

COMMERCIAL MATHEMATICS:

We shall study the following quantities in this unit.

Ratio, Proportion, Percentages, Discount

Ratio: Ratio is the relation existing between any two quantities of the same kind.

Notes:

1. A **ratio** is a comparison between two numbers.
2. Ratio is a term used to denote a/b (or $a \div b$) where 'a' and 'b' are two (quantities) numbers of the same kind.
3. Ratio is sometimes also express as $a:b$ (, read as a is to b) or a to b.
4. It indicates so many as per unit of b.
5. Order of the terms in the ratio is very important
6. Ratio does not have any unit.
7. *Ratio is a positive fraction, comparing two quantities of same kind.*
8. *Ratio involves only one "Universe or population" .ie. both numerator and denominator are derived from the same source. For example College going student of Goa out of college going students of India.*
9. To divides 'n' things between any two person (say Siya and Riya) in the ratio $a:b$, we have,

$$\text{Siya's share} = \frac{a}{a+b} * n$$

$$\text{Riya's share} = \frac{b}{a+b} * n$$

10. In a partnership, if investment are in the ration $a:b$ and the periods are in the ratio $m : n$, then they share profit P (loss L) in the ratio $am:bn$, as

$$\text{First share} = \frac{am}{am + bn} * P$$

$$\text{Riya's share} = \frac{bn}{am + bn} * P$$

Illustrations:

Ex. 1.

Rohan is 3 years older than Rita. After 7 years their ages will be in the ratio 6:5. Find their present ages.

Soln: Let the present age of Rita = x years.

\therefore Rohan's present age = $x + 3$ years.

After 7 years, we have the ratio

$$\frac{x+3+7}{x+7} = \frac{6}{5}$$

$$\therefore 5(x + 10) = 6(x + 7)$$

$$5x + 50 = 6x + 42$$

$$-x = -8$$

$$x = 8$$

\therefore the present age of Rita is 8 and Rohan is $(8+3=)$ 11 years.

Ex. 2.

The combine cost of a cycle and a watch is Rs. 9,500. If their costs are in the ratio 3:17, find their costs.

Soln: Let the costs of cycle = Rs. $3x$ and

Cost of watch = Rs. $17x$

$$\therefore 3x + 17x = 9500$$

$$20x = 9500$$

$$x = 475$$

\therefore Cost of cycle = Rs. $3 * 475 =$ Rs. 1425/-

Cost of watch = Rs. $17 * 475 =$ s. 8095/-

Alternatively

Let the cost of cycle = x

Therefore the cost of the watch = $9500 - x$

Given that,

$$x : 9500 - x = 3 : 17$$

$$\frac{x}{9500 - x} = \frac{3}{17}$$

$$17x = 3(9500 - x)$$

$$17x = 28500 - 3x$$

$$20x = 28500$$

$$x = \frac{18500}{20}$$

$$x = 1425$$

Thus, the cost of the cycle = Rs. 1425

And the cost of Watch is = Rs. 8075

Alternatively

Using Note no 9,

We can solve the problem as follows:

$$\text{Cost of Cycle} = \frac{3}{3+17} * 9500 = 1425$$

$$\text{Cost of watch} = \frac{3}{3+17} * 9500 = 8075$$

Ex. 3. (sum is given)

Two workers Ritesh and Preetesh are getting their salaries in the ratio 9:7 and the sum of their salaries was 6400. It was decided to deduct an equal amount from their salary so that they may be paid in the ratio 3:2. Calculate the deduction.

Soln: Let Ritesh's salary = $9x$

Preetesh's salary = $7x$.

$$\therefore 9x + 7x = 6400$$

$$x = 400$$

$$\therefore \text{Ritesh's salary} = 9x = 3600$$

$$\text{Preetesh's salary} = 7x = 2800$$

Let the amount deducted = Rs. A

$$\therefore \frac{3600 - A}{2800 - A} = \frac{3}{2}$$

$$2(3600 - A) = 3(2800 - A)$$

$$7200 - 2A = 8400 - 3A$$

$$A = 8400 - 7200$$

$$A = 1200$$

\therefore Amount deducted = Rs. 1200.

Ex.4 (Sum is not given)

Monthly salaries of two friends are in the ratio 5:6. The company offers them an increment of Rs. 100/- each. The ratio of their new salaries is 26:31. Find their original salaries.

Soln: Let the salary of first friend = $5x$

The salary of second friend = $6x$.

New salary of first friend = $5x + 100$

New salary of second friend = $6x + 100$

Now new salaries are in ratio, 26:31

$$\therefore (5x + 100):(6x + 100) = 26:31$$

$$31(5x + 100) = 26(6x + 100)$$

$$x = 500$$

\therefore Original Salary of first friend = $5x = 2500$

Original Salary of first friend = $6x = 3000$

Exercise:1.1

1. The present ages of two persons are in the ratio 9:2. Five years ago their ages were in the ratio 8:1. Find their ages.
2. The measures of the angles of a triangle are in the ratio 3:4:5. Find their measures.

Exercise:1.2

1. An amount of Rs. 25,600/- was divided among three persons A, B and C as 4:5:7. Find the amount of each one of them.
2. The salary of two friends Ramu and Shamu are in ratio 4:3. Their expenses are in the proportion of 3:2. Both Raamu and Shamu save each Rs. 600 a month. Find the monthly salary of Ramu and Shamu. (2400,1800)
3. Monthly salaries of two friends are in the ratio 5:6. The company offers them an increment of Rs. 100/- each. The ratio of their new salaries is 26:31. Find their original salaries. (2500,3000)

Exercise:1.3

1. What number must be subtracted from each of the terms of the ratio 59:37, so that the resulting ratio is equal to 5:3.

Some more solved problems from the net:

Ex. 1. Two numbers are respectively 20% and 50% more than a third number. The ratio of the two numbers is

Soln: Let the third number be x .

$$\text{First number} = 120\% \text{ of } x = \frac{120 * x}{100} = \frac{6 * x}{5}$$

$$\text{Second number} = 150\% \text{ of } x = \frac{150 * x}{100} = \frac{3 * x}{2}$$

$$\therefore \text{Ratio of the first two numbers} = \frac{6 * x}{5} : \frac{3 * x}{2} = \frac{6 * x}{5} * \frac{2}{3 * x} = 4 : 5$$

Ex. 2. A sum of money is to be distributed among A, B, C, D in the proportion of 5 : 2 : 4 : 3. If C gets Rs. 1000 more than D, what is B's share?

Soln:

Let the shares of A, B, C and D be Rs. $5x$, Rs. $2x$, Rs. $4x$ and Rs. $3x$ respectively.

$$\text{Then, } 4x - 3x = 1000$$

$$\Rightarrow x = 1000.$$

$$\therefore \text{B's share} = \text{Rs. } 2x = \text{Rs. } (2 \times 1000) = \text{Rs. } 2000.$$

Ex.3. Seats for Mathematics, Physics and Biology in a school are in the ratio 5 : 7 : 8. There is a proposal to increase these seats by 40%, 50% and 75% respectively. What will be the ratio of increased seats?

Soln: Originally, let the number of seats for Mathematics, Physics and Biology be $5x$, $7x$ and $8x$ respectively.

Number of increased seats are (140% of $5x$), (150% of $7x$) and (175% of $8x$).

$$\Rightarrow \left(\frac{140}{100} * 5x\right), \left(\frac{150}{100} * 7x\right), \left(\frac{175}{100} * 8x\right)$$

$$\Rightarrow (7x), \left(\frac{21}{2}x\right), (14x)$$

$$\therefore \text{the require ratio is} = 7x : \frac{21}{2}x : 14x$$

$$\Rightarrow 14x : 21x : 28x$$

$$\Rightarrow 2 : 3 : 4$$

Ex.5. The ratio of the number of boys and girls in a college is 7 : 8. If the percentage increase in the number of boys and girls be 20% and 10% respectively, what will be the new ratio?

Soln: Originally, let the number of boys and girls in the college be $7x$ and $8x$ respectively.

Their increased number is (120% of $7x$) and (110% of $8x$).

$$\text{Thus, the require ratio is } \left(\frac{120}{100} * 7x\right) : \left(\frac{110}{100} * 8x\right)$$

$$\Rightarrow \left(\frac{84 * x}{100}\right) : \left(\frac{88 * x}{100}\right)$$

$$\therefore \text{the require ratio is } 84 : 88$$

$$\Rightarrow 42 : 44$$

$$\Rightarrow 21 : 22$$

Ex.4In a mixture 60 litres, the ratio of milk and water 2 : 1. If this ratio is to be 1 : 2, then the quantity of water to be further added is:

Soln: the mixture of milk and water is in the ratio 2 : 1

$$\therefore \text{the quantity of milk} = \frac{2}{3} * 60 = 40 \text{ litres}$$

$$\therefore \text{the quantity of water} = \frac{1}{3} * 60 = 20 \text{ litres}$$

Now, the new ratio of milk and water is 1 : 2

Let quantity of water to be added to 20 litres be x litres

Thus, we have,

$$\begin{aligned}
40 : (20 + x) &= 1 : 2 \\
\Rightarrow \frac{40}{20+x} &= \frac{1}{2} \\
\Rightarrow 80 &= 20 + x \\
\Rightarrow x &= 60
\end{aligned}$$

\therefore Quantity of water to be added = 60 litres.

Ex.6. Salaries of Ravi and Sumit are in the ratio 2 : 3. If the salary of each is increased by Rs. 4000, the new ratio becomes 40 : 57. What is Sumit's salary?

Soln: Let the original salaries of Ravi and Sumit be Rs. $2x$ and Rs. $3x$ respectively.

The new ratio is $(2x + 4000) : (3x + 4000) = 40 : 57$

$$\begin{aligned}
\Rightarrow \frac{2x+4000}{3x+4000} &= \frac{40}{57} \\
\Rightarrow 57(2x + 4000) &= 40(3x + 4000) \\
\Rightarrow 6x &= 68,000 \\
\Rightarrow 3x &= 34,000
\end{aligned}$$

Sumit's present salary = $(3x + 4000) = \text{Rs.}(34000 + 4000) = \text{Rs. } 38,000$.

Worked out Problems on Ratio and Proportion (Web page Math – by – math)

Worked out problems on ratio and proportion are explained here in detailed description using step-by-step procedure. Solved examples involving different questions related to comparison of ratios in ascending order or descending order, simplification of ratios and also word problems on ratio proportion.

Sample questions and answers are given below in the worked out problems on ratio and proportion to get the basic concepts of solving ratio proportion.

1. Arrange the following ratios in descending order.

$2 : 3, 3 : 4, 5 : 6, 1 : 5$

Solution:

Given ratios are $2/3, 3/4, 5/6, 1/5$

The L.C.M. of 3, 4, 6, 5 is $2 \times 2 \times 3 \times 5 = 60$

Now, $2/3 = (2 \times 20)/(3 \times 20) = 40/60$

$3/4 = (3 \times 15)/(4 \times 15) = 45/60$

$5/6 = (5 \times 10)/(6 \times 10) = 50/60$

$1/5 = (1 \times 12)/(5 \times 12) = 12/60$

Clearly, $50/60 > 45/60 > 40/60 > 12/60$

Therefore, $5/6 > 3/4 > 2/3 > 1/5$

So, $5 : 6 > 3 : 4 > 2 : 3 > 1 : 5$

2. Two numbers are in the ratio 3 : 4. If the sum of numbers is 63, find the numbers.

Solution:

Sum of the terms of the ratio = $3 + 4 = 7$

Sum of numbers = 63

Therefore, first number = $3/7 \times 63 = 27$

Second number = $4/7 \times 63 = 36$

Therefore, the two numbers are 27 and 36.

3. The ratio of number of boys and girls is 4 : 3. If there are 18 girls in a class, find the number of boys in the class and the total number of students in the class.

Solution:

Number of girls in the class = 18

Ratio of boys and girls = 4 : 3

According to the question,

$$\text{Boys/Girls} = 4/5$$

$$\text{Boys}/18 = 4/5$$

$$\text{Boys} = (4 \times 18)/3 = 24$$

Therefore, total number of students = $24 + 18 = 42$.

4. If $x : y = 1 : 2$, find the value of $(2x + 3y) : (x + 4y)$

Solution:

$$x : y = 1 : 2 \text{ means } x/y = 1/2$$

$$\text{Now, } (2x + 3y) : (x + 4y) = (2x + 3y)/(x + 4y)$$

[Divide numerator and denominator by y.]

$$= [(2x + 3y)/y]/[(x + 4y)/2] = [2(x/y) + 3]/[(x/y) + 4], \text{ put } x/y = 1/2$$

$$\text{We get} = [2(1/2) + 3]/(1/2 + 4) = (1 + 3)/[(1 + 8)/2] = 4/(9/2) = 4/1 \times 2/9 = 8/9$$

Therefore the value of $(2x + 3y) : (x + 4y) = 8 : 9$

5. What must be added to each term of the ratio 2 : 3, so that it may become equal to 4 : 5?

Solution:

Let the number to be added be x , then $(2 + x) : (3 + x) = 4 : 5$

$$\Rightarrow (2 + x)/(3 + x) = 4/5$$

$$5(2 + x) = 4(3 + x)$$

$$10 + 5x = 12 + 4x$$

$$5x - 4x = 12 - 10$$

$$x = 2$$

6. The length of the ribbon was originally 30 cm. It was reduced in the ratio 5 : 3. What is its length now?

Solution:

Length of ribbon originally = 30 cm

Let the original length be $5x$ and reduced length be $3x$.

$$\text{But } 5x = 30 \text{ cm}$$

$$x = 30/5 \text{ cm} = 6 \text{ cm}$$

Therefore, reduced length = 3 cm

$$= 3 \times 6 \text{ cm} = 18 \text{ cm}$$

7. Divide \$370 into three parts such that second part is $1/4$ of the third part and the ratio between the first and the third part is 3 : 5. Find each part.

Solution:

Let the first and the third parts be $3x$ and $5x$.

Second part = $1/4$ of third part.

$$= (1/4) \times 5x$$

$$= 5x/4$$

Therefore, $3x + (5x/4) + 5x = 370$

$$(12x + 5x + 20x)/4 = 370$$

$$37x/4 = 370$$

$$x = (370 \times 4)/37$$

$$x = 10 \times 4$$

$$x = 40$$

$$\begin{aligned}\text{Therefore, first part} &= 3x \\ &= 3 \times 40 \\ &= \$120\end{aligned}$$

$$\begin{aligned}\text{Second part} &= 5x/4 \\ &= 5 \times 40/4 \\ &= \$50\end{aligned}$$

$$\begin{aligned}\text{Third part} &= 5x \\ &= 5 \times 40 \\ &= \$ 200\end{aligned}$$

Proportion:

An equality of two ratios is called proportion.

Thus, if, $a:b = c:d$ then the four numbers a, b, c and d are in proportion.

Note: (Give three points)

- 1) $a:b = c:d$ is also shown as $a:b :: c:d$ (read as 'a to b is as c to d')
- 2) Here the first and the last quantities are called extremes where as the middle two quantities are called means.

Thus a and d are the extremes where as b and c are the means

- 3) Some important points:

1. Let a, b, c, and d be in proportion, then,

$$a:b = c:d$$

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

$$ad = bc$$

(Product of extremes = product of means)

2. If $a:b = b:c$, then b is called the mean proportional of 'a' and 'c'.

Also,

$$a:b = b:c$$

$$\text{i.e. } b^2 = a * c$$

3. d is called the fourth proportional of a,b and c

Illustrations:

Ex. 1. If 8, 3, 32, x are in proportion, then find the value of x.

Soln: Given that the four numbers 8, 3, 32 and x are in proportion

Thus,

$$\frac{8}{3} = \frac{32}{x}$$

$$8 * x = 32 * 3$$

$$x = 12$$

Ex. Find out the mean proportional between 25 and 81.

Solution: Let the mean proportional be x

$$\therefore 25:x = x : 81$$

$$\frac{25}{x} = \frac{x}{81}$$

$$x^2 = 25 * 81$$

$$x = 5 * 9$$

$$x = 45$$

Ex. Find the fourth Proportional to $\frac{1}{2}, \frac{1}{3}, \frac{1}{4}$

Soln: Let the fourth Proportional be x

$$\begin{aligned}\therefore \quad \frac{1}{2} : \frac{1}{3} &= \frac{1}{4} : x \\ \frac{\frac{1}{2}}{\frac{1}{3}} &= \frac{\frac{1}{4}}{x} \\ \frac{1}{2} * x &= \frac{1}{3} \frac{1}{4} \\ x &= \frac{1}{6}\end{aligned}$$

Ex.2. What number should be subtracted from each of the numbers 15, 12, 25 and 16 so that the resulting numbers will be in proportion?

Soln: Let x be the number subtracted from each of the number so that the Numbers 15 - x, 12 - x, 25 - x and 16 - x are in proportion.

$$\begin{aligned}\frac{15-x}{12-x} &= \frac{25-x}{16-x} \\ (15-x) * (16-x) &= (25-x)*(12-x) \\ 240 - 31x + x^2 &= 300 - 37x + x^2 \\ 6 * x &= 60 \\ x &= 10\end{aligned}$$

Thus, the number to be deducted is 10

Exercise:2.1 (100, 45, $12ab^2$)

1. Find the fourth proportional to 63, 35 and 180
2. Find the fourth proportional to $6a^2b$, $9a^3$ and $8b^3$

Exercise:2.2

1. Find the mean proportional between 8 and 18.
2. Find the mean proportional between 3 and 1083

Exercise:2.3

1. What number must be added to each of the numbers 3, 4, 13 and 16 so that the result may be in proportion?
2. What number must be added to each of the numbers 3, 11, 2 and 9 so that the result may be in proportion?

Exercise: 2.4

1. Find three numbers in continued proportion, so that the middle number is 60 and the sum of the others is 125.
2. Find three numbers in continued proportion, so that their sum is 13 and their product is 27.

3. Percentage:

Percentage is the combination of two words per and cent. Cent means hundred and per means each. Hence percentage means value per hundred. Symbolically it is expressed as ‘%’

Note:

1. To express as a percentage, multiply the given ratio with 100.
2. To convert % into common fraction, divide by 100.
3. If there is an increase of x % in a quantity, then its value increased by (100 + x) % over its original value.

$$\text{Increase value} = \left(\frac{100 + x}{100}\right) * \text{Number.}$$

4. If there is a decrease of x % in a quantity, then its value decreased by (100 - x) % over its original value.

$$\text{decrease value} = \left(\frac{100 - x}{100}\right) * \text{Number.}$$

Examples.

Ex. 1 A and B together invest Rs. 52,000/- in a business. A's share of business is 46% of the amount. Find B's investment

Soln: The total investment of A and B is 52000.

$$\begin{aligned} \text{A's share is 46\%} &= \frac{46}{100} * 52000 \\ &= 23920 \end{aligned}$$

$$\begin{aligned} \therefore \text{B's share is} &= 52000 - 23920 \\ &= 28080 \end{aligned}$$

Ex. 2 Mr. A spent 35% of his salary on entertainment, 15% on rent, 10 % on clothing and 20% on miscellaneous. Mr. A draws a salary of Rs. 60,000 /- How much is the expenses on clothing? Is there an unspent amount?

Soln: Let us write the expenses of Mr. a as follows:

Items	Expenses in %
Ent	35 %
Rent	15 %
Clothing	10 %
Misc	20 %
Unspent amt	20 %

100 %

$$\begin{aligned} \text{Salary drawn by Mr. A is Rs. 60,000/-} \\ \text{Expenses on clothing} &= 10 \% \text{ of } 60,000 \\ &= 6000/- \end{aligned}$$

$$\begin{aligned}\text{Unspent amount} &= 20 \% \text{ of } 60,000 \\ &= 12000/-\end{aligned}$$

Ex. 2 Mr. A spent 35% of his salary on entertainment, and from the remaining, 15% on rent, 10 % on clothing and 20% on miscellaneous. Mr. A draws a salary of Rs. 60,000 /- How much is the expenses on clothing? Is there an unspent amount?

Soln: Let us write the expenses of Mr. a as follows:

$$\text{Entertainment} - 35 \% \text{ of } 60,000 = 21000$$

$$\text{Remainder} - 65 \% \text{ of } 60,000 = 39000.$$

Thus, the total expenses of Mr. a are as follows:

<u>Items</u>	<u>Expenses in %</u>
Ent	35 % of 60,000 = 21,000
Rent	15 % of 39,000 = 5850
Clothing	10 % of 39,000 = 3900
Misc	20 % of 39,000 = 7800
Unspent amt	55 % of 39,000 = 21450
	60,000

Salary drawn by Mr. A is Rs. 60,000/-

$$\begin{aligned}\text{Expenses on clothing} &= 10 \% \text{ (of } 65 \% \text{ of } 60,000) \\ &= 0.1 (0.65 * 60,000) \\ &= 3900 /-\end{aligned}$$

$$\begin{aligned}\text{Unspent amount} &= 55 \% \text{ of } (65 \% \text{ of } 60,000) \\ &= 0.55 * 0.65 (60,000) \\ &= 21450 /-\end{aligned}$$

Exercise:3.1

1. A man spends 35% of his income on food, 15 % on clothing, 10 5 on rent and 20 % on other items. If his monthly income is Rs. 20,000/-, find the amount spent on each. How much does he save?
2. Find the amount, 9% of which is 1530/-
3. A man spends 88% of his income and saves Rs 540/-. What is his income?

4. Discount:

Manufacturer fixes Selling Price (S.P.) of the product by adding his profit to the manufacturing cost (Cost Price or C.P.).

Selling Price = Manufacturing cost + Profit

i.e. S.P. = Manufacturing cost + Profit

Selling Price is also called as List Price (L.P.) or Market Price (M.P.).

Further to increase the sale or to retain customer ship, manufacturer or seller sells the product to lower price than the selling price (by compensating on his profit). This deduction is called as Discount. Discount is usually expressed in percentage.

We are going to study two types of discount:

1. Trade discount
2. Cash discount.
3. Retail discount (not there in syllabus)

1. Trade discount:

The discount given by the manufacturer to a wholesaler or by the wholesaler to a retailer on the selling price is called "Trade discount".

The price at which the product is sold after deducting trade discount is called "Invoice Price (I.P.)" or. "Reduced selling Price".

Thus,

∴ I.P. = S.P. – Trade discount

Note: Trade discount is given on selling price (or List price or Market price).

2. Cash discount:

The discount given to the purchaser to encourage them to pay in cash or to make early payment is called Cash discount.

A purchaser may be allowed both the discounts. Then in such case cash discount is given on I.P or Reduced Selling price.

The selling price of the product after deducting cash discount is called Net Price (N.P.).

∴ N.P. = I.P. – Cash discount

Note: 1. Generally cash discount is given on I.P.

2. N.P. is also called as Net Selling Price (N.S.P.)

Note:

1. S.P. = L.P. = M.P. = cost of manufacturer + manufacturer's profit
2. I.P. = Reduced List Price.
3. I.P. = S.P. – Trade discount.
4. N.P. = I.P. – Cash Discount.

5. Profit = N.P. – Cost price.

6. Loss = Cost price – N.P.

Note: Profit and Loss are calculated on Cost Price.

4.1. To find Net selling price discount:

Ex. A market price of Refrigerator is Rs. 15,000/-. If a trader allows 7% discount and further 2 % of cash discount, what is the net selling price of the refrigerator?

Soln: We know that

Invoice price = Market price – Trade discount

But,

Net price = Invoice price – Cash discount

Thus,

$$\begin{aligned}\text{Invoice Price} &= \text{Market price} - \text{Trade discount} \\ &= 15000 - 7\% \text{ of } (15000) \\ &= 15000 - 1050 \\ &= 13950\end{aligned}$$

i.e.

$$\begin{aligned}\text{Invoice price} &= \left(\frac{100-7}{100}\right) * 15000 \\ &= 13950\end{aligned}$$

Thus,

$$\begin{aligned}\text{Net (Selling) price} &= \text{Invoice price} - \text{Cash discount} \\ &= 13950 - 2\% \text{ of } 13950 \\ &= 13950 - 279 \\ &= 13671\end{aligned}$$

i.e.

$$\begin{aligned}\text{Net selling price} &= \left(\frac{100-2}{100}\right) * 13950 \\ &= 13671\end{aligned}$$

Thus, the net selling price of the Refrigerator is Rs. 13671/-

Ex. A sack of 100kg of wheat was marketed for Rs. 3,500. If a merchant allowed 15 % trade discount and 5 % discount on cash payment what was the net selling price of a sack of wheat?

Soln: We know that

Net Selling price = Invoice price – Cash discount

But,

Invoice price = List price – Trade discount

Thus,

$$\begin{aligned}\text{Invoice Price} &= \text{list price} - \text{Trade discount} \\ &= 3,500 - 15\% \text{ of } (3,500)\end{aligned}$$

$$= 3,500 - 525$$

$$= 2975$$

Thus,

$$\begin{aligned} \text{Net Selling price} &= \text{Invoice price} - \text{Cash discount} \\ &= 2975 - 5 \% \text{ of } 2975 \\ &= 2975 - 148.75 \\ &= 2826.25 \end{aligned}$$

Thus, the net selling price of the sack of wheat is Rs. 2826.25/-

Exercise: 4.1

1. On the purchase of 500 calculators, a manufacturing company allows $7\frac{1}{2}\%$ trade discount and further $2\frac{2}{5}\%$ cash discount to a retailer. If a calculator is marked for R. 350, what price a retailer would be paying for a single calculator?
2. A firm allows trade discount at 25 % and a further discount of 10 % for cash payment. Find the selling price of an article which is marked for Rs. 2,000/-

4.2. To find Market price:

Ex. A manufacturer allows 20 % discount on list price and further 7 % discount on cash payment. What is the list price of the product which is sold for Rs. 14,880/-?

Soln: Note: such problems can be solved in two ways:

1. One can start with List price and go to net Price (by assuming MP = x) and,
2. Start with Net price and arrive at the MP.

We know that

$$\text{Net (Selling) price} = \text{Invoice price} - \text{Cash discount}$$

But,

$$\text{Invoice price} = \text{List price} - \text{Trade discount}$$

To find: List Price.

Given,

$$\text{Net (Selling) Price} = 14,880$$

$$\text{i.e. Invoice price} - \text{Trade discount} = 14,880$$

$$\left(\frac{100-7}{100}\right) * \text{I.P.} = 14,880$$

$$\text{I.P.} = \frac{100}{93} * 14,880$$

$$\text{I.P.} = 16000$$

Now,

$$\text{Invoice Price} = 16000$$

i.e.,

$$\text{List price} - \text{Trade price} = 16000$$

$$\left(\frac{100-20}{100}\right) * \text{L.P.} = 16000$$

$$\text{L.P.} = \frac{100}{80} * 16000$$

$$\text{I.P.} = 20000$$

Thus, the List price of the product is Rs. 20,000/-

Alternatively:

Let the list price be Rs. x

Therefore trade discount at 20 % on $x = \frac{20}{100} * x = \frac{2}{10} * x = \frac{2x}{10}$

Invoice price = List price - Trade discount

$$= x - \frac{2x}{10}$$

$$= \frac{8x}{10}$$

Cash Discount is 7 % on I.P. = $\frac{7}{100} * I.P$

$$= \frac{7}{100} * \frac{8x}{10}$$

$$= \frac{56x}{1000}$$

Therefore,

Net (Selling) price = Invoice price - Cash discount

$$= \frac{8x}{10} - \frac{56x}{1000}$$

$$= \frac{(8000 - 560)x}{10000}$$

$$= \frac{7440}{10000} * x$$

But N.P. = 14880.

Therefore,

$$\frac{7440x}{10000} = 14880$$

$$7440x = 14880 * 10000$$

$$x = 20000$$

Thus, the List Price of the product is Rs. 20,000/-

Exercise:4.2

Ex. 1. A shopkeeper sold a tin of groundnut oil for Rs. 960, after allowing 20 % trade discount and 4 % cash discount. What is the list price of a tin (1250)

Ex. 2. A firm assembles computer and sells it for Rs. 30,000/-, after allowing 20 % trade discount and 4 % cash discount. Find the list market price of the computer. (39062.50)

4.3. To find Trade discount:

Ex. A trader sells 90 umbrellas for Rs. 8640. If the list price of umbrella is Rs. 100, what is the rate of trade discount?

Soln: Given that,

Net price = Rs. 8,640/-

List price of 90 umbrellas = 90 x 100 = Rs. 9000/-

But,

Net price = List price – Trade discount

$$8640 = 9000 - \text{Trade discount}$$

Let Trade discount be = y %

$$8640 = 9000 - y\% \text{ of list Price}$$

$$8640 = 9000 - \frac{y}{100} * 9000$$

$$360 = 90 y$$

$$y = 4$$

Thus,

Trade discount = 4 %

Alternatively

Net selling price of 90 umbrellas = Rs. 8,640/-

List price of 90 umbrellas = 90×100 = Rs. 9000/-

But,

Trade discount = List price - Net price

$$= 9000 - 8640$$

$$= 360$$

Let Trade discount be = y %

$$\text{i.e } 360 = y \%$$

$$360 = \frac{y}{100} * 9000$$

$$360 = 90 y$$

$$y = 4$$

Thus,

Trade discount = 4%

Exercise: 4.3

Ex.1. Neeta brought a saree for Rs. 984, which was marked for Rs. 1025. What was the rate of discount. (4%)