frac{f_1 - f_0}{2f_1 - f_0 - f_2}\right) \times h$$

Since the maximum number of students (7) have got marks in the interval, 40-65

←The modal class = 40 - 55.
The lower boundary of the modal class (l) = 40
The class size (h) = 15
The frequency of modal class ($f1$) = 7

The frequency of the class preceding the modal class (f_0) = 3,
the frequency of the class succeeding the modal class (f_2) = 6.

$$\text{MODE} = l + \left(\frac{f_1 - f_0}{2f_1 - f_0 - f_2}\right) \times h = 40 + \left(\frac{7-3}{2 \times 7 - 6 - 3}\right) \times 15 = 40 + \frac{4}{5} \times 15 = 40 + 12 = 52.$$

Interpretation : The mode marks is 52. The mean marks is 62. So, the maximum number of students obtained 52 marks, while on an average a student obtained 62 ma

The following table shows the ages of the patients admitted in a hospital during a year: Find the mode and the mean of the data given above. Compare and interpret the two measures of central tendency.

Age (in years) C.I	Number of patients f_i	Class Marks xi	f_i . xi
5-15	6		
15-25	11		
25-35	21		
35-45	23		
45-55	14		
55-65	5		

$$\text{MODE} = l + \left(\frac{f_1 - f_0}{2f_1 - f_0 - f_2}\right) \times h$$

Since the maximum number of students ----- have got marks in the interval ---------
The modal class =
The lower boundary of the modal class (l) =
The class size (h) =
frequency of modal class ($f1$) =
The frequency of the class preceding the modal class (f_0) =
The frequency of the class succeeding the modal class (f_2) =

$$\text{MODE} = l + \left(\frac{f_1 - f_0}{2f_1 - f_0 - f_2}\right) \times h$$

Interpretation :The mode marks is -------. The mean marks is ----------. So, the maximum number of students obtained -----marks, while on an average a student obtained -------- marks

2) The following data gives the information on the observed life times (in hours) of 225 electrical components Determine the modal lifetimes of the components.

Family size *C.I*	*Number of States* f_i
0-20	10
20-40	35
40-60	52
60-80	61
80-100	38
100-120	29
	$\sum f_i$ =

Solution : $\text{MODE} = l + \left(\frac{f_1 - f_0}{2f_1 - f_0 - f_2}\right) \times h$

Here the maximum class frequency is ------- and the class corresponding to this frequencyis ----------. So, the modal class is ---------

The modal class =
lower boundary of modal class (l) =
class size (h) =
frequency of the modal class ($f1$) =
frequency of class preceding the modal class ($f0$) =
frequency of class succeeding the modal class ($f2$) =
MODE = $l + \frac{f_1 - f_0}{2f_1 - f_0 - f_2} \times h$ =
The mode of the data above is ----------

3)The following data gives the distribution of total monthly household expenditure of 200 families of a village. Find the modal monthly expenditure of the families. Also, find the mean monthly expenditure :

Age (in years) C.I	Number of patients f_i	Class Marks xi	f_i . xi
1000-1500	24		
1500-2000	40		
2000-2500	33		
2500-3000	28		
3000-3500	30		
3500-4000	22		
4000-4500	16		
4500-5000	7		
	$\sum f_i$ =		

Solution : Arithmetic Mean = X = $\frac{\sum f_i \text{ xi}}{\sum f_i}$ =

MODE = $l + \left(\frac{f_1 - f_0}{2f_1 - f_0 - f_2}\right) \times h$

Since the maximum number of students --- have got
marks in the interval ---------
The modal class =
The lower boundary of the modal class (l) =
The class size (h) =
The frequency of modal class (f_1) =
The frequency of the class preceding the modal class ($f0$) =
The frequency of the class succeeding the modal class ($f2$) =

MODE = $l + \left(\frac{f_1 - f_0}{2f_1 - f_0 - f_2}\right) \times h$ = + ( )x =

Interpretation : The mode marks is -------. The mean marks is ---------. So, the maximum number of students obtained -----marks, while on an average a student obtained -------- marks.

4. The following distribution gives the state-wise, teacher-student ratio in higher secondary schools of India. Find the mode and mean of this data. Interpret the two measures.

Number of students C.I	Number of States f_i	Class Marks Xi	f_i . xi
15-20	3		
20-25	8		
25-30	9		
30-35	10		
35-40	3		
40-45	0		
45-50	0		
50-55	2		
	$\sum f_i$ =		

Solution : Arithmetic Mean = X = $\frac{\sum f_i \text{ xi}}{\sum f_i}$ =

MODE = $l + \left(\frac{f_1 - f_0}{2f_1 - f_0 - f_2}\right) \times h$

Since the maximum number of students ----- have got marks in the interval ---------
The modal class =
The lower boundary of the modal class (l) =
The class size (h) =
The frequency of modal class ($f1$) =
The frequency of the class preceding the modal class (f_0) =
The frequency of the class succeeding the modal class (f_2) =

MODE = $l + \left(\frac{f_1 - f_0}{2f_1 - f_0 - f_2}\right) \times h$ = + ( )x =

Interpretation :
The mode marks is -------. The mean marks is ---------. So, the maximum number of students obtained ----- marks, while on an average a student obtained -------- marks.

5). The given distribution shows the number of runs scored by some top batsmen of the world in one-day international cricket matches.

Runs *C.I*	Number of batsmen f_i
3000-4000	4
4000-5000	18
5000-6000	9
6000-7000	7
7000-8000	6
8000-9000	3
9000-10000	1
10000-11000	1
	$\sum f_i$ =

Solution : MODE = $l + \left(\frac{f_1 - f_o}{2f_1 - f_0 - f_2}\right) \times h$

Here the maximum class frequency is ------- and the class corresponding to this frequencyis ----------.

So, the modal class is ---------

The modal class =

lower boundary of modal class (l) =

class size (h) =

frequency of the modal class ($f1$) =

frequency of class preceding the modal class ($f0$) =

frequency of class succeeding the modal class ($f2$) =

MODE = $l + \frac{f_1 - f_o}{2f_1 - f_0 - f_2} \times h$ =

The mode of the data above is ----------

6) A student noted the number of cars passing through a spot on a road for 100 periods,each of 3 minutes, and summarised this in the table given below. Find the mode of the data.

Runs *C.I*	Number of batsmen f_i
0-10	7
10-20	14
20-30	13
30-40	12
40-50	20
50-60	11
60-70	15
70-80	8
	$\sum f_i$ =

Solution : MODE = $l + \left(\frac{f_1 - f_o}{2f_1 - f_0 - f_2}\right) \times h$

Here the maximum class frequency is ------- and the class corresponding to this frequencyis ----------.

The modal class is ---------

The modal class =

lower boundary of modal class (l) =

class size (h) =

frequency of the modal class ($f1$) =

frequency of class preceding the modal class ($f0$) =

frequency of class succeeding the modal class ($f2$) =

MODE = $l + \frac{f_1 - f_o}{2f_1 - f_0 - f_2} \times h$ =

The mode of the data above is ----------

find the median of the following data

Class interval	Below 140	140-145	145-150	150-155	155-160	160-165
Number of student	4	7	18	11	6	5

Class interval C.I	Number of student f_i	Cumulative frequency c f
Below 140	4	4 = 4
140-145	7	4+7 =11
145-150	18	4+7+18 =29
150-155	11	4+7+18+11 =40
155-160	6	4+7+18+11+6 =46
160-165	5	4+7+18+11 +6+5 =51
	51	

Median = $l + \frac{\frac{n}{2} - cf}{f} \times h$

n/2 = 51/2 =25.5, Median class is 145-150

l = lower boundary of median class = 145

n = number of observations = 51

cf = cumulative frequency of class preceding the median class= 11

f= frequency of median class = 18

h=class size (assuming class size to be equal). = 5

Median = $l + \frac{\frac{n}{2} - cf}{f} \times h = 145 + \frac{25.5 - 11}{18} \times 5$

$=145+\frac{14.5}{18} X\ 5 = 145 + \frac{72.5}{18}$ = 145+4.03

=149.03

Monthly consumption C.I	Number of consumers f_i	Cumulative frequency c f
65--85	4	
85--105	5	
105--125	13	
125--145	20	
145--165	14	
165--185	8	
185--205	4	

$$\text{Median} = l + \frac{\frac{n}{2} - cf}{f} \times h$$

n/2 = ---------- = ---------- , Median class is ----------

l = lower boundary of median class =

n = number of observations =

cf = cumulative frequency of class preceding the median class =

f = frequency of median class =

h = class size (assuming class size to be equal). =

$$\text{Median} = l + \frac{\frac{n}{2} - cf}{f} \times h =$$

Class interval C.I	Frequency f_i	Cumulative frequency c f
0-10	5	
10-20	8	
20-30	20	
30-40	15	
40-50	7	
50-60	5	

$$\text{Median} = l + \frac{\frac{n}{2} - cf}{f} \times h$$

n/2 = ---------- = ---------- , Median class is ----------

l = lower boundary of median class =

n = number of observations =

cf = cumulative frequency of class preceding the median class =

f = frequency of median class =

h = class size (assuming class size to be equal).

$$\text{Median} = l + \frac{\frac{n}{2} - cf}{f} \times h =$$

Length (in mm) C.I	Number of leaves f_i	Cumulative frequency c f
118-126	3	
127-135	5	
136-144	9	
145-153	12	
154-162	5	
163-171	4	
172-180	2	

$$\text{Median} = l + \frac{\frac{n}{2} - cf}{f} \times h$$

n/2 = ---------- = ---------- , Median class is ----------

l = lower boundary of median class =

n = number of observations =

cf = cumulative frequency of class preceding the median class =

f = frequency of median class =

h = class size (assuming class size to be equal). =

$$\text{Median} = l + \frac{\frac{n}{2} - cf}{f} \times h =$$

The following table gives the distribution of the life-time of 400 neon lamps, Find the median life time of a lamp.

Life time (in hours)C.I	Number of lamps f_i	Cumulative frequency c f
1500-2000	14	
2000-2500	56	
2500-3000	60	
3000-3500	86	
3500-4000	74	
4000-4500	62	
4500-5000	48	

$$\text{Median} = l + \frac{\frac{n}{2} - cf}{f} \times h$$

n/2 = ---------- = ---------- , Median class is ----------

l = lower boundary of median class =

n = number of observations =

cf = cumulative frequency of class preceding the median class =

f = frequency of median class =

h = class size (assuming class size to be equal). =

$$\text{Median} = l + \frac{\frac{n}{2} - cf}{f} \times h =$$

surnames were randomly picked up from a local telephone directory and the frequencydistribution of the number of letters in the English alphabet in the surnames was obtained as follows Determine the median number of letters in the surnames. Find the mean number of letters in the surnames? Also, find the modal size of the surnames.

Number of letters C.I	Number of surnames f_i	Cumulative frequency c f
1-4		
4-7		
7-10		
10-13		
13-16		
16-19		

Median = l + $\frac{\frac{n}{2} - cf}{f}$ x h

n/2 = ---------- = ---------- , Median class is ----------

l = lower boundary of median class =

n = number of observations =

cf = cumulative frequency of class preceding the median class =

f = frequency of median class =

h = class size (assuming class size to be equal). =

Median = l + $\frac{\frac{n}{2} - cf}{f}$ x h =

The distribution below gives the weights of 30 students of a class. Find the median weight of the students.

Weight (in kg) C.I	Number of students f_i	Cumulative frequency c f
40-45	2	
45-50	3	
50-55	8	
55-60	6	
60-65	6	
65-70	3	
70-75	2	

Median = l + $\frac{\frac{n}{2} - cf}{f}$ x h

n/2 = ---------- = ---------- , Median class is ----------

l = lower boundary of median class =

n = number of observations =

cf = cumulative frequency of class preceding the median class =

f = frequency of median class =

h = class size (assuming class size to be equal). =

Median = l + $\frac{\frac{n}{2} - cf}{f}$ x h =

STATISTICS

Find the Arithmetic mean — Direct Method

S.NO	$\sum f_i$ xi	$\sum f_i$	Arithmetic Mean = X = $\frac{\sum f_i \text{ xi}}{\sum f_i}$
1	1779	30	
2	1860	30	
3	1390	35	
4	162		8.1
5	1152		18
6		30	0.099
7		80	35.37

Deviation Method [or] Assumed Mean Method.

S.NO	a	$\sum f_i$ di	$\sum f_i$	Arithmetic Mean = X = a + $\frac{\sum f_i \text{ di}}{\sum f_i}$
1	50	1390	35	
2	47.5	435	30	
3	50	-360	35	
4	275	1900	50	
5		12	30	75.9
6		-99	40	49
7	135		68	135.1
8	8.5	-18		8.32

Step- deviation method

S.NO	a	$\sum f_i$ ui	$\sum f_i$	h	Arithmetic Mean = X =a + $\frac{\sum f_i \text{ui}}{\sum f_i}$ x h
1	50	-36	35	10	
2	47.5	29	30	15	
3	200	-106	45	20	
4	22	25	400	5	
5	125	43	25	50	
6		-2	35	10	69.43
7	3250	-235	200		2662.5
8	32.5		35	5	30.625
9	135	7		20	137.05

Mode

MODE = l + ($\frac{f_1-f_0}{2f_1-f_0-f_2}$) X h

S.NO	l	f_0	f_1	f_2	h	MODE = l + ($\frac{f_1-f_0}{2f_1-f_0-f_2}$) X h
1	3	7	8	2	2	
2	40	3	7	6	15	
3	35	21	23	14	10	
4	60	52	61	38	20	
5	1500	24	40	33	500	
6		9	10	3	5	29.22
7	4000	4	18	9		4608.7
8	40	12	20		10	44.7
9	125	13	20	14		135.769
10		30	40	16	3	7.882

Median

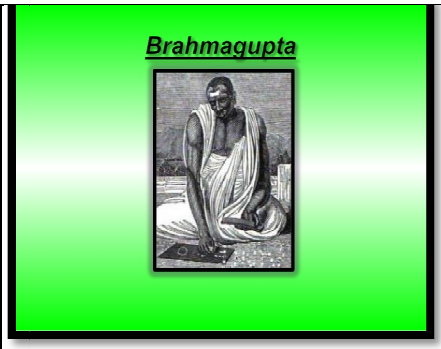
Median = l + $\frac{\frac{n}{2} - cf}{f}$ x h

S.NO	l	n	$\frac{n}{2}$	cf	f	h	Median = l + $\frac{\frac{n}{2} - cf}{f}$ x h
1	145	51		11	18	5	
2	500		50	25	20	100	
3	125		34	22	20	20	
4	20	60		13	20	10	
5	144.5		20	17	12		146.75
6		400	200	130	86	500	3406.98
7	7			36	40	3	8.05
8	50	30	15		8	6	57.5
9	46			14	14	2	46.5

NOTE : FILL IN THE SHADED REGION WITH APPROPRIATE VALUES IN THE BOXES

INDIAN FAMOUS MATHEMATICIANS

Aryabhatta



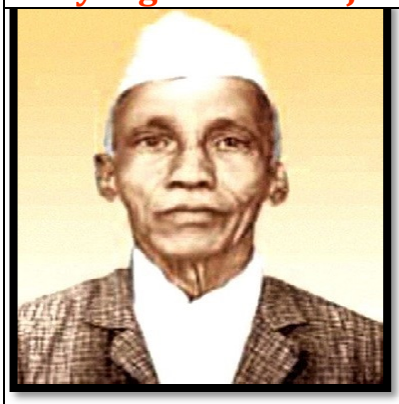
BRAHMAGUPTA

BHASKARACHARYA- 2

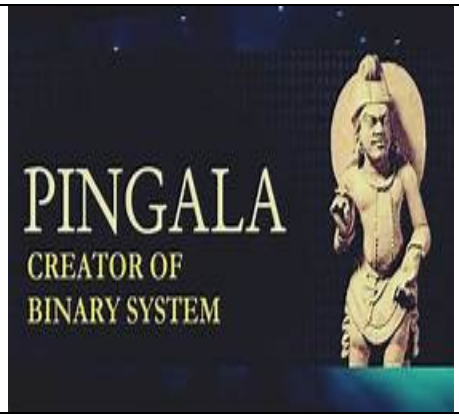
Srinivasa Aiyangar Ramanujan

Shakuntala Devi

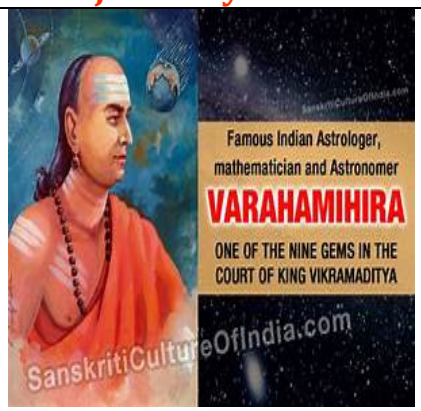
Lakkoju Sanjeevaraya Sharma



D. R. Kaprekar

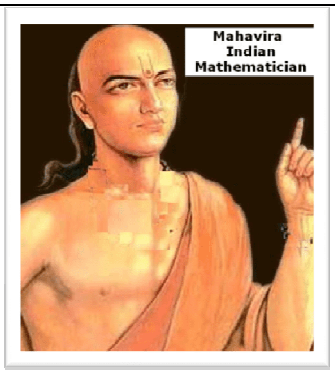


PINGLA

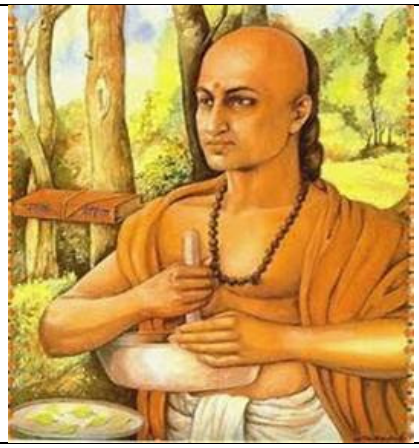


VARAHAMHIRA

MAHALANOBIS



MAHAVIRA



BHASKARACHARYA- 1

Ramanujan Number is -- $1729 = 10^3 + 9^3 = 12^3 + 1^3$