

1) Two vessels contain milk & water in the ratio 7:5 and 7:9. If both vessels are mixed in ratio 1:1, find the ratio of milk and water in the new mixture?

A) 49:47 B) 5:4 C) 47:49 D) 41:43

M : W

$$\begin{array}{r} 7 : 5 \\ 28 : 20 \\ \hline 12 \times 4 \end{array}$$

$$\begin{array}{ccc} M & : & W \\ 28 + 21 & & 20 + 27 \\ \hline 49 & : & 47 \end{array}$$

M : W

$$\begin{array}{r} 7 : 9 \\ 21 : 27 \\ \hline 16 \times 3 \end{array}$$

2) Three vessels each of 10 litre capacity contain of milk & water in the ratio 2:1, 3:1 and 3:2. if all the three vessels are emptied into a large vessel, find the ratio of milk & water in new mixture?

A) 59:73 B) 59:121 C) 131:121 D) 121:59

M : W

$$\begin{array}{r} 2 : 1 \\ 40 : 20 \\ \hline 3 \times 20 \end{array}$$

M : W

$$\begin{array}{r} 3 : 1 \\ 45 : 15 \\ \hline 4 \times 15 \end{array}$$

M : W

$$\begin{array}{r} 3 : 2 \\ 36 : 24 \\ \hline 5 \times 12 \end{array}$$

$$\begin{array}{ccc} M & : & W \\ 40 + 45 + 36 & & 20 + 15 + 24 \\ \hline 121 & : & 59 \end{array}$$

3) Two vessel A & B contain a mixture of milk & water in the ratio 4:5 and 5:1. If both vessel are mixed in the ratio 5:2. find the ratio of milk & water in new mixture.

A) 3:2 B) 5:4 C) 7:5 D) 8:5

$$\begin{array}{rcl}
 m:w & & m:w \\
 4:5 & & 5:1 \\
 8:10 & & 15:3 \\
 9 \times 2 & & 6 \times 3 \\
 8:10 & & 15:3 \\
 \hline m & : & w \\
 40+30 & & 50+6 \\
 70 & : & 56 \\
 5 & : & 4
 \end{array}$$

4) 60 kg of an alloy A is mixed with 100 kg of alloy B. If alloy A has lead and tin in the ratio 3:2 and alloy B has tin and copper in the ratio 1:4, the amount of tin in the new alloy is ?

(a) 53 kg. (b) 44 kg. (c) 80 kg. (d) 24 kg

$$\begin{array}{rcl}
 A & & B \\
 60 & & 100 \\
 Pb:Sn & & Sn:Cu \\
 3:2 & & 1:4 \\
 122 & & 20 \\
 60 \times \frac{2}{5} & & 100 \times \frac{1}{5} \\
 24 & & 20 \\
 24+20 & = & 44 \text{ kg}
 \end{array}$$

5) A and B are two alloy of tin and copper prepared by mixing metals in proportions 13:11 and 5:7 respectively. If equal quantities of two alloys melted to form a 3rd alloy C, the proportion of tin and copper in C will be?

- (a) 23:25. (b) 22:23. (c) 18:17. (d) 22:27

A	:	B	
Tin : copper		Tin : copper	
<u>13 : 11</u>		<u>5 : 7</u>	
<u>24</u>		<u>10 : 14</u>	
		<u>12 : 14</u>	
		<u>23 : 28</u>	

13 + 10 : 11 + 14
23 : 25

6) The ratios of copper to zinc in alloys A and B are 3: 4 and 5: 9, respectively. A and B are taken in the ratio 2: 3 and melted to form a new alloy C. What is the ratio of copper to zinc in C?

- (a) 27:43. (b) 8:13. (c) 3:5. (d) 9:11

Cu Zn

3 : 4

6 : 8
7 x 2

6 : 8

Cu : Zn

5 : 9

14

Cu : Zn

12 + 15 : 16 + 27

27 : 43

(7) x 2

Cu : Zn

3 : 4

2 x 2

12 : 16

Cu : Zn

12 + 15 : 16 + 27

27 : 43

7) Alloy A contains copper and zinc in the ratio of 5:2 and alloy B contains copper and zinc in the ratio of 1:3. A and B are taken in the ratio of 9:8 and melted to form a new alloy. The percentage of zinc in the new alloy is closest to:

- (a) 46.9% (b) 53.86% (c) 48.73% (d) 50.42%

$$\begin{array}{l} 7 \\ \text{Cu : Zn} \\ 5 : 2 \\ 4 \times 9 \\ 36 \\ 180 : 72 \\ \hline \end{array}$$

$$\begin{array}{l} 4 \\ \text{Cu : Zn} \\ 1 : 3 \\ 7 \times 8 \\ 56 \\ 56 : 198 \\ \hline \end{array}$$

$$\begin{array}{l} \text{Cu : Zn} \\ 180 + 56 : 72 + 198 \\ 236 : 270 \\ \hline \text{Zn\%} : \frac{270}{506} \checkmark \end{array}$$

8) Two vessels contain mixture of milk and water. In 1st mixture milk is 31.25% less than water and in 2nd mixture the difference between quantity of milk and water is 11.11% of total mixture. If 10.5 liter of 1st mixture and 17.5 liter of 2nd mixture is mixed then find the ratio of milk and water in the new mixture.

- (a) 1:2. (b) 2:1. (c) 1:1 (d) 3:1

$$\begin{array}{l} \text{M : W} \\ 11 : 16 \\ 1 \times 3 \\ 33 \\ \hline 11 : 16 \\ \hline \end{array}$$

$$\begin{array}{l} \text{M : W} \\ 5 : 4 \\ 3 \times 5 \\ 9 \times 3 \\ \hline 25 : 20 \\ \hline \end{array}$$

$$36 : 36$$

$$\begin{array}{l} 31.25\% = \frac{1}{16} \\ \times 5 \\ 31.25\% = \frac{5}{16} \\ 11.11\% = \frac{1}{9} \\ \frac{1}{9} \Rightarrow \text{Total} \\ 5:4 \\ 10.5 : 17.5 \\ 21 : 35 \\ 3 : 5 \\ \hline \end{array}$$

9) Two vessels contain milk water in the ratio 5:9 and 7:11. If both vessels are mixed in ratio 4:3. Find the ratio of milk and water in new mixture?

- (a) 141:131. (b) 107:89. (c) 109:185. (d) 114:175

$$\begin{aligned}
 14 &= 2 \times 7 \\
 m : w \\
 5 : 9 \\
 9 \times 4 \\
 12 \\
 60 : 108
 \end{aligned}$$

$$\begin{aligned}
 18 &= 2 \times 9 \\
 m : w \\
 7 : 11 \\
 7 \times 8 \\
 7 \\
 49 : 77
 \end{aligned}$$

$$\begin{aligned}
 m : w \\
 60 + 49 : 108 + 77 \\
 109 :
 \end{aligned}$$

10) Three glasses of equal volume contain acid mixed with water. The ratios of acid and water are 2:3, 3:4 and 4:5 respectively. Contents of these glasses are poured in a large vessel. The ratio of acid and water in the large vessel is:

- (a) 411:540. (b) 401:544. (c) 417:564 (d) 407:560

$$\begin{aligned}
 &A : W \\
 &2 : 3 \\
 &5 \times 7 \times 9 \\
 &63 \\
 &126 : 189 \\
 &A : W \\
 &3 : 4 \\
 &7 \times 5 \times 9 \\
 &45 \\
 &135 : 180 \\
 &A : W \\
 &4 : 5 \\
 &9 \times 1 \times 7 \\
 &35 \\
 &140 : 175 \\
 &A : W \\
 &126 + 135 + 140 : 189 + 180 + 175 \\
 &401 : 544
 \end{aligned}$$

11) Three bottles of equal capacity have mixture of milk and water in ratio 5:7, 7:9 and 2:1 respectively. These three bottles are emptied into a large bottle. What is the percentage of milk in the new mixture?

- (a) 49.6% (b) 52.3% (c) 51.2% (d) 50.7%

$$\begin{array}{ccc}
 \text{m:w} & \text{m:w} & \text{m:w} \\
 5:7 & 7:9 & 2:1 \\
 12 \times 4 & 16 \times 3 & 3 \times 12 \\
 20:28 & 21:27 & 24:12 \\
 \text{m:w} & & \\
 20+21+24 : 28+27+12 \\
 65 : 67
 \end{array}$$

$$\begin{array}{r}
 132 \\
 65 \overline{) 132} \\
 \underline{132} \\
 0
 \end{array}$$

12) Three containers A, B and C are having mixture of milk and water in the ratio 1:3, 2:3 and 2:5 respectively. If the capacities of the containers are in the ratio 2:3:5, find the ratio of milk to water, if the mixture of all 3 containers are mixed together.

- (a) 143:296 (b) 438:962 (c) 348:962 (d) 481:219

$$\begin{array}{ccc}
 4 & 5 & 7 \\
 \text{m:w} & \text{m:w} & \text{m:w} \\
 1:3 & 2:3 & 2:5 \\
 5 \times 7 \times 2 & 4 \times 7 \times 3 & 4 \times 5 \times 5 \\
 35 & 42 & 50 \\
 \text{m:w} & & \\
 35:105 & 84:126 & 100:250 \\
 \text{m} & & \text{w} \\
 35 + 84 + 100 & & 105 + 126 + 250 \\
 229 & & 481
 \end{array}$$

13) There are 3 mixture contain milk and water. In 1st mixture milk is 37.5% of mixture and in 2nd mixture milk is 28.56% less than water, in 3rd mixture the ratio of milk and water is 5:4. If 12.4 liter of 1st mixture, 15.5 liter of 2nd mixture and 9.3 liter of 3rd mixture are mixed together then find the ratio of milk and water in new mixture?

(a) 7:6

(b) 7:9

(c) 9:7

(d) 11:5

$$37.5\% = \frac{3}{8}$$

$$28.56\% = \frac{2}{7}$$

3x31

$$m:w \\ 3:5$$

$$m:w \\ 5:7$$

$$m:w \\ 5:4$$

$$\begin{array}{c} 8 \\ 3 \times 4^2 \\ 6 \\ 18:30 \end{array}$$

$$\begin{array}{c} 12 \\ 2 \times 5 \\ 5 \\ 25:35 \end{array}$$

$$\begin{array}{c} 9 \\ 4 \times 2 \\ 4 \\ 20:16 \end{array}$$

$$\frac{12.4}{4} : \frac{15.5}{5} : \frac{9.3}{3}$$

$$\begin{array}{c} m \\ 18 + 25 + 20 \\ 63 \end{array} : \begin{array}{c} w \\ 30 + 35 + 16 \\ 81 \end{array}$$

most imp

14) Three vessels whose capacity are in 3:2:1 are completely filled with milk and water. Ratio of milk and water in mixture are 5:2, 4:1, and 4:1 respectively. Taking 1/3 first and mixture 1/2 of second and 1/7 of third, a new mixture obtained. Find % of water in new

(a) 28. %

(b) 30. %

(c) 32 %

(d) 24%

$$m:w \\ 5:2$$

$$m:w \\ 4:1$$

$$m:w \\ 4:1$$

$$7 \times 5 \\ 25:10$$

$$5 \times 2 \\ 28:7$$

$$5 \times 7 \\ 28:7$$

$$\begin{array}{c} m \\ 25 \times \frac{1}{3} + 28 \times \frac{1}{2} + 28 \times \frac{1}{7} \\ 25 + 28 + 4 \\ 57 \end{array} : \begin{array}{c} w \\ 10 \times \frac{1}{3} + 7 \times \frac{1}{2} + 7 \times \frac{1}{7} \\ 10 + 7 + 1 \\ 18 \end{array}$$

$$m:w \\ 57:18$$

$$\frac{18}{75} \times 100 = 24\%$$

Proposition

$$a:b::c:d$$

(5) 4th proportion

$$a:b::c:x$$

(*) 3rd proportion

$$a:b::b:x$$

$$ax = b^2$$

$$x = \frac{b^2}{a}$$

(*) Mean proportion

$$a:x::x:b$$

$$x^2 = ab$$

$$x = \sqrt{ab}$$

$$a:x::x:b$$

$$x^2 = ab$$

$$x = \sqrt{ab}$$

$$a:b::c:d$$

$$\frac{a}{b} = \frac{c}{d}$$

$$ad = bc$$

$$\frac{a}{b} = \frac{c}{x}$$

$$ax = \frac{bc}{1}$$

$$a:b::b:x$$

$$ax = b^2$$

$$x = \frac{b^2}{a}$$

$$3:7 \quad \frac{7^2}{3} = \frac{49}{3}$$

$$3:2$$

$$\frac{4}{3}$$

15) The third proportional of 12 and 18 is ?

- (a) 3. (b) 6. (c) 27 (d) 144

$$\frac{b^2}{a} = \frac{18^2}{12}$$

$$= \frac{9 \times 18 \times 18}{12}$$

$$= 27$$

16) What is the fourth proportional to 189, 273 and 153?

- (a) 117. (b) 299. (c) 221. (d) 187

$$189 : 273 :: 153 : x$$

$$x = \frac{273 \times 153}{189}$$

$$\frac{9}{9} \quad \text{①}$$

$$985 \approx \sqrt{a \times b}$$

$$\frac{52}{9}$$

17) What is the ratio of the mean proportional between 4.8 and 10.8 and the third proportional to 0.4 and 2.4?

- (a) 2:3. (b) 1:2. (c) 3:2. (d) 2:1

$$\sqrt{4.8 \times 10.8}$$

$$\sqrt{\frac{16 \times 3}{10} \times \frac{3 \times 36}{10}}$$

$$\frac{4 \times 3 \times 6}{10} = 7.2$$

$$\frac{(2.4)^2}{0.4}$$

$$\frac{2.4 \times 6}{2.4 \times 2.4}$$

$$0.4$$

$$7.2 : 2.4 \times 0.2$$

$$1:2$$

18) What is the ratio of the third proportional to 0.4 and 0.8, to the mean proportional between 13.5 and 0.24

- (a) 9:10. (b) 8:9. (c) 5:4. (d) 7:8

$$\frac{(0.8)^2}{0.4} = \frac{0.8 \times 0.8}{0.4}$$

$$= 1.6$$

$$\frac{8}{1.6} : \frac{9}{1.8}$$

$$\sqrt{13.5 \times 0.24}$$

$$\sqrt{\frac{135 \times 24}{100 \times 100}}$$

$$= \sqrt{\frac{9 \times 7 \times 3 \times 4}{100}}$$

$$\frac{3 \times 3 \times 2}{10} = 1.8$$

19) What number should be added to each of the number 103, 135, 110 and 144 so that the resulting numbers are in proportion?

- (a) 12. (b) 15. (c) 9 (d) 6

$$\frac{103+x}{135+x} = \frac{110+x}{144+x}$$

134 135 144

$$\frac{103+x}{32} = \frac{110+x}{17}$$

$$1751 + 17x = 1760 + 16x$$

$$x = 1760 - 1751 = 9$$

$$\frac{103+9}{144} = \frac{112}{144}$$

$$\frac{110+9}{144+9} = \frac{119}{153}$$

20) What is the ratio between the fourth proportional of 3, 4, 9 and the mean proportional between 2 and 98?

- (a) 7:8. (b) 7:6. (c) 8:7. (d) 6:7

$$3:4::9:x$$

$$x = \frac{4 \times 9}{3}$$

$$x = 12$$

$$\sqrt{2 \times 98}$$

$$= \sqrt{2 \times 2 \times 49}$$

$$= 2 \times 7$$

$$\frac{12}{6} : \frac{14}{7}$$