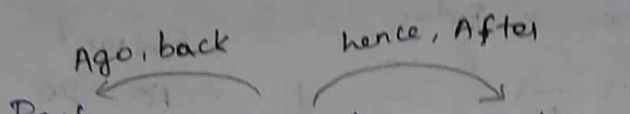
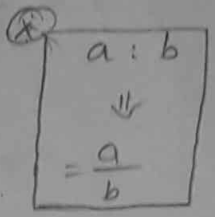
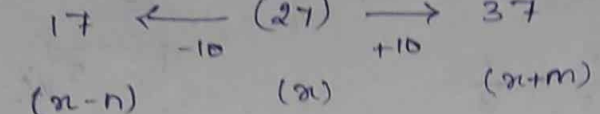
Problems ON Ages

Lesson #1 Basic





Ex:



1. The present ages of A and B are in the ratio 4:5 and after 5 yr they will be in the ratio 5:6. The present age of A is

Present Future

$4:5 \xrightarrow[+5]{} 5:6$

$4x : 5x$

$4x+5 : 5x+5 = 5:6$

$\Rightarrow 4(5)$

$\Rightarrow \boxed{20}$ //.

$\frac{4x+5}{5x+5} = \frac{5}{6}$

$24x + 30 = 25x + 25$

$\boxed{x = 5}$

2. The Respective ratio of the present ages of Swati and Trupu is 4:5. Six years hence, the respective ratio of their ages will be 6:7. What is the difference between their ages?

Pr Fut

$4:5 \xrightarrow[+6]{} 6:7$

$4x : 5x$

$4x+6 : 5x+6 = 6:7$

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

$28x + 42 = 30x + 36$

$2x = 6$

$\boxed{x = 3}$

Swati = $4x = 4(3) = \boxed{12 yr}$ //

Trupu = $5x = \boxed{15 yr}$ //.

$12 \sim 15 \Rightarrow \boxed{3}$ //.

3. The ratio of present ages of two brother is 1:2 and 5 yr back, the ratio was 1:3. What will be the ratio of their ages after 5 yr?

Past Pres Futu

$1:3 \xleftarrow[-5]{} 1:2 \xrightarrow[+5]{} \frac{?}{?} : \frac{?}{?}$

$\downarrow$

$x-5 : 2x-5 = 1:3$

$\frac{x-5}{2x-5} = \frac{1}{3}$

$3x - 15 = 2x - 5$

$\boxed{x = 10}$

Present

10 : 20

Future $\downarrow +5$

15 : 25 $\Rightarrow \frac{15}{25} \overset{3}{\underset{5}{}}$

$\boxed{3:5}$ //.

4. The ratio of the present ages of Anju and Sandhya is 13:17, respectively. Four years ago, the respective ratio of their ages was 11:15. What will be the respectively ratio of their ages six years hence?

Pa Pr Fut

$11:15 \xleftarrow[-4]{} 13:17 \xrightarrow[+6]{}$

$13x : 17x$

$13x - 4 : 17x - 4 = 11:15$

$\frac{13x-4}{17x-4} = \frac{11}{15}$

$195x - 60 = 187x - 44$

$8x = 16$

$\boxed{x = 2}$

$\Rightarrow 13(2) : 17(2)$

26 : 34

$\downarrow +6$

32 : 40

$\boxed{4:5}$ //

5. 4 yr ago, the ratio of the ages of A and B was 2:3 and after 4 yr, it will become 5:7. Find their present ages.

Past $\xleftarrow{-4}$ Pre $\xrightarrow{+4}$ Fut

2 : 3 — : — 5 : 7

$2x : 3x$ $2x+4 : 3x+4$

$2x+8 : 3x+8 = 5 : 7$

$$\frac{2x+8}{3x+8} = \frac{5}{7}$$

$14x + 56 = 15x + 40$

$\boxed{x = 16}$

$\Rightarrow 2x+4$

$= 2(16)+4$

$= \boxed{36}$

$\Rightarrow 3x+4$

$= \boxed{52}$

6. Harsha is 40 yr old and Rith is 60 yr old. How many years ago was the ratio of their ages 3:5?

3:5 $\leftarrow$ H : R

40 : 60

$$\frac{40-x}{60-x} = \frac{3}{5}$$

$200 - 5x = 180 - 3x$

$20 = 2x$

$\boxed{x = 10}$

7. The ratio of the ages of two persons is 4:7 and age of one of them is greater than that of the other by 20 yr. The sum of their ages (in years) is

A : B

4 : 7

$4x : 7x$

$\Rightarrow 4(10) : 7(10)$

$\Rightarrow 40 + 70 = \boxed{110}$

$4x - 7x = 30$

$3x = 30$

$x = 10$

8. The respective ratio between the present ages of Parag and Sapna is 21:19. Six years ago, the respective ratio between their ages was 9:8. How old is Lina, if her present age is 12 yr less than Sapna's present age?

$9:8 \xleftarrow{-6}$ Pr

P : S

21 : 19

$21x : 19x$

$21x - 6 : 19x - 6 :: 9 : 8$

$\frac{21x-6}{19x-6} = \frac{9}{8}$

$168x - 48 = 171x - 54$

$3x = 6$

$\boxed{x = 2}$

Sapna :

$\Rightarrow 19x$

$= \boxed{38}$ $\Big\} -12$

Lina

$= \boxed{26}$ //

Lesson #2 Twice / Thrice the Age

Note:

Son	Father
(x)	$(3x)$

① Father age is three times the age of his son.

Son	Father
(x)	$x + 3x$
	$\Rightarrow 4x$

② Father aged three times more than his son (+1)

1. I am three times as old as my son. 15 yr hence, I will be twice as old as my son. The sum of our age is

Son	Father
x	$3x$
$x + 15$	$3x + 15$

$3x + 15 = 2(x + 15)$

$3x + 15 = 2x + 30$

$\Rightarrow 3x - 2x = 30 - 15$

$\Rightarrow x = 15$

Son = 15

Father = 3(15)

$\Rightarrow \boxed{x = 15}$

$\boxed{60 \text{ yr}}$ //

2. The sum of present ages of A and B is 11 times of the difference of their ages. 5 years hence, their total ages will be 13 times the difference of their ages. What is the present age of elder one?

A B

$A+B = 11(A-B)$

$A+B = 11A - 11B$

$10A = 12B$

$\frac{A}{B} = \frac{6}{5}$ $\quad A:B = 6:5$

$\Rightarrow 6x+5+5x+5 = 13(6x-5x)$

$\Rightarrow 11x+10 = 13x$

$2x = 10$

$\boxed{x=5}$

$6x \Rightarrow 6(5) = \boxed{30yr}$

3. The Present age of a father is 3 yr more than three times the age of his son. 3 yr hence, father's age will be 10 yr more than twice the age of the son. The father's present age is

	Son	Father
Present	x	$3+3x$
Future	$x+3$	$3x+6$

$3x+6 = 10+2(x+3)$

$3x+6 = 10+2x+6$

$\boxed{x=10}$

Father

$\Rightarrow 3+3x$

$\Rightarrow 3+3(10)$

$\Rightarrow \boxed{33\ yr}$

4. 10 years ago daughter's age was two-fifth of her mother's age that time. While 10 years hence her age will be three fifth of her mother's age then. Find the difference in the ages of the two

	Daugh	Mother	
	x	y	$\Rightarrow x(26) \sim y(50)$
Past	$x-10$	$y-10$	$\Rightarrow$ 24

$(x-10) = \frac{2}{5}(y-10)$ — ①

$(x+10) = \frac{3}{5}(y+10)$ — ②

① → $5x - 50 = 2y - 20$

$5x - 2y = 30$ — ③

② → $5x + 50 = 3y + 30$

$5x - 3y = -20$ — ④

③ $5x - 2y = 30$

④ $-5x + 3y = -20$

$y = 50$

$5x - 100 = 30$

$5x = 130$

$x = 26$

5. Father is aged three times more than his son Arun. After 8 years, he would be two and a half times of Arun's age. After further 8 years, how many times would he be of Arun's age?

	Son	Father
Present	(x)	$x + 3x \Rightarrow 4x$
8 ↓	$x+8$	$4x+8$
8 ↓		

$4x + 8 = 2\frac{1}{2}(x+8)$

$4x + 8 = \frac{5}{2}(x+8)$

$8x + 16 = 5x + 40$

$3x = 40 - 16$

$x = 8$

Son	Father
24 ×2 →	48

2 time

6. If the ages of A and C are added to twice the age of B, the total becomes 59. If the ages of B and C are added to thrice the age of A, the total becomes 68 and if the age of A is added to thrice the age of B and thrice and age of C, the total becomes 108. What is the age of A?

$A + C + 2B = 59$ — (1)

$B + C + 3A = 68$ — (2)

$A + 3B + 3C = 108$ — (3)

(2)×3 $\Rightarrow$ $9A + 3B + 3C = 204$

(3) $\Rightarrow$ $-A - 3B - 3C = -108$

$8A = 96$

$\boxed{A = 12}$ //

7. The sum of the ages of father and son is 45 yrs. Five years ago the product of their ages was 4 times the father's age at that time the present ages of father & son are?

Present $F + S = 45$ yr

$F - 5 + S - 5 = 45$

Past $F + S = 35$

$F \times S = 4F$

$\boxed{S = 4}$ $\boxed{F = 31}$

$+5$ $+5$

9 // 36 //

8. In a family, a couple has a son and daughter. The age of the father is four times that of his daughter and the age of the son is half of his mother. The wife is ten years younger to her husband and the brother is six years older than his sister. what is the age of the mother?

Father	Mother	son	Daughter
$4x$	$4x-10$	$x+6$	x

$x + 6 = \frac{1}{2}(4x - 10)$

$2x + 12 = 4x - 10$

$2x = 22$

$\boxed{x = 11}$

Mother

$\Rightarrow 4(11) - 10$

$\Rightarrow 44 - 10 = \boxed{34}$ //

Lesson #5 Average Age

Note:

① Average Age of Father and Mother is 34. $\frac{F+M}{2} = 34$

$\boxed{F+M = 68}$

② Average Age of Father, Mother and son is 52.

$\frac{F+M+S}{3} = 52$

$\boxed{F+M+S = 156}$

1. In a family, the average age of father and mother is 35 yr. The average age of the father, mother and their only son is 27 yr. what is the age of the son?

$\frac{F+M}{2} = 35$

$\boxed{F+M = 70}$

$\frac{F+M+S}{3} = 27$

$\boxed{F+M+S = 81}$

$\Downarrow$

$70 + S = 81$

$\boxed{S = 11}$ //

2. 5 yr ago, the average age of A, B, C, and D was 45 yr. with E joining them now, the average age of all the five is 49 yr. How old is E?

Past ← -5 — Present

$\frac{A+B+C+D}{4} = 45$

$A+B+C+D = 180$

$+5 \; +5 \; +5 \; +5 = 20$

200

$\frac{A+B+C+D+E}{5} = 49$

200

$(A+B+C+D) + E = 245$

$200 + E = 245$

$\boxed{E = 45 \text{ yr}}$ //

3. The Average age of a husband and wife, who were married 4yr ago, was 25 yr at the time of their marriage. The average age of the family consisting of husband, wife and child, born during the interval is 20 yr today. The age of the child is.

Past ← -4 Present

$\frac{H+W}{2} = 25$

$H+W = 50$ (Past) +8

$\frac{H+W+C}{3} = 20$

$H+W+C = 60$ Present

$H+W = 58$ Present

$58+C = 60$

$C = 2\text{ yr}$ //.

4. Average age of 6 sons of a family is 8yr. Average age of son together with their parents is 22yr. If the father is older than the mother by 8yr, then the age of mother (in years) is.

Mother = x yr Father = $(x+8)$ yr

$\frac{6\text{ son}}{6} = 8\text{ yr}$

6 son (Ago) = 48 —①

$\frac{6\text{ son} + M + F}{8} = 22$

6 son + M + F = 176

$48 + M + F = 176$

$M + F = 128$

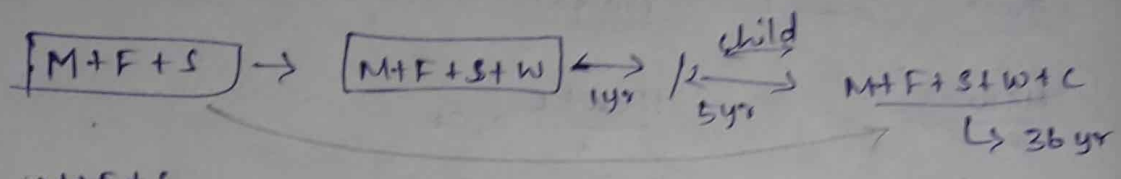
$x + x + 8 = 128$

$2x + 8 = 128$

$2x = 120$

$x = 60$

5. When the average age of husband and wife and their son was 42 yr, the son got married and child was born just one year after the marriage. When child turned to be 5 yr, then the average age of family became 36 yr. What was the age of daughter-in-law at the time of marriage?



$$\frac{M+F+S}{3} = 42$$

$$M+F+S = 126$$

$$\frac{(M+6)+(F+6)+(S+6)+(W+6)+5}{5} = 36$$

$$M+F+S+W = 180-29$$

$$126+W = 180+29$$

$$W = 180-29-126$$

$$W = 180-155$$

$$W = 25 \text{ yr}$$