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Name of the Bundle	Intermediate Bundle V2	Subject	Aptitude
Topic	Ratio and Proportion	Last updated on	22 January 2024

CONCEPT 1 – RATIO

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:

Method 1:

- **It is better to go through the options for this type of direct question.**

  1. As a:b=3:5, options (b) and (d) are correct based on the multiplication of the a:b ratio.
     - The value of a:b is 6:10.
  2. As b:c=2:3, options (d) are correct based on the multiplication of the b:c ratio.
     - The value of b:c is 10:15.
  3. Therefore, The answer will be a:b:c= 6:10:15.

Method 2:

- **Traditional Method:**

A	B	C
3	5	5 (neighbor ratio)
2 (neighbor ratio)	2	3
6	10	15

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2) 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:

Method 1:

- **It is better to go through the options for this type of direct question.**

1. As a:b=2:5, options a and b are correct based on the multiplication of the a:b ratio.
   - The value of a:b is 72 : 180.

2. As b:c=4:7, option (a) is correct based on the multiplication of the b:c ratio.
   - The value of b:c is 180 : 315.

3. As c:d=9:14, option (a) is correct based on the multiplication of the b:c ratio.
   - The value of b:c is 315 : 490.

4. Therefore, The answer will be **a:b:c:d= 72:180:315:490.**

Method 2:

- **Traditional Method:**

A	B	C	D
2	5	5 (neighbor ratio)	5 (neighbor ratio)
4 (neighbor ratio)	4	7	7 (neighbor ratio)
9 (neighbor ratio)	9 (neighbor ratio)	9	14
72	180	315	490

3) 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)
   e)

ANS: b) 48
Explanation:

- In this question, we need to know the ratio of three numbers.

A	B	C
2	3	3 (neighbor ratio)
4 (neighbor ratio)	4	5
8	12	15

➢ Therefore, A:B:C = 8:12:15.

➢ The second number should be a multiple of 12.

➢ 8x+12x+15x = 140

        x = 4.

➢ The second number is 12x = **48**.

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4) The cost of 8 pens and 14 pencils equals 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,

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

$$9y = 4x$$

$$x:y = 9:4.$$

5) Two numbers A and B, such that the sum of 10% of A and 8% of B is 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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6) The first number is one-third of the second number. The second number is 1.5 times 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:

➢ From the given data,
- A=1/3B,
- B=1.5C,
- C=3D,
- D=1.

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*4 = 40.

$3x+9x+6x+2x = 40$

$20x = 40$

$x = 2$

➢ Largest Number= 9x = 18.

CONCEPT 2 – INVERSE RATIO

7) 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:

➢ 1/X: 1/Y: 1/Z = 2: 3: 5

➢ X: Y: Z = (3*5): (2*5): (2*3)

➢ X: Y: Z = **15: 10: 6.**

8) 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 = $\frac{1}{4} : \frac{1}{6} : \frac{1}{9}$

➢   P: Q: R = (6*9): (4*9): (4*6)

        = 54: 36: 24

➢   P: Q: R = **9: 6: 4.**

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9) The speeds of the 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.

Therefore, $C_1 : C_2 : C_3$ = (4*6): (5*6): (5*4)

$$= 24: 30: 20$$

$C_1 : C_2 : C_3$ = **12 : 15: 10.**

10) If A: B =1/2 : 3/8, B:C =1/3 : 5/9 and C:D=5/6 : 3/4 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:

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

➢ As A: B=4:3, option (d) is correct based on the multiplication of the A: B ratio.

    - The value of A: B is 8: 6.

    - So, the correct answer is option(d) 8:6:10:9.

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CONCEPT 3-DUPLICATE RATIO

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

11) 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:

Duplicate ratio = 4^2: 3^2= **16: 9.**

CONCEPT 4-SUB-DUPLICATE RATIO

If a:b is a ratio then, their sub-duplicate ratio will be √a:√b.

12) 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 = √144: √121= **12: 11.**

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CONCEPT 5-TRIPLICATE RATIO

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

13) 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.**

CONCEPT 6- SUB-TRIPLICATE RATIO

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

14) 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.**

CONCEPT 7- COMPOUNDED RATIO

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

15) 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:

Compound ratio = (1*2*4) : (2*5*3) = 8:30 = **4:15.**

CONCEPT 8-TYPES OF PROPORTIONS

1. THIRD PROPORTIONAL

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

16) The third proportion of 10 and 20 is
   a. 40
   b. 200
   c. 10
   d. 20

ANS: a) 40

Explanation:

10 : 20 = 20 : x ;

x = (20*20) / 10 = 40.

Alternative:

If $\dfrac{10}{20} = \dfrac{20}{x}$ then,

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2. 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.

17) 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.

Alternative:

$$\frac{4}{9} = \frac{12}{x}$$

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

$$\begin{array}{c} *3 \\ 4 \longrightarrow 12 \\ 9 \longrightarrow 27 \\ *3 \end{array}$$

CONCEPT 9-MEAN PROPORTIONAL

The mean proportional between a and b is √(ab).

18) 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 = √9 * √49 = 3 * 7 = 21.

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19) **Find the mean proportional to 81 and 25.**
   a. 35
   b. 55
   c. 45
   d. 65

ANS: c) 45
Explanation:

81 : x = x : 25 $\Rightarrow$ x = √81 * √25 = 9 * 5 = **45.**

20) **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) = √13.5 * √0.24 =1.8

➢ X: Y = **8: 9.**

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CONCEPT 10-PROBLEMS BASED ON A NUMBER OF COINS

21) A box contains 1 rupee, 50p, and 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:

No. of Coins = 100p : 50p : 25p
            1 : 2 : 3
           ↑   ↓   ↑
        40   80   120

AMOUNT in Rs. = (40) + (80/2) + (120/4)

             = 40 + 40 + 30

             = Rs. 110.

Therefore, **Rs. 110** money was there in the box.

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22) In a wallet the ratio of 25 paise, 50 paise, and Rs. 1 coin 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

The ratio of values in Rupees is   25P : 50P : 1Rs.

3 : 2   : 3

8 units = Rs.600

1 unit = Rs.75

3 units = Rs.225

No. of 25p coins = 4 * 225 = 900 coins.

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CONCEPT 11 – COMPONENDO AND DIVIDENDO

23) 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,

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

x:y = 20:9

24) If (a+3b) : (2a+4b) = 3:5 then what is the value of a:b?
    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 $\Rightarrow$ a:b = 3:1

By using componendo and dividendo rule,

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

a:b =1: 2

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CONCEPT 12 – ADDITION/SUBTRACTION ON GIVEN RATIO

25) 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.**

26) 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:

$$\sim x \left(\frac{x+7}{2x+7} = \frac{3}{5} \right) \sim 2$$
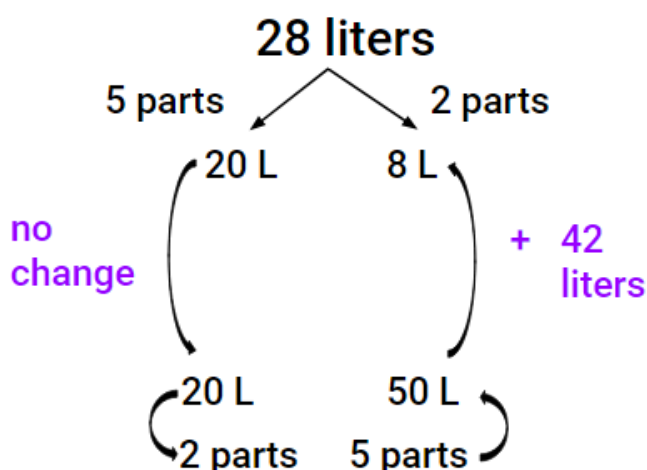
➢ 2(x + 7) = 3x ; x = 14
➢ Greater Number = 2 * 14 = **28.**

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27) In a 28-litre mixture of milk and water, the ratio of milk and water is 5: 2. How much water should be added to 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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28) A mixture contains milk and water in the ratio of 9: 4. On adding 8 liters 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, the quantity of milk is unaltered therefore we need to make the milk ratio the same.

MILK : WATER

$$\text{no change} \begin{pmatrix} 9:4 \\ 3*3 : 3*2 \\ 9:6 \end{pmatrix} \sim 2 \rightarrow +8 \text{ liters}$$

1 is 4 liters.

Then, total mixture contains = (9+4) * 4 = **52 liters.**

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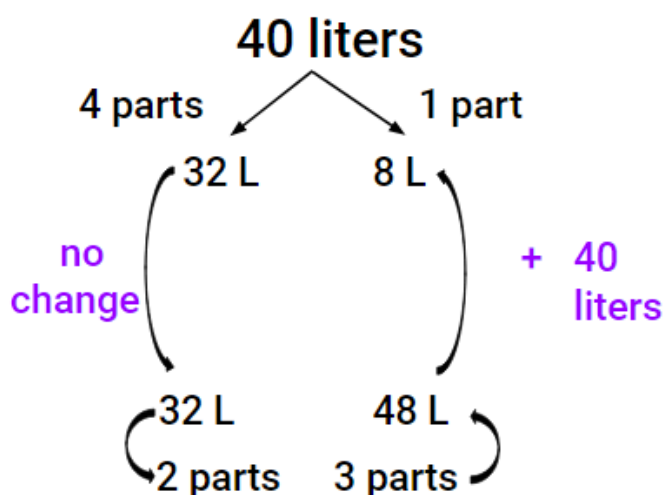
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29) In a mixture of 40 liters, the ratio of milk and water is 4: 1. How much water must be added to this mixture so that the ratio of milk and water becomes 2 : 3?

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

ANS: a) 40 liters
Explanation:

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30) 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

Here 2 Units = 20 then, students before the increase = (2 + 3 + 5) × 10 = **100.**

CONCEPT 13– 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:

A : B
1 : 3

~ 2 ⟶ 5 YEARS

A − 1 − 2.5 YEARS

B − 3 − 7.5 YEARS

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Name of the Bundle	Intermediate Bundle V2	Subject	Aptitude
Topic	Ratio and Proportion	Last updated on	22 January 2024

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:

<div align="center">

Khan : Ken

- 6 YEARS   **6 : 5**

~ 5   ~ 5

+4 YEARS   **11 : 10**   **10 YEARS**

</div>

1 − 2 Years

Then, Ken's age before 6 years was 5*2 = 10 years.

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

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Name of the Bundle	Intermediate Bundle V2	**Subject**	Aptitude
Topic	Ratio and Proportion	**Last updated on**	22 January 2024

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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Name of the Bundle	Intermediate Bundle V2	Subject	Aptitude
Topic	Ratio and Proportion	Last updated on	22 January 2024

CONCEPT 14 – 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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Name of the Bundle	Intermediate Bundle V2	Subject	Aptitude
Topic	Ratio and Proportion	Last updated on	22 January 2024

35) The ratio of income of two workers A and B is 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
Explanation:

$$P: \; Q \; : \; R: \; S$$

Income: $6: \; 10 \; : \; 16: \; 18$

$P \sim S = 12$ units $= 3744$

$Q + R = 26$ units $= $ **8112.**

37) The ratio of A's salary to B's was 4: 5. A's salary has 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%.

The new ratio of salaries will be 4 × 1.1:5 × 1.2 = **11: 15.**

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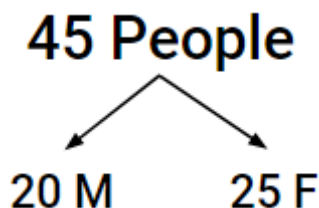| Name of the Bundle	Intermediate Bundle V2	Subject	Aptitude
Topic	Ratio and Proportion	Last updated on	22 January 2024

CONCEPT 15 – NUMBER OF PERSONS RELATED PROBLEMS.

38) There are 45 people in the 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:
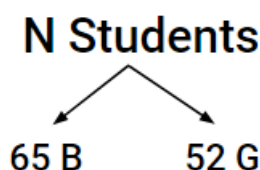
45 People

20 M   25 F

The ratio of Females to Males = **4:5**

39) Out of the total number of 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
Explanation:

N Students

65 B   52 G

The ratio of Girls to Boys = **4:5**

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Name of the Bundle	Intermediate Bundle V2	Subject	Aptitude
Topic	Ratio and Proportion	Last updated on	22 January 2024

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*1= 6: 4*30 = 120

1: 20

21 units = Rs. 2100

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