

PROBLEMS ON AGES

- ✓ Problems on ages is completely depends on few topics i.e. ratio's and averages.
- ✓ In ages topic, the difference between the ages of any two persons at any point of time must be equal.
- ✓ If the difference between the ages are not equal, then we have to make it as equal by multiplying first ratio with second difference and second ratio with first difference.

Some important formulae to be remember:

- ✓ If the ratio of the ages of A and B at present is $a : b$. After 'T' years, the ratio will be $c : d$. Then,
 - i. Present age of A = $a \times \frac{T(c-d)}{ad-bc}$
 - ii. Present age of B = $b \times \frac{T(c-d)}{ad-bc}$
- ✓ If the ratio of the ages of A and B at present is $a : b$. Before 'T' years, the ratio was $c : d$. Then,
 - i. Present age of A = $a \times \frac{T(c-d)}{bc-ad}$
 - ii. Present age of B = $b \times \frac{T(c-d)}{bc-ad}$
- ✓ The product of the ages of A and B is 'T' years and the ratio of their present ages is $a : b$. Then,
 - i. Present age of A = $a \times \sqrt{\frac{T}{ab}}$
 - ii. Present age of B = $b \times \sqrt{\frac{T}{ab}}$
- ✓ If the man's age is $x\%$ of what he was ' t_1 ' years ago and $y\%$ of what he will be after ' t_2 ' years.
Then, the present age is $\frac{xt_1 + yt_2}{x - y}$ years ($x > y$).

SOLVED EXAMPLES

1. The ratio of ages of father and son is 9 : 4. If the age of son is 28 years, then find the age of father.

Sol: Given that, $F : S = 9 : 4$

Let, $F = 9x$, $S = 4x$ (x – common factor)

$$S = 4x = 28 \text{ years} \Rightarrow x = 7$$

$$\therefore \text{Father's age } F = 9x = 9 \times 7 = 63 \text{ years.}$$

Present Ages

Father – F, Son – S

Shortcut:

$$F : S = 9 : 4$$

$$\text{Son, } S = 4 \text{ Parts} \longrightarrow 28 \text{ years}$$

$$\text{Father, } F = 9 \text{ Parts} \longrightarrow ? = \frac{9 \times 28}{4} = 63 \text{ years.}$$

2. The present ages of Rehan and Aman are in the ratio 5 : 3. What is the sum of their ages, if the age of Aman is 36 years old?

Sol: Given that, $R : A = 5 : 3$

Let, $R = 5x$, $A = 3x$ (x – common factor)

$$A = 3x = 36 \text{ years} \Rightarrow x = 12$$

$$\therefore \text{Sum of their ages} = 5x + 3x = 8x = 8 \times 12 = 96 \text{ years.}$$

Present Ages

Rehan – R, Aman – A

Shortcut:

$$R : A = 5 : 3$$

$$\text{Aman, } A = 3 \text{ parts} \longrightarrow 36 \text{ years}$$

$$\text{Sum of their ages} = 8 \text{ parts} \longrightarrow ? = \frac{36 \times 8}{3} = 96 \text{ years.}$$

3. 6 years ago, the ratio of the ages of mother and daughter is 11:5. If the present age of daughter is 21years, then find the age of mother after 6 years.

Sol: 6 years ago, $M - 6 : D - 6 = 11 : 5$

Let, $M - 6 = 11x$, $D - 6 = 5x$

$$\text{Given that, } D = 21 \text{ years} \Rightarrow 21 - 6 = 5x \Rightarrow x = 3 \quad \text{Mother – M, Daughter – D}$$

$$M - 6 = 11x = 11 \times 3 = 33 \text{ years}$$

$$M = 33 + 6 = 39 \text{ years}$$

$$\therefore \text{Mother's age after 6 years is } M + 6 = 39 + 6 = 45 \text{ years.}$$

Present Ages

Shortcut:

Given that, $M - 6 : D - 6 = 11 : 5$ and $D = 21$ years

$$D - 6 = 21 - 6 = 15 \text{ years}$$

$$D - 6 = 5 \text{ parts} \longrightarrow 15 \text{ years}$$

$$M - 6 = 11 \text{ parts} \longrightarrow ? = \frac{15 \times 11}{5} = 33 \text{ years}$$

$$M - 6 = 33 \text{ years} \Rightarrow M = 39 \text{ years}$$

\therefore Mothers age after 6 years $M + 6 = 39 + 6 = 45$ years.

4. The present ages of a family of father, mother and their only son are in the ratio 5 : 4 : 2 respectively. The age of mother after 15 years will be 47 years, then what is the age of son before 5 years?

Sol: Given that, $F : M : S = 5 : 4 : 2$

Present Ages

$$\text{Let, } F = 5x, M = 4x, S = 2x$$

Father – F, Mother – M, Son – S

After 15 years mother's age is $M + 15 = 47$ years

$$\text{Present age of mother } M = 47 - 15 = 32 \text{ years}$$

$$4x = 32 \Rightarrow x = 8$$

\therefore Son's age before 5 years $= S - 5 = 2x - 5 = 2 \times 8 - 5 = 11$ years.

Shortcut:

$$F : M : S = 5 : 4 : 2$$

$$\text{After 15 years mothers age } M + 15 = 47 \text{ years} \Rightarrow M = 47 - 15 = 32 \text{ years}$$

$$M = 4 \text{ parts} \longrightarrow 32 \text{ years}$$

$$S = 2 \text{ parts} \longrightarrow ? = \frac{32 \times 2}{4} = 16 \text{ years.}$$

\therefore Son's age before 5 years $= S - 5 = 16 - 5 = 11$ years.

5. At present the ratio between wife and husband is 5 : 6. 15 years back, the ratio was 10 : 13.

What will be the age of wife 6 years hence?

Sol: Given that, $W : H = 5 : 6$

Present Ages

$$\text{Let, } W = 5x, H = 6x \quad (x - \text{common factor})$$

Wife – W, Husband – H

According to question,

$$\frac{W - 15}{H - 15} = \frac{10}{13} \Rightarrow \frac{5x - 15}{6x - 15} = \frac{10}{13}$$

$$65x - 195 = 60x - 150 \Rightarrow 5x = 45 \Rightarrow x = 9$$

\therefore Wife's age 6 years hence $= W + 6 = 5x + 6 = 5 \times 9 + 6 = 51$ years.

Shortcut – 1:

Note:

- ✓ The difference between the ages of any 2 persons at any point of time must be equal.
- ✓ If difference between the ages of any 2 persons are not equal, then we have to make it as equal by multiplying the 1st ratio with 2nd difference and 2nd ratio with 1st difference.

		W		H	
					1 part
Present	→	5	:	6	
15 years ago	→	10	:	13	
					3 parts

Here, difference between their ages are not equal. Therefore, we have to make it as equal.

		W		H		W		H	
Present	→	(5 : 6) × 3	=	15 : 18					
						↓		↓	5 parts
15 years ago	→	(10 : 13) × 1	=	10 : 13					
		5 parts	→	15 years					
Wife W = 15 parts	→			? = $\frac{15 \times 15}{5}$	= 45 years				

∴ Wife's age 6 years hence = 45 + 6 = 51 years.

Shortcut – 2:

Note:

- ✓ If the ratio of the present ages of A and B is a : b. Before 'T' years, the ratio was c : d. Then,

i) Present age of A = $a \times \frac{T(c-d)}{bc-ad}$

ii) Present age of B = $b \times \frac{T(c-d)}{bc-ad}$

		W		H	
Present	→	5	:	6	Here a = 5, b = 6, c = 10, d = 13, T = 15
15 years ago	→	10	:	13	
Present age of wife	=	$a \times \frac{T(c-d)}{bc-ad}$	=	$5 \times \frac{15(10-13)}{6 \times 10 - 5 \times 13}$	= 45 years
∴ Wife's age 6 years hence	=	45 + 6	=	51 years.	

6. The present ages of A, B and C are in the ratio 5 : 9 : 6. 4 years ago, the sum of their ages was 108. Find their present ages.

Sol: Given that, Present A : B : C = 5 : 9 : 6
 Let, A = 5x, B = 9x, C = 6x (x – common factor)
 4 years back sum = (A – 4) + (B – 4) + (C – 4) = 108
 A + B + C = 108 + 12 = 120 years
 $5x + 9x + 6x = 120 \Rightarrow 20x = 120 \Rightarrow x = 6$
 \therefore Present ages: A = 5x = 5 × 6 = 30 years
 B = 9x = 9 × 6 = 54 years
 C = 6x = 6 × 6 = 36 years.

7. The sum of the ages of Ram, Gopal and Varma is 85 years. 7 years back, the ratio of their ages was 3 : 5 : 8. What is the present age of Gopal?

Sol: Given that, Present sum R + G + V = 85 years Present Ages
 7 years back ratio = 3 : 5 : 8 Ram – R, Gopal – G, Varma – V
 7 years back sum = 85 – 7 – 7 – 7 = 64 years \therefore Each person reduced by 7 years
 7 years back sum = 16 parts \longrightarrow 64 years
 7 years back Gopal = G – 7 = 5 parts \longrightarrow ? = $\frac{64 \times 5}{16} = 20$ years
 \therefore Present age of Gopal G = 20 + 7 = 27 years.

8. At present, Bhuvana's age is 2.5 times that of Sravani's age. After 22 years, the respective ratio between Sravani and Bhuvana age then will be 7 : 12. What is the average age of Bhuvana and Sravani at present?

Sol: According to question, Present Ages
 $B = 2.5 S \Rightarrow B : S = 2.5 : 1 \Rightarrow B : S = 5 : 2$ Bhuvana – B, Sravani – S
 Let, B = 5x, S = 2x (x – common factor)
 $\frac{S + 22}{B + 22} = \frac{7}{12} \Rightarrow \frac{2x + 22}{5x + 22} = \frac{7}{12}$
 $24x + 264 = 35x + 154 \Rightarrow 11x = 110 \Rightarrow x = 10$
 B = 5x = 5 × 10 = 50 years & S = 2x = 2 × 10 = 20 years
 \therefore Average = $\frac{B + S}{2} = \frac{50 + 20}{2} = 35$ years.

Shortcut:

		B	S		B	S	
Present	→	2.5	: 1	=	5	: 2	3 parts
After 22 years	→				12	: 7	5 parts

Hence, the difference between their ages are not equal. So, multiply 1st ratio with 2nd difference and 2nd ratio with 1st difference.

		B	S	
Present	→	(5 : 2) × 5 = 25	: 10	
		↓	↓	11 parts
After 22 years	→	(12 : 7) × 3 = 36	: 21	
11 parts	→	22 years	⇒ 1 part = 2 years	
B = 25 parts = 25 × 2 = 50 years & S = 10 parts = 10 × 2 = 20 years				
∴ Average = $\frac{B+S}{2} = \frac{50+20}{2} = 35$ years.				

9. 11 years ago, the ages of A and B was in the ratio of 7 : 4. After 15 years, their ratio will changes to 9 : 7. What are their present ages?

Sol: Consider, Present ages are A and B

$$\text{Given that, } \frac{A-11}{B-11} = \frac{7}{4} \Rightarrow 4A - 44 = 7B - 77 \Rightarrow 7B - 4A = 33 \dots\dots (1)$$

$$\text{Also, } \frac{A-15}{B-15} = \frac{9}{7} \Rightarrow 7A + 105 = 9B + 135 \Rightarrow 9B - 7A = -30 \dots\dots (2)$$

Solve (1) and (2) equations

$$(7B - 4A = 33) \times 7 = 49B - 28A = 231 \dots\dots (3)$$

$$(9B - 7A = -30) \times 4 = 36B - 28A = -120 \dots\dots (4)$$

$$(3) - (4) \Rightarrow 13B = 351 \Rightarrow B = 27 \text{ years} \dots\dots \text{Sub in (1)}$$

$$7 \times 27 - 4A = 33 \Rightarrow A = 39 \text{ years}$$

∴ Present ages of A and B = 39 years and 27 years.

Shortcut:

		A	B	
11 years ago	→	7	: 4	3 parts
15 years hence	→	9	: 7	2 parts

(Here, the difference between their ages are not equal.)

	A	B		A	B
11 years ago	(7 : 4) × 2 =			14 : 8	
				↓ ↓	13 parts
15 years hence	(9 : 7) × 3 =			27 : 21	
13 parts →	26 years (11 + 15)	⇒		1 part = $\frac{26}{13}$	= 2 years
∴ A - 11 = 14 parts = 14 × 2 = 28 years		⇒		A = 28 + 11 = 39 years	
	(or)				
A + 15 = 27 parts = 27 × 2 = 54 years		⇒		A = 54 - 15 = 39 years	
B - 11 = 8 parts = 8 × 2 = 16 years		⇒		B = 16 + 11 = 27 years	
	(or)				
B + 15 = 21 parts = 21 × 2 = 42 years		⇒		B = 42 - 15 = 27 years.	

10. X's age is thrice the sum of ages of Y and Z. If after 8 years, the age of X will be twice the sum of ages of Y and Z, then find the present age of X.

Sol: Let, Present ages are x , y and z years

According to question,

$$x = 3(y + z) = 3y + 3z \quad \longrightarrow \quad (1)$$

$$x + 8 = 2[(y + 8) + (z + 8)] = 2(y + z + 16)$$

$$x = 2y + 2z + 24 \quad \longrightarrow \quad (2)$$

$$(1) = (2) \Rightarrow 3y + 3z = 2y + 2z + 24 \Rightarrow y + z = 24$$

$$\therefore \text{Present age of } x = 3(y + z) = 3 \times 24 = 72 \text{ years.}$$

11. The ratio of present ages of P and Q is 2 : 3. If the difference between present age of P and age of Q before 6 years is 8, then what is the average age of P and Q?

Sol: Given that, Present P : Q = 2 : 3

$$\text{Let, } P = 2x, Q = 3x \quad (x - \text{common factor})$$

$$\text{Also, } (Q - 6) - P = 8 \Rightarrow 3x - 6 - 2x = 8 \Rightarrow x = 14$$

$$P = 2x = 2 \times 14 = 28 \text{ years, } Q = 3x = 3 \times 14 = 42 \text{ years}$$

$$\therefore \text{Average} = \frac{P + Q}{2} = \frac{28 + 42}{2} = 35 \text{ years.}$$

12. The product of the ages of Chandu and Madhu is 320. If twice the age of Madhu is more than Chandu's age by 12 years. What is the age of Chandu?

Sol: Given that, $C \times M = 320 \quad \longrightarrow \quad (1)$

$$2M = C + 12 \Rightarrow C = 2M - 12 \dots \text{Sub in (1)}$$

$$(2M - 12) \times M = 320$$

Present Ages

Chandu - C, Madhu - M

$$\begin{aligned}
2M^2 - 12M - 320 &= 0 \Rightarrow M^2 - 6M - 160 = 0 \\
M^2 - 16M + 10M - 160 &= 0 \Rightarrow M(M - 16) + 10(M - 16) = 0 \\
(M - 16)(M + 10) &= 0 \Rightarrow M = 16 \text{ years } (\because M \neq -10) \\
\therefore \text{Chandu's age } C &= \frac{320}{M} = \frac{320}{16} = 20 \text{ years.}
\end{aligned}$$

Note: This problem can be solved through options easily by checking one by one.

- 13. The age of Mohan 15 years ago was $\frac{2}{5}$ of what he is now. What will be the age of Mohan after 8 years?**

Sol: Consider, present age of Mohan = M years

$$\text{Given that, } M - 15 = \frac{2}{5}M \Rightarrow M - \frac{2}{5}M = 15$$

$$\frac{3M}{5} = 15 \Rightarrow M = 25 \text{ years}$$

$$\therefore \text{Age of Mohan after 8 years} = M + 8 = 25 + 8 = 33 \text{ years.}$$

- 14. After 11 years, X will be twice as old as Y was 11 years ago. If present age of X is 7 more than Y. What is the present age of X?**

Sol: According to question,

$$x + 11 = 2(y - 11) \longrightarrow (1)$$

$$x = y + 7 \Rightarrow y = x - 7 \dots\dots \text{Sub in (1)}$$

$$x + 11 = 2(x - 7 - 11) \Rightarrow x + 11 = 2(x - 18)$$

$$x + 11 = 2x - 36 \Rightarrow x = 47$$

$$\therefore \text{Present age of X} = 47 \text{ years.}$$

- 15. The sum of the ages of A, B and C is 125 years. A is thrice as old as B and C is 10 years younger than B. Find their respective ages.**

Sol: Given that, A + B + C = 125 years, A = 3B and C = B - 10

$$3B + B + (B - 10) = 125 \Rightarrow 5B = 135 \Rightarrow B = 27 \text{ years}$$

$$A = 3B = 3 \times 27 = 81 \text{ years, } C = B - 10 = 27 - 10 = 17 \text{ years}$$

$$\therefore A = 81 \text{ years, } B = 27 \text{ years, } C = 17 \text{ years.}$$

16. If 9 years are subtracted from present age of Amit and the remainder is divided by 17, then the present age of his grandson Bharath is obtained. If Bharath is 4 years younger to Chandu, whose age is 8 years. What is the age of Amit?

Sol: According to question,

$$\frac{A - 9}{17} = B, B = C - 4, C = 8 \text{ years}$$

Present Ages

$$B = 8 - 4 = 4 \text{ years}$$

Amit – A, Bharath – B, Chandu – C

$$\frac{A - 9}{17} = 4 \Rightarrow A = 17 \times 4 + 9 = 77 \text{ years}$$

∴ Present age of Amit = 77 years.

17. If x's age is 1.5 times the average of x, y and z. z's age is one – fourth of the average of x, y, z. If y is 20 years old, then what is the average age of x, y and z?

Sol: Given that, $x = 1.5 \left[\frac{x + y + z}{3} \right] = \frac{3}{2} \left[\frac{x + y + z}{3} \right]$

$$x + y + z = 2x \Rightarrow y + z = x \longrightarrow (1)$$

$$z = \frac{1}{4} \left[\frac{x + y + z}{3} \right], y = 20 \text{ years}$$

$$x + y + z = 12z \Rightarrow x + y = 11z \Rightarrow x = 11z - y \longrightarrow (2)$$

$$(1) = (2) \quad y + z = 11z - y \Rightarrow 10z = 2y = 2 \times 20 = 40 \quad \therefore y = 20 \text{ years}$$

$$10z = 40 \text{ years} \Rightarrow z = 4 \text{ years}$$

$$\text{From (1), } x = y + z = 20 + 4 = 24 \text{ years}$$

$$\therefore \text{Average} = \left[\frac{x + y + z}{3} \right] = \left[\frac{24 + 20 + 4}{3} \right] = 16 \text{ years.}$$

18. Girish is thrice as old as Harish and half as old as Kumar. If the sum of Harish's and Kumar's ages is 84 years, then find the age of Girish.

Sol: Given that, $G = 3H, G = \frac{K}{2}$

Present Ages

$$H + K = 84 \text{ years} \longrightarrow (1) \quad \text{Girish, – G, Harish – H, Kumar – K}$$

$$G = 3H = \frac{K}{2} \Rightarrow K = 6H \dots\dots \text{substitute in (1)}$$

$$H + 6H = 84 \Rightarrow H = 12 \text{ years}$$

$$\therefore \text{Girish's present age } G = 3H = 3 \times 12 = 36 \text{ years.}$$

19. The sum of the ages of 7 children born at the intervals of 2 years each is 84. What is the age of eldest child?

Sol: Consider, ages of 7 children are

$$x - 6, x - 4, x - 2, x, x + 2, x + 4, x + 6$$

∴ Interval gap = 2 years

$$\text{Sum of their ages} = 7x = 84 \Rightarrow x = 12 \text{ years}$$

$$\therefore \text{Age of eldest child} = x + 6 = 12 + 6 = 18 \text{ years.}$$

Shortcut:

$$\text{Average of children} = \frac{\text{Sum of children}}{\text{No. of children}} = \frac{84}{7} = 12 \text{ years}$$

Note: If no. of observations are odd and the gap between any two consecutive numbers are same, then average is always “middle number.”

Ages →

	6	8	10	12	14	16
				Average		

Since the Gap between 2 children = 2 years

$$\therefore \text{Age of eldest child} = 18 \text{ years.}$$

20. A man was asked to tell his age in years. He said that, “Take my age 5 years hence, multiply it by 4 and then subtract 4 times my age 2 years ago and you will know how old I am.” What was the age of the man?

Sol: Consider, a man’s present age = ‘M’ years

According to question,

$$M = (M + 5) 4 - 4(M - 2) \Rightarrow M = 4M + 20 - 4M + 8 \Rightarrow M = 28$$

$$\therefore \text{Age of the Man} = 28 \text{ years.}$$

21. Abhi’s present age is twice the age of Gopi three years ago. What is the sum of their present ages, if the ratio of the sum of their present ages to the difference of their present ages is 5:1?

Sol: Given that, $A = 2(G - 3) \rightarrow$ (1) Present Ages
 $(A + G) : (A - G) = 5 : 1$ Abhi – A, Gopi – G
 Let, $A + G = 5x$ and $A - G = x$ (x – common factor)
 $(A + G) + (A - G) = 5x + x \Rightarrow 2A = 6x \Rightarrow A = 3x$
 $G = 5x - 3x = 2x$ ∴ $A + G = 5x$
 Substitute $A = 3x, G = 2x$ in (1)

$$3x = 2(2x - 3) \Rightarrow 3x = 4x - 6 \Rightarrow x = 6$$

∴ Sum of their ages $A + G = 5x = 5 \times 6 = 30$ years.

- 22. Mother's age is equal to the sum of the ages of her son and daughter. The present age of son is 20 years. If 20 years ago, their average age was 25 years, then find the present age of the mother.**

Sol: Given that, $M = S + D$, $S = 20$ years

Present Ages

Mother – M, Son – S, Daughter – D

20 years ago means at the time of birth of son.

At that time there are only 2 members in the family.

$$\text{Therefore, Average} = \frac{(M - 20) + (D - 20)}{2} = 25$$

$$M + D = 2 \times 25 + 40 = 90$$

$$M = S + D \Rightarrow M = 20 + (90 - M) \quad \because M + D = 90, S = 20$$

$$2M = 110 \Rightarrow M = 55 \text{ years}$$

∴ Present age of mother $M = 55$ years.

- 23. If the product of ages of father and son is 1792 years and the ratio of their present ages is 7 :**

4. What are their present ages?

Sol: Given that, $F : S = 7 : 4$

Present Ages

Let, $F = 7x$, $S = 4x$ (x – common factor) Father – F, Son – S

$$F \times S = 1792 \Rightarrow 7x \times 4x = 1792$$

$$x^2 = 64 \Rightarrow x = 8$$

∴ Present age of Father $F = 56$ years & Present age of Son $S = 32$ years.

Shortcut:

Note: Product of ages of A and B is 'T' years and the ratio of their present ages is a : b.

$$\text{Then, Present age of A} = a \times \sqrt{\frac{T}{ab}} \text{ years}$$

$$\text{Present age of B} = b \times \sqrt{\frac{T}{ab}} \text{ years}$$

Given that, $F : S = 7 : 4$, Product = 1792

$$\therefore \text{Present age of Father } F = 7 \times \sqrt{\frac{1792}{7 \times 4}} = 56 \text{ years}$$

$$\text{Present age of Son } S = 4 \times \sqrt{\frac{1792}{7 \times 4}} = 32 \text{ years.}$$

- 24. Deepak's present age is 120% of what he was 15 years ago and 75% of what he will be after 9 years. What is the present age of Deepak?**

Sol: Consider, Deepak's present age is 'D' years.

According to question,

$$\frac{120}{100} \times (D - 15) = \frac{75}{100} \times (D + 9)$$

$$\frac{6}{5} \times (D - 15) = \frac{3}{4} \times (D + 9) \quad \Rightarrow \quad 24D - 360 = 15D + 135$$

$$9D = 360 + 135 = 495 \quad \Rightarrow \quad D = 55 \text{ years}$$

\therefore Deepak's present age D = 55 years.

Shortcut:

Note: If a man's age is $x\%$ of what he was t_1 years ago and $y\%$ of what he will be after t_2 years. Then, the present age of man is $\frac{x t_1 + y t_2}{x - y}$ years ($x > y$)

Here, $x = 120$, $t_1 = 15$, $y = 75$, $t_2 = 9$

$$\therefore \text{Deepak's present age} = \frac{120 \times 15 + 75 \times 9}{120 - 75} = 55 \text{ years.}$$

- 25. The sum of the ages of father and daughter is 51 years. 8 years ago, the product of their ages was 5 times the father's age at that time. What are their present ages?**

Sol: Given that, $F + D = 51$ years

Present Ages

$$(F - 8)(D - 8) = 5(F - 8)$$

Father – F, Daughter – D

$$D - 8 = 5 \quad \Rightarrow \quad D = 13 \text{ years}$$

$$F = 51 - D = 51 - 13 = 38 \text{ years}$$

\therefore Present age of Father F = 38 years & Present age of Daughter D = 13 years.

- 26. Father's present age is 3 times the sum of the ages of his 3 children, but 5 years hence his age will be only twice the sum of their ages. Find the present age of father.**

Sol: Consider, Father present age = F and Sum of 3 children = C

Given that, $F = 3C$ and After 5 years $F + 5 = 2(C + 3 \times 5)$

$$F + 5 = 2(C + 15) \quad \therefore \text{For every child 5 years increases}$$

$$3C + 5 = 2C + 30 \quad \Rightarrow \quad C = 25 \text{ years}$$

\therefore Present age of father $F = 3C = 3 \times 25 = 75$ years.

27. A father said to his son, “I was as old as you are at present at the time of your birth”. If the father’s age is 52 years now, then what will be the age of son after 6 years?

Sol: Consider, Father present age = F and Son present age = S.

According to question,

Father’s age was equal to son’s present age at the time of birth of son.

∴ Son’s birth was taken place ‘S’ years ago.

$$\text{‘S’ years ago, father’s age } F - S = S \quad \Rightarrow \quad F = 2S$$

$$52 = 2S \quad \Rightarrow \quad S = 26 \text{ years} \quad \therefore F = 52 \text{ years}$$

∴ Son’s age after 6 years = $S + 6 = 26 + 6 = 32$ years.

28. The present age of A is 6 years more than the age of B after 3 years. B’s present age is 9 years more than the age of C before 6 years. The present age of C is 23 years. What was the age of A 4 years ago?

Sol: Given that, $A = (B + 3) + 6 \quad \Rightarrow \quad A = B + 9$

$$B = (C - 6) + 9 \quad \Rightarrow \quad B = C + 3 \quad \therefore C = 23 \text{ years}$$

$$B = 23 + 3 = 26 \text{ years}$$

$$A = B + 9 = 26 + 9 = 35 \text{ years.}$$

∴ Age of A, 4 years ago = $A - 4 = 35 - 4 = 31$ years.

29. 9 years back, the ratio of the ages of Balu and Sravan was 19 : 12 respectively. The present age of Balu is $4\frac{2}{5}$ times of Ravi’s present age. If Ravi’s present age is 15 years, then what is Sravan’s present age?

Sol: Given that, $(B - 9) : (S - 9) = 19 : 12$

Present Ages

Let, $B - 9 = 19x$, $S - 9 = 12x$ (x – common factor) Balu – B, Sravan – S, Ravi – R

$$\text{Also, } B = 4\frac{2}{5} \times R = \frac{22}{5} \times 15 = 66 \text{ years} \quad \therefore R = 15 \text{ years}$$

$$B - 9 = 19x \quad \Rightarrow \quad 19x = 66 - 9 = 57 \quad \Rightarrow \quad x = 3$$

$$S - 9 = 12x \quad \Rightarrow \quad S = 12 \times 3 + 9 = 45 \text{ years}$$

∴ Sravan’s present age = 45 years.

30. The ratio between the present ages of Ajay and Vinay is 7 : 4 respectively. The ratio between Ajay's age 5 years ago and Vinay's age 4 years hence is 3 : 2. What is the ratio between Ajay's age after 3 years and Vinay's age 6 years hence?

Sol: Given that, $\frac{A}{V} = \frac{7}{4} \Rightarrow A = \frac{7}{4}V$ Present Ages

$\frac{A-5}{V+4} = \frac{3}{2} \Rightarrow 2A - 10 = 3V + 12 \dots\dots (1)$ Ajay – A, Vinay – V

Substitute $A = \frac{7}{4}V$ in (1)

$2 \times \frac{7}{4}V - 10 = 3V + 12 \Rightarrow \frac{7V}{2} - 3V = 22 \Rightarrow V = 44 \text{ years}$

$A = \frac{7}{4}V = \frac{7}{4} \times 44 = 77 \text{ years}$

\therefore Required ratio = $(A + 3) : (V + 6) = (77 + 3) : (44 + 6) = 8 : 5$.

31. The average age of a family of 7 members is 31 years. If the present age of younger person is 13 years, then what was the average age of the family at the time of birth of younger person?

Sol: Sum of family at present = $31 \times 7 = 217 \text{ years}$ \therefore Sum = Avg. \times No. of obs.

Sum of family at the time of birth of youngest person (13 years ago) = $217 - 13 \times 7 = 126$

\therefore Average at the time of birth of youngest Person = $\frac{\text{Sum of family}}{\text{No. of persons}} = \frac{126}{6} = 21 \text{ years}$.

\therefore At the time of birth of youngest person only 6 members were there in the family.

32. The average age of 24 students and their teacher is 18 years. The average age of first 10 students is 20 years and that of last 14 students is 15 years. Find the age of teacher?

Sol: Sum of 24 students and teacher = Avg. \times No. of persons = $18 \times 25 = 450 \text{ years}$

Sum of 1st 10 students = $20 \times 10 = 200 \text{ years}$

Sum of last 14 students = $15 \times 14 = 210 \text{ years}$

Age of teacher = Sum of 24 students and teacher – Sum of 1st 10 – Sum of last 14 students

\therefore Age of teacher = $450 - 200 - 210 = 40 \text{ years}$.

Shortcut:

	First 10 students				Last 14 students				Teacher
Initial avg.	1	2	.....	10	11	12	.....	24	
	18	18	.....	18	18	18	.....	18	
	↓ ₊₂	↓ ₊₂		↓ ₊₂	↓ ₋₃	↓ ₋₃		↓ ₋₃	
	20	20	.....	20	15	15	.....	15	18

Distributed value: $+2 \times 10 = +20$

$-3 \times 14 = -42$

\therefore Teacher's age = Initial average + Distributed value = $18 - 20 + 42 = 40$ years.

Note: If teacher's age is not the part of 1st 10 students and last 14 values, then distributed value sign will be reversed. i.e; '+' becomes '-' & '-' becomes '+'.
 \therefore Teacher's age = Initial average - Distributed value = $18 - 42 + 20 = -4$ years.

- 33. Shyam is 4 times his son's age and his wife is $\frac{7}{8}$ th of his present age. If the sum of the ages of all three of them is 119 years, then find the age of Shyam's son.**

Sol: Given that, $H = 4S \Rightarrow S : H = 1 : 4$ Present Ages
 $W = \frac{7}{8}H \Rightarrow H : W = 8 : 7$ Husband – H, Wife – W, Son – S

	S	H	W
S : H =	1	4	4
H : W =	8	8	7
S : H : W =	$1 \times 8 : 4 \times 8 : 4 \times 7 = 2 : 8 : 7$		
S + H + W =	17 parts \rightarrow 119 years		
S = 2 parts \rightarrow	$? = \frac{119 \times 2}{17} = 14$ years		

\therefore Shyam's son's age = 14 years.

- 34. If Krunal is as much elder than Amit as he is younger to Manish and the sum of the ages of Amit and Manish is 64 years. Find the age of Krunal.**

Sol: According to question, $A + M = 64$ years
 $(K - x) + (K + x) = 64 \Rightarrow K = 32$
 \therefore Krunal's present age $K = 32$ years.

Manish (M)	$\rightarrow K + x$
\uparrow	
Krunal	$\rightarrow K$
\downarrow	
Amit (A)	$\rightarrow K - x$

Shortcut:

Note: If A is as much elder than B as he is younger to C and sum of the ages

of B and C is 'T' years, then A's present age = $\frac{B + C}{2} = \frac{T}{2}$

\therefore Krunal's present age = $\frac{64}{2} = 32$ years.

35. At present, Saroj's age is 2 years more than thrice his son's age. After 3 years, his age would be 20 years less than 4 times of his son's age. Find the present age of son.

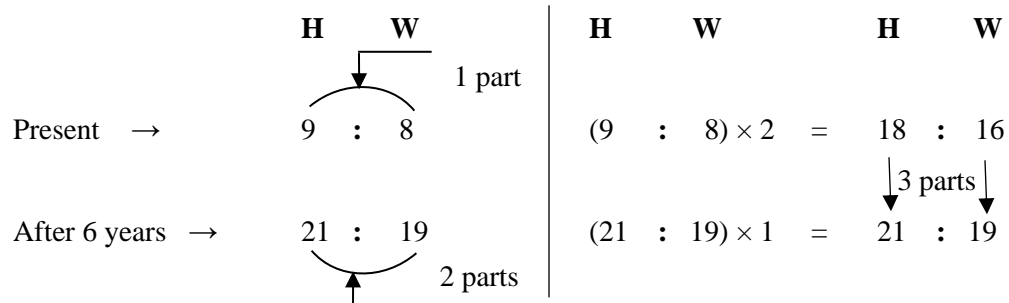
Sol: Given that, $F = 3S + 2$ **Present Ages**
 $F + 3 = 4(S + 3) - 20$ Father – F, Son – S
 $(3S + 2) + 3 = 4S + 12 - 20 \Rightarrow S = 13 \text{ years}$
 \therefore Present age of Saroj's son $S = 13$ years.

36. Anusha got married 10 years ago. Today her age is $1\frac{1}{3}$ times her age at the time of marriage. Her son's age is $\frac{1}{8}$ th of her age. What is the age of the son?

Sol: Given that, $A = 1\frac{1}{3}(A - 10)$ **Present Ages**
 $A = \frac{4}{3}(A - 10)$ \therefore A – got married 10 years ago Anusha – A, Son – S
 $A = \frac{4A}{3} - \frac{40}{3} \Rightarrow A = 40 \text{ years}$
Also, $S = \frac{A}{8} \Rightarrow S = \frac{40}{8} = 5 \text{ years}$
 \therefore Son's present age $S = 5$ years.

37. The ratio of the ages of husband and wife is 9:8. After 6 years, the ratio will be 21:19. If at the time of marriage the ratio was 13:11, then how many years ago were they married?

Sol: Given that, $H : W = 9 : 8$ **Present Ages**
Let $H = 9x$, $W = 8x$ (x – common factor) Husband – H, Wife – W
After 6 years, $\frac{H + 6}{W + 6} = \frac{21}{19} \Rightarrow \frac{9x + 6}{8x + 6} = \frac{21}{19}$
 $171x + 114 = 168x + 126 \Rightarrow x = 4$
 $H = 9x = 9 \times 4 = 36 \text{ years}$, $W = 8x = 8 \times 4 = 32 \text{ years}$
Consider, 'k' years ago they got married.
 $\frac{H - K}{W - K} = \frac{13}{11} \Rightarrow \frac{36 - K}{32 - K} = \frac{13}{11}$
 $396 - 11k = 416 - 13k \Rightarrow k = 10 \text{ years}$
 \therefore They got married 10 years ago.

Shortcut – 1:

3 parts → 6 years ⇒ 1 part = 2 years

H = 18 parts = $18 \times 2 = 36$ years & W = 16 parts = $16 \times 2 = 32$ years

Consider, 'k' years ago they got married.

$$\frac{H-K}{W-K} = \frac{36-K}{32-K} = \frac{13}{11} \Rightarrow 396 - 11k = 416 - 13k \Rightarrow k = 10$$

∴ They got married 10 years ago.

Shortcut – 2:

Note: If the ratio of the present ages of A and B is $a : b$. After 'T' years, the ratio will be $c : d$. Then,

$$\text{Present age of A} = a \times \frac{T(c-d)}{ad-bc}, \text{ Present age of B} = b \times \frac{T(c-d)}{ad-bc}$$

Here $a = 9$, $b = 8$, $c = 21$, $d = 19$, $T = 6$ years

$$\text{Present age of Husband H} = 9 \times \frac{6(21-19)}{9 \times 19 - 8 \times 21} = 36 \text{ years}$$

$$\text{Present age of Wife W} = 8 \times \frac{6(21-19)}{9 \times 19 - 8 \times 21} = 32 \text{ years}$$

Consider, 'k' years ago they got married.

$$\frac{H-K}{W-K} = \frac{36-K}{32-K} = \frac{13}{11} \Rightarrow 396 - 11k = 416 - 13k \Rightarrow k = 10$$

∴ They got married 10 years ago.

- 38. The present age of Keshav is 4 times the age of Gopi. After 6 years, Keshav will be thrice the age of Gopi, then how many times will Keshav's age be in another 6 years' time with respect to Gopi's age then?**

Sol: Given that, $K = 4G$

$$\text{After 6 years } K + 6 = 3(G + 6)$$

$$4G + 6 = 3G + 18 \Rightarrow G = 12 \text{ years}$$

$$K = 4G = 4 \times 12 = 48 \text{ years}$$

Present Ages

Keshav – K, Gopi – G

$$\therefore K = 4G$$

After 12 years (from 6 years to another 6 years) $K + 12 = x(G + 12)$

$$\Rightarrow 48 + 12 = x(12 + 12) \Rightarrow x = 2.5 \text{ times}$$

\therefore Keshav's age will be 2.5 times that of Gopi's age after 12 years.

- 39. Akhil got married 5 years back. His present age is $\frac{7}{6}$ times his age at the time of his marriage.**

Akhil's brother was 4 years elder to him at the time of marriage. What will be the age of his brother after 6 years?

Sol: According to question,

Present Ages

$$A = \frac{7}{6}(A - 5) \quad (\because \text{Akhil got married 5 years back}) \quad \text{Akhil} - A, \text{ Akhil's brother} - B$$

$$A = \frac{7A}{6} - \frac{35}{6} = 35 \text{ years}$$

$$\text{Also, at the time of marriage } B - 5 = (A - 5) + 4$$

$$B = 35 - 5 + 4 + 5 = 39 \text{ years}$$

\therefore Akhil's brother's age after 6 years $= B + 6 = 39 + 6 = 45$ years.

- 40. A father said to his son, "I am 5 times as old as you were when I was as old as you are". If the sum of their present ages is 112 years, then find their present ages.**

Sol: Consider, 'k' years ago son's present age and father's past age were equal.

According to question,

$$S + k = 5(S - k)$$

$$S + k = 5S - 5k$$

$$4S = 6k \rightarrow (1)$$

$$\text{Sum of present ages} = (S + k) + S = 112$$

$$k = 112 - 2S \quad \dots\dots\dots \text{Sub in (1)}$$

$$4S = 6(112 - 2S) \Rightarrow 4S = 672 - 12S$$

$$16S = 672 \Rightarrow S = 42 \text{ years}$$

$$k = 112 - 2S = 112 - 2 \times 42 = 28 \text{ years}$$

\therefore Father's present age $= S + k = 42 + 28 = 70$ years, Son's present age $S = 42$ years.

	Father	Son
Present	$S + k$	S
	$\downarrow - k$	$\downarrow - k$
'k' years ago	S	$S - k$

- 41. Amar's brother is 4 years elder to him. His father was 34 years of age when his sister was born, while his mother was 31 years of age when he was born. If his sister was 5 years of age when his brother was born. Find the ages of Amar's father and mother respectively when his brother was born.**

Sol: Amar's father was 34 years when his sister was born.

\therefore Amar's father's age, when his brother was born $= 34 + 5 = 39$ years

∴ Amar's sister was 5 years elder than his brother

Amar's mother was 31 years when Amar was born.

∴ Amar's mother's age, when his brother was born = $31 - 4 = 27$ years.

∴ Amar was 4 years younger than his brother

42. The ratio of the present ages of son and his father is 1 : 4 and that of his mother and father is 3 : 4. After 9 years the ratio of the ages of son to that of his mother becomes 4 : 9. What is the present age of father?

Sol: Present S : F = 1 : 4 Present Ages
 F : M = 4 : 3 Father – F, Son – S, Mother – M
 Present S : F : M = 1 : 4 : 3
 Let, S = x, F = 4x, M = 3x (x – common factor)
 After 9 years $\Rightarrow \frac{S+9}{M+9} = \frac{4}{9} \Rightarrow \frac{x+9}{3x+9} = \frac{4}{9}$
 $9x + 81 = 12x + 36 \Rightarrow x = 15$
 ∴ Present age of father F = $4x = 4 \times 15 = 60$ years.

Alternative method:

	S	F	M	
Present →	1	4		
Present →		4	3	
Present ratio, S : F : M = 1 : 4 : 3				
	S	M		
Present →	1	3	2 parts	
After 9 years →	4	9	5 parts	

S	M	S	M
(1 : 3) × 5	= 5	:	15
	↓ 3 parts		↓
(4 : 9) × 2	= 8	:	18

3 parts → 9 years \Rightarrow 1 part = 3 years

∴ Present age of son = 5 parts = $5 \times 3 = 15$ years

Present age of son 1 part = 15 years

∴ Father's present age F = 4 parts = $4 \times 15 = 60$ years.

- 43. Dinesh's father was 45 years of age when he was born, while his mother was 37 years old when his sister 3 years elder to him was born. What is the sum of father and mother at the time of birth of Dinesh?**

Sol: Dinesh's father's age, when Dinesh was born = 45 years
 Dinesh's mother's age, when Dinesh's sister was born = 37 years
 \therefore Dinesh's mother's age, when Dinesh was born = $37 + 3 = 40$ years.

\therefore Dinesh's sister was 3 years elder than Dinesh

\therefore Sum of the ages of father and mother, when Dinesh was born = $45 + 40 = 85$ years.

- 44. If the ages of P and R are added to twice the age of Q, the total becomes 59. If the ages of Q and R are added to thrice the age of P, the total becomes 68. If the age of P is added to thrice the age of Q and thrice the age of R, the total becomes 108. What is the age of P?**

Sol: According to question,

$$P + R + 2Q = 59 \quad \rightarrow \quad (1) \quad Q + R + 3P = 68 \quad \rightarrow \quad (2)$$

$$P + 3Q + 3R = 108 \quad \rightarrow \quad (3)$$

$$\text{From (2)} \Rightarrow Q + R = 68 - 3P, \text{ From (3)} \Rightarrow P + 3(Q + R) = 108$$

$$P + 3(68 - 3P) = 108 \quad \Rightarrow \quad P + 204 - 9P = 108 \quad \therefore Q + R = 68 - 3P$$

$$8P = 96 \quad \Rightarrow \quad P = 12$$

\therefore Present age of P = 12 years.

- 45. The average age of Dharma's family consisting of 6 members 5 years ago was 40 years. 3 years ago, a new baby was born in this family. What will be the average age of the family after 4 years?**

Sol: Sum of Dharma's family 5 years ago = $40 \times 6 = 240$ years \therefore Sum = Avg. \times No. of persons
 Sum of family at present = $240 + (6 \times 5) + 3 = 273$ years

\therefore 6 members age increased by 5 years and the age of new baby is 3 years

Sum of family after 4 years (7 members) = $273 + (7 \times 4) = 301$ years

$$\therefore \text{Average after 4 years} = \frac{\text{Sum after 4 years}}{\text{No. of persons}} = \frac{301}{7} = 43 \text{ years.}$$

46. The average age of 90 employees in an office is 33 years, where $\frac{1}{3}$ employees are males and in the ratio of average age of men and women is 5:3. What is the average age of males?

Sol: Sum of all employees = $33 \times 90 = 2970$ years \therefore Sum = Avg. \times No. of persons

Given that, No. of males = $\frac{1}{3} \times \text{Total} = \frac{1}{3} \times 90 = 30$ members

No. of females = Total – No. of males = $90 - 30 = 60$ members

Average age ratio, Men : Women = 5 : 3

Let, men average age = $5x$, women average age = $3x$

Sum of all employees = Sum of males + Sum of females

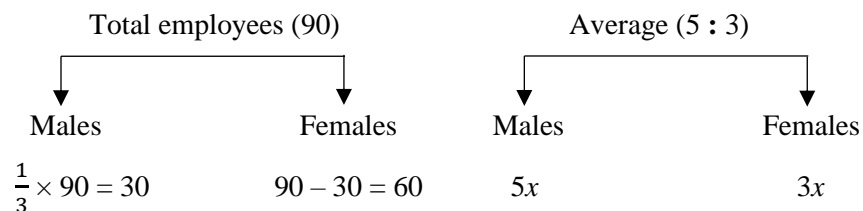
$$2970 = 30 \times 5x + 60 \times 3x \quad \Rightarrow \quad 330x = 2970 \quad \Rightarrow \quad x = 9$$

\therefore Average age of males = $5x = 5 \times 9 = 45$ years

Shortcut:

Sum of all employees = $33 \times 90 = 2970$ years

\therefore Sum = Avg. \times No. of persons



Sum of all employees = Sum of males + sum of females

$$2970 = 30 \times 5x + 60 \times 3x \quad \Rightarrow \quad 330x = 2970 \quad \Rightarrow \quad x = 9$$

\therefore Average age of males = $5x = 5 \times 9 = 45$ years.

47. The average age of A and B is 34 years. If C replaces A, the average becomes 37 years and if C replaces B, then the average becomes 33 years. If the average age of D, E and F is half of the average age of A, B and C. Find the average age of all 6 members?

Sol: $A + B = 34 \times 2 = 68$ years \rightarrow (1) \therefore Avg. of A and B is 34

$C + B = 37 \times 2 = 74$ years \rightarrow (2) \therefore C replaces A

$A + C = 33 \times 2 = 66$ years \rightarrow (3) \therefore C replaces B

$$(1) + (2) + (3) \Rightarrow 2(A + B + C) = 68 + 74 + 66 = 208 \quad \Rightarrow \quad A + B + C = 104$$

Also, given that

Average of D, E and F = $\frac{1}{2} \times [\text{Average of A, B and C}]$

$$\frac{D + E + F}{3} = \frac{1}{2} \times \frac{A + B + C}{3} \Rightarrow D + E + F = \frac{1}{2} \times 104$$

\therefore Average of all 6 members = $\frac{(A + B + C) + (D + E + F)}{6} = \frac{104 + 52}{6} = 26$ years.

- 48. In a joint family the average age of 5 males and 8 females is 38 years, 25 years respectively. If two persons whose average age is 16 years have left the family and three more members joined the family whose ages are 36, 22 and 32 years, then how much is the average age of the new family is increased?**

Sol: Sum of family of 13 members (5 males and 8 females) = $5 \times 38 + 8 \times 25 = 390$ years

$$\therefore \text{Sum} = \text{Avg.} \times \text{No. of persons}$$

$$\text{Average of 13 members} = \frac{390}{13} = 30 \text{ years}$$

Also, avg. of males = 38, average of females = 25

$$\text{New sum of family 14 members} = 390 - (2 \times 16) + (36 + 22 + 32) = 448$$

$$\text{New avg. of family} = \frac{448}{14} = 32 \text{ years}$$

\therefore 2 members left with an average of 16 and 3 members join the family

\therefore So new average is increased by 2 years.

- 49. The average age of all 30 teachers of a school 8 years ago was 42 years. 5 years ago, the principal has retired from his post at the age of 64 years and after 3 years a new principal whose age was 52 years recruited. What is the average age of all the teachers, if principal is also considered as a teacher?**

Sol: Sum of all 30 teachers 8 years ago = $42 \times 30 = 1260$ years

$$\therefore \text{Sum} = \text{Avg.} \times \text{No. of persons}$$

Without any replacement, present sum = $1260 + (30 \times 8) = 1500$ years

But, the principal was retired 5 years ago at the age of 64 years and after 3 years a new principal recruited at the age of 52 years

$$\text{New present sum} = 1500 - 5 - 64 + 2 + 52 = 1485 \text{ years}$$

$$\therefore \text{New average age} = \frac{\text{New sum}}{\text{No. of persons}} = \frac{1485}{30} = 49 \frac{1}{2} \text{ years.}$$

- 50. The average age of officers of a public sector bank, having 15 officers was 38 years. 2 officers whose ages were 56 years and 55 years transferred to other branches and on the same day one officer resigned from his duties. So 2 new officers aged 32 years and 30 ears joined in bank. After 2 years on the same date the average age of all 14 officers was found to be 35 years. What was the age of the officer who resigned from his duties?**

Sol: Sum of 15 officers = $38 \times 15 = 570$ years \therefore Sum = Avg. \times No. of persons

Here, 2 officers transferred, 1 officer resigned and 2 officers joined.

$$\text{Present sum of 14 officers} = 570 - 56 - 55 - x + 32 + 30 \rightarrow (1)$$

where 'x' is age of resigned officer

$$\text{Sum of 14 officers after 2 years} = 35 \times 14 = 490 \text{ years} \rightarrow (2)$$

$$(1) = (2) \Rightarrow 570 - 56 - 55 - x + 32 + 30 = 462 \Rightarrow x = 59 \text{ years}$$

\therefore Age of officer who resigned $x = 59$ years.

