Ans 1 Let there be M men and W women and C be the children.

Ratio of total amount given to all men, all women, all children is 5:4:3

Let x be the common multiple.

Total amounts are 5x, 4x, 3x.

∴ The amount obtained by each man = $\frac{5x}{M}$

∴ The amount obtained by each woman = $\frac{4x}{W}$

∴ The amount obtained by each children = $\frac{3x}{C}$

$\therefore \frac{5x}{M} = \frac{4x}{W} = \frac{3X}{C} = 3:2:1$

$\therefore \frac{5x/M}{4X/W} = \frac{3}{2}$

$\therefore \frac{4x/W}{3X/C} = \frac{2}{1}$

$\therefore \frac{5x/M}{3X/C} = \frac{3}{1}$

$\therefore \frac{5W}{4M} = \frac{3}{2}$

$\therefore \frac{4C}{3W} = \frac{2}{1}$

$\therefore \frac{5C}{3M} = \frac{3}{1}$

∴ 10W= 12M, 4C =6W, 5C =9M

∴ 5W = 6M, 2C = 3W, 5C = 9 M

LCM of 6 & 9 is 18

∴ 15W = 18M, 18M = 10 C

∴ w = $\frac{6}{5}$ M, $\frac{9}{5}$ M = C

But M+W+C = 60

∴ M + $\frac{6}{5}$ M+ $\frac{9}{5}$ M = 60

$\frac{20}{5}$ M = 60

M = 15

There are 15 men.

Ans 2 In Δ ABC.

A+b : b+c : c+a = 7:8:9

Let the common multiple be x

∴ a+b = 7x

b+c = 8x

c+a = 9x

∴ 2(a+b+c) = 24x

∴ a+b+c = 12x

∴ 7x + c =12x

∴ c = 5x

Similarly, a = 4x, b = 3x

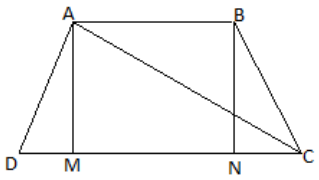
∴ $a^2 + b^2 = 16x^2 + 9\ x^2$

$= 25\ x^2$

$= c^2$

By Pythagoras theorem Δ ABC is the right angled triangle.

Ans 3



In fig. DC = a, AB = b

Diagonal AC = d = a

Height = h = b

In Δ ADM ,

Let DM = CN =x

∴ a = (b + 2x)

In Δ AMC

$AC^2 = AM^2 + MC^2$

$d^2 = h^2 + (b+x)^2$

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

$(b+2x)^2 = b^2 + b^2 + 2bx + x^2$

$b^2 + 4bx + 4x^2 = 2b^2 + 2bx + x^2$

$3x^2 + 2bx - b^2 = 0$

$3x(x+b) - b(x+b) = 0$

$(x+b)(3x-b) = 0$

$X = -b, 3x = b$

X= -b is impossible

3x = b

DC = x + 3x + x

= 5x

AB = b = 3x

Ratio $\frac{AB}{CD} = \frac{3}{5}$

i.e. 3:5

Ans 4 Let a be the first term and d be the common difference of first AP

Let a' be the first term and d' be the common difference of second AP

Given, $\frac{Sn}{S'n} = \frac{3n+31}{5n-3}$

$\frac{\frac{n}{2}[2a+(n-1)d}{\frac{n}{2}[2a'+(n-1)d'} = \frac{3n+31}{5n-3}$

$\frac{[2a+(n-1)d}{[2a'+(n-1)d'} = \frac{3n+31}{5n-3}$ ..... (1)

To find $\frac{a+9d}{a'+9d'}$ take n=19 in eq.(1)

LHS = $\frac{2a+18d}{2a'+18d'}$ RHS = $\frac{3x19+31}{5x19-3}$

$= \frac{a+9d}{a'+9d'}$ $= \frac{57+31}{95-3}$

$= \frac{88}{92}$

$= \frac{22}{23}$

Ratio is 22:23

Ans 5 Let x be the capacity of vessel

27 lit water is removed and 27 lit milk is added.

Remaining water (x- 27)

Again 27 lit mixture is removed

Water in 27 lit mixture is,($\frac{x-27}{x}$)27 = $\frac{27x-729}{x}$

Remaining water = $(x - 27) - \frac{x-729}{x}$

$= \frac{x(x-27)-27(x-27)}{x}$

$= \frac{1}{x}(x^2 - 54x + 729)$

$= \frac{1}{x}(x-27)^2$

Milk in the mixture of 27 lit is $\frac{27}{x} \times \frac{27}{1}$

Remaining milk = $\frac{27}{1} - \frac{729}{x}$

$$= \frac{27(x-27)}{x}$$

Again 27 lit milk is added

Quantity of milk = $\frac{27(x-27)}{x} + \frac{27}{1}$

$$= \frac{27x-729+27x}{x}$$

$$= \frac{54x-729}{x}$$

Ratio of milk to water is,

$\frac{54x-729}{x} / \frac{1}{x}$ (x-27)^2 =$\frac{9}{16}$

$$\frac{27(2x-27)}{(x-27)(x-27)} = \frac{9}{16}$$

$$\frac{3(2x-27)}{(x-27)(x-27)} = \frac{1}{16}$$

(6x-81)x16 = (x-27)^2

96x – 1296 = x^2 – 54x + 729

x^2 – 150x + 2025 = 0

(x-135)(x-15) = 0

X= 135 or x=15

x should be greater than 27

x=135Lit.

Ans 6 Given ratio is,

$1\frac{1}{4} : 1\frac{1}{3} : \frac{7}{8}$

i.e $\frac{5}{4} : \frac{4}{3} : \frac{7}{8}$

LCM of 4,3and 8 is 24

i.e. 30 : 32:21

Sum is 83

Share of first child = $\frac{30}{83}$ x 2324 = 840

Share of second child = $\frac{22}{83}$ x 2324 = 896

Share of first child = $\frac{21}{83}$ x 2324 = 588

Ans 7 Let the first and the third part be 3x and 5x

From the condition, Second part = $\frac{1}{4}$ of the third part

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

$3x + \frac{5x}{4} + 5x = 370$

$\frac{72x+5x+20x}{4} = 370$

$\frac{37x}{4} = 370$

X = 40

First part is 120.

Second part is 50.

Third part is 200.

Ans 8 We note that 8 x 30 = 240 and 12 x 20 = 240

Thus 8 x 30 = 12 x 20

$\frac{8}{12} = \frac{20}{30}$

8:12 = 20:30

Also $\frac{8}{20} = \frac{12}{30}$

8:20 = 12:30

By invertendo and alternendo,

$\frac{12}{30} = \frac{8}{20}$

12:30 = 8:20

Thus proportions are,

8:12=20:30, 8:20=12:30, 12:8=30:20, 12:30=8:20

Ans 9 Let the two numbers be x and y

Given, (x+y):(x-y):(xy) = 5:1:36

$\frac{x+y}{x-y} = \frac{5}{1}$ and $\frac{x-y}{xy} = \frac{1}{36}$

By componendo dividend

$\frac{2x}{2y} = \frac{6}{4}$

$\frac{x}{y} = \frac{3}{2}$

$\frac{\frac{3}{2}y-y}{\frac{3}{2}y.y} = \frac{1}{36}$

$\frac{\frac{1}{2}y}{\frac{3}{2}y.y} = \frac{1}{36}$

$\frac{1}{3y} = \frac{1}{36}$

y = 36

x = $\frac{3}{2}$ $x12$

x = 18

Therefore numbers are 18 and 12

Ans 10 Given, $\frac{a}{b} = \frac{7}{8}$

Let a = 7k and b = 8k

$\frac{\sqrt{ab}}{a+b} = \frac{\sqrt{56k^2}}{7k+8k}$

$= \frac{\sqrt{56}k}{15k}$

Therefore the ratio is $\sqrt{56} : 15$