Ratio and Proportion

Ratio and proportion is the heart of arithmetic. If you understand this chapter properly you can solve virtually any problem in arithmetic.

If two numbers are in the ratio 2:3 means for every two units of the first number, second has 3 units. This is a mere comparison between numbers, and actual numbers may be way bigger than these numbers. If you multiply or divide a ratio the comparison does not change. i.e., 2:3 is same as 4:6.

If two numbers are in the ratio a:b then this ration has to be multiplied with a number K, to get actual numbers. This K is called multiplication factor (MF)

If two ratios are equal then we say they are in proportion. then $a : b :: c : d \Rightarrow a \times d = b \times c$ or $\frac{a}{b} = \frac{c}{d} \Rightarrow a \times d = b \times c$.

Example 1:

A spends 90% of his salary and B spends 85% of his salary. But savings of both are equal. Find the income of B, if sum of their incomes is Rs. 5000.

Savings of A = (100 - 90)% = 10% of his salary.

Savings of B = (100 - 85)% = 15% of his salary.

Given, both saves equal amount.

Therefore, 10% of A's salary = 15% of B's salary

Therefore, A : B = 15 : 10 = 3 : 2

Hence, B's salary = $\frac{2}{5}$ x 5000 = Rs. 2000.

Example 2:

A man has some hens and some cows. If the number of heads is 50 and number of feet is 142. The number of cows is:

Let, the man has hens only.

Then total heads = 50 x 1 = 50.

And, legs = 50 x 2 = 100 which is short by 42 from the actual legs i.e. = 142.

Now, replacement of one cow with one hen means same number of heads and two more legs.

Therefore, Hens replaced with cows = $\frac{42}{2}$ = 21

Therefore, Cows = 21

Example 3:

A sum of Rs. 350 made up of 110 coins, which are of either Re. 1 or Rs. 5 denomination. How many coins are of Rs. 5?

Let, all the coins are of Re. 1 denomination.

Then, total value of 110 coins = 110 x 1 = Rs. 110 which is short from Rs. 350 by Rs. 350 - Rs. 110 = Rs. 240.

Now, replacing 1 one-rupee coin with five-rupee coin mean Rs. 4 extra.

Therefore, Five rupee coins = $\frac{240}{4}$ = 60 coins

Example 4:

The population of a village is 10000. In one year, male population increase by 6% and female population by 4%. If population at the end of the year is 10520, find size of male population in the village (originally).

Let, the population consists of females only.

Then, increase in the population is 4% of 10000 = 400

Therefore, Increased population = 10000 + 400 = 10400

But, actual increased population = 10520

Difference = 10520 - 10400 = 120

We know that for every 100 people, males grow at the rate of 6 and females at the rate of 4. So Males grow 2 people more than females. But we need 120 people extra. So

Therefore, Male population = $\frac{120}{2}$ x 100 = 6000

Alternatively:

Let the males are x. Then females are 10000 - x.

Now $x \times 106\% + (10000 - x)104\% = 10520$

$\Rightarrow x \times \frac{106}{100} + (10000 - x)\frac{104}{100} = 10520$

$\Rightarrow x \times \frac{106}{100} - x \times \frac{104}{100} + \frac{104}{100}(10000) = 10520$

$\Rightarrow x \times \frac{2}{100} + 10400 = 10520$

$\Rightarrow x = 120 \times \frac{100}{2}$

$\Rightarrow x = 6000$

Example 5:

Students in Class I, II and III of a school are in the ratio of 3 : 5 : 8. Had 15 more students admitted to each class, the ratio would have become 6 : 8 : 11. How many total students were there in the beginning?

Increase in ratio for 3 classes is 6 - 3 = 8 - 5 = 11 - 8 = 3.

Given, 15 more students are admitted to each class.

Therefore, 3 :: 15 ⇒ 1 :: 5

Therefore, 3 + 5 + 8 = 16 :: 16 x 5 = 80.

Hence, total students in the beginning were 80.

Example 6:

The ratio between two numbers is 5 : 8. If 8 is subtracted from both the numbers, the ratio becomes 1 : 2. The original numbers are:

Let the numbers be 5x and 8x.

$\Rightarrow \frac{5x-8}{8x-8} = \frac{1}{2}$

$\Rightarrow$ 10x - 16 = 8x - 8

$\Rightarrow$ x = 4.

Therefore, The numbers are 4 x 5 and 4 x 8 i.e. 20 and 32.

Example 7:

A mixture of 55 litres contains milk and water in the ratio of 7 : 4. How many litres of milk and water each must be added to the mixture to make the ratio 3 : 2?

Let milk and water in the mixture are 7x and the 4x litre respectively.

Then, 7x + 4x = 55

Therefore, x = $\frac{55}{11}$ = 5

So milk = 35, water = 20

Let k liters of milk and water to be added to the mixture to make to 7 : 4.

$\frac{35+k}{20+k} = \frac{3}{2}$

$\Rightarrow$ (35 + k) × 2 = (20 + k) × 3

$\Rightarrow$ k = 10 liters

Example 8:

Two vessels contain mixture of milk and water in the ratio of 5 : 2 and 3 : 1 respectively. Find the ratio of milk and water in the new solution, if two mixtures are mixed in equal amount.

Sum of the ratios are 5 + 2, 3 + 1 or 7 and 4.

LCM of sum of the ratios i.e. LCM of 7 and 4 is 28.

Therefore, We assume that 28 litres of mixture is taken from each vessel.

Now, milk in first vessel = $\frac{5}{7}$ x 28 = 20 litres

Therefore, Water in the first vessel = 28 - 20 = 8 litres

And milk in second vessel = $\frac{3}{4}$ x 28 = 21 litres

Therefore, Water in second vessel = 28 - 21 = 7 litres

Total quantity of milk in the resultant mixture = 20 + 21 = 41.

Total quantity of water in the resultant mixture = 8 + 7 = 15.

Therefore, Ratio of milk and water in the new solution = 41 : 15.

Chain Rule:

Chain rule is comes in handy when there are many variables need to compare with the given variable. We can understand this rule by observing a practice problem.

Example 9:

If 12 carpenters working 6 hours a day can make 460 chairs in 24 days, how many chairs will 18 carpenters make in 36 days, each working 8 hours a day?

Let us prepare small table to understand the problem.

Men	Hours	Days	Chairs
12	6	24	460
18	8	36	?

Now with repect to the Chairs we need to understand how each variable is related.

If the number of men got increased (i.e., 12 to 18), do they manufacture more chairs or less chairs is the question we have to ask ourselves. If the answer is "more" then the higher number between 12, 18 will go to the numerator and other will go to denominator and vice versa. Here answer is "more"

So $460 \times \frac{18}{12}$

Next we go to Hours. If the number of hours they work each day got increases then do they manufactures more chairs or less chairs? Answer is more

So $460 \times \frac{18}{12} \times \frac{8}{6}$

Last, If the number of day they work increases then.... answer is more.

So $460 \times \frac{18}{12} \times \frac{8}{6} \times \frac{36}{24} = 1380$

Direct and Inverse proportionality Method:

Most problems in arithmetic can be solved by observing the relationship between the given variables. Especially inverse relationship is omnipresent in most of the problems. This relationship can be observed in the following chapters.

Quantity x Concentration = Constant (Mixtures and Allegations Problems)

Price x Quantity = Constant (Profit and Loss)

Time x Speed = Distance (Time Speed and Distance)

Days x Efficiency = Total Work (Time and Work)

Let us throw some light on the problems based on the above concept.

Example 10:

Due to reduction in the price of mangoes by 30%, A person got 15 mangoes more for the same amount. What is the number of mangoes originally purchased?

Traditional Method:

We know that Price x quantity = Expenditure. Assume Price = P; Quantity = Q; Expenditure = E. Then we can write

$$\Rightarrow \frac{E}{P} = Q$$

But we know that if price of the mangoes got reduced by 30%, new price could be 70% (P). Since the expenditure is constant, that person got 15 mangoes extra at the reduced price.

$$\Rightarrow \frac{E}{70\%(P)} = Q + 15$$

we can substitute $\frac{E}{P} = Q$

$$\Rightarrow \frac{Q}{70\%} = Q + 15 \quad \Rightarrow \frac{Q}{\frac{70}{100}} = Q + 15$$

$$\Rightarrow \frac{100(Q)}{70} = Q + 15 \quad \Rightarrow \frac{3}{7}Q = 15$$

So Q = 35

Inverse proportionality Method:

We know this relationship Price x Quantity = Expenditure (or) P x Q = E

If price got changed to 70% (Price) or $\frac{7}{10}$ (price), quantity must change to $\frac{10}{7}$ of the original quantity to keep Expenditure constant.

$$\Rightarrow \frac{7}{10}P \times \frac{10}{7}Q = E$$

But we know that the quantity difference is 15 mangoes.

$$\Rightarrow \frac{10}{7}Q - Q = 15$$

So Q= 35.

Example 11:

A boy reached school 10 min early if he travels at a speed of 4 Kmph. But If he reduces his speed to 3 Kmph, He is 10 min late. What is the Distance between his school and House?

Traditional method:

Assume the distance between the school and the boy's home is D km and actual time is T hours.

If he travels at the speed of 4 kmph he is early by 10 min or $\frac{10}{60}$Hours . On the other hand he is 10 min or $\frac{10}{60}$Hours late when he travels at 3 kmph.

$$\Rightarrow \frac{D}{4} = T - \frac{10}{60}\text{Hours} \quad \text{---- (1)}$$

$$\Rightarrow \frac{D}{3} = T + \frac{10}{60}\text{Hours} \quad \text{----(2)}$$

By (2) - (1) we get

$$\Rightarrow \frac{D}{3} - \frac{D}{4} = \frac{20}{60} \quad \Rightarrow \frac{4D - 3D}{12} = \frac{1}{3}$$

$$\Rightarrow D = \frac{12}{3} = 4$$

Inverse proportionality Method:

If we assume his original speed is S kmph, then his speed changed from 4 kmph to 3 kmph. or we can say the speeds are in the ratio 4:3. otherwise his speeds are S, $\frac{3}{4}S$.

But we know that S x T = D

$\Rightarrow \frac{3}{4}S \times \frac{4}{3}T = D$.

But we know that the total time he is taking extra while reducing his speed from 4 to 3 is 20 min or 1/3 Hr.

$\Rightarrow \frac{4}{3}T - T = \frac{1}{3}$

or T = 1 hr.

So the boys takes one hour to reach his school while traveling at 4 kmph. so distance is equal to Speed x time = 4 x 1 hr = 4 km.

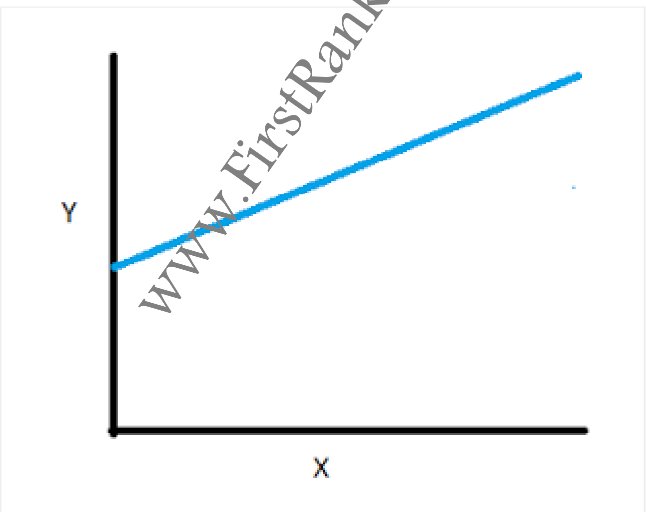
Two more important relations between variables:

Apart from direct proportion and indirect proportion, there exist another two relations between variables.

1. Direct relation
2. Indirect relation

1. Direct Relation:

Here the relation between variables can be best defined as Y = K + mX



Even though x is zero, y is not zero. It take a value of K. But Y varies directly in relation to x. If x increases, y also increases, If x decreases y also decreases.

Example 12:

The expenses of organizing a garden party increased from Rs.9000 to Rs.12000 when the number of registered candidates increased from 25 to 40. Find the total cost of organizing the party if there are 50 final registrations.

We know that the expenses of party increases not directly proportional but directly relational.

Assume the fixed component of expense is K rupees and Variable component is M rupees.

Then the total cost is given by

K + 25 x M = 9000 ....(1)

When there are 40 registrations the total cost is

K + 40 x M = 12000 ....(2)

By substracting (1) from (2)

$\Rightarrow 15M = 3000 \Rightarrow M = 200$

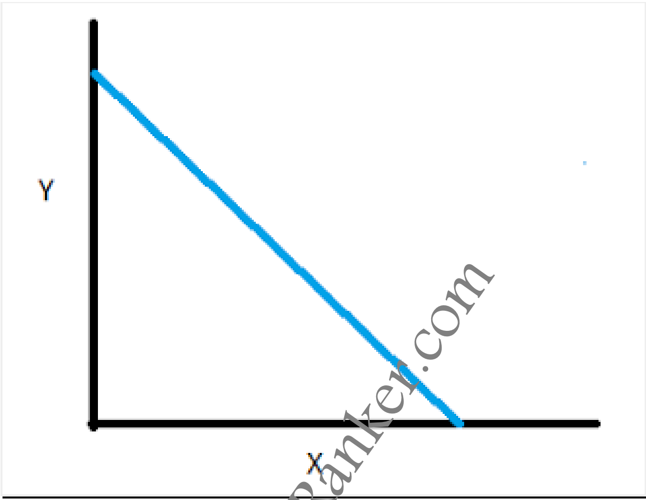
So the variable cost per head is Rs.200

To find the fixed cost we can substitute Rs.200 in either (1) or (2), then K = 4000

If there are 50 registrations then the total cost = 4000 + 50 x 200 = Rs.14000

2. Inverse Relation:

Here Y = K -mX holds good. If x increases, y decreases and vice versa.



Example 13:

The reduction in the speed of an engine is directly proportional to the square of the number of bogies attached to it. The speed of the train is 100 km/hr when there are 4 bogies and 55 km/hr when there are 5 bogies. What is the maximum number of bogies that can be attached to the train so that, even with those many numbers of bogies, it can just move?

We know that $S = S_{max} - K \times (\text{bogies})^2$

When there are 4 bogies speed of the train is 100km/hr $100 = S_{max} - K \times (4)^2 \Rightarrow 100 = S_{max} - K \times 16$ ....(1)

When there are 5 bogies speed of the train is 55km/hr $55 = S_{max} - K \times (5)^2 \Rightarrow 55 = S_{max} - K \times 25$ ....(2)

(2) - (1) gives $9K = 45 \Rightarrow K = 5$

By substituting K = 5 in either (1) or (2) we can find the maximum speed of the train = 180 km/hr

Assume, for N number of bogies the train does not move.

$\Rightarrow 0 = 180 - 5(N)^2 \quad \Rightarrow N = 6$

If the engine is attached to 6 bogies, it does not move. If we want the train to move we need to attach maximum of 5 bogies

MCQ's (Solved Examples)

1. One year ago the ratio between Laxman's and Gopal's salary was 3:4. The ratio's of their individual salaries between last year's and this year's salaries are 4:5 and 2:3 respectively. At present the total of their salary is

Rs.4290. The salary of Laxman now is :

a. Rs.1040

b. Rs.1650

c. Rs.2560

d. Rs.3120

Correct Option: B

Explanation:

Let the salaries of Laxman and Gopal one yer before be 12x and 16x.

Given that laxman's last year and present year salary are in the ratio 4 : 5 so his present salary = 5/4(12x) = 15x

Also Gopal's last year and present year salary are in the ratio 2 : 3 so his present salary = 3/2(16x) = 24x

But given that sum of the salaries 15x + 24x = 39x = 4290 ⇒ x = 110

Laxman's present salary = 15x = 15 x 110 = 1650

2. The ratio between Sumit's and Prakash's age at present is 2:3. Sumit is 6 years younger than Prakash. The ratio of Sumit's age to Prakash's age after 6 years will be :

a. 1 : 2

b. 2 : 3

c. 3 : 4

d. 3 : 8

Correct Option: C

Explanation:

Let their ages be 2x and 3x years.

3x-2x=6 or x=6

Sumit's age = 12 years, Prakash's age = 24 years

Ratio of their ages = 18 : 24 = 3 :4.

3. The ratio between the ages of Kamala and Savitri is 6:5 and the sum of their ages is 44 years. The ratio of their ages after 8 years will be :

a. 5 : 6

b. 7 : 8

c. 8 : 7

d. 14:13

Correct Option: C

Explanation:

Let their ages be 6x and 5x years

6x+5x=44 or x = 4

So their present ages are 24 years & 20 years

Ratio of their ages after 8 years = 32 : 28 = 8: 7

4. In a mixture of 60 litres, the ratio of milk and water is 2:1. What amount of water must be added to make the ratio 1:2?

a. 42 litres

b. 56 litres

c. 60 litres

d. 77 litres

Correct Option: C

Explanation:

Milk = $(60 \times \frac{2}{3})$ Litres = 40 litres

Water = (60-40)litres = 20 litres

Let x liters of water to be added to make it 1 : 2

$\frac{40}{20+x} = \frac{1}{2} \Rightarrow 20+x = 80$ or x = 60

Hence, water to be added = 60 litres

5. A's money is to B's money as 4:5 and B's money is to C's money as 2:3. If A has Rs.800, C has

a. Rs.1000

b. Rs.1200

c. Rs.1500

d. Rs.2000

Correct Option: C

Explanation:

A:B = 4:5=8:10 & B:C =2:3=10:15

A:B:C =8:10:15

If A has Rs.8, C has Rs.15

If A has Rs.800, C has Rs.$[\frac{15}{8} \times 800]$ = Rs.1500

6. 15 litres of a mixture contains 20% alcohol and the rest water. If 3 litres of water is mixed in it, the percentage of alcohol in the new mixture will be :

a. 17

b. $16\frac{2}{3}$

c. $18\frac{1}{2}$

d. 15

Correct Option: B

Explanation:

Alcohol = $[\frac{20}{100} \times 15]$ litres = 3 litres, Therefore water = 12 litres. If 3 litres of water is mixed, new mixture contains alcohol = 3 litres, water = 15 litres.

Percentage of alcohol in new mix

=$[\frac{3}{18} \times 100]$ % = $16\frac{2}{3}$%

7. Vinay got thrice as many marks in Maths as in English. The proportion of his marks in Maths and History is 4:3. If his total marks in Maths, English and History are 250, what are his marks in English ?

a. 120

b. 90

c. 40

d. 80

Correct Option: C

Explanation:

M=3E and $\frac{M}{H} = \frac{4}{3}$

H=$\frac{3}{4}M = \frac{3}{4} \times 3E = \frac{9}{4}E$

Now, M+E+H=250 ⇒ 3E+E+$\frac{9}{4}E$ =250

25E = 1000 or E = 40

8. One-fourth of the boys and three-eighth of the girls in a school participated in the sports. What fractional part of the total student population of the school participated in the annual sports ?

a. $\frac{4}{12}$

b. $\frac{5}{8}$

c. $\frac{8}{12}$

d. Data inadequate

Correct Option:d

Explanation:

Boys and girls ratio was not given.

9. Gold is 19 times as heavy as water and copper 9 times as heavy as water. The ratio in which these two metals be mixed so that the mixture is 15 times as heavy as water is:

a. 1 : 2

b. 2 : 3

c. 3 : 2

d. 19: 135

Correct Option: C

Explanation:

$$\frac{1 \times 19 + x \times 9}{1 + x} = 15 \Rightarrow 19 + 9x = 15 + 15x$$

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

So they are to be mixed in the ratio $1 : \frac{2}{3}$ or 3 : 2

10. If a:b=c:d, then $\frac{ma+nc}{mb+nd}$ is equal to

a. m : n

b. na:mb

c. a : b

d. md:nc

Correct Option: C

Explanation:

Let $\frac{a}{b}=\frac{c}{d}=k$. Then a = bk and c=dk

$\frac{ma+nc}{mb+nd}=\frac{mbk+ndk}{mb+nd}=k[\frac{mb+nd}{mb+nd}]$ = k

But $k=\frac{a}{b}$ So the required ratio = a : b

11. Rs.1050 is divided among P, Q and R. The share of P is $\frac{2}{5}$ of the combined share of Q and R. Thus, P gets:

a. Rs.200

b. Rs.300

c. Rs.320

d. Rs.420

Correct Option: B

Explanation:

Let Q + R got 5 units then P gets 2 units.

P : (Q + R)= 2:5

But total P + Q + R = 7 units. So,

P's share =Rs.$(1050\times\frac{2}{7})$ =Rs.300

12. Divided Rs.600 among A,B and C so that Rs.40 more than $\frac{2}{5}$th of A's share. Rs.20 more than $\frac{2}{7}$ of B's share and Rs.10 more than $\frac{9}{17}$th of C's share may all be equal. What is A's share ?

a. Rs.280

b. Rs.150

c. Rs.170

d. Rs.200

Correct Option: B

Explanation:

$\frac{2}{5}A+40=\frac{2}{7}B+20=\frac{9}{17}C+10=x$

A=$\frac{5}{2}(x-40), B=\frac{7}{2}(x-20)$ and c = $\frac{17}{9}(x-10)$

Given that $\frac{5}{2}(x-40)+\frac{7}{2}(x-20)$ + $\frac{17}{9}(x-10)=600$

$\frac{45x-1800+63x-1260+34x-340}{18}=600$

45x - 1800+63x -1260 +34x-340=10800

142x=14200 or x = $\frac{14200}{142}=100$

Hence, A's share = $\frac{5}{2}(100-40) = \text{Rs.}150$

13. 729 ml.of a mixture contains milk and water in the ratio of 7:2. How much more water is to be added to get a new mixture containing milk and water in the ratio of 7:3 ?

a. 60 ml

b. 70 ml

c. 81 ml

d. 90 ml

Correct Option: C

Explanation:

Milk = $(729 \times \frac{7}{9}) = 567\text{ml}$

Water= $(729 \times \frac{2}{9}) = 162\text{ml}$

$\frac{567}{162+x} = \frac{7}{3} \Rightarrow 7(162+x) = 3 \times 567$

$7x = 1701 - 1134$ or x = $\frac{567}{7} = 81$ ml

14. A and B are two alloys of gold and copper prepared by mixing metals in proportions 7:2 and 7:11 respectively. If equal quantities of the alloys are melted to form a third alloy C, the proportion of gold and copper in C will be :

a. 5 : 9

b. 5 : 7

c. 7 : 5

d. 9 : 5

Correct Option: C

Explanation:

Gold in C = $(\frac{7}{9} + \frac{7}{18}) = \frac{21}{18} = \frac{7}{6}$

Copper in C = $(\frac{2}{9} + \frac{11}{18}) = \frac{15}{18} = \frac{5}{6}$

Gold : Copper = $\frac{7}{6} : \frac{5}{6} = 7 : 5$

15. The students in three classes are in the ratio 2:3:5. If 20 students are increased in each class, the ratio changes to 4:5:7. The total number of students before the increase were :

a. 10

b. 90

c. 100

d. None of these

Correct Option: C

Explanation:

Let the number of students be 2x, 3x and 5x.

Then (2x + 20):(3x + 20):(5x + 20)

= 4 : 5 : 7

So, $\frac{2x+20}{4} = \frac{3x+20}{5} = \frac{5x+20}{7}$

5(2x + 20)=4(3x + 20) or x = 10

Hence, total number of students before increase =10x = 100

16. The ratio of money with Ram and Gopal is 7:17 and that with Gopal and Krishna is 7:17 . If Ram has Rs.490, Krishna has :

a. Rs.2890

b. Rs.2330

c. Rs.1190

d. Rs.2680

Correct Option: A

Explanation:

Ram: Gopal = 7 : 17 = 49 : 119

Gopal : Krishna = 7 : 17 = 119 : 289

Ram : Gopal : Krishna = 49 : 119 : 289

or Ram : Krishna = 49 : 289

Thus, 49 : 289 = 490 : x

x = $\frac{289 \times 490}{49} = 2890$

17. Rs.5625 is divided among A, B and C so that A may receive $\frac{1}{2}$ as much as B and C together receive, B receives $\frac{1}{4}$ of what A and C together receive.

The share of A is more than that of B by :

a. Rs.750

b. Rs.775

c. Rs.1500

d. Rs.1600

Correct Option: A

Explanation:

A=$\frac{1}{2}$ (B+c) or B+C = 2A

$\Rightarrow$ A + B + C=3A

Thus , 3A = 5625 or A =1875

Again, B = $\frac{1}{4}$ (A+C)$\Rightarrow$ A+C=4B

$\Rightarrow$A+B+C=5B

5B=5625 or B = 1125

Then, A's share is more than that of B by

Rs.(1875-1125) i.e. Rs.750

18. A certain amount was divided between Kavita and Reena in the ratio of 4:3. If Reena's share was Rs.2400, the amount is :

a. Rs. 5600

b. Rs. 3200

c. Rs. 9600

d. None of these

Correct Option: A

Explanation:

Let their shares be Rs.4x and Rs.3x.

Thus, 3x = 2400 ⇒ x = 800

Total amount = 7x = Rs.5600

19.The prices of a scooter and a television set are in the ratio 3:2 . If a scooter costs Rs.6000 more than the television set, the price of the television set is :

a. Rs.6000

b. Rs.10,000

c. Rs.12,000

d. Rs.18,000

Correct Option: C

Explanation:

Let the price of scooter be Rs.3x and that of a television set be Rs.2x.

Then 3x-2x=6000 or x = 6000

Cost of a television set = 2x = Rs.12000

20.If 18:x = x:8, then x is equal to :

a. 144

c. 72

c. 26

d. 12

Correct Option: D

Explanation:

$18 \times 8 = x^2$ or x = $\sqrt{144} = 12$

21. A right cylinder and a right circular cone have the same radius and the same volume. The ratio of the height of the cylinder to that of the cone is :

a. 3:5

b. 2:5

c. 3:1

d. 1:3

Correct Option: D

Explanation:

Let the heights of the cylinder and cone be h and H respectively. Then,

$\pi r^2 h = \frac{1}{3}\pi r^2 H$ or $\frac{h}{H} = \frac{1}{3}$

So, their heights are in the ratio 1 : 3

22. A circle and square have same area. Therefore, the ratio of the side of the square and the radius of the circle is :

a. $\sqrt{\pi} : 1$

b. $1 : \sqrt{\pi}$

c. $1 : \pi$

d. $\pi : 1$

Correct Option: A

Explanation:

Let the side of the square be x and let the radius of the circle be y.

Then, $x^2 = \pi y^2 \Rightarrow \frac{x^2}{y^2}\pi$ or $\frac{x}{y} = \sqrt{\pi}$

x : y = $\sqrt{\pi} : 1$

23. In a class, the number of boys is more than the number of girls by 12% of the total strength. The ratio of boys to girls is :

a. 11:4

b. 14:11

c. 25:28

d. 28:25

Correct Option: B

Explanation:

Let the number of boys and girls be x and y respectively. Then (x-y) = 12% of (x+y)

or x-y = $\frac{3}{25}$ (x+y)

25x-25y=3x+3y or 22x = 28y

y 22 11

or