



Name of the Bundle	ADVANCED BUNDLE V2	Subject	APTITUDE
Topic	RATIO AND PROPORTION	Last updated on	22 January 2024

CONCEPT 1 – JOIN RATIO TOGETHER

1) If a:b is 3:5 and b:c is 2:3, then the proportion of a:b:c is ?

- a) 3:10:15.
- b) 6:10:3.
- c) 3:10:5.
- d) 6:10:15.

ANS: d) 6:10:15.

Explanation:

- For this type of direct question, it is better to go through the options.

1. a:b is 3:5, therefore opt (b), opt(d) becomes correct.
2. b:c is 2:3, therefore opt(d) becomes correct.

2) Of the three numbers, the ratio of the first and the second is 2:3 and that of the second and third is 4:5 . If the sum of all the three numbers is 140, then what is the second number?

- a) 60.
- b) 48.
- c) 96.
- d) 32.

ANS: b) 48.



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Explanation: In this question we need to know the ratio of three numbers.

A	B	C
2	3	3
4	4	5
8	12	15

Therefore, A:B:C = 8:12:15.

Second number should be a multiple of 12 – opt (a),(b),(c)

$$8x+12x+15x = 140 ; x = 4.$$

$$\text{Second number, } 12x = 48$$

3) If a:b is 2:5, b:c is 4:7 and c:d is 9:14, then the proportion of a:b:c:d is?

- a) 72:180:315:490.
- b) 72:180:114:390.
- c) 62:180:315:490.
- d) 72:160:144:390.

ANS:a) 72:180:315:490.

Explanation:

- For this type of direct question, it is better to go through the options.
 1. a:b is 3:5, therefore opt (a), opt(b) becomes correct.
 2. b:c is 2:3, therefore opt(a) becomes correct.



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4) The first number is one-third of the second number. The second number is 1.5 times of the third number. The third number is three times the fourth number. If the average of the four numbers is 10, find the largest of the number.

- a) 12.
- b) 18.
- c) 15.
- d) 16.

ANS:b) 18.

Explanation:

A	B	C	D
1	3	3	3
3	3	2	2
3	3	3	1
3	9	6	2

Therefore, A:B:C:D = 3:9:6:2, Average = 10 means, Sum = $10 \times 4 = 40$.

$3x + 9x + 6x + 2x = 20x$ is 40.

Largest Number = $9x = 18$.



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CONCEPT 2 – $Ax+By = Cx+Dy$

5) The cost of 8 pens and 14 pencils is equal to the cost of 12 pens and 5 pencils. What is the ratio of the cost of a pen to that of a pencil?

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

ANS: c) 9:4.

Explanation:

Let pen be x and pencil be y,

$$8x+14y = 12x+5y$$

$$9y = 4x$$

$$x:y = 9:4$$

6) Two numbers A and B, such that the sum of 10% of A and 8% of B is $\frac{3}{5}$ th of the sum of 12% of A and 16% of B, the ratio of A:B is ?

- a) 2:3.
b) 2:7.
c) 4:7.
d) 4:3.

ANS: c) 4:7.

Explanation:

$$5 (10\%A + 8\%B) = 3 (12\%A + 16\%B)$$

$$50\%A + 40\%B = 36\%A + 48\%B$$

$$14\% A = 8\%B$$

$$A:B = 4:7$$



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CONCEPT 3 – COMPONENDO AND DIVIDENDO

7) If $(6x+5y) : (6x-5y) = 11:5$ then what is the value of $x:y$?

- a) 20:9. b) 12:9. c) 11:8. d) 18:11.

ANS: a) 20:9.

Explanation:

By using componendo and dividendo rule,

$$\frac{6x+5y + 6x-5y}{6x+5y - 6x+5y} = \frac{11+5}{11-5} \quad \frac{12x}{10y} = \frac{16}{6}$$

$$x:y = 20:9$$

8) If $(a+3b) : (2a+4b) = 3:5$ then what is the value of $x:y$?

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

ANS: b) 1:2.

Explanation:

$$\frac{a+3b}{2a+4b} = \frac{3}{5}$$

$$5a+15b = 6a+12b$$

$$3b=a ; a:b = 3:1$$

By using componendo and dividendo rule,

$$\frac{a-b}{a+b} = \frac{2}{4} = \frac{1}{2}$$



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CONCEPT 4 – TYPES OF RATIO

1.COMPOUNDED RATIO:

- If a:b,c:d and e:f are three ratios then, their compound ratio will be $a \times c \times e : b \times d \times f$.

9) What is the Compound ratio of 1:2,2:5 and 4:3?

- a) 4:30.
- b) 8:30.
- c) 8:15.
- d) 4:15.

ANS: d) 4:15.

Explanation:

$$\text{Compound ratio} = (1 \times 2 \times 4) : (2 \times 5 \times 3) = 8:30 = 4:15.$$

2.DUPLICATE RATIO:

- If a:b is a ratio then, their duplicate ratio will be $a^2:b^2$.

10) What is the duplicate ratio of 4:3?

- a) 4:3.
- b) 16:3.
- c) 16:9.
- d) 64:27.

ANS: c) 16:9.

Explanation:

$$\text{Duplicate ratio} = 4^2 : 3^2 = 16 : 9.$$



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3. SUB-DUPLICATE RATIO:

- If $a:b$ is a ratio then, their sub-duplicate ratio will be $\sqrt{a}:\sqrt{b}$.

11) What is the sub-duplicate ratio of 144:121?

- a) 11:12.
- b) 12:11.
- c) 12:10.
- d) 14:11.

ANS: b) 12:11.

Explanation:

Sub-Duplicate ratio = $\sqrt{144} : \sqrt{121} = 12 : 11$.

4. TRIPLICATE RATIO:

- If $a:b$ is a ratio then, their Triplicate ratio will be $a^3:b^3$.

12) What is the Triplicate ratio of 8:5?

- a) 512:125.
- b) 512:115.
- c) 64:25.
- d) 64:125.

ANS: a) 512:125.

Explanation:

Triplicate ratio = $8^3 : 5^3 = 512 : 125$.



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5. SUB-TRIPLICATE RATIO:

- If $a:b$ is a ratio then, their sub-triplicate ratio will be $\sqrt[3]{a}:\sqrt[3]{b}$.

13) What is the sub-triplicate ratio of 729:1331?

- a) 7:13. b) 9:11. c) 9:12. d) 11:13.

ANS: b) 9:11.

Explanation: Sub-Triplicate ratio = $\sqrt[3]{729} : \sqrt[3]{1331} = 9 : 11$.

6. INVERSE RATIO

14) If $\frac{1}{x} : \frac{1}{y} : \frac{1}{z} = 2 : 3 : 5$, then $x : y : z = ?$

- a) 2:3:5
b) 5:3:2
c) 15:10:6
d) 15:10:9

ANS: c) 15:10:6

Explanation:

$X: Y: Z = (3 \times 5) : (2 \times 5) : (2 \times 3) = 15: 10: 6$.



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15) If $4P=6Q=9R$ then, find P: Q: R.

- a) 15:13:10.
- b) 9:6:4.
- c) 4:6:9.
- d) 16:36:81.

ANS: b) 9:6:4.

Explanation:

$$P: Q: R = \frac{1}{4} : \frac{1}{6} : \frac{1}{9} \quad \text{then, } P: Q: R = (6*9): (4*9): (4*6) = 54: 36: 24 = 9: 6: 4.$$

16) The speeds of three cars are in the ratio 5:4:6. The ratio between the time taken by them to travel the same distance is:

- a) 5:4:6
- b) 6:4:5
- c) 10:12:15
- d) 12:15:10

ANS: d)12:15:10.

Explanation:

$$SPEED = \frac{DISTANCE}{TIME}$$

Speed is inversely proportional to the time when the distance is constant.

$$\text{Therefore, } C_1 : C_2: C_3 = (4*6): (5*6): (5*4) = 24: 30: 20 = 12 : 15: 10.$$



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17) If $A : B = \frac{4}{5} : \frac{3}{5}$, $B : C = \frac{5}{6} : \frac{4}{6}$ and $C : D = \frac{6}{7} : \frac{5}{7}$ then the ratio of $A : B : C : D$ is

- a) 4:6:8:10
- b) 6:4:8:10
- c) 6:8:9:10
- d) 8:6:10:9

ANS: d) 8:6:10:9.

Explanation: First find $A : B$ ratio, $\frac{A}{B} = \frac{1}{2} * \frac{8}{3}$ then, $A : B = 4 : 3$.

Go through the options which have $A : B = 4 : 3$.

Opt (d) is the correct ANS.

CONCEPT 5 – TYPES OF PROPORTIONS

1. FOURTH PROPORTIONAL:

- If $a : b = c : d$, then
 1. a, d are Extremes and b,c are means.
 2. $a*d = b*c$.
 3. d is called the fourth proportional to a, b, c.

18) Find the fourth proportional (x) to 4,9,12 and x.

- a) 27.
- b) 50.
- c) 80.
- d) 65.

ANS: a) 27.

Explanation:

$$4 : 9 = 12 : x ;$$

$$x = (9*12) / 4 = 27.$$



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Alternative:

$$\text{If } \frac{4}{9} = \frac{12}{x} \text{ then,}$$

$\begin{array}{ccc} & * 3 & \\ \text{4} & \longrightarrow & 12 \\ \text{9} & \longrightarrow & 27 \\ & * 3 & \end{array}$

2. THIRD PROPORTIONAL:

- If $a : b = b : c$, then c is called the third proportional to a and b

19) The third proportional of 10 and 20 is

- 40.
- 200.
- 10.
- 20.

ANS: a) 40.

Explanation:

$$10 : 20 = 20 : x ;$$

$$x = (20 \times 20) / 10 = 40.$$

Alternative:

$$\text{If } \frac{10}{20} = \frac{20}{x} \text{ then,}$$

$\begin{array}{ccc} & * 2 & \\ 10 & \longrightarrow & 20 \\ 20 & \longrightarrow & 40 \\ & * 2 & \end{array}$



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3. MEAN PROPORTIONAL:

- Mean proportional between a and b is \sqrt{ab}

20) If 9, x, x, 49 are in proportion, then find the value of x

- a) 18.
- b) 21.
- c) 98.
- d) 58.

ANS: b) 21.

Explanation:

$$9 : x = x : 49 ;$$

$$x = \sqrt{9} * \sqrt{49} = 3 * 7 =$$

21.

21) Find the mean proportional to 81 and 25?

- a) 35.
- b) 55.
- c) 45.
- d) 65.

ANS: c) 45.

Explanation:

$$81 : x = x : 25 ;$$

$$x = \sqrt{81} * \sqrt{25} = 9 * 5$$

= 45.



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22) 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) 5:4.
- b) 7:8.
- c) 8:9.
- d) 9:10.

ANS: c) 8:9.

Explanation:

Third proportional (X) = $(0.8)^2 / 0.4 = 0.64 / 0.4 = 1.6$

Mean proportional (Y) = $\sqrt{13.5 * 0.24} = 1.8$

X:Y = 8 : 9.

CONCEPT 5 – ADDITION/SUBTRACTION ON GIVEN RATIO

23) The ratio of two numbers is 15:7. If each number decreases by 2, the two numbers are in the ratio 7:3.

- a) 15,7.
- b) 45,21.
- c) 60,28.
- d) 30,14.

ANS: d) 30,14.

Explanation:

$$\sim 8x \left(\frac{15x-2}{7x-2} = \frac{7}{3} \right) \sim 4$$

$8x = 4$; $x = 2$. Therefore, the two numbers = $15*2$, $7*2 = 30, 14$.



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24) Two numbers are in the ratio of 1 : 2. If 7 is added to both, their ratio changes to 3 : 5. The greater number is :

- a) 20. b) 24. c) 28. d) 32.

ANS: c) 28.

Explanation:

$$\sim x \left(\frac{x+7}{2x+7} = \frac{3}{5} \right) \sim 2$$

$$2(x + 7) = 3x ; x = 14$$

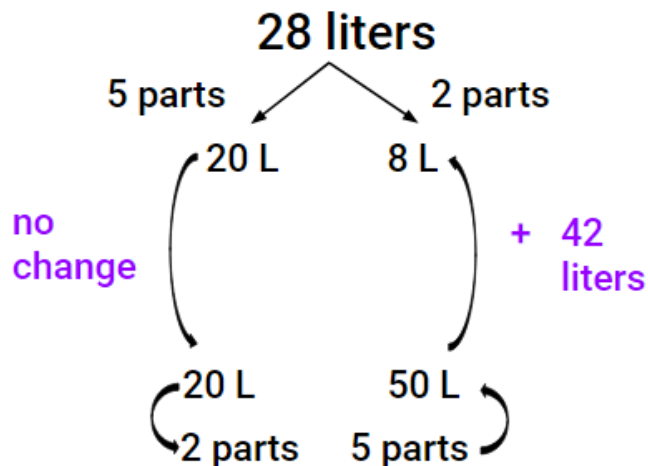
$$\text{Greater Number} = 2 * 14 = 28.$$

25) In a 28 litre mixture of milk and water, the ratio of milk and water is 5 : 2. How much water should be added in the mixture so that the ratio of milk to water becomes 2 : 5?

- a) 42 liters. b) 32 liters. c) 24 liters. d) 39 liters.

ANS: a) 42 liters.

Explanation:





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26) A mixture contains milk and water in the ratio 9 : 4. On adding 8 litres of water, the ratio becomes 3 : 2. Find the total quantity of the original mixture.

- a) 30 liters.
- b) 104 liters.
- c) 52 liters.
- d) 26 liters.

ANS: c) 52 liters.

Explanation:

Here, quantity of milk is unaltered therefore we need to make milk ratio same

MILK : WATER

$$\begin{array}{l} \text{no} \\ \text{change} \end{array} \left(\begin{array}{c} 9 : 4 \\ 3 \cdot 3 : 3 \cdot 2 \\ 9 : 6 \end{array} \right) \sim 2 \rightarrow +8 \\ \text{liters}$$

1 is 4 liters.

Then, total mixture contains = $(9+4) \cdot 4 = 52$ liters.



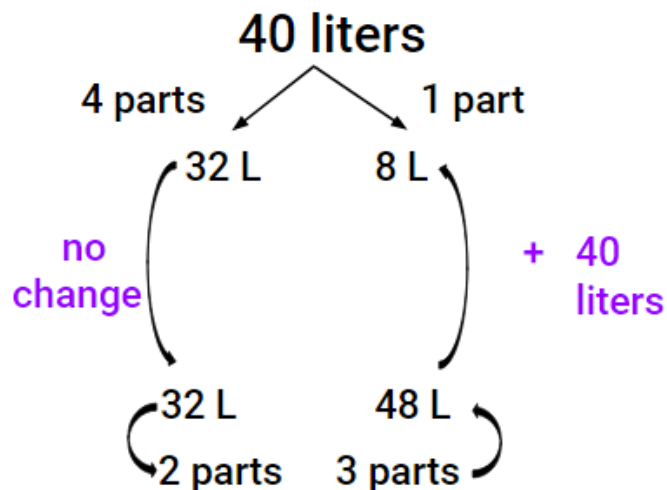
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27) In a mixture of 40 litres, the ratio of milk and water is 4 : 1. How much water must be added to this mixture so that the ratio of milk and water becomes 2 : 3.

- a) 40 liters.
- b) 32 liters.
- c) 20 liters.
- d) 30 liters.

ANS: a) 40 liters.

Explanation:





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28) The students in three batches at AMS Careers are in the ratio 2 : 3 : 5. If 20 students are increased in each batch, the ratio changes to 4 : 5 : 7. The total number of students in the three batches before the increase were:

- a) 10.
- b) 90.
- c) 100.
- d) 150.

ANS: c) 100.

Explanation:

Ratio of students in Batches

$$\begin{array}{ccc} \text{I} & \text{II} & \text{III} \\ 2 & : 3 & : 5 \\ \downarrow +2 & \downarrow +2 & \downarrow +2 \\ \text{New Ratio } 4 & : 5 & : 7 \end{array}$$

Here 2 Units = 20 then, students before the increase = $(2 + 3 + 5) \times 10 = 100$.



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CONCEPT 6 – COINS RELATED PROBLEMS.

29) A box contains 1 rupee, 50p, 25p coins in the ratio 1: 2: 3. The number of 50p Coins was 80. How much money was there in the box?

- a) Rs.108.
- b) Rs.110.
- c) Rs.105.
- d) Rs.100.

ANS: b) Rs.110.

Explanation:

$$\begin{array}{ccccccc} \text{No. of Coins} & = & 100\text{p} & : & 50\text{p} & : & 25\text{p} \\ & & 1 & : & 2 & : & 3 \\ & & \uparrow & & \downarrow & & \uparrow \\ & & 40 & & 80 & & 120 \end{array}$$

$$\begin{aligned} \text{AMOUNT in Rs.} &= (40) + (80/2) + (120/4) \\ &= 40 + 40 + 30 \\ &= \text{Rs. } 110. \end{aligned}$$



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30) In a wallet the ratio of 25 paise, 50 paise and Rs. 1 coins are in the ratio of 12 : 4 : 3, which amounts to Rs. 600. Find the no. of coins of 25 paise :

- a) 500 coins.
- b) 900 coins.
- c) 700 coins.
- d) 850 coins.

ANS: b) 900 coins.

Explanation:

$$25P : 50P : 1Rs.$$

$$12 : 4 : 3$$

Ratio of values in Rupees is $25P : 50P : 1Rs.$

$$3 : 2 : 3$$

$$8 \text{ units} = \text{Rs.}600$$

$$1 \text{ unit} = \text{Rs.}75$$

$$3 \text{ units} = \text{Rs.}225$$

$$\text{No. of 25p coins} = 4 * 225 = 900 \text{ coins.}$$



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CONCEPT 7 – AGE RELATED PROBLEMS.

31) The ratio of the age of person A and another person B is 1:3. If person A is 5 years younger than person B, then what are their ages?

- a) 2 and 7 years respectively.
- b) 7 and 2 years respectively.
- c) Two and a half and seven and a half years respectively.
- d) Seven and a half and two years respectively.

ANS: c) Two and a half and seven and a half years respectively.

Explanation:

$$\begin{array}{c} A : B \\ 1 : 3 \end{array}$$

$$\sim 2 \rightarrow 5 \text{ YEARS}$$

$$A - 1 - 2.5 \text{ YEARS}$$

$$B - 3 - 7.5 \text{ YEARS}$$



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32) Six years ago, the ratio of the ages of Khan and Ken was 6:5. Four years from today, the ratio of their ages will be 11:10. Then Ken must be _____ years old.

- a) 18 Years.
- b) 12 Years.
- c) 19 Years.
- d) 16 Years.

ANS: d) 16 Years.

Explanation:

$$\begin{array}{ccc} & \text{Khan : Ken} & \\ - 6 \text{ YEARS} & \left(\begin{array}{c} 6 : 5 \\ \\ 11 : 10 \end{array} \right) & \\ \sim 5 & & \sim 5 \\ +4 \text{ YEARS} & & \downarrow \\ & & 10 \text{ YEARS} \end{array}$$

1 – 2 Years

Then, Ken's age before 6 years was $5 \times 2 = 10$ years .

As of now(after 6 years), Ken's age is 16 years.



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33) Today the ratio of the ages of Don and Den is 4:3. Six years hence, Don's age will be 26 years. How old is Den today?

- a) 10 Years.
- b) 15 Years.
- c) 20 Years.
- d) 25 Years.

ANS: b) 15 Years.

Explanation:

- **NOTE: Hence means after. After 6 years, Don's age is 26 years.**
- **Then, Don's today's age will be = $26 - 6 = 20$ years.**

**If 4 – 20 years
3 – 15 years. (Den's age)**

Alternative:

We can check by options. Den's age should be a multiple of 3 therefore , option (b) will be the ANS.



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CONCEPT 8 – SALARY RELATED PROBLEMS.

34) The number of employees is reduced in the ratio 3: 2 and the salary of each employee is increased in the ratio 4: 5. By doing so, the company saves Rs. 12000. What was the initial expenditure on the salary?

- a) 72000.
- b) 50000.
- c) 60000.
- d) 62000.

ANS: a) 72000.

Explanation:

Initial: Final

The number of employees: 3 : 2

The salary of each employee: 4 : 5

Then the expenditure will be: $4*3 = 12$: $2*5 = 10$



Company saves 12000 = Initial expenditure - final expenditure = 2 units

1 unit = 6000

initial expenditure = 12 units = 72000.



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35) The ratio of income of two workers A and B are 3: 4. The ratio of expenditure of A and B is 2: 3 and each saves Rs 200. Find the income of A and B.

- a) 500,600.
- b) 600,800.
- c) 900,1200.
- d) 1200,1600.

ANS: b) 600,800.

Explanation: Income = Expenditure + Savings.

A : B

Income: 3 : 4

Expenditure: 2 : 3

Savings: 3-2 = 1 : 4-3 = 1

Savings = 1 unit = 200

Income = A = 3*200 = 600 ; B= 4*200 = 800.

36)The income is divided between four people P, Q, R and S in the ratio 6:10:16:18 respectively. The share of S is 3744 more than the share of P. Find the total income of Q & R together?

- a) 8112.
- b) 4165.
- c) 8056.
- d) 7065.

ANS: a) 8112.



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Explanation:

$$\begin{array}{l} P : Q : R : S \\ \text{Income:} \quad 6 : 10 : 16 : 18 \end{array}$$

$$P \sim S = 12 \text{ units} = 3744$$

$$Q + R = 26 \text{ units} = 8112.$$

37) The ratio of A's salary to B's was 4 : 5. A's salary is increased by 10% and B's by 20%, what is the ratio of their salaries now?

- a) 14 : 11.
- b) 15 : 14.
- c) 11 : 15.
- d) None of these.

ANS: c) 11 : 15 .

Explanation:

Present ratio = 4 : 5.

Increase of 10% and 20%.

New ratio of salaries will be $4 \times 1.1 : 5 \times 1.2 = 11 : 15.$



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CONCEPT 9 – NUMBER OF PERSONS RELATED PROBLEMS.

38) There are 45 people in an office. Out of which female employees are 25 and the remaining are male employees. Find the ratio of females to males.

- a) 5:4.
- b) 4:5.
- c) 2:5.
- d) 5:2.

ANS: b) 4:5.

Explanation:



Ratio of Female to Male = 4:5

39) Out of the total students in a class, if the number of boys is 65 and the number of girls is 52, then find the ratio between girls and boys.

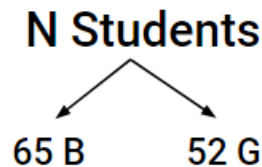
- a) 5:4.
- b) 4:5.
- c) 3:5.
- d) 4:3.

ANS: b) 4:5.



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Explanation:



Ratio of Girls to Boys = 4:5

40) The ratio of the first and second-class fares between the two stations is 6 : 4 and the number of passengers traveling by first and second-class is 1 : 30. If Rs. 2100 is collected as fare, what is the amount collected from first class passengers?

- a) 250.
- b) 200.
- c) 150.
- d) 100.

ANS: d) 100.

Explanation:

First class : Second class

Fare: 6 : 4

Number of Passengers: 1 : 30

Then the expenditure will be: $6 \times 1 = 6$: $4 \times 30 = 120$

1 : 20

21 units = Rs. 2100

Amount collected from first class passengers = 1 unit = Rs.100.