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MATHEMATICS LINEAR EQUATIONS IN TWO VARIABLES

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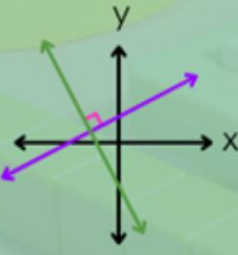
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01
MATHEMATICS LINEAR EQUATIONS IN TWO VARIABLES

PATTERN 1ST :

1). $3x - 5y = -1$; $x - y = -1$

2). $11x + 15y = -23$; $7x - 2y = 20$

3). $-6x + 5y = 2$; $-5x + 6y = 9$

4). $2x + 3y = 0$; $3x + 4y = 5$

5). $11x - 8y = 27$; $3x + 5y = -7$

6). $8x - 3y = 1$; $34x - 3y = 14$

7). $9x + 4y = 5$; $3x - 5y = 8$

8). $10x + 3y = 75$; $6x - 5y = 11$

9). $x + y = 8$; $2x + 3y = 1$

10). $x + y = 3$; $4x - 3y = 26$

11). $2x - 3y = 13$; $7x - 2y = 40$

12). $3x - 5y = 19$; $3y - 7x = -1$

PATTERN 2nd :

1). $\dfrac{x}{2} + y = 0.8$; $\dfrac{7}{x + \frac{y}{2}} = 10$

2). $0.4x - 1.5y = 6.5$; $0.3x + 0.2y = 0.9$

3). $x - y = 0.9$; $\dfrac{11}{2(x+y)} = 1$

4). $0.4x + 0.3y = 1.7$; $0.7x - 0.2y = 0.8$

PATTERN 3rd :

1). $\dfrac{11}{v} - \dfrac{7}{u} = 1$; $\dfrac{9}{v} - \dfrac{4}{u} = 1$

2) $\dfrac{15}{a} + \dfrac{2}{b} = 17$; $\dfrac{1}{a} + \dfrac{1}{b} = \dfrac{36}{5}$

3). $\dfrac{1}{2x} - \dfrac{1}{y} = -1$; $\dfrac{1}{x} - \dfrac{1}{2y} = 8$

4) $\dfrac{x}{4} + \dfrac{y}{3} = 5$; $\dfrac{x}{2} - \dfrac{y}{9} = 6$

5). $\dfrac{x}{3} + \dfrac{y}{4} = 11$; $\dfrac{5x}{6} - \dfrac{y}{3} = -7$

6) $\dfrac{1}{x} + \dfrac{1}{y} = 7$; $\dfrac{2}{x} + \dfrac{3}{y} = 17$

7). $4x + 6/y = 15$; $3x - 4/y = 7$

8). $x + y/2 = 4$; $x/9 + 2y = 5$

PATTERN 4th :

1). $\dfrac{x + y}{xy} = 2$; $\dfrac{x - y}{xy} = 6$

2). $\dfrac{x + y}{xy} = 5$; $\dfrac{x - y}{xy} = 9$

3). $\dfrac{x + y}{xy} = 5$; $\dfrac{3x + 2y}{xy} = 13$

4). $\dfrac{xy}{x + y} = 6$; $\dfrac{xy}{x - y} = \dfrac{6}{5}$

PATTERN 5th :

1). $9x + 5y = 37xy$; $7x + 4y = 13xy$

2). $4x + 3y = 8xy$; $6x + 5y = 13xy$

3). $4x + 6y = 3xy$; $8x + 9y = 5xy$

4). $32x + 16y = 11xy$; $5x + 3y = 11xy$

5). $2u + 15v = 17uv$; $5u + 5v = 36uv$

6). $8x + 7y = 2xy$; $6x + y = 10xy$

7). $2(3u - v) = 5uv$; $2(u + 3v) = 5uv$

8). $3(2u + v) = 7uv$; $3(u + 3v) = 11uv$

9). $2x + y = \dfrac{7}{2}xy$; $x + 3y = \dfrac{11}{3}xy$

PATTERN 6th :

1). $\dfrac{2}{x} + \dfrac{3}{y} = \dfrac{9}{xy}$; $\dfrac{4}{x} + \dfrac{9}{y} = \dfrac{21}{xy}$ 2). $\dfrac{8}{x} - \dfrac{3}{y} = \dfrac{18}{xy}$; $\dfrac{5}{x} + \dfrac{4}{y} = \dfrac{23}{xy}$

3). $\dfrac{3}{x} - \dfrac{2}{y} = \dfrac{4}{xy}$; $\dfrac{5}{x} + \dfrac{4}{y} = \dfrac{14}{xy}$

PATTERN 7th :

1) . $\dfrac{4}{x-5} + \dfrac{6}{y-5} = 5$; $\dfrac{5}{x-5} - \dfrac{3}{y-5} = 1$ 2). $\dfrac{2}{x-1} + \dfrac{3}{y+1} = 2$; $\dfrac{3}{x-1} + \dfrac{2}{y+1} = \dfrac{13}{6}$

2) . $\dfrac{5}{x+1} - \dfrac{2}{y-1} = \dfrac{1}{2}$; $\dfrac{10}{x+1} + \dfrac{2}{y-1} = \dfrac{5}{2}$

PATTERN 8th :

1) . $\dfrac{5}{x+y} - \dfrac{2}{x-y} = -1$; $\dfrac{10}{x+y} + \dfrac{2}{x-y} = 10$ 2). $\dfrac{40}{x+y} + \dfrac{2}{x-y} = 5$; $\dfrac{25}{x+y} - \dfrac{3}{x-y} = 1$

3). $\dfrac{22}{x+y} + \dfrac{15}{x-y} = 5$; $\dfrac{55}{x+y} + \dfrac{45}{x-y} = 14$ 4) $\dfrac{44}{x+y} + \dfrac{30}{x-y} = 10$; $\dfrac{55}{x+y} + \dfrac{40}{x-y} = 13$

5). $\dfrac{3}{x+y} + \dfrac{2}{x-y} = 2$; $\dfrac{9}{x+y} - \dfrac{4}{x-y} = 1$ 6). $\dfrac{10}{x+y} - \dfrac{4}{x-y} = -2$; $\dfrac{15}{x+y} + \dfrac{7}{x-y} = 10$

7). $\dfrac{57}{x+y} + \dfrac{6}{x-y} = 5$; $\dfrac{38}{x+y} + \dfrac{21}{x-y} = 9$ 8). $\dfrac{6}{x+y} = \dfrac{7}{x-y} + 3$; $\dfrac{1}{2(x+y)} = \dfrac{1}{3(x-y)}$

9). $\dfrac{2}{3x+2y} + \dfrac{3}{3x-2y} = \dfrac{17}{5}$; $\dfrac{5}{3x+2y} + \dfrac{1}{3x-2y} = 2$ 9). $\dfrac{1}{2(2x+3y)} + \dfrac{12}{7(3x-2y)} = \dfrac{1}{2}$; $\dfrac{7}{(2x+3y)} + \dfrac{4}{(3x-2y)} = 2$

PATTERN 9TH :

1) . $217 x + 131 y = 913$; $131 x + 217 y = 827$ 2). $35 x + 23 y = 209$; $23 x + 35 y = 197$

3). $23 x + 37 y = 32$; $37 x + 23 y = 88$ 4). $99x + 101 y = 499$; $101 x + 99 y = 501$

5). $31 x + 23 y = 39$; $23 x + 31 y = 15$ 6). $37 x + 41 y = 70$; $41 x + 37 y = 86$

7). $73 x + 29 y = 380$; $29 x + 73 y = 28$

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01

MATHEMATICS — LINEAR EQUATIONS IN TWO VARIABLES

PATTERN 10TH :

1). $7(y+3) - 2(x+2) = 14$; $4(y-2) + 3(x-3) = 2$

2). $4x + \dfrac{6}{y} = 15$; $3x - \dfrac{4}{y} = 7$

3). $2/x + 3/y = 1/6$; $3/x + 2/y = 0$
And, hence find the value of '**a**' if $y = ax + 4$

CONDITION FOR SOLVABILITY OF LINEAR EQUATION :

The system of a pair of linear equations : $a_1 x + b_1 y = c_1$; $a_2 x + b_2 y = c_2$

------- (i) **is consistent with unique solution , if** $\dfrac{a_1}{a_1} \neq \dfrac{b_1}{b_2}$ | lines represented by these two equations are not parallel

------- (ii) **is coincident with infinitely many solutions , if** $\dfrac{a_1}{a_2} = \dfrac{b_1}{b_2} = \dfrac{c_1}{c_2}$

line represented by the equation are coincident

------- (iii) **is inconsistent if,** $\dfrac{a_1}{a_2} = \dfrac{b_1}{b_2} \neq \dfrac{c_1}{c_2}$
(no solution)

line represented by the equation are parallel & non- coincident

PRACTICE PROBLEMS : SET -1

1] Find the value of '**K**' for which the system of equation : $Kx + 2y = 5$; $3x + y = 1$,
(i) a unique solution   (ii) no solution

2]. Find the value of '**K**' for which the system of equation : $5x + 2y = K$; $10x + 4y = 3$,
(i) infinitely many solution

3]. Find the value of '**K**' for which the system of equation : $4x + 6y = 11$; $2x + Ky = 7$,
(i) no solution

4]. Find the value of '**K**' for which the system of equation : $Kx + 3y = K-3$; $12x + Ky = K$,
(i) a unique solution

5]. Find the value of '**K**' for which the system of equation : $4x - y = 6$; $Kx + 3y = 7$,
(i) no solution

6]. Find the value of '**K**' for which the system of equation : $x + 2y = 0$; $2x + Ky = 5$,
(i) no solution

7]. Find the value of '**K**' for which the system of equation : $x + 5y - 7 = 0$; $4x + 20y + K = 0$,
(i) infinitely many solution

8]. Find the value of '**K**' for which the system of equation : $x + 2y + 7 = 0$; $2x + Ky + 14 = 0$,
(i) infinitely many solution

9]. Find the value of '**K**' for which the system of equation : $2x + Ky = 11$; $5x - 2y = 5$,
(i) no solution

10]. Find the value of **'K'** for which the system of equation : $Kx + 2y = 5$; $3x + y = 1$,
(i) unique solution

11]. Find the value of **'K'** for which the system of equation : $Kx + 3y = 3$; $12x + Ky = 6$,
(i) no solution

12]. Find the value of **'K'** for which the system of equation : $x + 2y = 3$; $5x + Ky + 7 = 0$,
(i) unique solution

SET -2   ... ...

1]. In each of the following system of equation , determine whether the system of equation has a unique solution, no sol[n],
or infinitely many solutions .
(i) $5x + 2y = 16$; $7x + 4y = 3$,   (ii) $5x + 2y = 16$; $3x + 6/5 y = 2$
(iii) $4x + 7y = 10$; $10x + 35y = 25$ (iv) $5x + 2y = 16$; $15/2 x + 3y = 24$
(v) $3x - 5y = 20$; $7x + 2y = 17$ (vi) $-3x + 4y = 5$; $9/2 x - 6y = 15/2$

2]. Prove that there is a value of **'c'** for which the system of equation has infinitely many solution and also, find this value.
$$6x + 3y = c - 3 \quad ; \quad 12x + cy = c$$ 5.

3]. Prove that there is a value of **'K'** for which the system of equation has infinitely many solutions and also, find this value.
$$2x + 3y = 7 \quad ; \quad x(K+1) + (2K-1)y = 4K+1$$

4]. Prove that there is a value of **'K'** for which the system of equation has infinitely many solutions and also, find this value.
$$6x + (K-2)y = K \quad ; \quad 6x + (2K-1)y = 2K+5$$

5]. Prove that there is a value of **'K'** for which the system of equation has infinitely many solutions and, find this value.
$$x + (K+1)y = 5 \quad ; \quad x(K+1) + 9y = 8K-1$$

6]. Prove that there is a value of **'K'** for which the system of equation has no solution and, find this value.
$$(3K+1)x + 3y - 2 = 5 \quad ; \quad x(K^2+1) + (K-2)y - 5 = 0$$

⭐
7]. Find the value of 'm' and 'n' for which the system of linear equation has infinitely many solutions.
$$3x + 4y = 12 \quad ; \quad (m+n)x + 2(m+n)y = 5m-1$$

⭐
8]. Find the value of 'p' and 'q' for which the system of equation has infinite solution.
(i) $(2p-1)x + 3y - 5 = 0$; $3x + (q-1)y - 2 = 0$
(ii) $2x + 3y = 7$; $(p+q)x + (2p-q)y = 21$.

⭐
9]. Find the value of 'a' and 'b' for which the system of equation has infinite solution.
(i) $2x + 3y = 7$; $(a-b)x + (a+b)y = 3a + b - 2$

− −

CROSS – MULTILICATION METHOD

$$\frac{x}{b_1 c_2 - b_2 c_1} = \frac{y}{c_1 a_2 - c_2 a_1} = \frac{-1}{a_1 b_2 - a_2 b_1}$$

$$x = -\frac{(b_1 c_2 - b_2 c_1)}{a_1 b_2 - a_2 b_1} \qquad\qquad y = -\frac{(c_1 a_2 - c_2 a_1)}{a_1 b_2 - a_2 b_1}$$

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MATHEMATICS
LINEAR EQUATIONS
IN TWO VARIABLES

Find the value of x and y :

1]. $x + ay = b$; $ax - by = c$

2]. $cx + dy = c^2$; $dx + cy = d^2$

3]. $ax + by = a - b$; $bx - ay = a + b$

4]. $x + y = a + b$; $ax - by = a^2 - b^2$

5]. $ax + by = c$; $dx + ay = 1 + c$

6]. $(a - b)x + (a + b)y = a^2 - 2ab - b^2$
$(a + b)(x + y) = a^2 + b^2$

7]. $\dfrac{x}{a} + \dfrac{y}{b} = 2$; $ax - by = a^2 - b^2$

8]. $\dfrac{a}{x} + \dfrac{b}{y} = 0$; $\dfrac{ab^2}{x} + \dfrac{a^2 b}{y} = a^2 + b^2$

9]. $ax + by = 1$; $bx + ay = \dfrac{(a + b)^2}{a^2 + b^2} - 1$

10]. $a(x + y) + b(x - y) = a^2 - ab + b^2$; $a(x + y) - b(x - y) = a^2 + ab + b^2$

11]. $2ax + 3by = a + 2b$; $3ax + 2by = 2a + b$

12]. $(a + 2b)x + 2aby = 2$; $(a - 2b)x + (2a + b)y = 3$

13]. $a^2 x + b^2 y = c^2$; $b^2 x + a^2 y = d^2$

14]. $5ax + 6by = 28$; $3ax + 4by = 18$.

14]. $ax + by = \dfrac{a + b}{2}$; $3x + 5y = 4$

---------------- WORD PROBLEMS --------------

☞ **Tools and Techniques**---------------------------

☞ **Even nos.** = $2x$, $2x + 2$, $2x + 4$ ....

☞ **Odd nos.** = $2x + 1$, $2x + 3$, $2x + 5$, ...

☞ **Successive (consecutive) nos.** = $x + 1$, $x + 2$, $x + 3$,................

☞ **Multiples of '2' =** $2x$, $2x + 2$, $2x + 4$, $2x + 6$ ....

☞ **Multiple of '3' =** $3x$, $3x + 3$, $3x + 6$, $3x + 9$ ....

☞ **Multiple of** '5' = $5x$, $5x + 5$, $5x + 10$ ....

PATTERN 1st —— [Number – type question] :

1]. **Sum of the numbers is 45 and their difference is 13 . Find the numbers**

2]. **The sum of two numbers is 8 . If their sum is four times their difference , Find the numbers .**

3]. **Find two nos. such that the sum of twice the first and thrice the second is 92 and 4 times the first exceeds 7 times the second by 2.**

4]. **Find the nos. such that sum of thrice the first and the second is 142, and four times the first exceed the second by 138.**

5]. **Of two nos. 4 times the smaller one, is less than 3 times the larger one by 6. Also, the sum of the nos. is larger than 6 times their difference by 5. Find the nos. [Hint : $3x = 4y + 6$; $x + y = 6(x - y) + 5$]**

6]. **If 45 is subtracted from twice the greater of the two nos. , the result is the other no. If 21 is subtracted from twice the smaller one , the result is the greater no, find the numbers.**

7]. If three times the larger of the two numbers is divided by the smaller , we get 4 as a quotient and 8 as a remainder. If 5 times the smaller one is divided by the larger , we get 3 as a quotient and 5 as the remainder . Find the nos.

8]. Difference between two numbers is 14 and difference between their square is 448 . Find the nos.

9]. The sum of two nos. is 137 and their difference is 43 . Find the nos.

10].If one number is 3 times the other and their sum is 16 , Find the numbers.

11]. The difference of two numbers is 15 and difference of their square is 465. Find the numbers .

12]. The sum of two numbers is 129 and their difference is 35 . Find the numbers .

13]. Divide 50 into two parts such that the sum of their reciprocal is 1/12 .

14]. The sum of two numbers is 15 . If the sum of their reciprocal is 3 / 10 , find the numbers.

15]. The sum of two numbers is 1000 and the difference between their square is 256000 . Find the numbers .

16]. Find two numbers such that sum of twice the first and thrice the second is equal to 99 & four times the first exceed 7 times the second by 3 . Find the numbers .   [Hint : 2 x + 3y = 99 ,   4 x = 7 y + 3].

17].One – third of a number is greater than one- fourth of its successor by 1 . Find the number.

18]. Of two nos. 4 times the smaller one, is less than 3 times the larger one by 5 . Also, the sum of the nos. is larger than 6 times their difference by 6. Find the nos.

PATTERN 2nd —— [Rupees – type question] Set -I :

1]. Ashmita has 10 paise and 50 paise coins in her purse .If the total no. of coins is 17 and the total value of the coins is Rs. 4.50 . Find the no. of coins of each type does she have ?

2]. A lady has 25 p and 50 p coins in her purse . If in all she has 40 coins totalling Rs. 12.75 , how many of each type does she has ?

3]. A man has 20p and 25 p coins in her purse . If he has 50 coins totalling Rs. 11.25 , how many of each type does he have ?

4]. A purse contains 25 p and 10 p coins .The total amount in the purse is Rs. 8.25 . If the no of 25 p coins is one – third of the no. of 10 p coins , find the total no. of coins in the purse .

5]. A man went to RBI with Rs. 1000 , and asked the cashier to give him Rs. 5 and Rs. 10 notes in return . He got 175 notes in all . Find how many notes of Rs. 5 & Rs. 10   did he receive ?

6]. A horse and two cow together costs Rs. 680 .If a horse costs Rs. 80 more than a cow , Find the cost of each ?

7]. A man starts his job with certain monthly salary and earn a fixed increment per year . If his salary was Rs. 1500 after 4 year of service and Rs. 1800 after 10 years of his service, What was his starting salary and what was his annual increment?

8]. A person invested some amount @ 12% SI and some other amount @ 10 % S I . He received annual interest of Rs. 130.But , if he had interchanged the amount invested , he could have received Rs. 4 more than as the interest . How much did he receive at different rates ?

9]. The income of two person are in the ratio of 9:7 and ratio of their expenditure are 4: 3 . If each of them saves Rs. 200 per month , Find their monthly income & expenditure ?

10]. The income of two person are in the ratio of 8 : 7 and ratio of their expenditure are 19:16 . If each of them saves Rs. 2500 per month , Find their monthly income & expenditure ?

11]. A person invested some amount @ 8 % SI and some other amount @ 6 % S I . He received annual interest of Rs. 248.But , if he had interchanged the amount invested , he could have received Rs. 34 less , as the interest . How much did he receive at different rates ?

12]. The income of two person are in the ratio of 5 : 4 and ratio of their expenditure are 7 : 5 . If each of them saves Rs. 3000 per month , Find their monthly income & expenditure ?

13]. A person invested some amount @ 12 % SI and some other amount @ 10 % S I . He received annual interest of Rs.1145. But , if he had interchanged the amount invested , he could have received Rs. 90 less , as the interest . How much did he received at different rates ?

14]. Meena went to RBI with Rs. 2000 , and asked the cashier to give him Rs. 50 and Rs. 100 notes in return . He got 25 notes in all . Find how many notes of Rs. 50 & Rs. 100   did he receive ?

15].The income of two person are in the ratio of 8 : 7 and ratio of their expenditure are 19:16 . If each of them saves Rs. 1250 per month , Find their monthly income & expenditure ?

16].The income of two person are in the ratio of 9 : 7 and ratio of their expenditure are 4 : 3 . If each of them saves Rs. 1600 per month , Find their monthly income & expenditure ?

17]. Ravinder started his job   years ago with a certain salary with fixed increment every year . If his present salary is Rs. 7000 and after 4-year Rs. 8200 .Find his initial salary and the annual increment .

PATTERN 2nd —— [Rupees – type question] Set -II

1]. 7- Audio cassette and 3- video cassette costs Rs. 1110 . 5- Audio cassette & 4-video cassette costs Rs. 1350. Find the cost of and audio & a video cassette.

2]. 2-tables and 3-chairs together costs Rs. 2000 whereas 3-tables and 2 –chair together costs Rs. 2500 .Find the cost of 1 table and 5 chair .

3]. The total cost of 8 – bucket and & 5-mug is Rs. 92 .The cost of 5 bucket and 8 – mug is Rs. 77 . Find the cost of 2-mug and3 buckets.

4] . 3-bag & 4-pen costs Rs. 257 whereas 4-bag and 3-pens together costs Rs. 324 .Find the total cost of 1 bag and 3 pens .

5]. 5-book and 7- pens together cost Rs. 79 whereas 7 book and 5-pens together costs Rs. 77 . Find the cost of 1 book and 2-pens .

6]. The price of 1-kg apples & 1 kg oranges are in the ratio 3:2 .If 5 kg of apples and 3 kg of oranges costs Rs. 210 , how much money one has to pay to buy 1-kg apples and 1 kg oranges .

7]. A shopkeeper buys 8 TV sets and 6 music system for Rs. 1,00,000 .If he buys 3 TV sets less and 3 Music system more, he has to spend Rs. 20,000 less. What is the price of a TV set & a Music system ?

8].]. 3-tables and 4-chairs together costs Rs. 2100 whereas 2-tables and 5 –chair together costs Rs. 1750 .Find the cost of 1 table and 5 chair.

9]. 2-kg of tea and 3-kg of sugar together cost Rs. 39 . The price of tea has risen by 25% and that of sugar by 20% . Hence , the same quantities of tea and sugar now cost Rs. 48 .30 .Find the original price of tea and sugar per kg.

10]. 3 metre of cotton and 4 meter of terry cot cost Rs. 124 . If the cost of cotton increases by 10 % and that of terrycot increases by 20% , the total cost increases by Rs. 22.40 .Find the new cost per metre of each type of cloth .

11]. Gunjan bought 10 notebooks from the market and 8 notebooks of the same kind from the school stores for Rs. 27.60 Aarushi bought 8 notebooks from the market and 10 notebooks from the school stores for Rs. 27.30 . Find how much does a student gain in each notebook by purchasing if from the school stores?

12]. The coach of a cricket team buys 7 bats and 6 balls for Rs.3800 . Later , he buys 3 bats and 5 balls for Rs. 1750. Find the Cost of each bat and each ball.

13].Reena has pens and pencil which together are 40 in number . If she had 5 more pencil and 5 less pens, then number of pencil would have become 4 times the number of pens . Find the original number of pens and pencil .

PATTERN 3rd —— [Age– type question]

1]. A father is three times as old as his son . After 12 years , his age will be twice that of the age of his son . Find their present ages .

2]. 5 years ago , 'A' was thrice as old as 'B' . 10 years later, 'A' shall be twice as old as 'B' , what is the present ages of 'A' & 'B'?

3]. 6 Years hence , a man's age will be three times as old as his son . 3years ago, he was 9 times as old as his son . Find their present ages .

4]. I am 3 times as old as my son . 5 years later , I shall be $2\frac{1}{2}$ times as old as my son . How old am I and how old is my son ?

5]. 5 years hence, father's age will be 3 times as old as his son . 5 years ago , father was 7 times as old as his son . Find their present ages .

6].The present age of father was 12 times as old as his son . 10 years hence , he will be twice as old as his son . Find their present ages.

7].The present age of father is 3 years more than 3 times the age of his son . 3 years hence, father age will be 10 years more than twice the age of his son . Find their present ages .

8]. 10 years ago, a man was 12 times as old as his son . 10 years later, he will be twice as old as his son . Find their Present ages.

9]. A father is 4 times as old as his son . 5 years hence, father will be 3 times as old as his son . Find their present ages .

10].7 years ago , a man was 7 times as old as his daughter . 3 years hence, he will be 3 times as old as his daughter. Find their present ages .

11]. If twice the son's age is added to his mother's age , the sum is 70 . If twice the mother's age is added to her son's age, the sum is 95. Find their present age .

12].10 years later , 'A' will be twice as old as 'B' and five years ago, 'A' was three times as old as 'B' .What are the present ages of 'A' & 'B' ?

13]. Father's age is three times the sum of the ages of his two children . After 5 years , his age will be twice the sum of the ages of two children . Find the present age of father .

14]. 2 years ago, a father was five times as old as his son . Two years later , his age will be 8 more than three times the age of the son . Find the present ages of father and son .

15].The age of father is four times the age of his son . 5 years hence, the age of father will be three times the age of his son . Find the present ages of father and son .

16]. Kabir is now half of his father's age . Twenty years ago, the father's age was six times Kabir's age . Find the present ages of father and son .

17]. Tanvy is now one –third of her father's age . Twelve years hence , she will be half as old as her father . Find their present ages .

♀ 18]. The age of mother and a daughter are 31- and 7-years resp. In how many years , will the mother's age be 3/2 times that of daughter's age ?

19]. 20 years ago, the age of father was four times the age of his son . After 4 years from now, the age of father will be double that of the son . Find the present ages of the father and son.

20]. A father is 25 years older than his son . After 8 years , the ratio of their ages will be 13:8 . Find their present ages .

21]. At present , the sum of the ages of ruby and her daughter is 49 . Seven years ago , Ruby was six times as old as her daughter . Find their present ages .

♀ 22]. Mr. John has a son and a daughter , the son being 4 years older than the daughter . Five years ago, the age of Mr. John was 23 years more than the sum of the ages of his son and daughter . After 18 years from now, the age of Mr. John will be 17 times the difference of ages of his son and daughter . Find their present ages .
Hint : John = x   ;   daughter = y   ;   son = y + 4
A/q,   (x - 5) – (y+ 4 – 5 + y – 5) =   23   Also,   x + 18 = 17 { (y + 4 + 18) – (y + 18)}

♀23]. Ages of two friends A and B differ by 3 years . A's father D is twice as old as A , and B is twice as old as his sister C . The ages of C and D differ by 30 years . Find the ages of A,B,C& D.

24]. The present age of father is equal to sum of the ages of 5 children . 12 years hence, the sum of the ages of his children will be twice the ages of their father . Find the present age of the father .

♀ 25]. When the son will as old as father today , their ages will add up to 126 years . When the father was as old as the son today ,their ages added up to 38 years . Find their present ages .
Hint : Son = x & father = y ; difference of ages = (y- x) . If this difference is added to the present age of son, then son will be as old as father now and at that time , father's age will be { y + (y – x) }
∴. A/q   { x + (y- x)} + [y + (y – x) } = 126 ;   also, { y + (x – y) } + { x + (x – y) } = 38

26]. At the time of marriage , the bridegroom was 5 years older than the bride . Nine years later the ratio of their ages was 7: 6 . how many years after marriage will their ages be in the ratio 8 : 7 ?

27]. The ages of A and B are in the ratio 9:4 . Seven years later , the ratio of their ages will be 5 : 3 . Find their present ages.

28]. The ages of two men differ by 10 years and 15 years ago the elder was just twice as old as the younger . Find their present ages.

29]. In a family , the age of father is 10 years more than twice the age of the son . The age of mother is 10 years less than 3 times the age of daughter . The father is 6 years older than the mother and the daughter 2 years younger than the son . Find the age of all the member of the family.

PATTERN 4th —— [Fraction– type question]

1]. A fraction becomes 4/5 if 1 is added to the numerator and denominator . If however, 5 is subtracted from both the numerator and denominator , the fraction becomes ½ . What is the fraction.

2]. If we add 1 to the numerator(N) and subtract 1 from the denominator (D) , the fraction becomes 1 . It also becomes ½ if we only subtract 1 from the D. What is the fraction .

3]. A fraction is such that if N is multiplied by 3 and D is reduced by 3 , we get 18 / 11 .But if N is increased by 8 and D is doubled , we get 5/2 . Find the fraction .

☠ 4]. When the N of a fraction is increased by 4 , the fraction increases by 2/3. What is the denominator of the fraction ?

5]. When 1 is added to each of the two numbers , the ratio is 1:2 . When 5 is subtracted from each of them , the ratio becomes 5 : 11 . Find the numbers .

6]. A fraction becomes 1/3 if 1 is subtracted from its N & D . IF 1 is added to both N & D , the fraction becomes ½ . Find the fraction .

7]. The N of a fraction becomes is 4 less than its denominator . If the N is increased by 2 and D is increased by 1 then D is 8 times the N . Find the fraction.

8]. A fraction becomes 9 /11 if 2 is added to both N & D . If 3 be added to both N & D , it becomes 5/6 . Find the fraction.

9]. Two nos. are in the ratio ¾ .If 4 is added to each the ratio becomes 4:5 . Find the nos.

10]. A fraction is such that if N is multiplied by 2 and D is increased by 1 , we get ¾ .But , if N is increased by 1 and D is doubled , we get ½ .Find the fraction .

11]. In a given equation , if the N is multiplied by 2 and D is reduced by 5 , we get 6/5 .But , if the N of the given fraction is increased by 8 and D is doubled , we get 2/5 . Find the fraction.

12]. If 2 is added to each of the given no. , the ratio becomes ½ . If However if 4 is subtracted from each of the given no. , the ratio becomes 5/11 . Find the no.

13]. The sum of a no. in N and D of a fraction is 4 more than twice the N . If N and D are increased by 3 , they are in the ratio 2:3 . Find the fraction .

14]. Find the fraction which becomes ½ when 1 is subtracted from N and 2 is added to D . The fraction becomes 1/3 when 7 is subtracted from N and 2 is subtracted from D.

15]. The D of the fraction is greater than its N by 11 . If 8 is added to both the N & D , it becomes ¾ . Find the fraction .

16]. If 2 is added to D of a fraction , it is reduced to ½ and if 1 is subtracted from D , it reduced to 1/3 . Find the fraction.

17]. When 3 is added to D and 2 is subtracted from N , a fraction becomes `1/4 . When 6 is added to N & D is multiplied by 3 it becomes 2/3 . Find the fraction .

18]. The sum of N and D of a fraction is 18 . If D is increased by 2 , the fraction reduced to 1/3 . Find the fraction .

19]. The denominator of a fraction is 4 more than the twice the numerator . When both the numerator and denominators are decreased by 6 , then the denominator becomes 12 times the numerator. Determine the fraction .

20]. The sum of numerator and denominator of a fraction is 4 more than twice the numerator . If the numerator and denominator are increased by 3 , they are in the ratio 2: 3 . Find the fraction .

21]. The sum of numerator and denominator of a fraction is 3 less than twice the denominator. If the numerator and denominator are decreased by 1 , the numerator becomes half the denominator . Find the fraction .

22]. The sum of N and D of a fraction is 8 . If 3 is added to both the numerator and denominator the friction becomes 3/4 . Find the fraction.

23]. The denominator of a fraction is one more than twice the numerator. If the numerator is decreased by 1 and denominator is increased by 1, then the friction becomes 1/3. Find the friction.

24]. Find the fraction which becomes ½ when the denominator is increased by 4, and 1/8 when numerator is diminished by 5.

25]. If the denominator is added to the numerator and the numerator is subtracted from the denominator, a fraction becomes 11/3. Also, the numerator is 3 les than the denominator. Find the fraction.

26]. Two numbers are such that twice the smaller number added to 2 gives the larger number. Also, double of the larger no.is less than five times the smaller number. Find (the smaller number) : (larger number) .

or

Find the proper fraction for which twice the numerator added to 2 equals the denominator. Also, double of the denominator is one less than five times of the numerator.

27]. If 2 be added to the numerator of a fraction, it reduces to ½ and if 1 be subtracted from the denominator, it reduces to 1/3 . Find the friction.

28]. A fraction reduces to ¼ when 2 is subtracted from numerator and 3 is added to the denominator. But it reduces to 2/3 if 6 added to the numerator and the denominator is multiplied by 3. Find the fraction.

29]. If the numerator of a fraction is decreased by 1 its value becomes 2/3, but if the denominator is increased by 5 the value becomes ½ . What is the fraction.

30]. Find the fraction which becomes ½ when the denominator is increased by 4 and is equal to the 1/8 when the numerator is diminished by 5.

PATTERN 5th —— [Digits– type question

1] A no. consist of two digits whose sum is 5 . When the digits are reversed , the no. become greater by 9 . What is the no.?

Hint : let the digit in the unit's place = 'x'   ; Let the digit in the ten's place = y

A/q, $x + y = 5$ --------------------------------------[1]

original no. = $10y + x$

Reversed no. = $10x + y$

Also,   R. no. - 9 = O . no. => $10x + y - 9 = 10y + x$ ------------------------[2]

2]. In a two digit no ., the unit digit is twice the ten's digit . If 27 is added to the no. , the digit interchanged their places . Find the no.

☠ 3]. The sum of digits in a two-digit no. is 9 . The no. obtained by reversing the order of the digits of the given no. exceeds the given no. by 27 . Find the no.

4]. In a two-digit no. , the ten's digit is 3 times the unit's digit . When the no. is decreased by 54, the digits interchanged their places . Find the no.

☠ 5]. 7 times the given two-digit no. is equal to 4 times the no. obtained by interchanging the digits . The difference of the digit is 3 . Find the no.

6]. A two-digit no. is either obtained by multiplying the sum of the digit by 8 and adding 1 or obtained by multiplying the difference of the digit by 13 and by adding 2 . Find the no.

Hint : $10y + x = 8(x + y) + 1$; $10y + x = 13(y - x) + 2$

7]. The sum of two digit no . is 12 . If the digit are reversed , the new no. is 12 less than twice the original no. Find the no.

8]. A two-digit no. is 4 more than 6 times the sum of its digit . If 18 is subtracted from the no. , the digits are reversed . find the no.

9]. The sum of two digit no and the no. obtained by interchanging its digit is 110 . If 10 is subtracted from the 1st no . , the new no. is 4 more than 5 times the sum of the digits . Find the no.

10]. The sum of a 2-digit no. and the no. obtained by reversing the order of the digit is 99 . IF the digit differ by 3 , find the no.

11]. A no. consisting of 2 digit is 7 times the sum of its digit . When 27 is subtracted from the no. , the digit interchanged their places . Find the no.

12]. In a two-digit no. ,the sum of the digit is 13 . If the no. is subtracted from one obtained by interchanging the order of the digit , the result is 45. What is the number ?

13]. A no. consist of two digit . When it is divided by sum of its digit , the quotient is 6 with no remainder . When the no. is decreased by 9, the digits are reversed . Find the no.

14]. A two-digit no. is 3 more than 4 times the sum of its digits . If 18 is added to the no , the digits are reversed . Find the no.

15]. The sum of two-digit no. and the no. obtained by the order of the digits is 165 . Find the no.

16]. The sum of the digits of a two-digit no. is 8 . The difference between the no. and that formed by reversing the order of is 18 . Find the no.

17]. The sum of two-digit no. and the no. obtained by reversing the order of the digits is 121. If the digit is differed by 3. Find the no.

18]. The sum of two-digit no. and the no. obtained by reversing the order of the digits is 154. If the digit is differed by 4. Find the no.

19]. The sum of two-digit no. and the no. obtained by reversing the order of the digits is 132 . If 12 is added to the no . the new no. becomes 5 times the sum of the digits . Find the no.

Hint : $10y + x + 10x + y = 132$; $10y + x + 12 = 5(x + y)$

20]. The sum of the digits of a 2-digit no. is 9 . Also, nine times this number is twice the no. obtained the order of the digits Find the no.

21]. The sum of digits in a two-digit no. is 15 . The no. obtained by reversing the order of the digits of the given no. exceeds the given no. by 9 . Find the no.

22]. The sum of digits in a two-digit no. is 9 . The no. obtained by reversing the order of the digits of the given no. exceeds the given no. by 9 . Find the no.

23]. A two-digit no. is 4 times the sum of its digits . If 18 is added to the no , the digits are reversed . Find the no.

24]. A two-digit no. is 4 more than 6 times the sum of its digits . If 18 is subtracted to the no , the digits are reversed . Find the no.

25]. The sum of two-digit no. and the no. obtained by reversing the order of the digits is 165. If the digit is differed by 3 . Find the no.

26].A two-digit number is four times the sum of its digits and is also equal to twice the product of its digits . Find the no.

27]. A two-digit number is 7 times the sum of its digits and is also equal to 12 less than three times the product of its digits . Find the no.

Hint : $10 y + x = 7 (x + y)$; $10 y + x = 3(x y) - 12$

28]. A two-digit number is 5 times the sum of its digits and is also equal 5more than twice the product of its digits . Find the no.

29]. The sum of the digits of a two digits number is 9 . If the digits are reversed , the number formed bears the ratio 3 : 8 to the original number . Find the original number .

30]. The sum of the digits of a two digits number lying between 10 and 100 is 9 . IF the number is multiplied by 7, it becomes four times the number writing the digits in reverse order . Find the original number .

31]. The ratio of a two-digit number and the no. obtained after the digits are reversed is 4:7 . If the difference of the digit is 3. Find the no.

hint : $\dfrac{10 y + x}{10 x + y} = \dfrac{4}{7}$ & $y - x = 3$ because 4< 7 implies that the no. must increases when the digits are reversed.

32]. In a three-digit number , the digit at the hundred's place is three times the digit at the one's place , and the sum of the digit is 15 . If the digits are reversed the number is reduced by 396. Find the number .

Hint : One's place = x ; ten's place = y .'. Original no. $= 100 \times 3x + 10 y + x$

A/q, $3x + y + x = 15$; $(100 \times 3x + 10 y + x) - (100 x + 10 y + 3x) = 396$

33]. A consist of three digits , of which the middle one is Zero . If the left hand and right hand digits are interchanged , the n0. increases by 198 . If the left hand digit be halved and the middle and the right hand digits be interchanged , the no. diminished by 228. Find the no. Ans : 608.

34]. The sum of two-digit no. is 8 . If the digits are reversed , the new number decreased by 10 equals two times the original no. Find the number . Ans : 26

35]. The sum of two-digit no. is 7 . If the digits are reversed , the new number increases by 3 equals 4 times the original no. Find the number . Ans : 16

36]. A certain no. of two digits is three times the sum of its digits , and if 45 is added to it , the digits will be reversed . Find the number.

PATTERN 6th —— [Distance problems]

1]. Points A and B are 70 km apart on a highway . A car starts from A and another car starts from B at the same time. If they travel in the same directio9n , they meet in 7 hours , but if they travel in opposite direction , they meet in 1 hour. What are their speed ?

2]. Points A and B are 90 km apart on a highway . A car starts from A and another car starts from B at the same time. If they travel in the same directio9n , they meet in 9 hours , but if they travel in opposite direction , they meet in 9 hours. What are their speed ?

3]. Two-person , 27 km apart , settling at the same time , meet together in 9 hours , if they travel in the same direction. But if they travel in the opposite direction , they meet in 3 hours , find their speed .

4]. Two places A and B are 120 km apart from each other . A car starts from A and another from B at the same time . If they travel in the same direction , they meet in 6 hours . If they move in opposite direction , they meet in 1 hour and 12 min. Find the speed of each other.

[5]. Place A and B are 70 km apart on a highway . A car starts from A and another car starts from B at the same time. If they travel in the same direction, they meet in 5 hours, but if they travel in opposite direction, they meet in 1 hour. What are their speed?

[6]. Place A and B are 80 km apart on a highway . A car starts from A and another car starts from B at the same time. If they travel in the same directio9n , they meet in 8 hours , but if they travel in opposite direction , they meet in 1 h 20 min. What are their speed ?

PATTERN 7th —— [Area - problems]

[1]. The area of rectangle gets reduced by 9 square units if its length is reduced by 5 units and breadth is increased by 3 sq. Units . If we increase the length by 3 sq. units and breadth by 2 units , the area increases by 67 sq. units . Find the length and breadth of the rectangle.

[2]. The area of rectangle remains the same , if length is increased by 7 m and the breadth is decreased by 3 m . The area remains the unaffected if the length is decreased by 7m and breadth is increased by 5 m . Find the length and breadth of the rectangle .

[3]. If in a rectangle , the length is increased by 2 and the breadth is reduced by 2 units , the area is reduced by 28 sq. units If however, the length is reduced by 1 unit and breadth increases by 2 units , the area increases by 33 sq,. units . Find the dimension of the rectangle.

[4]. The area of the rectangle gets reduced by 80 sq. units, if its length is reduced by 5 units and breadth is increased by 2 units. If we increase the length by 10 units and decrease the breadth by 5 units, the area is increased by 50 sq. units. Find the dimensions of the rectangle.

[5]. The perimeter of rectangular plot of land is 32m .If the length increase by 2 m and the breadth decreases by 1 m , the area remains unchanged . Find the dimensions of the rectangular plot.

[6]. The perimeter of rectangular plot of land is 32m .If the length increase by 3 m and the breadth decreases by 2 m , the area remains unchanged . Find the dimensions of the rectangular plot.

[7]. The area of the rectangle gets reduced by 8 m^2 , if its length is reduced by 5 m and breadth is increased by 3 m . If we increase the length by 3 m and the breadth by 2m , the area is increased by 74 m^2 . Find the dimensions of the rectangle.

[8]. If in a rectangle , the length is increased by 3 m and the breadth is reduced by 4 m , the area is reduced by 67 m^2 . If, however, the length is reduced by 1 m and breadth increases by 4 m , the area increases by 89 m^2 . Find the dimension of the rectangle.

☠ [9]. If the length is reduced by 1 cm and breadth is increased by 2 cm , a rectangle becomes a square . if the perimeter of the rectangle is 34 cm , find the area of the rectangle.
Hint : length = x ; breadth = y ,   A/q, (x − 1) = (y + 2) & 2 (x + y) = 34

[10]. The length of the rectangular floor of a room is 3 m more than its breadth . If its length is increased by 3 m and the breadth is reduced by 2 m ; the area of the floor does not change . Find the length & breadth of the floor.

[11]. The area of the rectangle gets reduced by 15 m^2 , if its length is reduced by 5 m and breadth is increased by 3 m . If we increase the length by 2 m and the breadth by 3 m , the area is increased by 90 m^2 . Find the dimensions of the rectangle.

[12]. If in a rectangle , the length is increased by 8 m and breadth by 3 m , the area is increased by 200 m^2 . If the length is increased by 3 m and breadth is decreased by 8 m ; the area is increased by 255 m^2 . Find the dimension of the rectangle .

[13]. The perimeter of rectangular plot of land is 192 m . It is reduced in size so that the length is 4/5 and the breadth is ¾ th of the original dimensions . Now , its new perimeter is 150 m. Find the dimensions of the rectangular plot

[14]. If in a rectangle , the length is increased by 1m and the breadth by 1 m , the area is reduced by 21 m^2 If, however, the breadth is reduced by 1m and length increases by 2 m , the area decreases by 5 m^2 . Find the dimension of the rectangle.

[15]. The perimeter of rectangular plot of land is 80m .If the length decreases by 2 m and the breadth increases by 2 m , the area is increased by 36 m^2 . Find the dimensions of the rectangular plot.

[16]. The length of the rectangular floor of a room is 12 m more than its breadth . If the perimeter of the rectangular floor is 64 m . Find the length & breadth of the floor.

[17]. The breadth of a rectangle is 11 cm less than the length and perimeter is 79 cm more than the breadth . Find the length , breadth and perimeter.

PATTERN 8th —— [Reasoning]

[1]. A and B each have certain no. of mangoes . A says to B *"If you give me 30 of your mangoes, I will have twice the No. of mangoes left with you".* B replies *"if you give me 10 of your mangoes, I will have thrice as many as left with you ".* How many mangoes does each have?

[2]. There are two examination rooms A & B . If 10 students are sent from A to B , the no. of students in each room is the same . If 20 students are sent from B to A , the no. of students in A is double the no. of students in B . Find the no. of students in each room.

[3]. A and B each have certain no. of oranges . A says to B *"If you give me 10 of your* oranges*, I will have twice the no. of* oranges *left with you".* B replies *"if you give me 10 of your* oranges *, I will have same no. of oranges as left with you ".*How many oranges does each have ?

[4]. A & B each have some money .If A gives Rs. 30 to B then B will have twice the money left with A. But, If B give Rs. 10 to A then A will have thrice as many as left with B . How much does each have?

[5]. The student of a class are made to stand in rows . If 4 students are extra in each row , there would be 2 rows less . if 4 students are less in each row , there would be 4 rows more . Find the no . of students in the class.
   hint : Let the no. of students in each row = x ; no. of rows = y
        (x + 4) (y − 2) = x y   ;   (x − 4) (y + 4) = x y

[6] . On one bus journey , a conductor 20 return ticket and 15 single tickets collecting Rs. 45 . On the second journey he sold 15 return tickets and 20 single tickets , collecting Rs. 42.50 . Find the price of each kind of tickets .

[7]. A telephone company charges a fixed amount of monthly rent which includes 60 free calls per month and charges a fixed amount of every additional calls thereafter. A family paid Rs. 850 for 360 calls during August 2003 and Rs.750 for 310 calls during September 2003. Find the amount paid by that family during October 2003 if it calls 400 calls during month.

[8]. The expenses of a lunch are partly constant and partly proportional to the number of guests. The expenses amount to Rs. 65 for 7 guests and Rs. 97 for 11 guests . The expenses for 18 guests amounts to ?

[9]. A man wished to give Rs. 12o each person and found that he fell short of Rs. 6 when he wanted to give all the person present . He, therefore, distributed Rs. 9 to each person and found that Rs. 9 were left over . How much money did he have and how many persons were there ?

Hint : No. of person = x and total money = y ; 12 x = y + 6 ; 9x = y − 9

[10]. Pushpa and Priya have some money . 50% of Pushpa's money exceeds 30% of Priya's money by Rs. 10 . But 20% of Priya's money exceeds 25% of Pushpa's money by Rs. 20 . How much money do Pushpa and Priya have ?

[11]. In a screening test for admission to an engineering college , 90 multiple – choice questions were asked .In the test , 4 marks were awarded for each correct answer and 1 mark was deducted from each wrong Answer . A candidate answered all the questions and secured 200 marks . How many questions did he answer correctly ?

[12]. A taxi charge in a city consist of fixed charges and the remaining depends upon the distance travelled in Km . If a person travels 20 km , he pays Rs. 500 and for travelling 100 km , he has to pay Rs. 680 . Express the above statement with the help of equation and hence find the fixed charge and the rate per km.

[13].A part of monthly hostel charge is fixed, and the remaining depends upon the no. of days , one has taken food in the mesh . One student 'A' pays Rs. 1750 as hostel charge and takes food for 25 days . While student 'B' takes food for 28 days and Rs. 1900 as hostel charge . Find the 'fixed charge' and the cost of food per day.

[14] In an examination , the ratio of pass to failure is 4:1 . Had 30 less appeared , and 20 less passed then the ratio of pass to failure would be 5:1 . How many students appeared in the examination ?

Hint : Students passed = x ; Students fail = y A / q , x / y = 4 / 1

Again, total no. of students = x + y

Decreased no. of students = x + y - 30

passed students = x − 20

No. of Failure students = x + y − 30 − (x- 20)

A/q, $\dfrac{x - 20}{x + y - 30 - (x- 20)} = \dfrac{5}{1}$

[15].A machine is manufactured by assembling two parts A and B . If the price of the part A increases by 10 % and that of part B decreases by 10 % , the cost of manufacturing the machine increases by 5 % . But if the price of part A decreases by 10 % and that of part B increases by 10 % , the cost decreases by Rs. 200 . Find the price of the parts .

[16].The combined railways fare for a journey undertaken by a family of 4 members travelling in 3-tier coach and a family of 3 members travelling in 2-tier coach is Rs. 5,100 . The total fare would have been Rs. 300 more if the first family had 1 member less while the second family had 1 member less while the second had 1 member more . What was the fare for a couple for the same journey in 2 tier coach .

[17]. In an examination 80 % students passed . If 15 less appeared and 10 less passed , the ratio of pass to failures would have become 5 : 1 . how many students passed and how many students appeared in the examination.

[18]. A part of monthly expenses of a family is constant and the remaining varies with the price of wheat . When the rate is Rs. 500 a quintal the total monthly expenditure of the family are Rs .2200 And when it is Rs. 600 a quintal the total monthly expenses are Rs. 2500 . Find the total monthly expenditure of the family when the cost of wheat is Rs.5500 per quintal ?

[19]. Mr. and Mrs. Grover weigh x kg and y kg respectively .They both take a dieting course at the end of which Mr. Grover loses 5 kg and weighs as much as the wife weighed before dieting course . Mrs. Grover lose 4 kg and weighs 7/8th of what her husband weighed before dieting course . Form two equation in x and y and hence find the present weights.

[20]. The combined distance from Sun to Jupiter and from Sun to Saturn 1369 million Km , Saturn is 409 million km from the farther from the Sun than Jupiter . Find the distance from the sun to both planets .

[21]. A railway half ticket costs half the full fare and the reservation charge is same as on half ticket or full ticket . One reserved first class ticket costs Rs. 216. One full and one-half first-class ticket (reserved) costs Rs. 327 . What is the basic first-class fare and what is the reservation charge ?

[22]. A man buys 2 vanilla and 4 strawberry ice cream and gives a hundred-rupee note to the vendor . The vendor asks him to pay Rs. 10 more or to take 4 vanilla and 2 strawberry ice-creams . How much would the man get back (from the vendor) if he bought 2 vanilla and 3 strawberry ice creams .

[23]. A man has certain no. of oranges . He divides them into two lots A and B . He sells the first lot at the rate of Rs. 2 for 3 oranges and the second lot at the rate of Re 1 per orange and gets a total of Rs. 400 . If he had sold the first lot at the rate of Rs. 4 for 5 oranges , his total collection would have been Rs. 460 . Find the total no. of oranges he had .

Hint :   No. of Oranges in lot A = x ; No. of Oranges in lot B = y

A/q, first condition: By selling the lot –A oranges at Rs. 2 for 3 oranges and the lot B oranges at Re 1 per oranges , he gets Rs. 400

$\therefore$. $\dfrac{2x}{3} + y = 400$

A/q, 2nd condition : By selling the lot –A oranges at Re. 1 per oranges and the lot B oranges at Rs. 4 for 5 oranges , he gets Rs. 460

$\therefore$. $x + \dfrac{4y}{5} = 460$

[24]. A earns 20 % more than B but spends 20 % less than B . If A saves Rs. 960 and B saves Rs. 200 , find their incomes and expenditure.

[25]. Two candles of equal heights but different thickness are lighted . The first burns off in 6 hours and the second in 8 hours . How long after lightening both ,will the first candle be half the height of the second ?

Hint : Let after 'x' hours , first candle be the half of the second candle .

Suppose the height of 1st candle which burns in 6 h = y

$\therefore$. Height of the first candle which burns in 1 h   = y / 6

$\therefore$. Height of the first candle which burns in x h   = x y / 6

Height of the remaining part first candle after 'x' h   = (y - x y / 6)

As, the height of second candle which burns in 8 h is also 'y'

$\therefore$. Height of the 2nd candle which burns in 1 h   = y / 8

$\therefore$. Height of the 2nd candle which burns in x h   = x y / 8

Height of the remaining part 2nd candle after 'x' h   = (y - x y /8)

A/q, $\left(y - \dfrac{xy}{6} \right) = \dfrac{1}{2}\left(y - \dfrac{xy}{8} \right)$

PATTERN 9th-[I] —— [Time ; Upstream & downstream]

[1] A boat covers 32 km upstream and 36 km downstream in 7 hours. Also, it covers 40 km upstream and 48 km downstream in 9 hours. Find the speed of the boat in still water and that of the stream.

[2]. A boat goes 12 km upstream and 40 km downstream in 8 hours. It can go 16 km upstream and 32 km downstream at the same time. Find the speed of the boat in still water and the speed of the stream.

[3] In a river, a boat covers 8 km in 40 minutes while travelling downstream but takes 1 hr to make the return journey. If the speed of the boat and the flow of the river are uniform, find the speed of the boat in still water and the speed of the stream

[4] .A boat takes 2 hours to go 50 km from A to B down the stream. But for return journey from B to A, it takes 3 hours. Find the uniform speed of the boat is still water and the uniform speed of the stream.

[5]. A man rowing at the rate of 5 km/hr is still water, taken much time in going 40 km/h up the river than going 40 km down. Find the rate at which the river flows

[6]. A sailor goes 16km downstream in 40 km & returns in 1 hr. Determine the speed of the sailors in still water and the speed of the current.

[7] A boat goes 16 km upstream and 24 km downstream in 6hrs. it covers 12 km upstream & 36 km downstream in the same time . Find the speed of the boat still water & that is the stream.

[8]. A boat covers 32 km upstream and 36 km downstream in this , it cover 40 km upstream and 48 km downstream is 9 hr. Find the speed of the boat & the speed of the current.

[9]. The boat goes 30 km upstream and 44 km downstream in 10 hours. In 13 hours it can go 40 km upstream and 55 km downstream. Determine the speed of stream and that of the boat in still water.

[10].A boat goes 24 km upstream and 28 km downstream in 6hrs. It goes 30 km upstream and 21 km downstream in 6 ½ hrs. Find the speed of the boat in still water and also speed of the stream.

PATTERN 9th-[II]

[11]. Ved travels 600 km to his home party by train and partly by car. He takes 8 hours if he travels 120 km by train and the rest by car. He takes 20 minutes longer if he travels 200 km by train and the rest by car. Find the speed of the train and the car.

[12]. A man travels 370 km partly by train and partly by car. If the covers 250 km by train and the rest by car, it takes him 4 hours. But, if he travels 130 km by train and the rest by car, he takes 18 minutes longer. Find the speed of the train and that of the car

[13] A man travels 370 km partly by train and partly by car. If he covers 250 km by train and the rest by car, it takes him 4 hours. But, if he travels 130 km by train and the rest by car, he takes 18 minutes longer. Find the speed of the train and that of the car.

[14]The distance between two places A and B is 300 metres. Rohan starts running from A towards B while Deepak starts running from B towards A. They meet after 4 minutes. Had Rohan doubled his speed and Deepak reduced his by 50% they would have met one minute earlier. Find their respective speeds.
[Hint : 4x + 4y = 300, 3.2x + 3.y/2 = 300

[15] .A cyclist after riding a certain distance stopped for half an hour to repair his machine after which he completes the whole journey of 30 km at half speed in 5 hours. If breakdown had occurred 10 km further off, he would have done the whole journey in 4hrs. Find where the breakdown occurred and his original speed

[16] A train overtakes two persons who are walking in the same direction in which the train in going, at the speed of 2 kmph and 4 kmph passes them completely in 9 and 10 second respectively. Find the length and speed of the train.

[17] A man walks a certain distance with certain speed. If he walks ½ km an hour faster, he takes 1 h less . But if he walks 1 km / h slower , he takes 3 more hours. Find the distance covered by the man and his original rate of walking .

[18] A train covers a certain distance between two stations at uniform speed. If the train had reduced its speed by 4 km/hr, it would have taken 4 hrs more than the scheduled time and if the train had been 6 km/hr faster, if would have taken 4 hrs less than the scheduled time. Find the length of the journey.

[19] A takes 3 hours longer than B to walk 30 km but if he doubles his speed, he takes 2 hours less time than B. Find their rates of walking.

[20] An athlete cover 60 km in 1.5 hrs with the wind, and 2 hrs against the wind. Find (i) speed of the athlete (ii) speed of the wind.

[21] 'X' take 3 hrs more than 'Y' to walk 30 km. But if 'X' doubles his pace he is ahead of 'Y' by $1_{1/2}$ the Find the speed of their walking.

[22] A man travels 370 km partly by train partly by car. If the covers 250 km by train and the rest by car it takes him 4 hrs. But if he travels 130 km by train and the rest by car, it takes 18 minutes longer. Find the speed of the train and that of the car.

[23] Raju travels 760 km to his home partly by train, partly by car. He takes 8hrs if he travels 160 km by train and the rest by car. He takes 12 minutes more if he travels 240 km by train and the rest by car . Find the speed of the train and the car.

[24] While covering a distance of 30 km. Ajeet takes 2 hours more than Amit. If Ajeet doubles his speed, he would take 1 hour less than Amit. Find their speeds of walking.

[25] A man travels 600 km partly by train and partly by a car. If the covers 400 km by train and the rest by car, it takes him 6 hours and 30 minutes. But, if the travels 200 km by train and the rest by car, he takes half an hour longer. Find the speed of the train and that of the car.

[26] Roohi travels 300 km to her home partly by train and partly by bus. She takes 4 hour if she travels 60 km by train and the remaining by bus. If she travels 100 km by train and the remaining by bus, she takes 10 minutes longer. Find the speed of the train and the bus separately.

[27]Ritu can row downstream 20 km in 2 hours, and upstream 4 km in 2 hours. Find her speed of rowing in still water and the speed of train.

[28] A takes 3 hours more than B to walk a distance of 30 km. But, if A doubles his pace (speed) he is ahead of B by
1 $\frac{1}{2}$ hours.
Find their speed of walking .

[29] Abdul travelled 300 km by train and 200 km by taxi, it took him 5 hours 30 minutes. But if he travels 260 km by train and 240 km taxi he takes 6 minutes longer. Find the speed of the train and that of the taxi.

[30] A train covered a certain distance at a uniform speed. If the train could have been 10 km/hr. faster , it would have taken 2 hours less than the scheduled time. And, if the train were slower by 10 km/hr; it would have taken 3 hours more than the scheduled time. Find the distance covered by the train.

PATTERN 10th -------- [GEOMETRY]

[1]. Find the four angles of a cyclic quadrilateral in which $\angle A = 2x - 3$, $\angle B = y + 7$, $\angle C = 2y \angle A$
$2\angle D = 4x - 9$

[2]. In a cycle quadrilateral ABCD , $\angle A = 2x + 4$, $\angle B = y + 3$, $\angle C = 2y + 10$, $\angle D = 4x - 5$ find the four $\angle$'s.

[3]. In a Δ ABC , $\angle C = 3\angle B = 2(\angle A + \angle B)$. find the three $\angle$'s.

[4]. In a Δ ABC , ∟A = x , ∟B = $3x − 2$, ∟C = y also ∟C - ∟B = 9 .find the three ∟'s.

[5]. In a Δ the sum of two ∟S is equal to the third ∟ and the difference between them is 50^0. Determine the ∟'s.

[6]. In a Δ ABC, ∟C is 90^0 more than ∟B, and ∟B id 2^0 less than three times ∟A. Find the angles of the triangle.
{ Hint : C = B + 9, B = 3A − 2 also A + B +C = 180. Thus, A+B+B+9 = 180^0 }

[7]. ABCD is a quadrilateral in which ∟B is 10^0 more than ∟A, also ∟D is double of ∟B, and ∟C is double of ∟A. Find the four angles of the quadrilateral.

[8]. The measures of the sided of a triangle are $\left(\dfrac{5x}{3} + y + \dfrac{1}{2}\right)$ cm, $\left(2x + \dfrac{1}{2} y\right)$ cm and $\left(\dfrac{2}{3} x + 2y + \dfrac{5}{2}\right)$ cm. For what values of x and y the triangle is equilateral? Also, find the measure of side of the triangle
{Hint : $\dfrac{5}{3} x + y + \dfrac{1}{2} = 2x + \dfrac{1}{2} y = \dfrac{2}{3} x + 2y + \dfrac{5}{2}$ }

[9]. An obtuse angle of a parallelogram is twice its acute angle. Find the measure of each angle of the parallelogram.

[10]. In Δ ABC, ∟A = x^0, ∟B = $3x^0$ and ∟C = y^0. If $3y − 5x = 30$, prove that the triangle is right angled.

[11]. In Δ ABC, ∟A = x^0, ∟B = y^0 and ∟C = $(y + 20)^0$. If $4 x − y = 10$, prove that the triangle is right angled.

[12]. The largest angle of a triangle is 20 more than the sum of the other two angles . If the largest angle is five times the smallest , find the angles of the triangle .

[13]. In a Δ, the sum of two ∟S is equal to the third ∟ and the difference between them is 10^0. Determine the ∟'s.

PATTERN 11th —— [Percentage]

[1]. A man sold a chair and a table together for Rs. 1520/- there by making a profit of 25% of chair and 10% of table. By selling them together for Rs.1535. He could make a profit of 10% on chair & 25% on table find the cost price of each.

[2]. The population of town is 50,000. If an year, the no of male were increases by 5% and that of female by 3% annually, the population would grow to 52020. Find the no of male & female in the town at present.

[3]. A chemist has solution having 50% of acid and 2nd containing 25% of acid . How much each should be used to make 10L of 40% of acid.

[4]. A chemist has one solution which is 40% acid and another which is 20% acid. How much of each solution should the chemists mix to get 10 L (liter) of a solution which is 25% acid ?

[5]. A dishonest milkman has one bucket of milk of 80% purity. He has another bucket milk of 60% purity. How much milk of each kind should he mix to supply 20 litters of milk of 75% purity?

[6]. When 6 new boys were admitted, and 6 girls were left from the class the % of boys in the class increased from 60% to 75%. Find the original number of boys and girls in the class.
Hint : No. of boys = x & no. of girls = y ; total no. of students = x + y
A/ q, $\dfrac{x}{x + y} = \dfrac{60}{100}$ and $\dfrac{x + 6}{(x + 6) + (y − 6)} = \dfrac{75}{100}$

[7] On selling a tea –set at 5% and a lemon set at 15 % gain , a crockery seller gains Rs.7 . If he sells the tea- set at 5% gain and the lemon set at 10% gain , he gain Rs.13 . Find the actual price of the tea & lemon sets.

[8]. If a milk man pours 1 kg of water in a can containing some milk , the resulting mixture has 40% water .But if he pours 1 kg of pure milk in the same can , the resulting mixture has 20% water . Find the percentage of water in the original mixture in the can.

Hint : Suppose in the beginning , the can contains a mixture of 'x' kg milk & 'y' kg water .

when 1kg of water is added , $\dfrac{y+1}{x+y+1} = \dfrac{40}{100}$

when 1kg of milk is added , $\dfrac{y}{x+y+1} = \dfrac{20}{100}$

[9]. There are 50 students in a class . In a test , 72% of the students passed . If 80% of the girls and 60% of the boys are passed the test , Find the number of boys and that of the girls in the class .

PATTERN 12th —— [one – day work]

[1]. 8 men and 12 boys was finishes a piece of work in 5 days while 6 men and 8 boys can finish it in 7 days. Find the time taken by 1 man & 1 boy . Hint : $\dfrac{8}{x} + \dfrac{12}{y} = \dfrac{1}{5}$ & $\dfrac{6}{x} + \dfrac{8}{y} = \dfrac{1}{7}$

[2]. 2 men and 5 boys can finish a piece of work in 4 days while 3 men & 6 boys can finish it in 3 days. Find the time taken by 1 man & 1boy to finish the same piece of work.

[3]. 2 men &7 boys can do a finish of work in 4 days. The same work in done is 3 days by 4 man & 4 boys How long would it take by 1 man & 1 boy to do it.

[4] . 8 men and 12 boys can finish a piece of work in 10 days while 6 men and 8 boys can finish it in 14 days. Find the time taken by one man alone and that by one boy alone to finish the work.

[5]. 2 men and 3 boys can finish a piece of work in 4 days while 3 men & 3 boys can finish it in 3 days. Find the time taken by 1 man & 1boy to finish the same piece of work.

[6]. 10 men and 5 boys can finish a piece of work in 2 days while 5 men & 10 boys can finish it in 2 ½ day. Find the time taken by 2 men & 6boy to finish the same piece of work.