RATIO, PROPORTION AND PERCENTAGE

Ratio

The ratio of two quantities 'a' and 'b' of the same kind and in the same units is a fraction $\frac{a}{b}$ which shows that how many times one quantity is of the other and is written as a : b and is read as 'a is to b' where b ≠ 0.

Terms of the ratio

In the ratio a : b, the quantities a and b are called terms of the ratio. Here, 'a' is called the first term or the antecedent and `b' is called the second term or consequent.

Example:

In the ratio 5 : 9, 5 is called the antecedent and 9 is called the consequent.

Properties of ratio

If the first term and the second term of a ratio are multiplied/divided by the same non-zero number, the ratio does not change.

- a/b = xa/xb, (x ≠ 0) So, a : b = xa : xb
- a/b = (a/x)/(b/x), (x ≠ 0) So, a : b = a/x : b/x

Ratio in the simplest form

A ratio a : b is said to be in the simplest form if a and b have no common factor other than 1.

Example:

Express 15 : 10 in the simplest form.

Solution:

15/10

= (15 ÷ 5)/(10 ÷ 5)

= 3/2 (In this we cancelled the common factor 5)

Thus, we have expressed the ratio 15/10 in the simplest form, i.e., 3/2 and the terms 3 and 2 have common factor only 1.

Note:

• In ratio, quantities being compared must be of the same kind, otherwise the comparison becomes meaningless.

For example; comparing 20 pens and 10 apples is meaningless.

• They must be expressed in the same units.

• In a ratio, order of the terms is very important. The ratio a: b is different from b : a.

• The ratio has no units.

For example; Dozen = 12, Gross = 144, Score = 20

Decade = 10, Century = 100, Millennium = 1000

Example:

Express the following ratios in the simplest form.

(a) 64 cm to 4.8 m

(b) 36 minutes to 36 seconds

(c) 30 dozen to 2 hundred

Solution:

(a) Required ratio = 64 cm/4.8 m

= 64 cm/(4.8 × 100) cm

= 64 cm/480m

= 64/480

= 2/15

= 2 : 15

(b) Required ratio = 36 minutes/36 seconds

= (36 × 60 seconds)/(36 seconds)

= 60/1

= 60 : 1

(c) Required ratio = (30 dozen)/(2 hundred)

= (30 × 12)/(2 × 100)

= 3/10

= 3 : 10

Simplification of ratio

If the terms of the ratio are expressed in fraction form; then find the Least Common Multiple of the denominators of these fractions. Now, multiply each fraction by the L.C.M. The ratio is simplified.

Example:

Simplify the following ratios.

(a) $^{5}/_{2} : {}^{3}/_{8} : {}^{4}/_{9}$

(b) $2^{1}/_{7} : 3^{2}/_{5}$

Solution:

(a) The L.C.M. of 2, 8, 9 = 2 × 2 × 2 × 3 × 3

= 8 × 9

= 72

Now, multiplying each fraction by the L.C.M.

5/2 × 72 = 160 3/8 × 72 = 27 4/9 × 72 = 32

So, the ratio becomes 160 : 27 : 32

(b) $2^{1}/_{7} : 3^{2}/_{5}$

= 15/7 : 17/5 (Here, we have used (a/b)/(c/d) = $_{ab}$ab × $_{dc}$dc)

= 15/7 × 5/17

= 75/119

So, the ratio becomes 75 : 119

Comparison of ratios

Ratios can be compared as fractions. Convert them into equivalent ratios as we convert the given fractions into equivalent fractions and then compare.

Example:

Which ratio is greater?

$2^1/_3 : 3^1/_2$, 2.5 : 3.5, 4/5 : 3/2

Solution:

Simplifying the given 3 ratios

$2^1/_3 : 3^1/_2 = {}^7/_3 : {}^7/_2 = {}^7/_3 \div {}^7/_2 = {}^7/_3 \times {}^2/_7 = {}^2/_3$

$2.5 : 3.5 = {}^{25}/_{35} = {}^5/_7$

$^4/_5 : {}^3/_2 = {}^4/_5 \times {}^2/_3 = {}^8/_{15}$

$^2/_3$, $^5/_7$, $^8/_{15}$

L.C.M. of 3, 7, 15 = 105

$^2/_3$ = (2 × 35)/(3 × 35) = ^{7}$/_{105}$,

$^5/_7$ = (5 × 15)/(7 × 15) = $^{45}/_{105}$,

$^8/_{15}$ = (8 × 7)/(15 × 7) = $^{56}/_{105}$

7010570105 > 5610556105 > 4510545105

Therefore, $^2/_3 > {}^8/_{15} > {}^5/_7$

Therefore, $2^1/_3 : 3^1/_2 > 4/5 : 3/2 > 2.5 : 3.5$

Dividing the given quantity in the given ratio

If 'p' is the given quantity to be divided in the ratio a : b, then add the terms of the a ratio, i.e., a + b, then the 1st part = {a/(a + b)} × p and 2nd part {b/(a + b)} × p

Example:

Divide Rs.290 among A, B, C in the ratio $1^1/_2$, $1^1/_4$ and $^3/_8$.

Solution:

Given ratios = $^3/_2 : {}^5/_4 : {}^3/_8$.

The L.C.M. of 2, 4, 8 is 8.

So we have $^3/_2 \times 8 : {}^5/_4 \times 8 : {}^3/_8 \times 8 = 12 : 10 : 3$

Therefore, Share of A = 12/29 × 290 = Rs.120

Share of B = 10/29 × 290 = Rs.100

Share of C = 3/29 × 290 = Rs.30

Proportion

We have already learnt that statement of equality of ratios is called proportion, if four quantities a, b, c, d are in proportion, then a : b = c : d or a : b : : c : d (: : is the symbol used to denote proportion).

⇒ ab = cd

⇒ a × d = b × c

⇒ ad = bc

Here *a, d* are called the **extreme terms** in which *a* is called the **first term** and *d* is called the **fourth term** and *b, c* are called the **mean terms** in which *b* is called the **second term** and *c* is called the **third term**.

Thus, we say, if product of mean terms = the product of extreme terms, then the terms are said to be in proportion.

Also, if **a : b :: c : d**, then d is called the fourth proportional of a, b, c.

Continued Proportion

The three quantities a, b, c are said to be in continued proportion if a : b :: b : c

⇒ ab = bc

⇒ a × c = b^2

⇒ b^2 = ac

⇒ b = √ac

Here, *b* is called the **mean proportional** of *a* and *c*. The square of **middle term** is equal to the product of **1st term** and **3rd term**.

Also, if **a : b :: b : c**, then c is called the third proportional of a, b.

Example:

Determine if the following are in proportion.

(a) 6, 12, 24

(b) $1^2/_3$, $6^1/_4$, $^4/_9$, $^5/_3$

Solution:

(a) Here, product of first term and third term = 6 × 24 = 144 and square of middle term = $(12)^2 = 12 \times 12 = 144$

(b) $1^2/_3, 6^1/_4, {}^4/_9, {}^5/_3$

Here, a = $1^2/_3$ b = $6^1/_4$ c = $^4/_9$ d = $^5/_3$

a : b = $1^2/_3 : 6^1/_4$ c : d = $^4/_9 : {}^5/_3$

$= {}^5/_3 : {}^{25}/_4$ = (4/9)/(5/3)

= (5/3)/(25/4) = 4/9 × 3/5

= 5/3 × 4/25 = 4/3 × 1/5

= 4/15 = 4/15

Since, **a : b = c : d**

Therefore, $1^2/_3, 6^1/_4, {}^4/_9, {}^5/_3$ are in proportion.

Q1. If 2A = 3B = 4C, find A : B : C

Solution:

Let 2A = 3B = 4C = x

So, A = x/2 B = x/3 C = x/4

The L.C.M of 2, 3 and 4 is 12

Therefore, A : B : C = x/2 × 12 : x/3 × 12 : x/4 = 12

= 6x : 4x : 3x

= 6 : 4 : 3

Therefore, A : B : C = 6 : 4 : 3

Q2. 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

⇒ (2 + x)/(5 + x) = 4/5

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

$10 + 5x = 12 + 4x$

$5x - 4x = 12 - 10$

$x = 2$

Q3. 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.

But 5x = 30 cm

x = 30/5 cm = 6 cm

Therefore, reduced length = 3 cm

= 3 × 6 cm = 18 cm

4. Mother divided the money among Ron, Sam and Maria in the ratio 2 : 3 : 5. If Maria got Rs.150, find the total amount and the money received by Ron and Sam.

Solution:

Let the money received by Ron, Sam and Maria be 2x, 3x, 5x respectively.

Given that Maria has got Rs. 150.

Therefore, 5x = 150

or, x = 150/5

or, x = 30

So, Ron got = 2x

= Rs. 2 × 30 = Rs.60

Sam got = 3x

= 3 × 60 = Rs.90

Therefore, the total amount Rs.(60 + 90 + 150) = Rs.300

5. Divide Rs.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) × 5x

= 5x/4

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

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

37x/4 = 370

x = (370 × 4)/37

x = 10 × 4

x = 40

Therefore, first part = 3x

= 3 × 40

= Rs.120

Second part = 5x/4

= 5 × 40/4

= Rs.50

Third part = 5x

= 5 × 40

= Rs. 200

6. The first, second and third terms of the proportion are 42, 36, 35. Find the fourth term.

Solution:

Let the fourth term be x.

Thus 42, 36, 35, x are in proportion.

Product of extreme terms = 42 ×x

Product of mean terms = 36 X 35

Since, the numbers make up a proportion

Therefore, 42 × x = 36 × 35

or, x = (36 × 35)/42

or, x = 30

Therefore, the fourth term of the proportion is 30.

7. 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,

Boys/Girls = 4/5

Boys/18 = 4/5

Boys = (4 × 18)/3 = 24

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

8. Find the third proportional of 16 and 20.

Solution:

Let the third proportional of 16 and 20 be x.

Then 16, 20, x are in proportion.

This means 16 : 20 = 20 : x

So, 16 × x = 20 × 20

x = (20 × 20)/16 = 25

Therefore, the third proportional of 16 and 20 is 25.

EXERCISE

1. The ratio of monthly income to the savings in a family is 5 : 4 If the savings be Rs.9000, find the income and the expenses.

2. What should be added to the ratio 5 : 11, so that the ratio becomes 3 : 4?

3. Two numbers are in the ratio 7 : 5. If 2 is subtracted from each of them, the ratio becomes 3 : 2. Find the numbers.

4. Two numbers are in the ratio 3 : 7. If their sum is 710, find the numbers.

5. Find the ratio of A : B: C when

(a) A : B = 3 : 5 A : C = 6 : 7

(b) B : C = 1/2: 1/6 A : B = 1/3 : 1/5

6. A sum of money is divided among Ron and Andy in the ratio 4 : 7. If Andy's share is Rs.616, find the total money.

7. Two numbers are in the ratio 5 : 7. On adding 1 to the first and 3 to the second, their ratio becomes 6/9 . Find the numbers.

8. The difference between two numbers is 33 and the ratio between them is 5 : 2. Find the numbers.

9. The ages of A and B are in the ratio 3 : 5. Four years later, the sum of their ages is 48. Find their present ages.

10. Ramon has notes of Rs.100, Rs.50 and Rs.10 respectively. The ratio of these notes is 2 : 3 : 5 and the total amount is Rs.2,00,000. Find the numbers of notes of each kind.

11. If 4A = 5B = 6C, find the ratio of A : B : C.

12. Divide Rs.430 into 3 parts such that A gets 5/4 of B and the ratio between B

and C is 3 : 4.

13. A certain sum of money is divided among A, B, C in the ratio 2 : 3 : 4. If A's share is Rs.200, find the share of B and C.

14. Divide Rs.940 among A, B, C in the ratio 1/3: 1/4 : 1/5

15. The ratio of number of male and female teachers in a school is 3 : 4. If there are 16 female teachers, find the number of male teachers.

16. In a library the ratio of English books to Math books, is the same as the ratio of Math books to Science book. If there are 1200 books on English and 1800 books on Math, find the number of Science books.

17. Set up all the possible proportions from the numbers 12, 15, 8, 10.

18. Find the first term, if second, third and fourth terms are 21, 80, 120.

19. Find the second term, if first, third and fourth terms are 15, 27, 63.

20. Find the mean term, if the other two terms of a continued proportion are 15 and 60.

Answers:

1. Rs.11250, Rs.2250 2. 13 3. 14, 10 4. 213, 497

5. (a) 6 : 10 : 7 (b) 5 : 3 : 1 6. Rs.968 7. 15, 21

8. 55, 22 9. 15 years, 25 years 10. 1000, 1500, 2500

11. 15 : 12 : 10 12. Rs.150, Rs.120, Rs.160 13. Rs.300, Rs.400

14. Rs.400, Rs.300, Rs.240 15. 12 16. 2700

17. (i) 12 : 15 = 8 : 10 (ii) 15 : 12 = 10 : 8 (iii) 12 : 8 = 15 : 10

(iv) 8 : 12 = 10 : 15

18. 14 19. 35 20. 30

Multiple Choice Questions on Ratio and Proportion

1. A ratio equivalent to 3 : 7 is:

(i) 3 : 9; (ii) 6 : 10; (iii) 9 : 21; (iv) 18 : 49

2. The ratio 35 : 84 in simplest form is:

(i) 5 : 7; (ii) 7 : 12; (iii) 5 : 12; (iv) none of these

3. In a class there are 20 boys and 15 girls. The ratio of boys to girls is:

(i) 4 : 3; (ii) 3 : 4; (iii) 4 : 5; (iv) none of these

4. Two numbers are in the ratio 7 : 9. If the sum of the numbers is 112, then the larger number is:

(i) 49; (ii) 72; (iii) 63; (iv) 42

5. The ratio of 1.5 m to 10 cm is:

(i) 1 : 15; (ii) 15 : 10; (iii) 10 : 15; (iv) 15 : 1

6. The ratio of 1 hour to 300 seconds is:

(i) 1 : 12; (ii) 12 : 1; (iii) 1 : 5; (iv) 5 : 1

7. In 4 : 7 : : 16 : 28, 7 and 16 are called

(i) extreme terms; (ii) middle terms; (iii) b middle and c extreme term; (iv) none of these

8. The first, second and fourth terms of a proportion are 16, 24 and 54 respectively. Then the third term is:

(i) 36; (ii) 28; (iii) 48; (iv) 32

9. If 12, 21, 72, 126 are in proportion, then:

(i) 12 × 21 = 72 × 126; (ii) 12 × 72 = 21 × 126; (iii) 12 × 126 = 21 × 72; (iv) none of these

10. If x, y and z are in proportion, then:

(i) x : y : : z : x; (ii) x : y : : y : z; (iii) x : y : : z : y; (iv) x : z : : y : z

11. 7 : 12 is equivalent to:

(i) 28 : 40; (ii) 42 : 71; (iii) 72 : 42; (iv) 42 : 72

12. The length and breadth of a rectangle are in the ratio 3 : 1. If the breadth is 7 cm, then the length of the rectangle is:

(i) 14 cm; (ii) 16 cm; (iii) 18 cm; (iv) 21 cm

13. The value of m, if 3, 18, m, 42 are in proportion is:

(i) 6; (ii) 54; (iii) 7; (iv) none of these

14. Length and width of a field are in the ratio 5 : 3. If the width of the field is 42 m then its length is:

(i) 100 m; (ii) 80 m; (iii) 50 m; (iv) 70 m

Solved Examples on Percentage

1. In an election, candidate A got 75% of the total valid votes. If 15% of the total votes were declared invalid and the total numbers of votes is 560000, find the number of valid vote polled in favour of candidate.

Solution:

Total number of invalid votes = 15 % of 560000

= 15/100 × 560000

= 8400000/100

= 84000

Total number of valid votes 560000 – 84000 = 476000

Percentage of votes polled in favour of candidate A = 75 %

Therefore, the number of valid votes polled in favour of candidate A = 75 % of 476000

= 75/100 × 476000

= 35700000/100

= 357000

2. A shopkeeper bought 600 oranges and 400 bananas. He found 15% of oranges and 8% of bananas were rotten. Find the percentage of fruits in good condition.

Solution:

Total number of fruits shopkeeper bought = 600 + 400 = 1000

Number of rotten oranges = 15% of 600

= 15/100 × 600

= 9000/100 = 90

Number of rotten bananas = 8% of 400

= 8/100 × 400

= 3200/100

= 32

Therefore, total number of rotten fruits = 90 + 32 = 122

Therefore Number of fruits in good condition = 1000 - 122 = 878

Therefore Percentage of fruits in good condition = (878/1000 × 100)%

= (87800/1000)%

= 87.8%

3. Aaron had Rs. 2100 left after spending 30 % of the money he took for shopping. How much money did he take along with him?

Solution:

Let the money he took for shopping be m.

Money he spent = 30 % of m

= 30/100 × m

= 3/10 m

Money left with him = m – 3/10 m = (10m – 3m)/10 = 7m/10

But money left with him = Rs. 2100

Therefore 7m/10 = Rs. 2100

m = Rs. 2100× 10/7

m = Rs. 21000/7

m = Rs. 3000

Therefore, the money he took for shopping is Rs. 3000.

4. In an exam Ashley secured 332 marks. If she secured 83 % makes, find the maximum marks.

Solution:

Let the maximum marks be m.

Ashley's marks = 83% of m

Ashley secured 332 marks

Therefore, 83% of m = 332

⇒ 83/100 × m = 332

⇒ m = (332 × 100)/83

⇒ m =33200/83

⇒ m = 400

Therefore, Ashley got 332 marks out of 400 marks.

5. An alloy contains 26 % of copper. What quantity of alloy is required to get 260 g of copper?

Solution:

Let the quantity of alloy required = m g

Then 26 % of m =260 g

⇒ 26/100 × m = 260 g

⇒ m = (260 × 100)/26 g

⇒ m = 26000/26 g

⇒ m = 1000 g

6. There are 50 students in a class. If 14% are absent on a particular day, find the number of students present in the class.

Solution:

Number of students absent on a particular day = 14 % of 50

i.e., 14/100 × 50 = 7

Therefore, the number of students present = 50 - 7 = 43 students.

7. In a basket of apples, 12% of them are rotten and 66 are in good condition. Find the total number of apples in the basket.

Solution:

Let the total number of apples in the basket be m

12 % of the apples are rotten, and apples in good condition are 66

Therefore, according to the question,

88% of m = 66

⟹ 88/100 × m = 66

⟹ m = (66 × 100)/88

⟹ m = 3 × 25 ⟹ m = 75

Therefore, total number of apples in the basket is 75.

8. In an examination, 300 students appeared. Out of these students; 28 % got first division, 54 % got second division and the remaining just passed. Assuming that no student failed; find the number of students who just passed.

Solution:

The number of students with first division = 28 % of 300

= 28/100 × 300

= 8400/100

= 84

And, the number of students with second division = 54 % of 300

= 54/100 × 300

=16200/100

= 162

Therefore, the number of students who just passed = 300 – (84 + 162)

= 54

Problems on Percentage:

1. In a class 60% of the students are girls. If the total number of students is 30, what is the number of boys?

Answer: 12

2. Emma scores 72 marks out of 80 in her English exam. Convert her marks into percent.

Answer: 90%

3. Mason was able to sell 35% of his vegetables before noon. If Mason had 200 kg of vegetables in the morning, how many grams of vegetables was he able to see by noon?

Answer: 70 kg

4. Alexander was able to cover 25% of 150 km journey in the morning. What percent of journey is still left to be covered?

Answer: 112.5 km

5. A cow gives 24 l milk each day. If the milkman sells 75% of the milk, how many liters of milk is left with him?

Answer: 6 l

Cost Price, Selling Price and Rates of Profit and Loss

We all go to shopping malls, markets, grocery shops and other shops to buy clothings, vegetables, grocery objects, etc. All of these objects have some maximum price mentioned on them. Often we tend to bargain for the objects we purchase. Sometimes we get objects at the bargained price while many a times the shopkeeper is not in the mood to negotiate and we have to buy the object at the price mentioned on the object.

Let's suppose a case where you go to a shopping mall to buy a brand new Nike t-shirt. You enter the showroom and choose a t-shirt with Rs 900 written on the price tag of the t-shirt. You find 10% off written over there. Now the price written on the price tag, i.e., Rs 900 is the actual price at which the t-shirt is to be sold. The off percent written over there is your discount percentage. Now the shopkeeper will subtract this discount percentage from the cost price of the t-shirt and that will become the selling price of the t-shirt and you will have to pay that amount to the shopkeeper.

Cost Price: The price at which goods are or have been bought by a merchant or retailer is known as cost price.

Selling Price: It is the price at which a good or commodity is sold by a shopkeeper to a customer.

Discount percent: It is the off percentage on a good or commodity or a percent that is to be subtracted from actual price of commodity which is to be sold.

A buys a commodity for Rs 50 from B, which B has bought from C for Rs 40.

Thus, the cost price of the commodity for B = Rs 40,

The selling price of the commodity for B = Rs 50

From the above example, it is clear about Cost Price, Selling Price and Discount. Now let us move towards profit and loss.

If the shopkeeper sells a commodity at a price more than the actual value or at the price at which he bought it from another shopkeeper, he will have profit. If he sells the commodity at a price less than the actual value or at a price less than the price at which he bought it from another shopkeeper, he will face a loss. This profit or loss percent can be calculated as:

Profit = Selling Price - Cost Price = S.P. - C.P.

Profit percent = (S.P.−C.P.)/C.P. **x 100%**

or,

Profit percent = Profit/C.P. **x 100%**

Loss = Cost Price - Selling Price = C.P. - S.P.

Loss Percent = (C.P.−S.P)/C.P. **X 100%**

or,

Loss percent = Loss/C.P. **x 100 %**

Discount

Marked Price:

In big shops and departmental stores, every article is tagged with a card and its price is written on it. This is called the **marked price** of that article, abbreviated as **MP**.

For books, the printed price is the marked price.

List Price:

Items which are manufactured in a factory are marked with a price according to the list supplied by the factory, at which the retailer is supposed to sell them. This price is known as the **list price** of the article.

Discount:

In order to increase the sale or clear the old stock, sometimes the shopkeepers offer a certain percentage of rebate on the marked price. This rebate is known as **discount**.

Notes:

The discount is always reckoned on the marked price.

Selling price = (marked price) - (discount)

As:

'selling price' is the amount you actually pay for the thing when you purchase.

'marked price' is the general price of the thing without any discount.

'discount' is a percentage of the marked price.

Problems

1. The marked price of a ceiling fan is Rs. 1250 and the shopkeeper allows a discount of 6% on it. Find the selling price of the fan.

Solution:

Marked price = Rs. 1250 and discount = 6%.

Discount = 6% of Marked Price

= (6% of Rs. 1250)

= Rs. {1250 × (6/100)}

= Rs. 75

Selling price = (Marked Price) - (discount)

= Rs. (1250 - 75)

= Rs. 1175.

Hence, the selling price of the fan is Rs. 1175.

2. A trader marks his goods at 40% above the cost price and allows a discount of 25%. What is his gain percent?

Solution:

Let the cost price be Rs. 100.

Then, marked price = Rs. 140.

Discount = 25% of Marked Price

= (25% of Rs. 140)

= Rs. {140 × (25/100)

= Rs. 35.

Selling price = (marked price) - (discount)

= Rs. (140 - 35) = Rs. 105.

Gain% = (105 - 100) % = 5%.

Hence, the trader gains 5%.

3. A dealer purchased a washing machine for Rs. 7660. He allows a discount of 12% on its marked price and still gains 10%. Find the marked price of the machine.

Solution:

Cost price of the machine = Rs. 7660, Gain% = 10%.

Therefore, selling price = [{(100 + gain%)/100} × CP]

= Rs. [{(100 + 10)/100} × 7660]

= Rs. [(110/100) × 7660]

= Rs. 8426.

Let the marked price be Rs. x.

Then, the discount = 12% of Rs.x

= Rs. {x × (12/100)}

= Rs. 3x/25

Therefore, SP = (Marked Price) - (discount)

= Rs. (x - 3x/25)

= Rs. 22x/25.

But, the SP = Rs. 8426.

Therefore, 22x/25 = 8426

⇒ x = (8426 × 25/22)

⇒ x = 9575.

Hence, the marked price of the washing machine is Rs. 9575.

4. How much per cent above the cost price should a shopkeeper mark his goods so that after allowing a discount of 25% on the marked price, he gains 20%?

Solution:

Let the cost price be Rs. 100.

Gain required = 20%.

Therefore, selling price = Rs. 120.

Let the marked price be Rs.x.

Then, discount = 25% of Rs.x

= Rs. (x × 25/100)

= Rs. x/4

Therefore, selling price = (Marked Price) - (discount)

= Rs. {x - (x/4)

= Rs. 3x/4

Therefore, 3x/4 = 120

⇔ x = {120 × (4/3)} = 160

Therefore, marked price = Rs. 160.

Hence, the marked price is 60% above cost price.

Practice Sums on Profit Loss and Discount

1. Ryan buys a clock for Rs. 75 and sells it for Rs. 100. His gain percent is …… .

(a) 25 %
(b) $33^{1}/_{3}$ %
(c) 20 %
(d) $37^{1}/_{2}$ %

2. A bat is bought for Rs. 120 and sold for Rs. 105. The loss percent is ……. .

(a) $12^{1}/_{2}$ %
(b) $14^{1}/_{5}$ %
(c) 15 %
(d) $16^{2}/_{3}$ %

3. A bookseller sold a book for Rs. 100 and thereby gains Rs. 20. Find his gain per cent.

(a) 20 %
(b) 25 %
(c) 40 %
(d) none of these

4. By selling a calculator for Rs. 418a shopkeeper 10%. The cost price of the calculator is …… .

(a) Rs. 360.000
(b) Rs. 372.80
(c) Rs. 376.20
(d) Rs. 380.00

5. A shopkeeper sells one transistor for Rs. 840 at a gain of 20% and another for Rs. 960 at a loss of 4%. His total gain or loss percent is …… .

(a) $5^{15}/_{17}$ % loss
(b) $5^{15}/_{17}$ % gain
(c) $6^{2}/_{3}$ % loss
(d) $6^{2}/_{3}$ % gain

6. The CP of 21 articles is equal to SP of 18 articles. Find the gain or loss percent.

(a) $12^{1}/_{2}$ % gain
(b) $12^{1}/_{2}$ % loss
(c) $16^{2}/_{3}$ % gain
(d) $16^{2}/_{3}$ % loss

7. A manufacturer offers a 20% rebate on the marked price of a product. The retailer offers another 30% rebate on the reduced price. The two reductions are equivalent to a single reduction of ……. .

(a) 42 %
(b) 44 %
(c) 46 %
(d) 50 %

8. A vendor loses the selling price of 4 oranges on selling 36 oranges. His loss per cent is …….. .

(a) 10 %
(b) $11^{1}/_{9}$ %
(c) $12^{1}/_{2}$ %
(d) none of these

9. A man bought apples at the rate of 8 for Rs. 34 and sold them at the rate of 1 2 for Rs. 57. How many apples should be sold to earn a net profit of Rs. 45?

(a) 90 (b) 100 (c) 135 (d) 150

10. Some articles were bought at 6 for Rs. 5 arid sold at 5 for Rs. 6. The gain per cent is …….. .

(a) 25 % (b) $33^{1}/_{3}$ % (c) 35 % (d) 44 %

11. By selling a chair for Rs. 504, a shopkeeper gains 12%. For how much should he sell it to gain 18%?

(a) Rs. 522.10 (b) Rs. 526.00 (c) Rs. 531.00
(d) Rs. 534.20

12. A shopkeeper sold two watches for Rs. 1485 each. On one he gains 10% and on the other he loses 10%. Find his gain or loss per cent in the whole transaction.

(a) neither gain nor loss
(b) 1 % gain
(c) 1 % loss
(d) 5 % gain

13. By selling a dinner set for Rs. 648, a man loses of his out lay. If it is sold for Rs. 810, what is the gain or loss percent?

(a) 9 % gain
(b) 11 % gain
(c) $11^{1}/_{9}$ % gain
(d) $12^{2}/_{9}$ % gain

14. A tradesman sold an article at a loss of 20%. Had he sold it for Rs. 100 more, he should have gained 5%. The cost price of the article was …… .

(a) Rs. 360 (b) Rs. 400 (c) Rs. 425 (d) Rs. 450

15. At what percentage above the cost price must an article be marked so as to gain 33% after allowing a customer a discount of 5%?

(a) 35 % (b) 38 % (c) 40 % (d) 42%