

# Comparing Quantities

## Understanding the Lesson

- Ratio and percentage
- Percentage, Fractions and Decimals
- Percentage increase and decrease
- Percentage change and percentage error
- Profit and Loss
- Market price, Discount and Net price
- Successive discount
- Sales Tax and Value Added Tax
- Compound interest
- Applications of Compound Interest

## Conceptual Facts

- In every hundred or per hundred is called as per cent.  
For example: 30% means 30 in every hundred.
- To change a percentage to a fraction:
 
$$40\% = \frac{40}{100} = 0.4, \quad 125\% = \frac{125}{100} = 1.25$$
- Percentage increase and decrease
 

Increase 240 by 10% =  $240 + \frac{10}{100} \times 240 = 240 + 24 = 264$

Decrease 180 by 18% =  $180 - \frac{18}{100} \times 180 = 180 - 32.4 = 147.6$
- Profit and Loss
 

Profit = SP – CP, Loss = CP – SP

$$\text{Profit}\% = \frac{\text{Profit}}{\text{CP}} \times 100, \quad \text{Loss}\% = \frac{\text{Loss}}{\text{CP}} \times 100$$

Profit and Loss are always calculated on CP.
- $\text{SP} = \text{CP} \left( 1 + \frac{\text{Profit}\%}{100} \right), \quad \text{SP} = \text{CP} \left( 1 - \frac{\text{Loss}\%}{100} \right)$
- **Marked Price:** The printed or the tagged price of an article is known as marked price or MP.
- **Discount:** The deduction allowed on the market price is called Discount. It is generally given in per cent.
- **Net Price:** The selling price after the discount to an article is called its Net Price.
- $\text{SP} = \text{MP} - \text{Discount}$ 

$$\text{MP} = \left( \frac{100 \times \text{SP}}{100 - \text{Discount}\%} \right)$$
- **Sales Tax:** Sales tax is a tax levied by the Government on the selling price of an article at a rate given by the Government.
- **Value Added Tax (VAT):** VAT is an extra tax which is levied and collected by State Government in lieu of State Tax.

• **Simple Interest:**

$$SI = \frac{\text{Principal} \times \text{Rate} \times \text{Time}}{100}$$

• **Compound Interest:**  $CI = \text{Amount} - \text{Principal}$

$$CI = P \left( 1 + \frac{r}{100} \right)^n - P$$

• **Amount** =  $P \left( 1 + \frac{r}{100} \right)^n$  where  $n$  represent time in years.

• **Conversion of Period:**

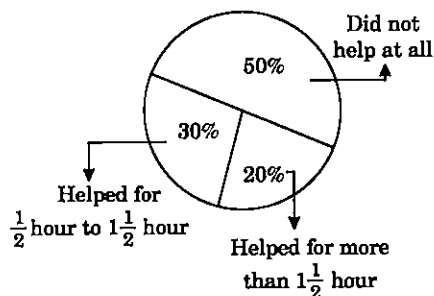
(i) If interest is calculated half yearly or semi-annually, then 'r' is halved and T is doubled.

(ii) If interest is calculated quarterly, then 'r' is one-fourth and T is four times.

**TRY THESE (PAGE 119)**

**Q1.** In a primary school, the parents were asked about the number of hours they spend per day in helping their children to do homework. There were 90 parents who helped for  $\frac{1}{2}$  hour to  $1\frac{1}{2}$  hours. The distribution of parents according to the time for which, they said they helped is given

in the adjoining figure; 20% helped for more than  $1\frac{1}{2}$  hours per day;



30% helped for  $\frac{1}{2}$  hour to  $1\frac{1}{2}$  hours; 50% did not help at all. Using this, answer the following:

- How many parents were surveyed?
- How many said that they did not help?

(iii) How many said that they helped for more than  $1\frac{1}{2}$  hours?

**Sol.** (i) Here number of parents who helped for  $\frac{1}{2}$  hour to  $1\frac{1}{2}$  hours = 90

Let total number of parents surveyed be  $x$ .  
Then, we have 30% of  $x = 90$

$$\Rightarrow \frac{30x}{100} = 90$$

$$\Rightarrow x = \frac{90 \times 100}{30} = 300$$

Thus, number of parents surveyed = 300

(ii) Number of parents who did not help = 50% of 300

$$= \frac{50}{100} \times 300 = 150$$

(iii) Number of parents who helped more than  $1\frac{1}{2}$  hours

$$= 20\% \text{ of } 300 = \frac{20}{100} \times 300 = 60$$

**EXERCISE 8.1**

**Q1.** Find the ratio of the following:

- speed of a cycle 15 km per hour to the speed of scooter 30 km per hour.
- 5 m to 10 km
- 50 paise to ₹ 5

**Sol.** (a) Speed of cycle: Speed of Scooter = 15 km per hour : 30 km per hour

$$= \frac{15}{30} = \frac{1}{2}$$

Hence, the ratio = 1 : 2

(b) 5 m to 10 km

$$= 5 \text{ m} : 10 \times 1000 \text{ m}$$

[∵ 1 km = 1000 m]

$$= 5 \text{ m} : 10000 \text{ m}$$

$$= \frac{5}{10000} = \frac{1}{2000}$$

Hence, the ratio = 1 : 2000

(c) 50 paise to ₹ 5

$$= 50 \text{ paise} : 5 \times 100 \text{ paise}$$

$$= 50 \text{ paise} : 500 \text{ paise}$$

$$= \frac{50}{500} = \frac{1}{10}$$

∴ ratio = 1 : 10

**Q2.** Convert the following ratios to percentages:

(a) 3 : 4    (b) 2 : 3

**Sol.** (a)  $3 : 4 = \frac{3}{4} \times 100 = 75\%$

(b)  $2 : 3 = \frac{2}{3} \times 100 = \frac{200}{3} = 66\frac{2}{3}\%$

**Q3.** 72% of 25 students are good in mathematics. How many are not good in mathematics?

**Sol.** Number of students who are good in mathematics = 72% of 25

$$= \frac{18}{100} \times 25 = 18$$

Number of students who are not good in mathematics = 25 - 18 = 7

**Q4.** A football team won 10 matches out of the total number of matches they played. If their win percentage was 40, then how many matches did they play in all?

**Sol.** 40 matches the team won out of 100 matches

1 match was won out of  $\frac{100}{40}$  matches

∴ 10 matches the team will won out of

$$\frac{25 \times 100}{40} \times 10 = 25 \text{ matches}$$

Hence, the total number of matches played by the team = 25

**Q5.** If Chameli had ₹ 600 left after spending 75% of her money, how much did she have in the beginning?

**Sol.** Let the money with Chameli be ₹ 100

Money spent by her = 75% of 100

$$= \frac{75}{100} \times 100 = ₹ 75$$

∴ The money left with her

$$= ₹ 100 - ₹ 75 = ₹ 25$$

₹ 25 are left with her out of ₹ 100

$$\therefore ₹ 1 \text{ is left with her out of } ₹ \frac{100}{25}$$

$$\therefore ₹ 600 \text{ will be left out of } ₹ \frac{4 \times 100}{25} \times 600$$

$$= ₹ 2400$$

Hence, she had ₹ 2400 in beginning.

**Q6.** If 60% people in a city like cricket, 30% like football and the remaining like other games, then what per cent of the people like other games? If the total number of people are 50 lakh, find the exact number who like each type of game.

**Sol.** Total number of people = 50,00,000

Number of people who like cricket = 60% of 50,00,000

$$= \frac{60}{100} \times 50,00,000$$

$$= 30,00,000$$

Number of people who like football = 30% of 50,00,000

$$= \frac{30}{100} \times 50,00,000$$

$$= 15,00,000$$

Number of people who like other games

$$= 50,00,000 - (30,00,000 + 15,00,000)$$

$$= 50,00,000 - 45,00,000$$

$$= 5,00,000$$

Percentage of the people who like other games

$$= \frac{5,00,000}{50,00,000} \times 100 = 10\%$$

Hence, 10% of people like other game

### TRY THESE (PAGE 121)

**Q1.** A shop gives 20% discount. What would the sale price of each of these be?

(a) A dress marked at ₹ 120

(b) A pair of shoes marked at ₹ 750

(c) A bag marked at ₹ 250

**Sol.** (a) Given: MP = ₹ 120

Discount = 20%

$$\therefore \text{Sale price} = \text{MP} \times \left(1 - \frac{\text{discount}}{100}\right)$$

$$= 120 \times \left(1 - \frac{20}{100}\right)$$

$$= 120 \times \frac{80}{100} = ₹ 96$$

Hence, the sale price of dress = ₹ 96

(b) Given: MP = ₹ 750

Discount = 20%

$$\begin{aligned}\therefore \text{Sale price} &= \text{MP} \times \left(1 - \frac{\text{discount}}{100}\right) \\ &= 750 \times \left(1 - \frac{20}{100}\right) \\ &= 750 \times \frac{80}{100} = ₹ 600\end{aligned}$$

Hence, the sale price of a pair of shoes = ₹ 600

(c) Given: MP = ₹ 250

Discount = 20%

$$\begin{aligned}\therefore \text{Sale price} &= \text{MP} \times \left(1 - \frac{\text{discount}}{100}\right) \\ &= 250 \times \left(1 - \frac{20}{100}\right) \\ &= 250 \times \frac{80}{100} = ₹ 200\end{aligned}$$

Hence, the selling price of bag = ₹ 200

**Q2.** A table marked at ₹ 15,000 is available for ₹ 14,400. Find the discount given and the discount per cent.

**Sol.** Given: MP = ₹ 15,000

SP = ₹ 14,400

$$\begin{aligned}\therefore \text{Discount} &= \text{MP} - \text{SP} \\ &= ₹ 15,000 - ₹ 14,400 \\ &= ₹ 600\end{aligned}$$

$$\begin{aligned}\therefore \text{Discount per cent} &= \frac{\text{discount}}{\text{MP}} \times 100 \\ &= \frac{600}{15000} \times 100 \\ &= 4\%\end{aligned}$$

Hence, the discount given = ₹ 600 and discount per cent = 4%

**Q3.** An almirah is sold at ₹ 5,225 after allowing a discount of 5%. Find its marked price.

**Sol.** Given: SP = ₹ 5,225

Discount = 5%

$$\begin{aligned}\text{SP} &= \text{MP} \times \left(1 - \frac{\text{discount}}{100}\right) \\ 5,225 &= \text{MP} \times \left(1 - \frac{5}{100}\right) \\ \Rightarrow 5,225 &= \text{MP} \times \frac{95}{100} \\ \Rightarrow \text{MP} &= \frac{5,225 \times 100}{95} \\ &= ₹ 5500\end{aligned}$$

Hence, the marked price of almirah = ₹ 5500

**TRY THESE (PAGE 123)****Q1.** Find selling price (SP) if a profit of 5% is made on

(a) a cycle of ₹ 700 with ₹ 50 as over-head charges.

(b) a lawn mower bought at ₹ 1150 with ₹ 50 as transportation charges.

(c) a fan bought for ₹ 560 and expenses of ₹ 40 made on its repairs.

**Sol.** (a) Cost price (CP) of a cycle = ₹ 700

Overhead charges = ₹ 50

 $\therefore$  Net cost price = ₹ 700 + ₹ 50 = ₹ 750

Profit = 5%

$$\begin{aligned}\therefore \text{SP} &= \text{CP} \left(1 + \frac{\text{Profit}}{100}\right) \\ &= 750 \left(1 + \frac{5}{100}\right) \\ &= 750 \times \frac{105}{100} \\ &= ₹ \frac{1575}{2} = ₹ 787.50\end{aligned}$$

Hence, the required selling price = ₹ 787.50

(b) Cost price of lawn mower = ₹ 1,150

Transportation charges = ₹ 50

 $\therefore$  Net cost price = ₹ 1,150 + ₹ 50 = ₹ 1,200

Profit = 5%

$$\begin{aligned}\therefore \text{Selling price} &= \text{CP} \left(1 + \frac{\text{Profit}}{100}\right) \\ &= 1,200 \left(1 + \frac{5}{100}\right) \\ &= 1200 \times \frac{105}{100} \\ &= ₹ 1,260\end{aligned}$$

Hence, the required selling price = ₹ 1,260

(c) Cost price of fan = ₹ 560

Expenses on repairs = ₹ 40

 $\therefore$  Net cost price = ₹ 560 + ₹ 40 = ₹ 600

$$\begin{aligned}\therefore \text{Selling price} &= \text{CP} \left(1 + \frac{\text{Profit}}{100}\right) \\ &= 600 \left(1 + \frac{5}{100}\right) \\ &= 600 \times \frac{105}{100} \\ &= ₹ 630\end{aligned}$$

Hence, the required selling price = ₹ 630

## TRY THESE (PAGE 123)

**Q1.** A shopkeeper bought two TV sets at ₹ 10,000 each. He sold one at a profit 10% and the other at a loss of 10%. Find whether he made an overall profit or loss.

**Sol.** Cost price of a TV set = ₹ 10,000

Profit = 10%

$$\begin{aligned}\therefore \text{SP} &= \text{CP} \left(1 + \frac{\text{Profit}}{100}\right) \\ &= 10,000 \left(1 + \frac{10}{100}\right) \\ &= 10,000 \times \frac{11}{10} \\ &= ₹ 11,000\end{aligned}$$

Cost price of other TV set = ₹ 10,000

Loss = 10%

$$\begin{aligned}\therefore \text{SP} &= \text{CP} \left(1 - \frac{\text{Loss}}{100}\right) \\ &= 10,000 \left(1 - \frac{10}{100}\right) \\ &= 10,000 \times \frac{90}{100} = ₹ 9,000\end{aligned}$$

Total CP of the two TVs =  $2 \times 10,000$   
= ₹ 20,000

Their total SPs = ₹ 11,000 + ₹ 9,000  
= ₹ 20,000

Since CP = SP = ₹ 20,000

Hence there is no overall profit or loss.

## TRY THESE (PAGE 124)

**Q1.** Find the buying price of each of the following when 5% ST is added on the purchase of

(a) A towel at ₹ 50

(b) Two bars of soap at ₹ 35 each

(c) 5 kg of flour at ₹ 15 per kg

**Sol.** (a) Given: CP of the towel = ₹ 50

ST = 5%

$$\begin{aligned}\therefore \text{Buying price (SP)} &= \text{CP} \left(1 + \frac{\text{ST}}{100}\right) \\ &= 50 \left(1 + \frac{5}{100}\right) \\ &= \cancel{50} \times \frac{105}{100_2} \\ &= \frac{105}{2} = ₹ 52.50\end{aligned}$$

$\therefore$  Required buying price = ₹ 52.50

(b) Given: CP of two bars = ₹  $35 \times 2$

= ₹ 70

ST = 5%

$$\begin{aligned}\therefore \text{Buying price (SP)} &= \text{CP} \left(1 + \frac{\text{ST}}{100}\right) \\ &= 70 \left(1 + \frac{5}{100}\right) = \cancel{70} \times \frac{105}{100} \\ &= \frac{735}{10} = ₹ 73.50\end{aligned}$$

Hence, the required buying price = ₹ 73.50

(c) Given: CP of 5 kg of flour = ₹  $15 \times 5$  = ₹ 75

ST = 5%

$\therefore$  Buying price (SP)

$$\begin{aligned}&= \text{CP} \left(1 + \frac{\text{ST}}{100}\right) \\ &= 75 \left(1 + \frac{5}{100}\right) \\ &= \cancel{75} \times \frac{105^{21}}{100^{20_4}} \\ &= ₹ \frac{315}{4} = ₹ 78.75\end{aligned}$$

**Q2.** If 8% VAT is included in the prices, find the original price of

(a) A TV bought for ₹ 13,500

(b) A shampoo bottle bought for ₹ 180

**Sol.** (a) Marked price of a TV included VAT

= ₹ 13,500

VAT = 8%

$$\therefore \text{SP} = \text{CP} \left(1 + \frac{\text{VAT}}{100}\right)$$

$$13,500 = \text{CP} \left(1 + \frac{8}{100}\right)$$

$$\Rightarrow 13,500 = \text{CP} \times \frac{108}{100}$$

$$\begin{aligned}\therefore \text{CP} &= 13,500 \times \frac{100}{108} \\ &= ₹ 12,500\end{aligned}$$

Hence, the original price of TV = ₹ 12,500

(b) Marked price of a shampoo bottle including VAT = ₹ 180

VAT = 8%

$$\therefore \text{SP} = \text{CP} \left(1 + \frac{\text{VAT}}{100}\right)$$

$$\Rightarrow 180 = \text{CP} \left(1 + \frac{8}{100}\right)$$

$$\Rightarrow 180 = \text{CP} \times \frac{108}{100}$$

$$\therefore \text{CP} = \frac{180 \times 100}{108}$$

$$= ₹ \frac{500}{3}$$

$$= ₹ 166.67$$

Hence, the original price of Shampoo bottle  
= ₹ 166.67

### EXERCISE 8.2

**Q1.** A man got a 10% increase in his salary. If his new salary is ₹ 1,54,000, find his original salary.

**Sol.** The increased salary = ₹ 1,54,000

Increase in salary = 10%

Increase salary = Original salary

$$\times \left(1 + \frac{\text{Increase}}{100}\right)$$

$$1,54,000 = \text{Original salary} \times \left(1 + \frac{10}{100}\right)$$

$$= \text{Original salary} \times \frac{110}{100}$$

$\therefore$  Original salary

$$= \frac{1,54,000 \times 100}{110}$$

$$= ₹ 1,40,000$$

Hence, the original salary = ₹ 1,40,000

**Q2.** On Sunday 845 people went to the Zoo. On Monday only 169 people went. What is the per cent decrease in the people visiting the Zoo on Monday?

**Sol.** Number of people visiting the Zoo on Sunday = 845

Number of people visiting the Zoo on Monday = 169

Decrease in number of people visiting the Zoo =  $845 - 169 = 676$

$\therefore$  Decrease per cent

$$= \frac{\text{Number of decrease in the people visiting the zoo}}{\text{No. of people visiting the Zoo on Sunday}} \times 100$$

$$= \frac{676 \times 100}{845} = 80\%$$

Hence, the decrease per cent = 80%

**Q3.** A shopkeeper buys 80 articles for ₹ 2,400 and sells them for a profit of 16%. Find the selling price of one article.

**Sol.** Cost price of 80 articles = ₹ 2,400

$$\therefore \text{Cost of 1 article} = ₹ \frac{2,400}{80}$$

$$= ₹ 30$$

Profit = 16%

$$\therefore \text{SP of 1 article} = \text{CP} \left(1 + \frac{\text{Profit}}{100}\right)$$

$$= 30 \left(1 + \frac{16}{100}\right)$$

$$= 30 \times \frac{116}{100}$$

$$= ₹ 34.80$$

Hence, the selling price of one article = ₹ 34.80

**Q4.** The cost of an article was ₹ 15,500. ₹ 450 were spent on its repairs. If it is sold for a profit of 15%, find the selling price of the article.

**Sol.** CP of the article = ₹ 15,500

Money spent on repairs = ₹ 450

$$\therefore \text{Net CP} = ₹ 15,500 + ₹ 450$$

$$= ₹ 15,950$$

Profit = 15%

$$\therefore \text{SP} = \text{CP} \left(1 + \frac{\text{Profit}}{100}\right)$$

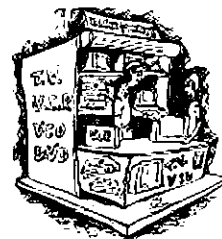
$$= 15,950 \left(1 + \frac{15}{100}\right)$$

$$= 15,950 \times \frac{115}{100}$$

$$= ₹ 18342.50$$

Hence, the selling price of article = ₹ 18342.50

**Q5.** A VCR and TV were bought for ₹ 8,000 each. The shopkeeper made a loss of 4% on the VCR and a profit of 8% on the TV. Find the gain or loss per cent on the whole transaction.



Sol. Cost price of a VCR = ₹ 8,000

$$\text{Loss} = 4\%$$

$$\begin{aligned} \therefore \text{SP} &= \text{CP} \left( 1 - \frac{\text{Loss}}{100} \right) \\ &= 8000 \left( 1 - \frac{4}{100} \right) \\ &= 8000 \times \frac{96}{100} \\ &= ₹ 7,680 \end{aligned}$$

Cost price of a TV = ₹ 8,000

$$\text{Profit} = 8\%$$

$$\begin{aligned} \therefore \text{SP} &= \text{CP} \left( 1 + \frac{\text{Profit}}{100} \right) \\ &= 8000 \left( 1 + \frac{8}{100} \right) \\ &= 8000 \times \frac{108}{100} \\ &= ₹ 8640 \end{aligned}$$

Total SP = ₹ 7,680 + ₹ 8,640 = ₹ 16,320

Total CP = ₹ 8,000 + ₹ 8,000 = ₹ 16,000

$$\text{Profit} = \text{SP} - \text{CP}$$

$$= ₹ 16,320 - 16,000$$

$$= ₹ 320$$

∴ Profit % on the whole transactions

$$= \frac{\text{Profit}}{\text{Total CP}} \times 100$$

$$= \frac{320}{16000} \times 100 = 2\%$$

Hence, the shopkeeper gained 2% profit on whole transaction.

Q6. During a sale, a shop offered a discount of 10% on the marked prices of all the items. What would a customer have to pay for a pair of Jeans marked at ₹ 1450 and two shirts marked at ₹ 850 each?

Sol. Marked Price (MP) of Jeans = ₹ 1,450

MP of two shirts = ₹ 850 × 2 = ₹ 1,700

∴ Total MP = ₹ 1,450 + ₹ 1,700 = ₹ 3,150

Discount = 10%

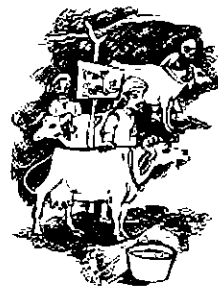
$$\text{SP} = \text{MP} \times \left( 1 - \frac{\text{discount}}{100} \right)$$

$$= 3,150 \times \left( 1 - \frac{10}{100} \right)$$

$$= 3,150 \times \frac{90}{100} = ₹ 2,835$$

Thus, the customer will have to pay ₹ 2,835.

Q7. A milkman sold two of his buffaloes for ₹ 20,000 each. On one he made a gain of 5% and on the other a loss of 10%. Find his overall gain or loss.



[Hint: Find CP of each]

Sol. SP of a buffalo = ₹ 20,000

Gain = 5%

$$\text{SP} = \text{CP} \left( 1 + \frac{\text{gain}}{100} \right)$$

$$\Rightarrow 20,000 = \text{CP} \left( 1 + \frac{5}{100} \right)$$

$$\Rightarrow 20,000 = \text{CP} \times \frac{105}{100}$$

$$\therefore \text{CP} = \frac{20,000 \times 100}{105}$$

$$= ₹ \frac{4,00,000}{21}$$

SP of other buffalo = ₹ 20,000

Loss = 10%

$$\therefore \text{SP} = \text{CP} \left( 1 - \frac{\text{loss}}{100} \right)$$

$$20,000 = \text{CP} \left( 1 - \frac{10}{100} \right)$$

$$\Rightarrow 20,000 = \text{CP} \times \frac{90}{100}$$

$$\therefore \text{CP} = 20,000 \times \frac{100}{90}$$

$$= ₹ \frac{2,00,000}{9}$$

Total CP of two buffaloes

$$= ₹ \frac{4,00,000}{21} + ₹ \frac{2,00,000}{9}$$

$$= ₹ \left( \frac{12,00,000 + 14,00,000}{63} \right)$$

$$= ₹ \frac{26,00,000}{63}$$

Total SP = ₹ 20,000 × 2 = ₹ 40,000

Here ₹  $\frac{26,00,000}{63} > ₹ 40,000$

∴ Loss = CP - SP

$$= ₹ \frac{26,00,000}{63} - ₹ 40,000$$

$$= ₹ \left( \frac{26,00,000 - 25,20,000}{63} \right)$$

$$= ₹ \frac{80,000}{63} = 1,269.84 \quad (\text{approx.})$$

$$\therefore \text{Loss\%} = \frac{\text{Loss}}{\text{CP}} \times 100$$

$$= \frac{80,000}{26,00,000} \times 100$$

$$= \frac{80,000}{26,00,000} \times \frac{63}{63} \times 100$$

$$= \frac{80}{26} \% = \frac{40}{13} \% = 3\frac{1}{13} \%$$

Hence, the overall loss =  $3\frac{1}{13} \%$

**Q8.** The price of a TV is ₹ 13,000. The sales tax charged on it is at the rate of 12%. Find the amount that Vinod will have to pay if he buys it.

**Sol.** Marked price of the TV = ₹ 13,000  
ST = 12%

$$\therefore \text{SP} = \text{MP} \times \left( 1 + \frac{\text{ST}}{100} \right)$$

$$= 13,000 \times \left( 1 + \frac{12}{100} \right)$$

$$= 13,000 \times \frac{112}{100} = ₹ 14,560$$

$\therefore$  Required amount that Vinod has to pay = ₹ 14,560

**Q9.** Arun bought a pair of skates at a sale where the discount given was 20%. If the amount he pays is ₹ 1,600, find the marked price.

**Sol.** Let the MP of the skates be ₹ 100

$$\therefore \text{Discount} = ₹ 20\% \text{ of } 100 = ₹ 20$$

$$\therefore \text{Sale price} = ₹ 100 - ₹ 20 = ₹ 80$$

If SP is ₹ 80 then MP = ₹ 100

$$\text{If SP is ₹ 1 then MP} = ₹ \frac{100}{80}$$

If SP is ₹ 1,600 then MP

$$= ₹ \frac{100}{80} \times 1600$$

$$= ₹ 2,000$$

Thus the MP = ₹ 2000.

**Q10.** I purchased a hair-dryer for ₹ 5,400 including 8% VAT. Find the price before VAT was added.

**Sol.** Let the original price be ₹ 100

$$\text{VAT} = 8\% \text{ of } 100 = ₹ 8$$

$$\therefore \text{Sale price} = ₹ 100 + ₹ 8 = ₹ 108$$

If SP is ₹ 108 then original price = ₹ 100

If SP is ₹ 1 then the original price

$$= ₹ \frac{100}{108}$$

If SP is ₹ 5,400 then the original price

$$= ₹ \frac{100}{108} \times 5,400 = ₹ 5,000$$

Thus, the price of hair-dryer before the addition of VAT = ₹ 5000

#### TRY THESE (PAGE 126)

**Q1.** Find interest and amount to be paid on ₹ 15,000 at 5% per annum after 2 years.

**Sol. Given :** Principal = ₹ 15,000

Rate of interest = 5%

Time period = 2 years

$$\text{Simple interest} = \frac{P \times R \times T}{100}$$

$$= \frac{15,000 \times 5 \times 2}{100} = ₹ 1,500$$

Amount = Principal + interest

$$= ₹ 15,000 + ₹ 1,500 = ₹ 16,500$$

Hence, the required interest is ₹ 1,500 and amount = ₹ 16500

#### TRY THESE (PAGE 129)

**Q1.** Find CI on a sum of ₹ 8,000 for 2 years at 5% per annum compounded annually.

**Sol. Given:** P = ₹ 8,000

R = 5%

n = 2 years compounded annually

$$\therefore A = P \left( 1 + \frac{R}{100} \right)^n$$

$$= 8,000 \left( 1 + \frac{5}{100} \right)^2$$

$$= 8,000 \left( \frac{21}{20} \right)^2$$

$$= 20 \cancel{8000} \times \frac{21}{20} \times \frac{21}{20} = ₹ 8,820$$

$$\therefore \text{CI} = A - P$$

$$= ₹ 8,820 - ₹ 8,000 = ₹ 820$$

Hence, the amount = ₹ 8,820 and CI = ₹ 820



## TRY THESE (PAGE 130)

Find the time period and rate for each.

1. A sum taken for  $1\frac{1}{2}$  years at 8% per annum is compounded half yearly.
2. A sum taken for 2 years at 4% per annum compounded half yearly.

Sol. 1. **Given:**  $n = 1\frac{1}{2}$  years

R = 8% per annum compounded half yearly

Since the interest is compounded half yearly

$$\therefore n = 2 \times 1\frac{1}{2}$$

$$= 2 \times \frac{3}{2} = 3 \text{ half years}$$

$$R = 8 \times \frac{1}{2} \% = 4\% \text{ per half year}$$

Hence the time period = 3 half years and Rate of interest = 4% per half year

2. **Given:**  $n = 2$  years

R = 4% per annum compounded half yearly

Since the interest is compounded half yearly

$$\therefore n = 2 \times 2 = 4 \text{ half years}$$

$$\text{and } R = 4 \times \frac{1}{2} \% = 2\% \text{ per half year}$$

Hence, the time period = 4 half years and Rate of interest = 2% per half year.

## TRY THESE (PAGE 131)

Find the amount to be paid

1. At the end of 2 years on ₹ 2,400 at 5% per annum compounded annually.
2. At the end of 1 year on ₹ 1,800 at 8% per annum compounded quarterly.

Sol. 1. **Given:** P = ₹ 2,400, R = 5% p.a. compounded annually and  $n = 2$  years

$$\therefore A = P \left( 1 + \frac{R}{100} \right)^n$$

$$= 2,400 \left( 1 + \frac{5}{100} \right)^2$$

$$= 2,400 \left( \frac{21}{20} \right)^2$$

$$= \cancel{2400}^6 \times \frac{21}{20} \times \frac{21}{20}$$

$$= ₹ 2646$$

Hence, the required amount = ₹ 2,646

2. **Given:** P = ₹ 1,800

$$n = 1 \times 4 = 4 \text{ quarters}$$

R = 8% pa compounded quarterly

$$= 8 \times \frac{1}{4} \% = 2\% \text{ per quarter}$$

$$\therefore A = P \left( 1 + \frac{R}{100} \right)^n$$

$$= 1,800 \left( 1 + \frac{2}{100} \right)^4$$

$$= 1,800 \times \left( \frac{51}{50} \right)^4$$

$$= 1,800 \times \frac{51}{50} \times \frac{51}{50} \times \frac{51}{50} \times \frac{51}{50}$$

$$= \frac{18 \times 2,601 \times 2,601}{25 \times 2,500}$$

$$= \frac{121773618}{62500}$$

$$= \frac{6,08,86,809}{31,250}$$

$$= ₹ 1,948.38$$

Hence, the required amount = ₹ 1,948.38

## TRY THESE (PAGE 133)

Q1. A machinery worth ₹ 10,500 depreciated by 5%. Find its value after one year.

Sol. **Given:** Principal value of the machine = ₹ 10,500

Rate of depreciation = 5%

Time = 1 year

$$\therefore \text{Value after 1 year} = P \left( 1 - \frac{R}{100} \right)^n$$

$$= 10,500 \left( 1 - \frac{5}{100} \right)^1$$

$$= \cancel{10,500}^{525} \times \frac{19}{20} = ₹ 9,975$$

Thus, the value of the machine after one year = ₹ 9975

Q2. Find the population of a city after 2 years, which is present 12 lakh, if the rate of increase is 4%.

Sol. **Given:** Present population of the city = 1200000

Rate = 4%

Time = 2 years

$$\begin{aligned} \text{Population of the city after 2 years} &= P \left( 1 + \frac{r}{100} \right)^n \\ &= 1200000 \left( 1 + \frac{4}{100} \right)^2 \end{aligned}$$

$$\begin{aligned} &= 1200000 \times \frac{104}{100} \times \frac{104}{100} \\ &= 1297920 \end{aligned}$$

∴ Population of the city after 2 years = 1297920

### EXERCISE 8.3

**Q1.** Calculate the amount and compound interest on

- (a) ₹ 10,800 for 3 years at  $12\frac{1}{2}\%$  per annum compounded annually.  
 (b) ₹ 18,000 for  $2\frac{1}{2}$  years at 10% per annum compounded annually.  
 (c) ₹ 62,500 for  $1\frac{1}{2}$  years at 8% per annum compounded half yearly.  
 (d) ₹ 8,000 for 1 year at 9% per annum compounded half yearly.  
 (You could use the year by year calculation using SI formula to verify).  
 (e) ₹ 10,000 for 1 year at 8% per annum compounded half yearly.

**Sol. (a) Given:**

$$P = ₹ 10,800, n = 3 \text{ years,}$$

$$R = 12\frac{1}{2}\% = \frac{25}{2}\% \text{ p.a.}$$

$$\begin{aligned} \therefore A &= P \left( 1 + \frac{R}{100} \right)^n \\ &= 10,800 \left( 1 + \frac{25}{2 \times 100} \right)^3 \\ &= 10,800 \left( \frac{9}{8} \right)^3 \\ &= \frac{10,800 \times 135 \times 27 \times 9}{8} \\ &= \frac{4,92,075}{32} = ₹ 15,377.34 \end{aligned}$$

$$CI = A - P$$

$$= ₹ 15,377.35 - ₹ 10,800$$

$$= ₹ 4,577.35$$

$$\text{Hence amount} = ₹ 15,377.34$$

$$\text{and CI} = ₹ 4,577.34$$

(b) **Given:**  $P = ₹ 18,000, n = 2\frac{1}{2} \text{ years} = \frac{5}{2} \text{ years}$

$$R = 10\% \text{ p.a.}$$

The amount for  $2\frac{1}{2}$  years, i.e., 2 years and 6 months can be calculated by first calculating the amount to 2 years using CI formula and then calculating the simple interest by using SI formula.

The amount for 2 years has to be calculated

$$\begin{aligned} A &= 18,000 \left( 1 + \frac{10}{100} \right)^2 \\ &= 18,000 \left( 1 + \frac{1}{10} \right)^2 \\ &= 18,000 \times \frac{11}{10} \times \frac{11}{10} = ₹ 21,780 \end{aligned}$$

$$\therefore \text{Interest after 2 years} = A - P$$

$$= 21,780 - 18,000 = ₹ 3,780$$

By taking ₹ 21,780 as principal amount, the SI for next  $\frac{1}{2}$  year will be calculated.

$$\begin{aligned} \text{SI for } \frac{1}{2} \text{ year} &= \frac{P \times R \times n}{100} \\ &= \frac{21,780 \times 10 \times 1}{100 \times 2} \\ &= ₹ 1,089 \end{aligned}$$

$$\text{Total CI} = ₹ 3780 + 1089$$

$$= ₹ 4,869$$

$$\therefore \text{Amount} = P + I$$

$$= ₹ 21,780 + ₹ 1,089$$

$$= ₹ 22,869$$

Hence, the amount = ₹ 22,869

and CI = ₹ 4,869

(c) **Given:**  $P = ₹ 62,500, n = 1\frac{1}{2} \text{ years} = \frac{3}{2} \text{ years}$   
 per annum compounded half yearly =  $\frac{3}{2}$   
 $\times 2 \text{ years} = 3 \text{ half years}$

$$R = 8\% = \frac{8}{2}\% = 4\% \text{ half yearly}$$

$$A = P \left( 1 + \frac{R}{100} \right)^n$$

$$\begin{aligned}
 &= 62,500 \left(1 + \frac{4}{100}\right)^3 \\
 &= 62,500 \left(\frac{26}{25}\right)^3 \\
 &= 62,500 \times \frac{26}{25} \times \frac{26}{25} \times \frac{26}{25} \\
 &= 4 \times 26 \times 26 \times 26 = ₹ 70,304 \\
 \therefore \text{CI} &= \text{A} - \text{P} = ₹ 70,304 - 62,500 \\
 &= ₹ 7,804
 \end{aligned}$$

Hence, amount = ₹ 70304 and CI = ₹ 7804

(d) **Given:** P = ₹ 8,000, n = 1 years R = 9% per annum compounded half yearly

Since, the interest is compounded half yearly

$$\therefore n = 1 \times 2 = 2 \text{ half years}$$

$$R = \frac{9}{2}\% \text{ per half year}$$

$$\begin{aligned}
 A &= P \left(1 + \frac{R}{100}\right)^n \\
 &= 8,000 \left(1 + \frac{9}{2 \times 100}\right)^2 \\
 &= 8,000 \left(\frac{209}{200}\right)^2 \\
 &= \cancel{8,000}^2 \times \frac{209 \times 209}{\cancel{200} \times \cancel{200}} \\
 &= ₹ \frac{87362}{10}
 \end{aligned}$$

$$= ₹ 8736.20$$

$$\text{CI} = \text{A} - \text{P}$$

$$= ₹ 8,736.20 - ₹ 8,000$$

$$= ₹ 736.20$$

Hence, the amount = ₹ 8736.20

and CI = ₹ 736.20

(e) **Given:** P = ₹ 10,000, n = 1 year and R = 8% pa compounded half yearly

Since the interest is compounded half yearly

$$\therefore n = 1 \times 2 = 2 \text{ half years}$$

$$R = 8 \times \frac{1}{2} = 4\% \text{ per half year}$$

$$\begin{aligned}
 A &= P \left(1 + \frac{R}{100}\right)^n \\
 &= 10,000 \left(1 + \frac{4}{100}\right)^2 \\
 &= 10,000 \left(\frac{26}{25}\right)^2
 \end{aligned}$$

$$\begin{aligned}
 &= 10,000 \times \frac{26}{25} \times \frac{26}{25} \\
 &= 16 \times 26 \times 26 = ₹ 10,816
 \end{aligned}$$

$$\text{CI} = \text{A} - \text{P}$$

$$= ₹ 10,816 - ₹ 10,000 = ₹ 816$$

Hence the amount = ₹ 10,816 and CI = ₹ 816

**Q2.** Kamala borrowed ₹ 26,400 from a Bank to buy a scooter at a rate of 15% per annum compounded yearly. What amount will she pay at the end of 2 years and 4 months to clear the loan?

(**Hint:** Find amount for 2 years with interest is compounded yearly and then find SI on the 2nd year amount for  $\frac{4}{12}$  years).

**Sol. Given:**

$$P = ₹ 26,400$$

$$R = 15\% \text{ p.a. compounded yearly}$$

$$n = 2 \text{ years and 4 months}$$

$$\text{Amount for 2 years} = P \left(1 + \frac{R}{100}\right)^n$$

$$= 26,400 \left(1 + \frac{15}{100}\right)^2$$

$$= 26,400 \left(\frac{23}{20}\right)^2$$

$$= \cancel{26,400}^{66 \times 132} \times \frac{23}{20} \times \frac{23}{20}$$

$$= 66 \times 529 = ₹ 34,914$$

$$\text{Principal for 4 months i.e., } \frac{4}{12} \text{ years}$$

$$= ₹ 34,914$$

$$\therefore \text{SI for 4 months} = \frac{P \times R \times n}{100}$$

$$= \frac{34,914 \times 15 \times \cancel{4}}{100 \times \cancel{12}}$$

$$= ₹ 1745.70$$

$$\therefore \text{Amount after 2 years and 4 months}$$

$$= ₹ 34,914 + ₹ 1745.70$$

$$= ₹ 36,659.70$$

Hence, the amount to be paid by Kamla = ₹ 36,659.70

**Q3.** Fabina borrows ₹ 12,500 at 12% per annum for 3 years at simple interest and Radha borrows the same amount for the same time period at 10% per annum, compounded annually. Who pays more interest and by how much?

Sol. For Fabina:  $P = ₹ 12,500$ ,  $R = 12\%$  p.a. and  $n = 3$  years

$$\begin{aligned} \therefore SI &= \frac{P \times R \times n}{100} \\ &= \frac{12,500 \times 12 \times 3}{100} \\ &= ₹ 4500 \end{aligned}$$

For Radha:  $P = ₹ 12,500$ ,  $R = 10\%$  p.a. and  $n = 3$  years

$$\begin{aligned} \therefore CI &= A - P \\ &= P \left( 1 + \frac{R}{100} \right)^n - P \\ &= 12,500 \left( 1 + \frac{10}{100} \right)^3 - 12,500 \\ &= 12,500 \left( \frac{11}{10} \right)^3 - 12,500 \\ &= 12,500 \times \frac{11 \times 11 \times 11}{10 \times 10 \times 10} - 12,500 \\ &= 12,500 \times \frac{1331}{1000} - 12,500 \\ &= 12,500 \times \left( \frac{1331}{1000} - 1 \right) \\ &= 12,500 \times \left( \frac{1331 - 1000}{1000} \right) \\ &= 12,500 \times \frac{331}{1000} \\ &= 12.5 \times 331 = ₹ 4137.50 \end{aligned}$$

Difference between the two interests = ₹ 4500 - ₹ 4137.50 = ₹ 362.50

Hence, Fabina pays more interest by ₹ 362.50.

Q4. I borrowed ₹ 12,000 from Jamshed at 6% per annum simple interest for 2 years. Had I borrowed this sum at 6% per annum compound interest, what extra amount would I have to pay?

Sol. Given:  $P = ₹ 12,000$ ,  $R = 6\%$  p.a.,  $n = 2$  years

$$\begin{aligned} \therefore SI &= \frac{P \times R \times n}{100} \\ &= \frac{12000 \times 6 \times 2}{100} \\ &= ₹ 1440 \\ CI &= P \left( 1 + \frac{R}{100} \right)^n - P \\ &= 12,000 \left( 1 + \frac{6}{100} \right)^2 - 12,000 \end{aligned}$$

$$\begin{aligned} &= 12,000 \left( \frac{53}{50} \right)^2 - 12,000 \\ &= 12,000 \left[ \left( \frac{53}{50} \right)^2 - 1 \right] \\ &= 12,000 \left[ \frac{53 \times 53}{50 \times 50} - 1 \right] \\ &= 12,000 \left[ \frac{2809}{2500} - 1 \right] \\ &= 12,000 \left[ \frac{2809 - 2500}{2500} \right] \\ &= \frac{12,000 \times 309}{2500} \\ &= \frac{7416}{5} = ₹ 1483.20 \end{aligned}$$

Difference between two interests

$$= ₹ 1483.20 - ₹ 1440 = ₹ 43.20$$

Hence, the extra amount to be paid = ₹ 43.20

Q5. Vasudevan invested ₹ 60,000 at an interest rate of 12% per annum compounded half yearly. What amount would he get

(i) after 6 months?

(ii) after 1 year?

Sol. (i) Given:  $P = ₹ 60,000$ ,  $R = 12\%$  p.a. compounded half yearly

$n = 6$  months

$$= \frac{6}{12} \text{ year} = \frac{1}{2} \text{ year}$$

$$\therefore \text{Simple Interest} = \frac{P \times R \times n}{100}$$

$$= \frac{60,000 \times 12 \times \frac{1}{2}}{100}$$

$$= ₹ 3600$$

$$\therefore \text{Amount} = P + SI$$

$$= ₹ 60,000 + ₹ 3600$$

$$= ₹ 63600$$

Hence the required amount = ₹ 63600

(ii) Given:  $P = ₹ 60,000$ ,  $R = \frac{12}{2}\% = 6\%$

$n = 1 \times 2 = 2$  half years

$$\begin{aligned} \therefore \text{Amount} &= P \left( 1 + \frac{R}{100} \right)^n \\ &= 60,000 \left( 1 + \frac{6}{100} \right)^2 \end{aligned}$$

$$\begin{aligned}
 &= 60,000 \left( \frac{53}{50} \right)^2 \\
 &= \frac{24}{120} \times 60,000 \times \frac{53}{50} \times \frac{53}{50} \\
 &= 24 \times 2809 \\
 &= ₹ 67416
 \end{aligned}$$

Hence, the required amount = ₹ 67416

**Q6.** Arif took a loan of ₹ 80,000 from a bank. If the rate of interest is 10% per annum, find the difference in amounts he would be paying after

$1\frac{1}{2}$  years if the interest is

(i) compounded annually.

(ii) compounded half yearly.

**Sol.** (i) **Given:**  $P = ₹ 80,000$

$$R = 10\% \text{ p.a.}$$

$$n = 1\frac{1}{2} \text{ years}$$

Since the interest is compounded annually

$$\therefore \text{SI for one year} = \frac{P \times R \times n}{100}$$

$$= \frac{80,000 \times 10 \times 1}{100} = ₹ 8,000$$

Principal for the second year

$$\begin{aligned}
 &= P + \text{SI} = ₹ 80,000 + ₹ 8,000 \\
 &= ₹ 88,000
 \end{aligned}$$

Now interest for  $\frac{1}{2}$  year

$$= \frac{440}{100 \times 2} \times 88,000 \times 10 \times 1 = ₹ 4,400$$

$$\begin{aligned}
 \therefore \text{Amount} &= ₹ 88,000 + ₹ 4,400 \\
 &= ₹ 92,400
 \end{aligned}$$

(ii) If the interest is compounded half yearly

$$R = \frac{10}{2} = 5\% \text{ half yearly}$$

$$n = 1\frac{1}{2} \text{ years}$$

$$= \frac{3}{2} \times 2 = 3 \text{ half years}$$

$$\therefore A = P \left( 1 + \frac{R}{100} \right)^n$$

$$= 80,000 \left( 1 + \frac{5}{100} \right)^3$$

$$= 80,000 \left( \frac{21}{20} \right)^3$$

$$= \frac{10}{20 \times 20 \times 20} \times \frac{21 \times 21 \times 21}{20 \times 20 \times 20}$$

$$= 10 \times 9261$$

$$= ₹ 92610$$

$\therefore$  Difference between the amounts

$$= ₹ 92,610 - ₹ 92,400$$

$$= ₹ 210$$

**Q7.** Maria invested ₹ 8,000 in a business. She would be paid interest at 5% per annum compounded annually. Find

(i) The amount credited against her name at the end of the second year.

(ii) The interest for the third year.

**Sol.** (i) **Given:**  $P = ₹ 8,000$ ,  $R = 5\% \text{ p.a.}$

and  $n = 2$  years

$$A = P \left( 1 + \frac{R}{100} \right)^n$$

$$= 8,000 \times \left( 1 + \frac{5}{100} \right)^2$$

$$= 8,000 \times \left( \frac{21}{20} \right)^2$$

$$= \frac{20}{8,000} \times \frac{21}{20} \times \frac{21}{20}$$

$$= 20 \times 441 = ₹ 8,820$$

Thus, the amount credited against Maria's name at the end of 2nd year = ₹ 8,820

(ii) Interest for the third year

= Amount after 3 years

– Amount after 2 years

$$= P \left( 1 + \frac{R}{100} \right)^n - ₹ 8,820$$

$$= 8,000 \times \left( 1 + \frac{5}{100} \right)^3 - ₹ 8,820$$

$$= 8,000 \left( \frac{21}{20} \right)^3 - ₹ 8,820$$

$$= \frac{8,000}{20 \times 20 \times 20} \times \frac{21}{20} \times \frac{21}{20} \times \frac{21}{20} - ₹ 8,820$$

$$= ₹ 9,261 - ₹ 8,820 = ₹ 441$$

Hence, interest for the third year = ₹ 441

**Q8.** Find the amount and the compound interest on ₹ 10,000 for  $1\frac{1}{2}$  years at 10% per annum, compounded half yearly. Would this interest be more than the interest he would get if it was compounded annually?

Sol. **Given:**  $P = ₹ 10,000$ ,  $n = 1\frac{1}{2}$  years

$R = 10\%$  per annum

Since the interest is compounded half yearly

$$\therefore n = 1\frac{1}{2} \text{ years}$$

$$= \frac{3}{2} \times 2 = 3 \text{ half years}$$

$$R = \frac{10}{2}\% = 5\% \text{ half yearly}$$

$$\begin{aligned} \therefore A &= P \left(1 + \frac{R}{100}\right)^n \\ &= 10,000 \left(1 + \frac{5}{100}\right)^3 \\ &= 10,000 \left(\frac{21}{20}\right)^3 \\ &= \cancel{10,000}^5 \times \frac{21}{20} \times \frac{21}{20} \times \frac{21}{20} \\ &= \frac{5}{4} \times 9261 = ₹ \frac{46305}{4} = ₹ 11576.25 \end{aligned}$$

$$\begin{aligned} \therefore \text{Compound interest} &= A - P \\ &= ₹ 11576.25 - 10,000 = ₹ 1576.25 \end{aligned}$$

If the interest is compounded annually, then

$$n = 1\frac{1}{2} \text{ year and } R = 10\%$$

$$\begin{aligned} \therefore \text{SI} &= \frac{P \times R \times n}{100} \\ &= \frac{10,000 \times 10 \times 1}{100} = ₹ 1,000 \end{aligned}$$

Principal for the second year

$$= 10,000 + ₹ 1,000$$

$$= ₹ 11,000$$

$$\therefore \text{Interest for } \frac{1}{2} \text{ year}$$

$$= \frac{11,000 \times \cancel{10}^5 \times 1}{\cancel{100} \times 2} = ₹ 550$$

$$\begin{aligned} \therefore \text{Total interest} &= ₹ 1,000 + ₹ 550 \\ &= ₹ 1,550 \end{aligned}$$

$\therefore$  Difference between the two interests

$$= ₹ 1,576.25 - ₹ 1,550$$

$$= ₹ 26.25$$

Hence, the interest will be ₹ 26.25 more when compounded half yearly than the interest when compounded annually.

**Q9.** Find the amount which Ram will get on ₹ 4,096, if he gave it for 18 months at  $12\frac{1}{2}\%$  per annum, interest being compounded half yearly.

**Sol. Given:**  $P = ₹ 4,096$ ,  $R = 12\frac{1}{2}\%$  pa,  $n = 18$  months

$$R = 12\frac{1}{2}\% \text{ pa}$$

$$= \frac{25}{2} \times \frac{1}{2} = \frac{25}{4}\% \text{ half yearly}$$

$$n = 18 \text{ months} = \frac{18}{12} \text{ years}$$

$$= \frac{18}{12} \times 2 = 3 \text{ half years}$$

$$\begin{aligned} \therefore A &= P \left(1 + \frac{R}{100}\right)^n \\ &= 4,096 \left(1 + \frac{25}{4 \times 100}\right)^3 \\ &= 4,096 \left(\frac{17}{16}\right)^3 \\ &= 4,096 \times \frac{17 \times 17 \times 17}{16 \times 16 \times 16} \\ &= ₹ 4,913 \end{aligned}$$

Hence, the required amount = ₹ 4913

**Q10.** The population of a place increased to 54,000 in 2003 at a rate of 5% per annum.

(i) Find the population in 2001.

(ii) What would be its population in 2005?

**Sol. (i) Given:** Population in 2003 = 54,000

Rate = 5% pa

Time = 2003 - 2001

$$= 2 \text{ years}$$

$$\therefore \text{Population in 2003} = \text{Population in 2001}$$

$$\times \left(1 + \frac{R}{100}\right)^n$$

$$54,000 = \text{Population in 2001} \times \left(1 + \frac{5}{100}\right)^2$$

$$\Rightarrow 54,000 = \text{Population in 2001} \times \left(\frac{21}{20}\right)^2$$

$$\Rightarrow 54,000 = \text{Population in 2001} \times \frac{441}{400}$$

$$\therefore \text{Population in 2001} = \frac{54,000 \times 400}{441}$$

$$= \frac{21,600,000}{441} = 48,979.59$$

$$= 48,980 \text{ (approximately)}$$

(ii) Population in 2005 = Population in 2003

$$\begin{aligned} & \times \left(1 + \frac{R}{100}\right)^n \\ & = 54,000 \times \left(1 + \frac{5}{100}\right)^2 \\ & = 54,000 \times \left(\frac{21}{20}\right)^2 \\ & = \frac{54,000}{100} \times \frac{441}{400} \\ & = 135 \times 441 = 59,535 \end{aligned}$$

**Q11.** In a Laboratory, the count of bacteria in a certain experiment was increasing at the rate of 2.5% per hour. Find the bacteria at the end of 2 hours if the count was initially 5,06,000.

**Sol. Given:** Initial count of bacteria = 5,06,000

Rate = 2.5% per hour

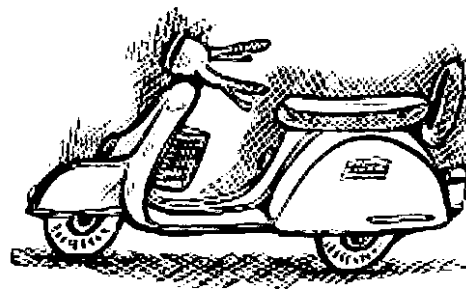
$n = 2$  hours

Number of bacteria at the end of 2 hours =  
Number of count of bacteria initially

$$\begin{aligned} & \times \left(1 + \frac{R}{100}\right)^n \\ & = 5,06,000 \left(1 + \frac{2.5}{100}\right)^2 \\ & = 5,06,000 \times \left(\frac{41}{40}\right)^2 \\ & = \frac{5,06,000}{100} \times \frac{1681}{1600} \\ & = 531616.25 \end{aligned}$$

Thus, the number of bacteria after two hours = 5,31,616 (approx).

**Q12.** A scooter was bought at ₹ 42,000. Its value depreciated at the rate of 8% per annum. Find its value after one year.



**Sol. Given:** Cost price of the scooter = ₹ 42,000

Rate of depreciation = 8% p.a.

Time = 1 year

Final value of the scooter

$$= \text{Present value} \times \left(1 - \frac{R}{100}\right)^n$$

$$= 42,000 \times \left(1 - \frac{8}{100}\right)$$

$$= \frac{1680}{100} \times \frac{23}{25}$$

$$= 1,680 \times 23 = 38,640$$

Hence, the value of scooter after 1 year = ₹ 38,640

## Learning More Q & A

### I. VERY SHORT ANSWER (VSA) QUESTIONS

**Q1.** Express the following in decimal form:

(a) 12%                      (b) 25%

**Sol.** (a)  $12\% = \frac{12}{100} = 0.12$

(b)  $25\% = \frac{25}{100} = 0.25$

**Q2.** Evaluate the following:

(a) 20% of 400              (b)  $12\frac{1}{2}\%$  of 625

**Sol.** (a)  $20\%$  of 400 =  $\frac{20}{100} \times 400 = 80$

(b)  $12\frac{1}{2}\%$  of 625 =  $\frac{25}{2}\%$  of 625  
 $= \frac{25}{2 \times 100} \times 625 = \frac{625}{8} = 78\frac{1}{8}$

**Q3.** If 20% of  $x$  is 25, then find  $x$ .

**Sol.** 20% of  $x = 25$

$$\Rightarrow \frac{20}{100} \times x = 25$$

$$\therefore x = 25 \times \frac{100}{20} = 125$$

Hence  $x = 125$

**Q4.** Express the following as a fraction

(a) 35%                      (b) 64%

**Sol.** (a)  $35\% = \frac{35}{100} = \frac{7}{20}$

(b)  $64\% = \frac{64}{100} = \frac{16}{25}$

**Q5.** Express the following into per cent

(a)  $1\frac{3}{5}$                       (b) 2 : 5

**Sol.** (a)  $1\frac{3}{5} = \frac{8}{5} = \frac{8}{5} \times 100 = 160\%$

(b)  $2 : 5 = \frac{2}{5} = \frac{2}{5} \times 100 = 40\%$

**Q6.** There are 24% boys in a school. If number of girls is 456, find the total number of the students in the school.

**Sol.** Let the total number of students be 100.

$\therefore$  Number of boys = 24% of 100

$$= \frac{24}{100} \times 100 = 24$$

Number of girls = 100 - 24 = 76

$\Rightarrow$  If number of girls is 76, then total number of students = 100

$\Rightarrow$  If Number of girls is 1, then total number of students =  $\frac{100}{76}$

$\Rightarrow$  If Number of girls is 456, then total number

$$\text{of students} = \frac{100 \times \overset{228}{456}}{\underset{76}{76}} = 600$$

Hence, the total number of students in the school = 600

**Q7.** The cost of 15 articles is equal to the selling price of 12 articles. Find the profit per cent.

**Sol.** Let CP of 15 articles be ₹ 100

$\therefore$  CP of 1 article = ₹  $\frac{100}{15}$

SP of 12 articles = ₹ 100

$\therefore$  SP fo 1 article = ₹  $\frac{100}{12}$

SP > CP

$\therefore$  Profit on 1 article = ₹  $\frac{100}{12} - ₹ \frac{100}{15}$

$$= ₹ \left( \frac{500 - 400}{60} \right)$$

$$= ₹ \frac{100}{60}$$

$\therefore$  Profit per cent =  $\frac{\text{Profit}}{\text{CP}} \times 100$

$$= \frac{100}{60} \times 100 = \frac{100}{15}$$

$$= \frac{100}{60} \times \frac{15}{100} \times 100 = 25\%$$

Hence, the profit = 25%

**Q8.** An articles is marked at ₹ 940. If it is sold for ₹ 799, then find the discount per cent.

**Sol.** MP = ₹ 940

SP = ₹ 799

$\therefore$  Discount = MP - SP

$$= ₹ (940 - 799) = ₹ 141$$

$\therefore$  Discount per cent =  $\frac{\text{Discount}}{\text{MP}} \times 100$

$$= \frac{141}{940} \times 100 = 15\%$$

Hence, discount = 15%

**Q9.** A watch was bought for ₹ 2,700 including 8% VAT. Find its price before the VAT was added.

**Sol.** Cost of watch including VAT = ₹ 2,700

Let the initial cost of the watch be ₹ 100

VAT = 8% of ₹ 100 = ₹ 8

$\therefore$  Cost of watch including VAT

$$= ₹ 100 + ₹ 8 = ₹ 108$$

If cost including VAT is ₹ 108, then its initial cost = ₹ 100

If cost including VAT is ₹ 1, then its initial cost

$$= ₹ \frac{100}{108}$$

If cost including VAT is ₹ 2,700, then its initial

$$\text{cost} = ₹ \frac{100}{108} \times 2700 = ₹ 2500$$

Hence, the required cost = ₹ 2,500

**Q10.** Find the amount if ₹ 2,000 is invested for 2 years at 4% p.a. compounded annually.

**Sol.**  $A = P \left( 1 + \frac{R}{100} \right)^n$

$$= 2000 \left( 1 + \frac{4}{100} \right)^2$$

$$= 2000 \times \left( \frac{26}{25} \right)^2$$

$$= 2000 \times \frac{26 \times 26}{25 \times 25}$$



$$= \frac{16 \times 676}{5} = ₹ \frac{10,816}{5}$$

$$= ₹ 2,163.20$$

Hence, the required amount = ₹ 2,163.20

## II. SHORT ANSWER (SA) QUESTIONS

**Q11.** A number is increased by 20% and then it is decreased by 20%. Find the net increase or decrease per cent. (NCERT Exemplar)

**Sol.** Let the number be 100

$$\therefore 20\% \text{ increase} = \frac{20}{100} \times 100 = 20$$

$$\therefore \text{Increased value} = 100 + 20 = 120$$

Now it is decreased by 20%

$$\therefore \text{Decreased value} = 120 - \frac{120 \times 20}{100}$$

$$= 120 - 24 = 96$$

$$\therefore \text{Net decrease} = 100 - 96 = 4$$

$$\therefore \text{Decrease per cent} = \frac{4}{100} \times 100 = 4\%$$

Hence, the net decrease per cent = 4%

**Q12.** Two candidates Raman and Rajan contested an election. Raman gets 46% of the valid votes and is defeated by 1600 votes. Find the total number of valid votes cast in the election.

**Sol.** Let the total number of valid votes be 100  
Number of votes got by Raman = 46% of 100

$$= \frac{46}{100} \times 100 = 46$$

$$\text{Number of votes got by Rajan}$$

$$= 100 - 46 = 54$$

$$\text{Difference between the votes}$$

$$= 54 - 46 = 8$$

$$\therefore 8\% \text{ of Valid votes} = 1,600$$

$$\Rightarrow \frac{8}{100} \times \text{Valid votes} = 1,600$$

$$\Rightarrow \text{Valid votes} = \frac{1,600 \times 100}{8} = 20,000$$

Hence, the total number of valid votes = 20,000

**Q13.** A man whose income is ₹ 57,600 a year spends ₹ 43,200 a year. What percentage of his income does he save?

**Sol.** Annual income of a man = ₹ 57,600

Amount spent by him in the year = ₹ 43,200

$$\therefore \text{Net amount saved by him}$$

$$= ₹ 57,600 - ₹ 43,200 = ₹ 14,400$$

$\therefore$  Percentage of his annual saving

$$= \frac{\text{Saving}}{\text{Income}} \times 100$$

$$= \frac{14,400}{57,600} \times 100 = 25\%$$

Hence, the saving percentage = 25%

**Q14.** A CD player was purchased for ₹ 3,200 and ₹ 560 were spent on its repairs. It was then sold at a gain of  $12\frac{1}{2}\%$ . How much did the seller receive?

**Sol.** Cost price of the CD player = ₹ 3,200

Amount spent on its repairing = ₹ 560

$\therefore$  Net cost price

$$= ₹ 3,200 + ₹ 560 = ₹ 3,760$$

$$\text{SP} = \text{CP} \left( 1 + \frac{\text{gain}}{100} \right)$$

$$= 3,760 \left( 1 + \frac{25}{2 \times 100} \right)$$

$$= \frac{470}{3,760} \times \frac{9}{8}$$

$$= 470 \times 9 = ₹ 4,230$$

Hence, the required amount = ₹ 4,230

**Q15.** A car is marked at ₹ 3,00,000. The dealer allows successive discounts of 6%, 4% and  $2\frac{1}{2}\%$  on it. What is the net selling price of it?

**Sol.** Marked price of the car = ₹ 3,00,000

Net selling price after the successive discounts

$$= 3,00,000 \times \left( \frac{100-6}{100} \right)$$

$$\times \left( \frac{100-4}{100} \right) \times \left( \frac{100-2.5}{100} \right)$$

$$= 3,00,000 \times \frac{94}{100} \times \frac{96}{100} \times \frac{97.5}{100}$$

$$= \frac{3 \times 94 \times 96 \times 97.5}{10} = ₹ 2,63,952$$

Hence, the net selling price = ₹ 2,63,952

**Q16.** Ramesh bought a shirt for ₹ 336, including 12% ST and a tie for ₹ 110 including 10% ST. Find the list price (without sales tax) of shirt and the tie together.

$$\text{Sol. List price of the shirt} = \frac{100}{112} \times 336 = ₹ 300$$

$$\text{List price of the tie} = \frac{100}{110} \times 110 = ₹ 100$$

$$\therefore \text{List price of both together}$$

$$= ₹ 300 + ₹ 100 = ₹ 400$$

**Q17.** Find the amount of ₹ 6,250 at 8% pa compounded annually for 2 years. Also find the compound interest.

$$\begin{aligned} \text{Sol. } A &= P \left( 1 + \frac{R}{100} \right)^n \\ &= 6,250 \left( 1 + \frac{8}{100} \right)^2 \\ &= 6,250 \left( \frac{27}{25} \right)^2 \\ &= 6,250 \times \frac{27}{25} \times \frac{27}{25} = ₹ 7,290 \end{aligned}$$

$$\begin{aligned} \therefore \text{CI} &= A - P \\ &= ₹ 7290 - ₹ 6,250 = ₹ 1,040 \end{aligned}$$

Hence, amount = ₹ 7,240 and CI = ₹ 1,040

**Q18.** Find the compound interest on ₹ 31,250 at 12% pa for  $2\frac{1}{2}$  years.

$$\begin{aligned} \text{Sol. } A &= 31,250 \left( 1 + \frac{12}{100} \right)^2 \left( 1 + \frac{12 \times \frac{1}{2}}{100} \right) \\ &= 31,250 \times \frac{28}{25} \times \frac{28}{25} \times \frac{53}{50} \\ &= 31,250 \times \frac{784}{625} \times \frac{53}{50} = ₹ 41,552 \\ \text{CI} &= A - P \\ &= ₹ 41,552 - ₹ 31,250 \\ &= ₹ 10,302 \end{aligned}$$

Hence, compound interest = ₹ 10,302

**Q19.** Vishakha offers a discount of 20% on all the items at her shop and still makes a profit of 12%. What is the cost price of an article marked at ₹ 280? (NCERT Exemplar)

**Sol.** Marked Price = ₹ 280

Discount = 20% of ₹ 280

$$= \frac{20}{100} \times 280 = ₹ 56$$

So selling price = ₹ (280 - 56) = ₹ 224

Let the cost price be ₹ 100

Profit = 12% of ₹ 100

$$= ₹ 12$$

So selling price = ₹ (100 + 12) = ₹ 112

If the selling price is ₹ 112, cost price = ₹ 100

If the selling price is ₹ 224, cost price

$$= ₹ \left( \frac{100}{112} \times 224 \right) = ₹ 200.$$

**Q20.** Find the compound interest on ₹ 48,000 for one year at 8% per annum when compounded half yearly. (NCERT Exemplar)

**Sol.** Principal (P) = ₹ 48,000

Rate (R) = 8% p.a.

Time (n) = 1 year

Interest is compounded half yearly

$$\begin{aligned} \therefore A &= P \left( 1 + \frac{R}{200} \right)^{2n} \\ &= 48,000 \left( 1 + \frac{8}{200} \right)^2 \\ &= 48,000 \times \frac{26}{25} \times \frac{26}{25} \\ &= 76.8 \times 26 \times 26 \\ &= ₹ 51,916.80 \end{aligned}$$

Therefore Compound Interest = A - P

$$= ₹ (51,916.80 - 48,000)$$

$$= ₹ 3,916.80$$

## Test Yourself

- Q1.** An electric press is marked at ₹ 840 and sold for ₹ 714. What is the discount per cent?
- Q2.** 65% of 80 students are good in Mathematics. How many of them are not good in this subject?
- Q3.** A chair marked at ₹ 1,500 and is available for ₹ 1,440. Find the discount per cent.
- Q4.** Rajni bought a second hand TV for ₹ 2,500 and spent ₹ 500 on its repairs and sold it for ₹ 3,300. Find his loss or gain per cent.
- Q5.** The distance between two places was 200 km. It was mismeasured as 280 km. Find the percentage error.

- Q6.** The price of a garment has been reduced by 15% in a sale to ₹ 306. Find its original price.
- Q7.** The cost of an article is increased by 10% and later decreased by 10%. What is the total change in per cent?
- Q8.** Harish had some apples. He sold 40% more than he ate. If he sold 70 apples, how many did he ate?
- Q9.** Manoj got 70% marks in an examination. If he got 490 marks, find the maximum marks.
- Q10.** An article is sold at a gain of 16%. Had it been sold for ₹ 200 more, the gain would have been 20%. Find the CP of the article.

- Q11. An article was sold for ₹ 448 with a profit of only 12%. Find the profit % if the selling price had been ₹ 512.
- Q12. Anshika bought two fans for ₹ 3,605. She sold one of them at a profit of 15% and the other at a loss of 9%. If she obtained the same amount for each fan, find the cost price of each fan.
- Q13. An article is sold for ₹ 96 at a profit per cent equal to its cost price in rupees. Find its CP.
- Q14. What price should Mayank mark on an object which costs ₹ 3,000 so as to gain 20% after allowing a discount of 10%?
- Q15. Find a single discount equivalent to two successive discounts of 20% and 5%.
- Q16. Kamlesh purchased a set of cosmetics. She paid ₹ 165 for it including ST. If the rate of ST is 10%, find the marked price of the set.
- Q17. The marked price of an article is 20% above the cost price. A discount of 10% is allowed to a customer. What is the profit per cent?
- Q18. Marked price of an article is ₹ 2,400. 10% discount is allowed on the printed price. A man earns a profit of 25% on this sale. What was the cost price at which the man purchased the article?
- Q19. Find the compound interest on ₹ 1,5625 at 16% pa for 9 months when compounded quarterly.
- Q20. Shyama purchases a scooter costing ₹ 36,450 and the rate of sales tax is 9%, then the total amount paid by her is (NCERT Exemplar)  
(a) ₹ 36,490.50 (b) ₹ 39,730.50  
(c) ₹ 36,454.50 (d) ₹ 33,169.50
- Q21. The marked price of an article is ₹ 80 and it is sold at ₹ 76, then the discount rate is (NCERT Exemplar)  
(a) 5% (b) 95%  
(c) 10% (d) appx. 11%
- Q22. A jacket was sold for ₹1,120 after allowing a discount of 20%. The marked price of the jacket is (NCERT Exemplar)  
(a) ₹ 1440 (b) ₹ 1400  
(c) ₹ 960 (d) ₹ 866.66
- Q23. A TV set was bought for ₹ 26,250 including 5% VAT. The original price of the TV set is (NCERT Exemplar)  
(a) ₹ 27,562.50 (b) ₹ 25,000  
(c) ₹ 24,937.50 (d) ₹ 26,245
- Q24. Radhika bought a car for ₹ 2,50,000. Next year its price decreased by 10% and further next year it decreased by 12%. In the two years overall decrease per cent in the price of the car is (NCERT Exemplar)  
(a) 3.2% (b) 22% (c) 20.8% (d) 8%
- Q25. The present population of a village is 6,250. If it increases at a rate of 4% every year, what will be the population of the village (i) at the end of 2 years (ii) at the end of 3 years?

### ANSWERS

- |                   |              |            |                |                 |          |
|-------------------|--------------|------------|----------------|-----------------|----------|
| 1. 15%            | 2. 28        | 3. 4%      | 4. Profit 10%  | 5. 40%          | 6. ₹ 360 |
| 7. 1% decrease    | 8. 50        | 9. 700     | 10. ₹ 5,000    | 11. 28%         |          |
| 12. ₹ 1592.50, 20 |              | 12. 50     | 13. ₹ 60       | 14. ₹ 4,000     | 15. 24%  |
| 16. ₹ 150         | 17. 8%       | 18. ₹ 1728 | 19. ₹ 1,951    | 20. ₹ 39,730.50 | 21. 5%   |
| 22. ₹ 1400        | 23. ₹ 25,000 | 24. 20.8%  | 25. 6760, 7030 |                 |          |

### Internal Assessment

Q1. Fill in the blanks.

- (a) The compound interest on ₹ 1000 at 5% pa for 1 year = ₹ \_\_\_\_\_ .
- (b) In case of compound interest, the principal of the second year = \_\_\_\_\_ + \_\_\_\_\_ .
- (c) Amount  $A = P +$  \_\_\_\_\_ .
- (d) 10% of 80 = \_\_\_\_\_ .
- (e) If 7% of  $x$  is 28, then  $x =$  \_\_\_\_\_ .
- (f) If SP = ₹ 2,200 and gain = 10%, then CP = \_\_\_\_\_ .

Q2. Select the correct answers:

- (a) If a sum of money borrowed on simple interest doubles itself in 10 years, then the rate of interest is  
(i) 2% (ii) 5%  
(iii) 10% (iv) 12%
- (b) An object marked at ₹ 96 is sold for ₹ 72. The rate of discount is  
(i) 25% (ii) 30%  
(iii) 4% (iv) 24%

(c) Cost of 5 pens is ₹ 72, then the cost of such 10 pens is

- (i) ₹ 104 (ii) ₹ 144  
(iii) ₹ 36 (iv) ₹ 108

(d) If  $P = ₹ 2,000$ ,  $R = 10\%$  pa and  $n = 2$  years, then CI is

- (i) ₹ 410 (ii) ₹ 420  
(iii) ₹ 402 (iv) ₹ 400

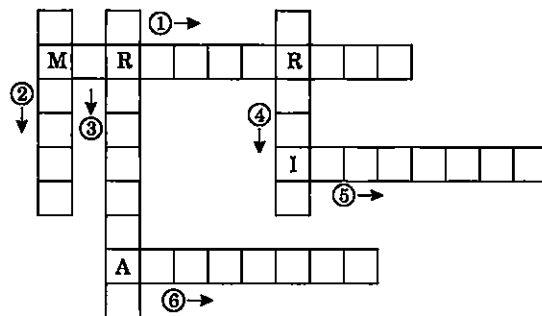
Q3. Find the profit or loss per cent if  $CP = ₹ 55$  and  $SP = ₹ 72.60$ .

Q4. A cycle is sold for ₹ 1,485 at a profit of 8%, find its CP.

Q5. 20% more can be gained if a merchant sold a cloth for ₹ 83 instead of ₹ 78. Find the cost price of the piece of the cloth.

Q6. By selling an article for ₹ 81, a man gains 8%. At what should he sell it to gain 12%.

Q7. Complete the given crossword puzzle.



Hints:

- (1) The \_\_\_\_\_ of an article is the list price.  
(2) \_\_\_\_\_ = Principal + Interest  
(3) Amount = \_\_\_\_\_ + interest  
(4) \_\_\_\_\_ =  $SP - CP$   
(5) \_\_\_\_\_ = Amount - Principal  
(6) CI of ₹ 500 at 5% pa compounded \_\_\_\_\_ for 2 years is ₹ 551.25.

### ANSWERS

1. (a) 50 (b) Principal, interest (c) Interest (d) 8 (e) 400 (f) ₹ 2,000  
2. (a) (iii) (b) (i) (c) (ii) (d) (ii) 3. 32% 4. ₹ 1,375 5. ₹ 25 6. ₹ 84  
7. (1) MARKED PRICE (2) AMOUNT (3) PRINCIPAL  
(4) PROFIT (5) INTEREST (6) ANNUALLY

# ◆ Half Yearly Assessment

## SET-1

Time: 3 hour

M.M.: 80

**General Instructions**

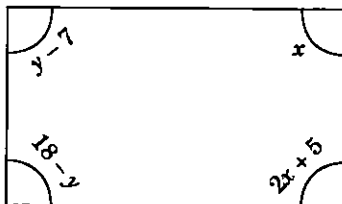
- All questions are compulsory. However internal choice is given.
- Section A consists of 4 questions carrying 1 mark each.
- Section B consists of 5 questions carrying 2 marks each.
- Section C consists of 10 questions carrying 3 marks each.
- Section D consists of 9 questions carrying 4 marks each.

**SECTION-A**

1. The perimeter of a rectangle is 13 cm and its width is  $2\frac{3}{4}$  cm. Find its length.
2. Solve for  $x$ :  $\frac{15}{4} - 7x = 9$ .
3. Find two rational numbers between  $-\frac{2}{5}$  and  $\frac{1}{2}$ .
4. Find:  $\frac{2}{5} \times \frac{-3}{7} - \frac{1}{14} - \frac{3}{7} \times \frac{3}{5}$

**SECTION-B**

5. Represent the following rational numbers on number lines.
  - (i)  $\frac{4}{9}$
  - (ii)  $\frac{-3}{7}$
6. The sum of three consecutive integers is 51. Find the three numbers.
7. Solve for  $x$ :  $5x + \frac{7}{2} = \frac{3}{2}x - 14$ .
8. Present ages of Anu and Raj are in the ratio 4 : 5. Eight years from now, the ratio of their ages will be 5 : 6. Find their present ages.
9. In the given figure, find the value of  $x$  and  $y$ .



**SECTION-C**

10. Draw a  $\square ABCD$  in which  $AB = 4.5$  cm,  $\angle B = 70^\circ$ ,  $BC = 5$  cm,  $AD = 4.2$  cm.

11. Draw the histogram of the following data:

Class intervals	Frequency
0-10	2
10-20	10
20-30	21
30-40	19
40-50	7
50-60	1
Total	60

OR

On a particular day, the sales (in rupees) of different items of a banker's shop are given below:

Ordinary bread	:	320
Fruit bread	:	80
Cakes	:	160
Biscuits	:	120
Others	:	40
Total	:	720

Draw a pie chart of the given data.

12. Write a Pythagorean triplets whose smallest number is 8.
13. Find the smallest number by which 9408 must be divided so that the quotient is a perfect square. Find the square root of the quotient.
14. Find the cube root of 13824 by prime factorisation method.
15. Evaluate:  $\sqrt{900} + \sqrt{0.09} + \sqrt{0.000009}$
16. The price of a TV is ₹ 13,000. The sales tax charged on it is at the rate of 12%. Find the amount that Ayush will have to pay if he buys it.
17. Find compound interest on ₹ 12600 for 2 years at 10% per annum compounded annually.
18. A scooter was bought at ₹ 42,000. Its value depreciates at the rate of 8% per annum. Find its value after one year.
19. Anshika purchased an object for ₹ 5400 including 8% VAT. Find the price before VAT was added.

**SECTION-D**

20. What amount is to be repaid on a loan of ₹ 12000 for  $1\frac{1}{2}$  years at 10% p.a. compounded half yearly?
21. A shopkeeper buys 80 articles for ₹ 2400 and sells them for a profit of 16%. Find the selling price of one article.

22. Mr. Anuj had ₹ 600 left after spending 75% of his money, how much did he have in the beginning?

OR

The list price of a frock is ₹ 220. A discount of 20% is announced on sales. What is the amount of discount on it and its sale price?

23. Two numbers are in the ratio 8 : 3. If the sum of the numbers is 143, find the numbers.
24. The digits of a two digit number differ by 3. If the digits interchange their places and the resulting number is added to the original number, we get 143. What can be the original number?
25. The angles of a quadrilateral are in the ratio 2 : 3 : 5 : 8, find the measure of each of the four angles.
26. Construct a  $\square$  MORE in which  $MO = 6$  cm,  $OR = 4.5$  cm,  $\angle M = 60^\circ$ ,  $\angle O = 105^\circ$  and  $\angle R = 105^\circ$ .
27. Draw a histogram of the following data:

<b>Salary in thousand rupees</b>	15–20	20–25	25–30	30–35	35–40
<b>No. of employees</b>	35	30	45	40	10

28. A card is drawn from a well shuffled deck of 52 cards. Find the probability of getting
- (a) a red king                      (b) a black card.

OR

Find the probability of getting 53rd Monday in a leap year.

# ◆ Half Yearly Assessment

## SET-2

Time: 3 hour

M.M.: 80

**General Instructions:** Same as paper-1**SECTION-A**

1. Find the product:  $-3x^2y \times xy^2 \times (-2x^3y^2)$
2. Factorise:  $x^2 + 12x - 28$
3. Solve for  $x$ :  $\frac{3}{2}x + 1 = \frac{3}{8}x + 4$
4. The angles of a triangle are in the ratio 5 : 6 : 7, find the angles.

**SECTION-B**

5. The sum of the digits of a two digit number is 8. If 18 is added to the number, the digits interchange their places. Find the number.
6. In an elections, there were only two candidates. The winner polled 55% votes and won by a margin of 8756 votes. Find the total number of votes polled.
7. Factorise:  $25x^2 - 4y^2 + 28yz - 49z^2$ .
8. Find the cube root of  $-21952$ .
9. Find the square root of 0.327 upto 2 decimal places.

**SECTION-C**

10. Find the value of  $\sqrt{\frac{5832}{1331}}$ .
11. Add:  $5x^2 - 7xyz + z^2$ ,  $2x^2y + 3xyz - 4z^2$  and  $9x^2y + 2xyz - 3z^2$ .
12. Subtract  $3a(a + b + c) - 2b(a - b + c)$  from  $4c(-a + b + c)$ .
13. Multiply  $p^2 + 2q$  by  $p^3 - 2pq + q^3$  and hence find the value of the product for  $p = 1$  and  $q = -1$ .

OR

Find the value of  $\frac{7.87 \times 7.87 - 1.72 \times 1.72}{6.15}$ 

14. Divide:  $12x^3 - 17x^2 + 26x - 15$  by  $3x^2 - 2x + 5$ .
15. Solve the equations:  $\frac{3x - 2}{4} - \frac{2x + 3}{3} + x = \frac{2}{3}$
16. The present ages of Raina and Ranjana are in the ratio 5 : 4. Eight years hence, their ages will be in the ratio 6 : 5. Find their present ages.
17. If the setting price of 5 articles is equal to the cost price of 6 articles. Find the profit or loss per cent.
18. What is the single discount equivalent to successive discounts of 20% and 15%?
19. The sum of two numbers is 8 and their difference is 4. Find the two numbers.



## SECTION-D

20. A rational number is such that when you multiply it by  $\frac{5}{2}$  and add  $\frac{2}{3}$  to the product, you get  $-\frac{7}{22}$ . What is the number?
21. The denominator of a rational number is greater than its numerator by 8. If the numerator is increased by 17 and the denominator is decreased by 1, the number obtained is  $\frac{3}{2}$ . Find the rational number.
22. Solve for  $x$ :  $\frac{(3x+1)}{16} + \frac{2x-3}{7} = \frac{x+3}{8} + \frac{3x-1}{14}$ .
23. In the given fig. (i) ABCD is a parallelogram. Find the values of  $x$  and  $y$ .

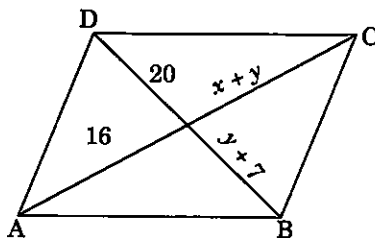


Fig. (i)

OR

ABCDE is a regular polygon shown in fig. (ii), find the value of  $x$  and hence find the measure of all exterior angles.

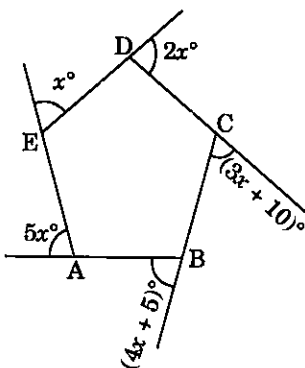


Fig. (ii)

24. Construct a  $\square$ ABCD in which  $AB = 4.5$  cm  $\angle B = 105^\circ$ ,  $BC = 5$  cm,  $CD = 2.5$  cm and  $AD = 4.5$  cm.
25. Construct a rhombus whose diagonals are 5.2 cm and 6.4 cm long.
26. Find the smallest number by which 68600 must be multiplied to get a perfect cube.
27. Mr. Rajat Kumar bought two fans for ₹ 1200 each. He sold one at a loss of 5% and the other at a profit of 10%. Find the selling price of each. Also, find out the total profit or loss.
28. Find compound interest paid when a sum of ₹ 10,000 is invested for 1 year and 3 months at  $8\frac{1}{2}\%$  p.a. compounded annually.