EXERCISE 13.1

A student buys a pen for Rs 90 and sells it for Rs 100. Find his gain and gain percent.
Solution:
We know that the cost price of pen = Rs 90
Selling price of pen = Rs 100
By using the formula,
Gain = selling price – cost price
= 100 – 90
= Rs 10
By using the formula,
Gain % = (gain/cost price) × 100
= (10/90) × 100
= 100/9
= 11 1/9 %

1. Rekha bought a saree for Rs 1240 and sold it for Rs 1147. Find her loss and loss percent.
Solution:
We know that the cost price of saree = Rs 1240
Selling price of saree = Rs 1147
By using the formula,
Loss = cost price – selling price
= 1240 – 1147
= Rs 93
By using the formula,
Loss % = (loss/cost price) × 100
= (93/1240) × 100
= 7.5 %

2. A boy buys 9 apples for Rs 9.60 and sells them at 11 for Rs 12. Find his gain or loss percent.
Solution:
We know that the cost price of 9 apples = Rs 9.60
Cost price of 1 apple = Rs 9.60/9
Selling price of 11 apple = Rs 12
Selling price of 1 apple = Rs 12/11
By using the formula,

Gain = selling price – cost price
= 12/11 – 9.60/9
= (108-105.60)/99
= Rs 2.40/99
By using the formula,
Gain % = (gain/cost price) × 100
= ((2.40/99)/(9.60/9)) × 100
= 25/11
= 2 3/11%

3. The cost price of 10 articles is equal to the selling price of 9 articles. Find the profit percent.
Solution:
We know that the cost price of 10 article = selling price of 9 article
Let us consider CP of 1 article as Rs X

Selling price of 9 article = 10X
Selling price of 1 article = 10x/9

Profit = 10x/9 – x
= x/9
Profit % = Gain % = (gain/cost price) × 100
= (x/9)/x × 100
= 100/9
= 11 1/9%

4. A retailer buys a radio for Rs 225. His overhead expenses are Rs 15. If he sells the radio for Rs 300, determine his profit percent.
Solution:
The cost price of a radio = Rs 225
Overhead expenses = Rs 15
Total cost = cost price + overhead expenses = 225+15 = Rs 240

Selling price of radio = Rs.300
By using the formula,
Gain = selling price – cost price
= 300 – 240 = Rs 60
By using the formula,
Gain % = (gain/cost price) × 100

= 60/240 × 100
= 25 %

5. A retailer buys a cooler for Rs 1200 and overhead expenses on it are Rs 40. If he sells the cooler for Rs 1550, determine his profit percent.
Solution:
We know the cost price of cooler = Rs 1200
Overhead expenses = Rs 40
Total cost = Rs 1200 + Rs 40 = Rs 1240
Selling price of cooler = Rs 1550
By using the formula,
Gain = selling price – cost price
= Rs 1550 - Rs1240
= Rs 310
By using the formula,
Gain % = (gain/cost price) × 100
= 310/1240 × 100
= 25%

6. A dealer buys a wristwatch for Rs 225 and spends Rs 15 on its repairs. If he sells the same for Rs 300, find his profit percent.
Solution:
We know the cost price of wrist watch = Rs 225
Cost of repairing = Rs 15
Total cost = Rs 225 + Rs 15 = Rs 240
Selling price of watch = Rs 300
By using the formula,
Gain = selling price – cost price
= Rs 300 – Rs 240
= Rs 60
By using the formula,
Gain % = (gain/cost price) × 100
= 60/240 × 100
= 25%

7. Ramesh bought two boxes for Rs 1300. He sold one box at a profit of 20% and the other box at a loss of 12%. If the selling price of both boxes is the same, find the cost price of each box.
Solution:

We know the cost price of two boxes = Rs 1300
So let us consider cost price of one box be Rs x
Cost price of other box = Rs 1300 – x

Selling price of first box = $x + x \times 20/100$
$= x + x/5$
= Rs $6x/5$

Selling price of second box = $(1300 - x) – (1300 - x) \times 12/100$
= Rs $(28600 – 22x)/25$
By equating SP of first and second box we get,
$6x/5 = (28600 – 22x)/25$
$150x = 28600 \times 5 – 110x$
$150x + 110x = 28600 \times 5$
$260x = 28600 \times 5$
$x = (28600 \times 5)/260$
$= 550$
∴ Cost price of first box = Rs. 550
Cost price of second box = Rs1300 – Rs550 = Rs 750

8. If the selling price of 10 pens is equal to cost price of 14 pens, find the gain percent.
Solution:
Given that, Selling price of 10 pens = cost price of 14 pens
So, let the cost price of 1 pen be Rs x
Selling price of 10 pens = Rs 14x
Selling price of 1 pen =Rs 14x/10
By using the formula,
Gain = selling price – cost price
$= 14x/10 – x$
$= 4x/10$
By using the formula,
Gain % = (gain/cost price) × 100
$= (4x/10)/x \times 100$
$= 2/5 \times 100$
= 40%

9. If the selling price of 18 chairs be equal to selling price of 16 chairs, find the gain or loss percent.

Solution:
Given that, Cost price of 18 chairs = selling price of 16 chairs
So, let the cost price of 1 chair be Rs x
Selling price of 16 chairs =Rs 18x
Selling price of 1 chair = Rs 18x/16
By using the formula,
Gain = selling price – cost price
= 18x/16 – x
= 2x/16
= Rs x/8
By using the formula,
Gain % = (gain/cost price) × 100
= (x/8)/x × 100
= 25/2
= 12 ½ %

10. If the selling price of 18 oranges is equal to the cost price of 16 oranges, find the loss percent.
Solution:
Given that, Selling price of 18 oranges = cost price of 16 oranges
So, let the cost price of 1 orange be Rs x
Selling price of 18 oranges = Rs 16x
Selling price of 1 orange = Rs 16x/18
By using the formula,
Loss = cost price – selling price
= x – 16x/18
= 2x/18
= Rs x/9
By using the formula,
Loss % = (loss/cost price) × 100
= (x/9)/x × 100
= 100/9
= 11 1/9 %

11. Ravish sold his motorcycle to Vineet at a loss of 28%. Vineet spent Rs 1680 on its repairs and sold the motor cycle to Rahul for Rs 35910, thereby making a profit of 12.5%, find the cost price of the motor cycle for Ravish.
Solution:
Let us consider the cost price of motorcycle for Ravish be Rs x

Loss% for Ravish = 28%
Selling price for Ravish = x – x × 28/100 = (100x – 28x)/100 = 72x/100
= Rs 18x/25
Selling price for Ravish = cost price for Vineet = Rs 18x/25
Repair cost by Vineet = Rs 1680

Total cost price of the motorcycle for Vineet = Rs18x/25 + Rs 1680
Selling price for Vineet = Rs 35910

Profit = 35910 – (18x+42000)/25
= Rs (855750 – 18x)/25

Profit % = 12.5% (Given)

By using the formula,
Gain % = (gain/cost price) × 100
=> [(855750-18x)/25] / [(18x+42000)/25] × 100 = 12.5
=> [(855750-18x)/25] × [25/(18x+42000)] = 125/1000
=> (855750-18x) / (18x+42000) = 1/8
=> By cross multiplying we get
=> 8(855750-18x) = (18x+42000)
=> 6846000 – 144x = 18x + 42000
=> 6846000 – 42000 = 18x + 144x
=> 162x = 6804000
x = 6804000/162
= 42000
∴ Cost price of motorcycle for Ravish = Rs 42000

12. By selling a book for Rs 258, a bookseller gains 20%. For how much should he sell it to gain 30%?
Solution:
Given details are,
Selling price of book is = Rs 258
The man's gain percent is = 20% of 100 = 20/100
So, let us consider the cost price of book be Rs x
By solving,
x + x×20/100 = 258
x + x/5 = 258
(5x+x)/5 = 258

By cross multiplying
6x= 5×258
x = 1290/6
= 215
Now, the cost price of book is = Rs 215
For a gain of 30% the man should sell the book at = 215 + 215×30/100
= 215 + 64.5
= 279.50
∴ To gain 30% the man should sell the book at Rs 279.50

13. A defective briefcase costing Rs 800 is being sold at a loss of 8%. If the price is further reduced by 5%, find its selling price.
Solution:
Given, cost price of the defective briefcase is = Rs. 800
The loss percent is = 8% of 100 = 8/100
Selling price of briefcase is = 800 - 800×8/100
= 800 – 64
= Rs 736

When the price is further reduced by 5% (Given) = 5% of 100 = 5/100
New selling price = 736 - 736×5/100
= 736 – 36.8
= Rs 699.2
∴ The selling price of the defective briefcase is Rs 699.2

14. By selling 90 ball pens for Rs 160 a person loses 20%. How many ball pens should be sold for Rs 96 so as to have profit of 20%?
Solution:
Given, selling price for 90 ball pens is = Rs 160
Selling price of 1 ball pen = Rs 160/90 = Rs 16/9
The loss percent is = 20% of 100 = 20/100
Let us consider the cost price of 1 pen be Rs x
By solving,
x – x×20/100 = 16/9
x – x/5 = 16/9
(5x-x)/5 = 16/9
4x/5 = 16/9
By cross multiplying
4x×9 = 16×5

36x = 80
x = 80/36
= Rs 20/9
Now, cost price of 1 ball pen = Rs 20/9

To get a profit of 20%...
Let us consider the number of pens be 'x'
So, selling price of 'x' pens is = Rs 96
Selling price of 1 pen is = Rs 96/x
We know that,
Gain % = (gain/cost price) × 100
20% = [(96/x) – (20/9)] / (20/9) × 100
20/100 = [(96/x) – (20/9)] / (20/9) × 100
(20/100 × 200/9) + 200/90 = 96/x
4/9 + 200/90 = 96/x
(40+200)/90 = 96/x
240/90 = 96/x
24/9 = 96/x
By cross multiplying
24x = 96×9
x = 864/24
= 36
∴ 36 ball pens can be sold at a price of Rs 96

15. A man sells an article at a profit of 25%. If he had bought it at 20% less and sold it for Rs 36.75 less, he would have gained 30%. Find the cost price of the article.
Solution:
Let us consider the cost price of article be Rs x
The Profit percent is = 25% of 100 = 25/100
Selling price of article = x + x × 25/100
= x + x/4
= (4x+x)/4
= Rs 5x/4

If cost price of article is 20% less (given) = 20% of 100 = 20/100
Now, cost price is = x - x×20/100
= x – x/5
= (5x-x)/5
= Rs 4x/5

Now, selling price is = Rs5x/4 – 36.75
The Profit percent is = 30% of 100 = 30/100
He would have gained 30% selling at that price (Given)
We know that, Gain = SP – CP
= 5x/4 – 36.75 – 4x/5
= (25x – 16x)/20 – 36.75
= 9x/20 – 36.75

Gain % = (gain/cost price) × 100
30% = [{(5x/4) – 36.75} - (4x/5)] / (4x/5) × 100
30/100 = (9x/20 – 36.75) / (4x/5) × 100
x = 175
∴ Cost price of article is Rs 175

16. A dishonest shopkeeper professes to sell pulses at his cost price but uses a false weight of 950 gm for each kilogram. Find his gain percent.
Solution:
Let us consider the cost price of 1000gm pulses be Rs x
Selling price of 950 gm pulses is also = Rs x
Selling price of 1000 gm pulses = x/950 × 1000
So, Gain = SP – CP
Gain = 1000x/950 – x
= (1000x – 950x)/950
= 50x/950
Gain % = (gain/cost price) × 100
= (50x/950)/x × 100
= 50x/950x × 100
= 5/95 × 100
= 100/19
= 5 5/19%
∴ The Shopkeeper's gain percent is 5 5/19%

17. A dealer bought two tables for Rs 3120. He sold one of them at loss of 15% and other at a gain of 36%. Then, he found that each table was sold for the same price. Find the cost price of each table.
Solution:
Given, the cost price of two tables is = Rs 3120
Let cost price of first table be = Rs x

Then, cost price of second table will be = Rs 3120 – x
We know that one is a gain and other is a loss.

Selling price of first table (gain) = x + x × 36/100
= x +9x/25
= (25x + 9x)/25
= Rs 34x/25

Selling price of second table (loss) = (3120 - x) × 85/100
= Rs (3120×85 – 85x)/100

So now, by equating both we get,
34x/25 = (3120×85 – 85x)/100
34x = (3120×85 – 85x)/4
34x × 4 = 3120×85 – 85x
136x + 85x = 3120×85
221x = 3120×85
x = (3120×85)/221
= 1200

∴ Cost price of first table (x) is = Rs 1200
Cost price of second table (3120 - x) = 3120 – 1200 = Rs 1920

18. Mariam bought two fans for Rs 3605. She sold one at a profit of 15% and the other at a loss of 9%. If Mariam obtained the same amount for each fan, find the cost price of each fan.
Solution:
Given, cost price of 2 fans is = Rs 3605
Let cost price of 1 fan be = Rs x
Then CP of other fan will be = Rs 3605 – x
We know that one is a gain and other is a loss.

Selling price of first fan (gain) = x + x×15/100
= x + x×3/20
= (20x+3x)/20
= Rs 23x/20

Selling price of second fan (loss) = (3605 - x) × 91/100
= Rs (3605×91 – 91x)/100

So now, by equating both we get,
23x/20 = (3605×91 – 91x)/100
23x = (3605×91 – 91x)/5
23x × 5 = 3605×91 – 91x
115x + 91x = 3605×91
206x = 3605×91
x = (3605×91)/206
= 1592.50

∴ Cost price of one fan (x) is = Rs 1592.50
Cost price of second fan (3605 - x) is = 3605 – 1592.50 = Rs 2012.50

19. Some toffees are bought at the rate of 11 for Rs 10 and the same number at the rate of 9 for Rs 10. If the whole lot is sold at one rupee per toffee, find the gain or loss percent on the whole transaction.
Solution:
Let the total number of toffees be 'x'
Given, cost price of 11 toffees is = Rs 10
Cost price of 1 toffee is = Rs 10/11

Given, cost price of 9 toffees is = Rs 10
Cost price of 1 toffee is = Rs 10/9

When equating both the costs we get,
Cost price of two toffees = (10/11) + (10/9)
= (90 + 110)/99
= 200/99
Cost price of one toffee is = (Rs 200/99)/2 = Rs 200/198
We know that selling price of 1 toffee (Given) = Rs 1
Loss = CP – SP
= 200/198 – 1
= (200-198)/198
= 2/198
Loss% = (loss/cost price) × 100
= (2/198)/(200/198) × 100
= 2/198 × 198/200 × 100
= 2/200 × 100
= 2/2
= 1%

∴ It is 1% loss on the whole truncation.

20. A tricycle is sold at a gain of 16%. Had it been sold for Rs 100 more, the gain would have been 20%. Find the C.P. of the tricycle.
Solution:
Let us consider the cost price of tricycle be = Rs x
Selling price of the tricycle be = Rs x
Given, Gain% = 16% of 100 = 16/100

Selling price of tricycle = x + x×16/100
= (100x+16x)/100
= 116x/100
= 29x/25

Given, if selling price is Rs 100 more
New Selling price = 29x/25 + 100
Then, Gain% = 20%

By using the formula
Gain % = (gain/cost price) × 100 [by using Gain = SP – CP]
20 = [((29x/25)+100) – x] / x × 100
20x/100 = (29x + 2500 – 25x)/25
x/5 = (29x + 2500 – 25x)/25
5x = 4x + 2500
x = 2500
∴ Cost price of tricycle is Rs 2500

21. Shabana bought 16 dozen ball bens and sold them at a loss equal to S.P. of 8 ball pens. Find
(i) her loss percent
(ii) S.P. of 1 dozen ball pens, if she purchased these 16 dozen ball pens for Rs 576.
Solution:
Given, number of ball pens bought by Shabana is = 16 dozen = 16×12 = 192 pens
So, let's consider the cost price of each pen as Rs x
CP of 8 pens = Rs 8x

Let SP of one pen be = Rs x
So, SP of 192 pens = 192x
Given, loss of 192 pens = SP of 8 ball pens

So, loss = 8SP
192x = (192+8) SP
SP = 192x/200
Loss = CP – SP
= x – 192x/200
(i) Loss% = (loss/CP) × 100
= (x – 192x/200)/x × 100
= (200x-192x)/200x × 100
= 8/2
= 4%

(ii) Given, CP of 16 dozen pens = Rs 576
192x = 576
x = 576/192
We know that SP of 1 pen = 192x/200
SP of dozen pens = 12 × 192x/200
= 12 × 192/200 × 576/192
= 12 × 576/200
= 34.56
∴ Loss% = 4% and SP of 1 dozen pens is Rs 34.56

22. The difference between two selling prices of a shirt at profits of 4% and 5% is Rs 6. Find
(i) C.P. of the shirt
(ii) The two selling prices of the shirt
Solution:
(i) Let the CP of shirt be = Rs x
Profit (4%) = 4/100 of CP
= 4/100 × x
= 4x/100
Selling Price = C.P + Profit
= x + 4x/100
= (100x + 4x)/100
= 104x/100

(ii) Let the CP of shirt be = Rs x
Profit (5%) = 5/100 of CP
= 5/100 × x
= 5x/100

Selling Price = C.P + Profit
= x + 5x/100
= (100x + 5x)/100
= 105x/100

Given that, the difference between the two selling price is Rs 6
So, 105x/100 - 104x/100 = 6
(105x-104x)/100 = 6
x/100 = 6
x = 600

∴ Now, C.P of the shirt is = Rs 600
Selling Price of one shirt = 104x/100 = (104×600)/100 = Rs 624
Selling Price of other shirt = 105x/100 = (105×600)/100 = Rs 630

23. Toshiba bought 100 hens for Rs 8000 and sold 20 of these at a gain of 5%. At what gain percent she must sell the remaining hens so as to gain 20% on the whole?
Solution:
Given, Total hens = 100
Remaining hens = 100-20 = 80 hens
Toshiba bought 100 hens for = Rs 8000
1 hen cost is = 8000/100 = Rs 80
20hens cost = 20 × 80 = Rs 1600
Given, Gain = 5%
SP = 105/100 × 1600
= Rs 1680
CP for 80 hens = 80 × 80 = Rs 6400
SP of 80 hens = Rs (1600 + 6400-80) = Rs 7920
Gain on 80 hens = SP of 80 hens – CP of 80 hens
= 7920 – 6400
= Rs 1520

Gain % = (gain/cost price) × 100
Gain% on 80 hens = (1520/6400) × 100
= 23.75%
∴ Toshiba require 23.75% gain on the remaining hens (80hens).