NCERT Solutions for Class 8 Maths Chapter 8 - Comparing Quantities

Chapter 8 - Comparing Quantities Exercise Ex. 8.1

Solution 1

(a) Ratio of the speed of cycle to the speed of scooter $= \frac{15}{30} = 1:2$

(b) Since 1 km = 1000 m,

$$\text{Required ratio} = \frac{5\,\text{m}}{10\ \text{km}} = \frac{5\,\text{m}}{10 \times 1000\,\text{m}} = 1:2000$$

(c) Since Re 1 = 100 paise,

$$\text{Required ratio} = \frac{50\,\text{paise}}{\text{Rs}\,5} = \frac{50\,\text{paise}}{500\,\text{paise}} = 1:10$$

Solution 2

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

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

$= \left(\frac{66 \times 3 + 2}{3}\right)\% = 66\frac{2}{3}\%$

Solution 3

It is given that 72% of 25 students are good in mathematics.

Therefore,

Percentage of students who are not good in mathematics = (100 − 72)%

= 28%

∴Number of students who are not good in mathematics $= \frac{28}{100} \times 25$

= 7

Thus, 7 students are not good in mathematics.

Solution 4

Let the total number of matches played by the team be x.

It is given that the team won 10 matches and the winning percentage of the team was 40%.

Therefore,

$$\frac{40}{100} \times x = 10$$
$$x = 10 \times \frac{100}{40}$$
$$x = 25$$

Thus, the team played 25 matches.

Solution 5

Let the amount of money which Chameli had in the beginning be x.

It is given that after spending 75% of Rs x, she was left with Rs 600.

Therefore,

$(100 - 75)\%$ of x = Rs 600

Or, 25 % of x = Rs 600

$$\frac{25}{100} \times x = \text{Rs } 600$$
$$x = \text{Rs}\left(600 \times \frac{100}{25}\right) = \text{Rs } 2400$$

Thus, she had Rs 2400 in the beginning.

Solution 6

Percentage of people who like other games = (100 − 60 − 30)%

= (100 − 90)% = 10 %

Total number of people = 50 lakh

Therefore, number of people who like cricket $= \left(\frac{60}{100} \times 50\right)$ lakh = 30 lakh

Number of people who like football $= \left(\frac{30}{100} \times 50\right)$ lakh = 15 lakh

Number of people who like other games $= \left(\frac{10}{100} \times 50\right)$ lakh = 5 lakh

Chapter 8 - Comparing Quantities Exercise Ex. 8.2

Solution 1

Let the original salary be x. It is given that the new salary is Rs 1,54,000.

Original salary + Increment = New salary

However, it is given that the increment is 10% of the original salary.

Therefore,

$$x + \frac{10}{100} \times x = 154000$$

$$\frac{110x}{100} = 154000$$

$$x = \left(154000 \times \frac{100}{110}\right)$$

$$x = 140000$$

Thus, the original salary was Rs 1,40,000.

Solution 2

It is given that on Sunday, 845 people went to the zoo and on Monday, 169 people went.

Decrease in the number of people = 845 − 169 = 676

$$\text{Percentage decrease} = \left(\frac{\text{Decrease in the number of people} \times 100}{\text{Number of people who went to zoo on sunday}} \right)\%$$

% decrease = 676 / 845 x 100 = 80%

Thus, there was 80% decrease in the people visiting the zoo on Monday.

Solution 3

It is given that the shopkeeper buys 80 articles for Rs 2,400.

$$\text{Cost of one article} = \text{Rs } \frac{2400}{80} = \text{Rs } 30$$

Profit percent = 16

$$\text{Profit Percent} = \frac{\text{Profit}}{\text{C.P.}} \times 100$$

$$16 = \frac{\text{Profit}}{\text{Rs } 30} \times 100$$

$$\text{Profit} = \text{Rs} \left(\frac{16 \times 30}{100} \right) = \text{Rs } 4.80$$

Selling price of one article = C.P. + Profit = Rs (30 + 4.80) = Rs 34.80

Solution 4

Total cost of an article = Cost + Overhead expenses

= Rs 15500 + Rs 450

= Rs 15950

$$\text{Profit } \% = \frac{\text{Profit}}{\text{C.P.}} \times 100$$

$$15 = \frac{\text{Profit}}{\text{Rs } 15950} \times 100$$

$$\text{Profit} = \text{Rs} \left(\frac{15950 \times 15}{100} \right) = \text{Rs } 2392.50$$

∴Selling price of the article = C.P. + Profit = Rs (15950 + 2392.50)

= Rs 18342.50

Solution 5

C.P. of a VCR = Rs 8000

The shopkeeper made a loss of 4 % on VCR.

This means if C.P. is Rs 100, then S.P. is Rs 96.

When C.P. is Rs 8000, S.P. = $\text{Rs}\left(\frac{96}{100}\times 8000\right)$ = Rs 7680

C.P. of a TV = Rs 8000

The shopkeeper made a profit of 8 % on TV.

This means that if C.P. is Rs 100, then S.P. is Rs 108.

When C.P. is Rs 8000, S.P. = $\text{Rs}\left(\frac{108}{100}\times 8000\right)$ = Rs 8640

Total S.P. = Rs 7680 + Rs 8640 = Rs 16320

Total C.P. = Rs 8000 + Rs 8000 = Rs 16000

Since total S.P.> total C.P., there was a profit.

Profit = Rs 16320 – Rs 16000 = Rs 320

$$\text{Profit \%} = \frac{\text{Profit}}{\text{C.P.}}\times 100$$
$$= \frac{320}{16000}\times 100 = 2\%$$

Therefore, the shopkeeper had a gain of 2% on the whole transaction.

Solution 6

Total marked price = Rs (1,450 + 2 × 850) = Rs (1,450 +1,700) = Rs 3,150

Given that, discount % = 10%

$$\text{Discount} = \text{Rs}\left(\frac{10}{100}\times 3150\right) = \text{Rs } 315$$

Also, Discount = Marked price − Sale price

Rs 315 = Rs 3150 − Sale price

∴ Sale price = Rs (3150 − 315) = Rs 2835

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

Solution 7

S.P. of each buffalo = Rs 20000

The milkman made a gain of 5% while selling one buffalo.

This means if C.P. is Rs 100, then S.P. is Rs 105.

C.P. of one buffalo = 20000 x 100 / 105 = Rs 19,047.62

Also, the second buffalo was sold at a loss of 10%.

This means if C.P. is Rs 100, then S.P. is Rs 90.

$$\therefore \text{C.P. of other buffalo} = \text{Rs}\left(20000\times\frac{100}{90}\right) = \text{Rs } 22222.22$$

Total C.P. = Rs 19047.62 + Rs 22222.22 = Rs 41269.84

Total S.P. = Rs 20000 + Rs 20000 = Rs 40000

Loss = Rs 41269.84 − Rs 40000 = Rs 1269.84

Thus, the overall loss of milkman was Rs 1,269.84.

Solution 8

On Rs 100, the tax to be paid = Rs 12

On Rs 13000, the tax to be paid will be $= \text{Rs}\left(\frac{12}{100}\times 13000\right)$

$= \text{Rs } 1560$

Required amount = Cost + Sales Tax = Rs 13000 + Rs 1560

$= \text{Rs } 14560$

Thus, Vinod will have to pay Rs 14,560 for the T.V.

Solution 9

Let the marked price be x.

$$\text{Discount percent} = \frac{\text{Discount}}{\text{Marked price}}\times 100$$

$$20 = \frac{\text{Discount}}{x}\times 100$$

$$\text{Discount} = \frac{20}{100}\times x = \frac{1}{5}x$$

Also,

Discount = Marked price − Sale price

$$\frac{1}{5}x = x - \text{Rs } 1600$$

$$x - \frac{1}{5}x = \text{Rs } 1600$$

$$\frac{4}{5}x = \text{Rs } 1600$$

$$x = \text{Rs}\left(1600\times\frac{5}{4}\right) = \text{Rs } 2000$$

Thus, the marked price was Rs 2000.

Solution 10

The price includes VAT.

Thus, 8% VAT means that if the price without VAT is Rs 100, then price including VAT will be Rs 108.

When price including VAT is Rs 108, original price = Rs 100

$$\text{When price including VAT is Rs 5400, original price } = \text{Rs}\left(\frac{100}{108}\times 5400\right)$$
$$= \text{Rs } 5000$$

Thus, the price of the hair-dryer before the addition of VAT was Rs 5,000.

Solution 11
Let the original price of an article be Rs. 100. GST = 18%.
Price after GST included = Rs. (100 + 18) = Rs. 118
When selling price is Rs. 118 then original price = Rs. 100
When selling price is Rs. 1239 then original price

$$\frac{100}{118}\times 1239 = \text{Rs.}1050$$

Therefore the price of an article before GST was added is Rs. 1050.

Chapter 8 - Comparing Quantities Exercise Ex. 8.3

Solution 1

(a) Principal (P) = Rs 10, 800

Rate (R) $= 12\frac{1}{2}\% = \frac{25}{2}\%$ (annual)

Number of years $(n) = 3$

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

$= \text{Rs}\left[10800\left(1+\frac{25}{200}\right)^3\right]$

$= \text{Rs}\left[10800\left(\frac{225}{200}\right)^3\right]$

$= \text{Rs}\left(10800\times\frac{225}{200}\times\frac{225}{200}\times\frac{225}{200}\right)$

$= \text{Rs } 15377.34375$

$= \text{Rs } 15377.34 \qquad (\text{approximately})$

C.I. = A − P = Rs (15377.34 − 10800) = Rs 4,577.34

(b) Principal (P) = Rs 18,000

Rate (R) = 10% annual

Number of years $(n) = 2\frac{1}{2}$ years

The amount for 2 years and 6 months can be calculated by first calculating the amount for 2 years using the compound interest formula, and then calculating the simple interest for 6 months on the amount obtained at the end of 2 years.

Firstly, the amount for 2 years has to be calculated.

$$A = \text{Rs}\left[18000\left(1+\frac{1}{10}\right)^2\right] = \text{Rs}\left(18000\times\frac{11}{10}\times\frac{11}{10}\right) = \text{Rs } 21780$$

By taking Rs 21780 as principal, the S.I. for the next year will be calculated.

$$\text{S.I.} = \text{Rs}\left(\frac{21780\times\frac{1}{2}\times10}{100}\right) = \text{Rs } 1089$$

∴ Interest for the first 2 years = Rs (21780 − 18000) = Rs 3780

And interest for the next $\frac{1}{2}$ year = Rs 1089

∴ Total C.I. = Rs 3780 + Rs 1089 = Rs 4,869

A = P + C.I. = Rs 18000 + Rs 4869 = Rs 22,869

(c) Principal (P) = Rs 62,500

Rate = 8% per annum or 4% per half year

Number of years $= 1\frac{1}{2}$

There will be 3 half years in $1\frac{1}{2}$ years.

$$A = P\left(1+\frac{R}{100}\right)^{n} = \text{Rs}\left[62500\left(1+\frac{4}{100}\right)^{3}\right]$$

$$= \text{Rs}\left(62500\times\frac{26}{25}\times\frac{26}{25}\times\frac{26}{25}\right)$$

$$= \text{Rs } 70304$$

C.I. = A − P = Rs 70304 − Rs 62500 = Rs 7,804

(d) Principal (P) = Rs 8000

Rate of interest = 9% per annum or $\frac{9}{2}$% per half year

Number of years = 1 year

There will be 2 half years in 1 year.

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

$$= \text{Rs}\left[8000\left(1+\frac{9}{200}\right)^2\right]$$

$$= \text{Rs}\left[8000\left(\frac{209}{200}\right)^2\right] = \text{Rs } 8,736.20$$

C.I. = A − P = Rs 8736.20 − Rs 8000 = Rs 736.20

(e) Principal (P) = Rs 10,000

Rate = 8% per annum or 4% per half year

Number of years = 1 year

There are 2 half years in 1 year.

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

$$= \text{Rs}\left[10000\left(1+\frac{4}{100}\right)^2\right] = \text{Rs}\left[10000\left(1+\frac{1}{25}\right)^2\right]$$

$$= \text{Rs}\left(10000\times\frac{26}{25}\times\frac{26}{25}\right) = \text{Rs } 10,816$$

C.I. = A − P = Rs 10816 − Rs 10000 = Rs 816

Solution 2

Principal (P) = Rs 26,400

Rate (R) = 15% per annum

Number of years $(n) = 2\frac{4}{12}$ years

The amount for 2 years and 4 months can be calculated by first calculating the amount for 2 years using the compound interest formula, and then calculating the simple interest for 4 months on the amount obtained at the end of 2 years.

Firstly, the amount for 2 years has to be calculated.

$$A = \text{Rs}\left[26400\left(1+\frac{15}{100}\right)^2\right] = \text{Rs}\left[26400\left(1+\frac{3}{20}\right)^2\right]$$
$$= \text{Rs}\left(26400\times\frac{23}{20}\times\frac{23}{20}\right) = \text{Rs } 34,914$$

By taking Rs 34,914 as principal, the S.I. for the next $\frac{1}{3}$ years will be calculated.

$$\text{S.I.} = \text{Rs}\left(\frac{34914\times\frac{1}{3}\times15}{100}\right) = \text{Rs } 1,745.70$$

Interest for the first two years = Rs (34914 − 26400) = Rs 8,514

And interest for the next $\frac{1}{3}$ year = Rs 1,745.70

Total C.I. = Rs (8514 + Rs 1745.70) = Rs 10,259.70

Amount = P + C.I. = Rs 26400 + Rs 10259.70 = Rs 36,659.70

Solution 3

Interest paid by Fabina =

$$= \text{Rs}\left(\frac{12500 \times 12 \times 3}{100}\right) = \text{Rs } 4,500$$

Amount paid by Radha at the end of 3 years $= A = P\left(1 + \frac{R}{100}\right)^n$

$$A = \text{Rs}\left[12500\left(1 + \frac{10}{100}\right)^3\right]$$

$$= \text{Rs}\left(12500 \times \frac{110}{100} \times \frac{110}{100} \times \frac{110}{100}\right) = \text{Rs } 16,637.50$$

C.I. = A − P = Rs 16637.50 − Rs 12500 = Rs 4,137.50

The interest paid by Fabina is Rs 4,500 and by Radha is Rs 4,137.50.

Thus, Fabina pays more interest.

Rs 4500 − Rs 4137.50 = Rs 362.50

Hence, Fabina will have to pay Rs 362.50 more.

Solution 4

P = Rs 12000

R = 6% per annum

T = 2 years

$$\text{S.I.} = \frac{P \times R \times T}{100} = \text{Rs}\left(\frac{12000 \times 6 \times 2}{100}\right) = \text{Rs } 1,440$$

To find the compound interest, the amount (A) has to be calculated.

$$A = P\left(1+\frac{R}{100}\right)^{n} = \text{Rs}\left[12000\left(1+\frac{6}{100}\right)^{2}\right]$$

$$= \text{Rs}\left[12000\left(1+\frac{3}{50}\right)^{2}\right] = \text{Rs}\left(12000 \times \frac{53}{50} \times \frac{53}{50}\right)$$

$$= \text{Rs } 13,483.20$$

$\therefore$ C.I. = A − P = Rs 13483.20 − Rs 12000 = Rs 1,483.20

C.I. − S.I. = Rs 1,483.20 − Rs 1,440 = Rs 43.20

Thus, the extra amount to be paid is Rs 43.20.

Solution 5

(i) P = Rs 60,000

Rate = 12% per annum = 6% per half year

n = 6 months = 1 half year

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

$$= \text{Rs}\left[60000\left(1+\frac{6}{100}\right)^{1}\right] = \text{Rs}\left(60000 \times \frac{106}{100}\right) = \text{Rs } 63,600$$

(ii) There are 2 half years in 1 year.

n = 2

$$A = \text{Rs}\left[60000\left(1+\frac{6}{100}\right)^{2}\right] = \text{Rs}\left(60000 \times \frac{106}{100} \times \frac{106}{100}\right) = \text{Rs } 67,416$$

Solution 6

(i) P = Rs 80,000

R = 10% per annum

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

The amount for 1 year and 6 months can be calculated by first calculating the amount for 1 year using the compound interest formula, and then calculating the simple interest for 6 months on the amount obtained at the end of 1 year.

Firstly, the amount for 1 year has to be calculated.

$$A = \text{Rs}\left[80000\left(1+\frac{10}{100}\right)^{1}\right]$$

$$= \text{Rs}\left[80000\left(1+\frac{1}{10}\right)\right] = \text{Rs}\left(80000\times\frac{11}{10}\right) = \text{Rs } 88,000$$

By taking Rs 88,000 as principal, the SI for the next $\frac{1}{2}$ year will be calculated.

$$\text{S.I.} = \frac{P\times R\times T}{100} = \text{Rs}\left(\frac{88000\times 10\times\frac{1}{2}}{100}\right) = \text{Rs } 4,400$$

Interest for the first year = Rs 88000 − Rs 80000 = Rs 8,000

And interest for the next $\frac{1}{2}$ year = Rs 4,400

Total C.I. = Rs 8000 + Rs 4,400 = Rs 12,400

A = P + C.I. = Rs (80000 + 12400) = Rs 92,400

(ii) The interest is compounded half yearly.

Rate = 10% per annum = 5% per half year

There will be three half years in $1\frac{1}{2}$ years.

$$A = \text{Rs}\left[80000\left(1+\frac{5}{100}\right)^3\right] = \text{Rs}\left[80000\left(1+\frac{1}{20}\right)^3\right]$$
$$= \text{Rs}\left(80000\times\frac{21}{20}\times\frac{21}{20}\times\frac{21}{20}\right) = \text{Rs } 92,610$$

Difference between the amounts = Rs 92,610 − Rs 92,400 = Rs 210

Solution 7

(i) P = Rs 8,000

R = 5% per annum

$n = 2$ years

$$A = \text{Rs}\left[8000\left(1+\frac{5}{100}\right)^2\right] = \text{Rs}\left(8000\left(1+\frac{1}{20}\right)^2\right)$$
$$= \text{Rs}\left(8000\times\frac{21}{20}\times\frac{21}{20}\right) = \text{Rs } 8,820$$

(ii) The interest for the next one year, i.e. the third year, has to be calculated.

By taking Rs 8,820 as principal, the S.I. for the next year will be calculated.

$$\text{S.I.} = \text{Rs}\left(\frac{8820\times5\times1}{100}\right) = \text{Rs } 441$$

Solution 8

P = Rs 10,000

Rate = 10% per annum = 5% per half year

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

There will be 3 half years in $1\frac{1}{2}$ years.

$$A = \text{Rs}\left[10000\left(1+\frac{5}{100}\right)^{3}\right] = \text{Rs}\left[10000\left(1+\frac{1}{20}\right)^{3}\right]$$
$$= \text{Rs}\left(10000\times\frac{21}{20}\times\frac{21}{20}\times\frac{21}{20}\right) = \text{Rs } 11{,}576.25$$

C.I. = A − P

= Rs 11576.25 − Rs 10000 = Rs 1,576.25

The amount for 1 year and 6 months can be calculated by first calculating the amount for 1 year using the compound interest formula, and then calculating the simple interest for 6 months on the amount obtained at the end of 1 year.

The amount for the first year has to be calculated first.

$$A = \text{Rs}\left[10000\left(1+\frac{10}{100}\right)^{1}\right] = \text{Rs}\left[10000\left(1+\frac{1}{10}\right)\right]$$
$$= \text{Rs}\left(10000\times\frac{11}{10}\right) = \text{Rs } 11{,}000$$

By taking Rs 11,000 as the principal, the S.I. for the next $\frac{1}{2}$ year will be calculated.

$$\text{S.I.} = \text{Rs}\left(\frac{11000\times10\times\frac{1}{2}}{100}\right) = \text{Rs } 550$$

∴ Interest for the first year = Rs 11000 − Rs 10000 = Rs 1,000

∴ Total compound interest = Rs 1000 + Rs 550 = Rs 1,550

Therefore, the interest would be more when compounded half yearly than the interest when compounded annually.

Solution 9

$P = \text{Rs } 4{,}096$

$R = 12\frac{1}{2}\%\ \text{per annum} = \frac{25}{4}\%\ \text{per half year}$

$n = 18$ months

There will be 3 half years in 18 months.

Therefore,

$$A = \text{Rs}\left[4096\left(1+\frac{25}{400}\right)^3\right] = \text{Rs}\left[4096\left(1+\frac{1}{16}\right)^3\right]$$

$$= \text{Rs}\left(4096\times\frac{17}{16}\times\frac{17}{16}\times\frac{17}{16}\right) = \text{Rs } 4{,}913$$

Thus, the required amount is Rs 4,913.

Solution 10

(i) It is given that, population in the year 2003 = 54,000

Therefore,

$$54000 = (\text{Population in } 2001)\left(1+\frac{5}{100}\right)^2$$

Population in 2001 = 48979.59

Thus, the population in the year 2001 was approximately 48,980.

(ii) Population in $2005 = 54000\left(1+\frac{5}{100}\right)^2$

$$= 54000\left(1+\frac{1}{20}\right)^2 = 54000\times\frac{21}{20}\times\frac{21}{20} = 59{,}535$$

Thus, the population in the year 2005 would be 59,535.

Solution 11

The initial count of bacteria is given as 5,06,000.

$$\text{Bacteria at the end of 2 hours} = 506000\left(1+\frac{2.5}{100}\right)^2$$

$$= 506000\left(1+\frac{1}{40}\right)^2 = 506000\times\frac{41}{40}\times\frac{41}{40}$$

$$= 531616.25 = 5,31,616 \text{ (approx.)}$$

Thus, the count of bacteria at the end of 2 hours will be 5,31,616 (approx.).

Solution 12

Principal = Cost price of the scooter = Rs 42,000

Depreciation = 8% of Rs 42,000 per year

$$= \text{Rs}\left(\frac{42000\times 8\times 1}{100}\right)$$

$$= \text{Rs } 3,360$$

Value after 1 year = Rs 42000 − Rs 3360 = Rs 38,640