Chapter 8: Percentage and Its Applications

Exercise 8.1

1. (a) $\dfrac{2}{3} = \left(\dfrac{2}{3} \times 100\right)\% = \dfrac{200}{3}\% = 66.67\%$

(b) $0.75 = 0.75 \times 100\% = 75\%$

(c) $2 : 9 = \dfrac{2}{9} = \dfrac{2}{9} \times 100\% = \dfrac{200}{9}\% = 22.22\%$

(d) $1.05 = 1.05 \times 100\% = 105\%$

(e) $2\dfrac{3}{4} = \dfrac{11}{4} = \dfrac{11}{4} \times 100\% = 275\%$

2. (a) $15\% = 15 \times \dfrac{1}{100} = 0.15$

(b) $42\% = 42 \times \dfrac{1}{100} = 0.42$

(c) $0.004\% = 0.004 \times \dfrac{1}{100} = 0.00004$

(d) $35\% = 35 \times \dfrac{1}{100} = 0.35$

(e) $\dfrac{1}{4}\% = \dfrac{1}{4} \times \dfrac{1}{100} = 0.0025$

3. (a) $4\% = 4 \times \dfrac{1}{100} = \dfrac{4}{100} = \dfrac{1}{25}$

(b) $3.5\% = 3.5 \times \dfrac{1}{100} = \dfrac{35}{1000} = \dfrac{7}{200}$

(c) $\dfrac{7}{8}\% = \dfrac{7}{8} \times \dfrac{1}{100} = \dfrac{7}{800}$

(d) $25\% = 25 \times \dfrac{1}{100} = \dfrac{25}{100} = \dfrac{1}{4}$

(e) $2.4\% = 2.4 \times \dfrac{1}{100} = \dfrac{24}{1000} = \dfrac{3}{125}$

4. (a) $\dfrac{25}{8}\%$ of $150 + 12\%$ of 250

$= \dfrac{25}{800} \times 150 + \dfrac{12}{100} \times 250$

$= \dfrac{75}{16} + 30$

$= \dfrac{555}{16}$

(b) $2\dfrac{3}{4}\%$ of $200 + \dfrac{1}{2}\%$ of 150

$= \dfrac{11}{400} \times 200 + \dfrac{1}{200} \times 150$

$= \dfrac{11}{2} + \dfrac{3}{4}$

$= \dfrac{22 + 3}{4}$

$= \dfrac{25}{4}$

5. (a) 4% of _____ $= 8$

Let x be the missing number.

4% of $x = 8$

$\Rightarrow \dfrac{4}{100} \times x = 8$

$\Rightarrow x = 200$

(b) 60% of _____ = 6

Let x be the missing number.

60% of $x = 6$

$\Rightarrow \dfrac{60}{100} \times x = 6$

$\Rightarrow x = \dfrac{600}{60}$

$\Rightarrow x = 10$

6.

The difference of two numbers is 4496.

Let the numbers be x and $x + 4496$.

2.5% of $(x + 4496) = 22.5\%$ of x

$\Rightarrow \dfrac{2.5}{100}(x + 4496) = \dfrac{22.5}{100}x$

$\Rightarrow \dfrac{25}{1000}(x + 4496) = \dfrac{225}{1000}x$

$\Rightarrow \dfrac{1}{40}(x + 4496) = \dfrac{9}{40}x$

$\Rightarrow (x + 4496) = 9x$

$\Rightarrow 8x = 4496$

$\Rightarrow x = 562 \qquad \Rightarrow x + 4496 = 562 + 4496 = 5058$

Thus, the numbers are 562 and 5058.

7.

It is given that 32% of 60% of 25% of the number is 480.

Let x be the number.

32% of 60% of 25% of $x = 480$

$\Rightarrow \dfrac{32}{100} \times \dfrac{60}{100} \times \dfrac{25}{100} \times x = 480$

$\Rightarrow x = \dfrac{480 \times 100 \times 100 \times 100}{32 \times 60 \times 25}$

$\Rightarrow x = 10{,}000$

Thus the required number is 10,000.

8.

Let the number be x.

64% of x – 48% of $x = 79872$

$\Rightarrow \dfrac{64}{100}x - \dfrac{48}{100}x = 79872$

$\Rightarrow \dfrac{64 - 48}{100}x = 79872$

$\Rightarrow \dfrac{16x}{100} = 79872$

$\Rightarrow x = \dfrac{79872 \times 100}{16}$

$\Rightarrow x = 499200$

So 25% of $499200 = \dfrac{25}{100} \times 499200 = 124800$.

Thus the required number is 1,24,800.

9.

Let the number be x.

$\frac{1}{8}x = 45$

$x = 360$

So 255% of 360 $= \frac{255}{100} \times 360 = 918$

Thus the required number is 918.

10.

Let the monthly income be ₹x.

Monthly saving = ₹18900

$\Rightarrow$ 18% of $x = 18900$

$\Rightarrow \frac{18}{100}x = 18900$

$\Rightarrow x = \frac{18900 \times 100}{18}$

$\Rightarrow x = 105000$

Thus the monthly income is ₹1,05,000.

Exercise 8.2

1. (a) It is given that C.P. = ₹760 and S.P. = ₹875.

Profit = S.P. – C.P.= 875 – 760 = ₹115

$\text{Profit\%} = \dfrac{\text{Profit}}{\text{C.P.}} \times 100 = \dfrac{115}{760} \times 100 = 15.13\%$

(b) It is given that C.P. = ₹260 and S.P. = ₹1197.

Profit = S.P. – C.P.= 1197 – 260 = ₹937

$\text{Profit\%} = \dfrac{\text{Profit}}{\text{C.P.}} \times 100 = \dfrac{937}{260} \times 100 = 360.38\%$

(c) It is given that C.P. = ₹6890 and S.P. = ₹6250.

Loss = C.P. – S.P. = 6890 – 6250 = ₹640

$\text{Loss\%} = \dfrac{loss}{C.P.} \times 100 = \dfrac{640}{6890} \times 100 = 9.28\%$

2. (a) It is given that C.P. = ₹1550 and profit% = 5%.

$\text{S.P.} = \left(\dfrac{100 + \text{Profit\%}}{100}\right) \times \text{C.P.} = \left(\dfrac{100 + 5}{100}\right) \times 1550$

$= \dfrac{105}{100} \times 1550 = ₹1627.50$

(b) It is given that C.P. = ₹915 and profit% = $6\frac{2}{3}\%$.

$\text{S.P.} = \left(\dfrac{100 + \text{Profit\%}}{100}\right) \times \text{C.P.} = \left(\dfrac{100 + \dfrac{20}{3}}{100}\right) \times 915$

$= \dfrac{320}{300} \times 915 = ₹976$

(c) It is given that C.P. = ₹875 and loss% = 12%.

$\text{S.P.} = \left(\dfrac{100 - \text{Loss\%}}{100}\right) \times \text{C.P.} = \left(\dfrac{100 - 12}{100}\right) \times 875$

$= \dfrac{88}{100} \times 875 = ₹770$

3. (a) It is given that S.P. = ₹810 and profit% = 8%

$\text{C.P.} = \left(\dfrac{100 \times \text{S.P.}}{100 + \text{Profit\%}}\right) = \left(\dfrac{100 \times 810}{100 + 8}\right) = \dfrac{81000}{108} = ₹750$

(b) It is given that S.P. = ₹987 and loss% = 6%

$\text{C.P.} = \left(\dfrac{100 \times \text{S.P.}}{100 - \text{Loss\%}}\right) = \left(\dfrac{100 \times 987}{100 - 6}\right) = \dfrac{98700}{94} = ₹1,050$

(c) It is given that S.P. = ₹371 and profit% = 6%

$\text{C.P.} = \left(\dfrac{100 \times \text{S.P.}}{100 + \text{Profit\%}}\right) = \left(\dfrac{100 \times 371}{100 + 6}\right) = \dfrac{37100}{106} = ₹350$

4. C.P. of 14 toys = S.P. of 21 toys ... (1)

Let the C.P. of 1 toy be ₹100.

∴ C.P. of 14 toys = ₹1,400

From equation (1), S.P. of 21 toys = ₹1400

C.P. of 21 toys = ₹2,100

Loss = C.P. − S.P. = 2100 − 1400 = ₹700

$Loss\% = \dfrac{Loss}{C.P.} \times 100 = \dfrac{700}{2100} \times 100 = \dfrac{100}{3} = 33.33\%$

Thus loss percent is 33.33%.

5. C.P. of 60 oranges = ₹100

Rotten oranges = 20

S.P. of 40 oranges = ₹90

Loss = 100 − 90 = ₹10

$Loss\% = \dfrac{Loss}{C.P.} \times 100 = \dfrac{10}{100} \times 100 = 10\%$

6. S.P. of toy robot = ₹50

Profit % = 25%

Let the C.P. be ₹x.

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

$\Rightarrow 25 = \dfrac{50 - x}{x} \times 100$

$\Rightarrow 25x = 5000 - 100x$

$\Rightarrow 125x = 5000$

$\Rightarrow x = ₹40$

C.P. of toy = ₹40

If gain % is 30%, then

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

$\Rightarrow 30 = \dfrac{S.P. - 40}{40} \times 100$

$\Rightarrow 1200 = 100 \times S.P. - 4000$

$\Rightarrow 1200 + 4000 = 100 \times S.P.$

$\Rightarrow S.P. = \dfrac{5200}{100} = 52$

The shopkeeper should sell the toy for ₹52 to gain 30%.

7. S.P. of shirt 1 =

$S.P. = \dfrac{C.P. \times (100 + Profit\%)}{100} = \dfrac{775 \times (100 + 10)}{100}$

$= \dfrac{775 \times 110}{100} = 852.50$

$$= \frac{775 \times 110}{100} = 852.50$$

S.P. of shirt 2 =

$$\text{S.P.} = \frac{\text{C.P.} \times (100 - \text{Loss\%})}{100} = \frac{775 \times (100 - 5)}{100} = \frac{775 \times 95}{100}$$

$$= 736.25$$

Total C.P. of both the shirt = 775 × 2 = ₹1550

Total S.P. of both the shirt = 852.50 + 736.25 = ₹1588.75

Profit = ₹1588.75 − ₹1550 = ₹38.75

$$\text{Profit\%} = \frac{\text{Profit}}{\text{C.P.}} \times 100 = \frac{38.75}{1550} \times 100 = 2.5\%$$

8. C.P. of variety 1 apples = 20 × 55 = ₹1,100

C.P. of variety 2 apples = 25 × 45 = ₹1,125

Total C.P. of both the variety of apples = 1100 + 1125 = ₹2,225

Total weight of the both the type of variety = 20 + 25 = 45

S.P. of mix apples = ₹50 per kg.

Total S.P. = 45 × 50 = ₹2,250

Profit = 2250 − 2225 = ₹25

$$\text{Profit\%} = \frac{\text{Profit}}{\text{C.P.}} \times 100 = \frac{25}{2225} \times 100 = 1.12\%$$

9. Let C.P. of the table be x.

$$\text{S.P.} = \frac{\text{C.P.} \times (100 - \text{Loss\%})}{100} = \frac{x \times (100 - 6)}{100} = \frac{x \times 94}{100}$$

As given S.P. = 3500,

$$3500 = \frac{94x}{100} \Rightarrow x = \frac{3500 \times 100}{94} = 3723.40$$

New S.P. = 4000

Profit = 4000 − 3723.40 = 276.60

$$\text{Profit\%} = \frac{\text{Profit}}{\text{C.P.}} \times 100 = \frac{276.60}{2723.40} \times 100 = 7.43\%$$

10. Purchase price of motorcycle = ₹73,500

Overhead expense = 10300 + 2600 = ₹12,900

Total C.P. = ₹86,400

S.P. of motorcycle = ₹84,240

Loss = 86400 − 84240 = 2160

$$\text{Loss\%} = \frac{\text{Loss}}{\text{C.P.}} \times 100 = \frac{2160}{86400} \times 100 = 2.5\%$$

11. Loss = 10% = 10/100 = 1/10; S.P. = 4500

So, CP of the dinner set = $\frac{10}{9} \times 4500 = ₹\,5000$

Required selling price to gain 20% = ₹ 5000 + 20% of ₹ 5000 = ₹ (5000 + 1000) = ₹ 6,000

12. CP = 5000 + 500 + 300 = 5800 (Inclusive of overhead expenses)

SP = 5500; Here, CP > SP. Thus, a loss is occurred.

Loss = CP − SP

Loss = 5800 − 5500= 300

Loss % = (Loss/CP) × 100

Loss% = (300/5800) × 100 = 5.17%

13. Let the cost price be *x*.

Selling price = $\frac{100+gain\%}{100} \times CP = \frac{100+7}{100} \times x = \frac{107x}{100}$

Selling price after ₹ 75 is added = $\frac{100+gain\%}{100} \times CP = \frac{100+12}{100} \times x = \frac{112x}{100}$

According to the problem, $\frac{112x}{100} - \frac{107x}{100} = 75$

$\Rightarrow \frac{5x}{100} = 75 \Rightarrow 5x = 7500 \Rightarrow x = 1500$

14. Let the C.P. of first set be ₹ *x*.

And the C.P. of the second set will be ₹ (41000 − *x*)

S.P. of the first set = $\frac{100 +profit\%}{100} \times CP = \frac{100+15}{100} \times x$ (given profit = 15 %)

                             = $\frac{115}{110}x$

S.P. of the second set = $\frac{100 -loss \%}{100} \times$ C.P.= $\frac{100 - 10}{100} \times$ (41000 − *x*)   (given loss = 10 %)

                            = $\frac{90}{100} \times$ (41000 − *x*)

It is given that the selling price of both the T.V set is equal.

$\frac{115}{110}$ x = $\frac{9}{10} \times$ (41000 − *x*) $\Rightarrow$ x = 18000

Hence, the cost price of first T.V set is ₹ 18000 and for the second one price will be (41000 − 18000 = ₹ 23000).

15. No, Kirti is not right because gain = 3000 − 2500 = 500, and not 5000.

Exercise 8.3

Net S.P. = M.P. − discount

Discount% = $\frac{\text{Discount}}{\text{M.P.}} \times 100$

M.P. = $\frac{100 \times \text{S.P.}}{100 - \text{Discount}\%}$

1. Given: M.P. = ₹900, Discount% = 15

M.P. = $\frac{100 \times \text{S.P.}}{100 - \text{Discount}\%}$

$\Rightarrow$ S.P. = $\frac{\text{M.P.} \times (100 - \text{Discount}\%)}{100}$

Hence S.P = $\frac{900 \times (100 - 15}{100} = \frac{900 \times 85}{100}$ = ₹765

2. Given: S.P. = ₹10,000 and Discount% = 20

M.P. = $\frac{100 \times \text{S.P.}}{100 - \text{Discount}\%} = \frac{100 \times 10000}{100 - 20}$

     = $\frac{1000000}{80}$ = ₹12,500

3. Given: M.P. = ₹960 S.P. = ₹720

Discount = 960 − 720 = ₹240

Discount% = $\frac{\text{Discount}}{\text{M.P.}} \times 100 = \frac{240}{960} \times 100 = 25\%$

4. Given: M.P. = ₹28,600, Discount% = 25, and Profit% = 10

$$M.P. = \frac{100 \times S.P.}{(100 - \text{Discount\%})}$$

$$\Rightarrow S.P. = \frac{M.P. \times (100 - \text{Discount\%})}{100}$$

Hence S.P of laptop $= \frac{28600 \times (100 - 25)}{100} = \frac{25600 \times 75}{100}$
$= ₹21,450$

Now, S.P. of laptop = ₹21,450, Profit% earned on laptop = 10

$$S.P. = \frac{C.P. \times (100 + \text{Profit\%})}{100}$$

$$\Rightarrow C.P. = \frac{S.P. \times 100}{100 + \text{Profit\%}} = \frac{21450 \times 100}{100 + 10} = \frac{21450 \times 100}{110}$$

$$= ₹19,500$$

Thus the cost price of the laptop is ₹19,500.

5. Given: S.P. = ₹322 and Discount% = 8

$$M.P. = \frac{100 \times S.P.}{100 - \text{Discount\%}} = \frac{100 \times 322}{100 - 8} = \frac{32200}{92} = 350$$

Thus the marked price of the article is ₹350.

6. Given: M.P. of table = ₹5,000 and Successive discount = 15% and 20%

S.P. of table after the second discount = {(100% − Second discount%) of (100% − First discount%)} of M.P. of table

$= \{(100\% - 20\%) \times (100\% - 15\%)\}$ of 5000

$= (80\% \times 85\%)$ of 5000

$$= \frac{80}{100} \times \frac{85}{100} \times 5000 = 3400$$

Thus the selling price of the dining table is ₹3,400.

7. Given: S.P. of cupboard = ₹4,590 and successive discount = 25% and 10%

S.P. of cupboard after the second discount = {(100% − Second discount%) of (100% − First discount%)} of M.P. of cupboard

$\Rightarrow$ M.P. of cupboard =

$$\frac{\text{S.P. of cupboard after the second discount}}{\{(100\% - \text{Second discount\%}) \text{ of } (100\% - \text{First discount\%})\}}$$

$$= \frac{4590}{\{(100\% - 25\%) \times (100\% - 10\%)\}} = \frac{4590}{75\% \times 90\%}$$

$$= \frac{4590}{\frac{75}{100} \times \frac{90}{100}}$$

$$= \frac{4590 \times 100 \times 100}{75 \times 90} = 6800$$

Thus the marked price of the cupboard is ₹6,800.

8. Given: M.P. = ₹840 and S.P. = ₹882

GST = S.P. – M.P. = 882 – 840 = 42

Rate of GST = $\frac{\text{GST}}{\text{M.P.}} \times 100 = \frac{42}{840} \times 100 = 5$

Thus the rate of GST is 5%.

9. Given: S.P. of watch = ₹2,362.50 and GST rate = 12%

Let the M.P. of watch = m,

Selling Price of watch after GST = m + 12% of m

m(1 + 12% of 1) = ₹2362.50

m(1 + 0.12) = ₹2362.50

$m = \frac{2362.50}{1.12} = 2109.375$

Thus the original price of the watch is ₹2,109.34.

10. Given: M.P. of television = ₹14,650 and GST rate = 18%

$$\begin{aligned}\text{S.P. of television} &= \text{M.P.} + \text{GST of M.P.}\\ &= 14650 + 18\% \text{ of } 14650\\ &= 14650 + \frac{18}{100} \times 14650\\ &= 14650 + 2637 = ₹17,287\end{aligned}$$

Thus the cost of television set is ₹17287.

11. Given: S.P. of scooter = ₹69,749.80 and M.P. of scooter = ₹59,110

GST = S.P. – M.P. = 69749.80 – 59110 = ₹10,639.80

Rate of GST = $\frac{\text{GST}}{\text{M.P.}} \times 100 = \frac{10639.80}{59110} \times 100 = 18\%$

Thus the rate of GST is 18%.

12. Given: C.P. of medicine = ₹625 and GST rate = 5%

GST = 5% of 625 = $\frac{5 \times 625}{100} = 31.25$

M.P. of medicine = 625 + 31.25 = ₹656.25

Thus the amount to be paid for the medicine is ₹656.25.

13.

M.P. of a blanket = ₹500

M.P. of 36 blankets = 500 × 36 = ₹18,000

Discount offered by shopkeeper = 10%

S.P. of 1blankets = (100 – Discount%) % of M.P. of 1 blanket

= (100 – 10)% of 500 = 90% of 500 = $\frac{90}{100} \times 500 = 450$

S.P. of 36 blankets = 36 × 450 = ₹16,200

Hence amount still left with Avinash = M.P. of 36 blankets – S.P. of 36 blankets = 18000 – 16200 = ₹1,800

Number of blankets that can be purchased with ₹1,800

$= \frac{1800}{450} = 4$ blankets

Thus Avinash can purchase 4 extra blankets.

14. Use formula, equivalent discount = (A + B) − (AB/100) where A = first discount,
B = second discount.
Thus, equivalent discount = 29 − 1 = 28%.
Alternatively, 25% is same as 0.25 in decimals and 4% is same as 0.04 in decimals. Now an equivalent discount for successive discounts of 25% and 4% can be given as:
Equivalent discount for successive discounts 25% and 4% = 1 − {1 − 0.25) × (1 − 0.04)}
$$= 1 - \{0.75 \times 0.96\} = 1 - 0.72 = 0.28 = 28\%$$