1. Commission, Brokerage and Discount

Exercise 1.1

1. An agent charges 12% commission on the sales.
What does he earn, if the total sales amount to ₹ 48,000?
What does the seller get?

Solution:
Agent's commission at 12% on ₹ 48,000
$= ₹\,48{,}000 \times \frac{12}{100}$
₹ 5,760
Seller gets sales amount – commission
= ₹ (48000 - 5760) = ₹ 42250.
Agent's commission is ₹ 5760; seller gets ₹ 42240.

2. A salesman receive 3% commission on the sale up to ₹ 50,000 and 4% commission on the sales over ₹ 50,000. Find his total income on the sales of ₹ 2, 00,000.

Solution:
3% commission on the sales up to ₹ 50,000
$= ₹\,50{,}000 \times \frac{3}{100}$
$\rightarrow = ₹\,1500 \ldots . \quad (1)$

4% commission on sales over ₹ 50,000
Sales over ₹ 50,000
= ₹ (2, 00,000 – 50,000) = ₹ 1, 50,000
i.e. 4% commission on ₹ 1,50,000
$= ₹\,150000 \times \frac{4}{100}$
$\rightarrow = ₹\,6000 \ldots . \quad (2)$
From (1) and (2),
Total commission = ₹ (1500+6000) = ₹ 7500
Salesman's total income is ₹ 7500

3. Ms. Saraswati was paid ₹ 88000 as commission on the sale of computers at the rate of 12.5%. If the price of each computer was ₹ 32000 how many computers did she sell?

Solution:
Commission on 12.5% on a computer coasting ₹ 32000
$= ₹\,32000 \times \frac{12.5}{100} = 4000$

Ms. Saraswati received ₹ 88000, as on commission on selling computers.
The number of computer sold
$= \frac{\text{total commission}}{\text{commission on 1 computer}}$
$\rightarrow = \frac{88000}{4000} = 22$
Ms. Saraswati sold 22 computers.

4. Anita's is allowed 6.5% commission on the total sales made by her, plus a bonus of $\frac{1}{2}$% on the sales over ₹ 20000. If her total commission amount to ₹ 3400. Find the sales made by her.

Solution:
Let the total sales by Anita be ₹ x.
Commission at 6.5% on total sales
$= ₹\,x \times \frac{6.5}{100}$
$\rightarrow = ₹\,\frac{6.5x}{100} \ldots (1)$

Sales exceeding ₹ 20000 = ₹ (x – 20000)
Bonus at $\frac{1}{2}$% on sale over
₹ 20000
$= ₹\,(x - 20000) \times \frac{1}{2} \times \frac{1}{100}$
$\rightarrow = ₹\,(x - 20000) \times \frac{1}{200} \ldots (2)$

Total commission amount to ₹ 3400. … (Given) ….. (3)
From (1), (2) and (3),
$\frac{6.5x}{100} + \frac{x-20000}{200} = 3400$
∴ 13x + x – 20000= 680000 …(Multiplying both the side by 200)
∴ 14x = 680000 + 20000
∴ 14x = 700000
∴ x = 50000
Total sales made by Anita is ₹ 50000.

5. Priya gets salary of ₹ 15,000 per month and commission at 8% on the sales over ₹ 50,000. If she gets ₹ 17400 in a certain month, find the sales made by her in that month.

Solution:
Total income = monthly salary + commission
∴ ₹ 17400 = ₹ 15000 + commission
∴ Commission = ₹ (17400 – 15000) = ₹ 2400
Commission at 8% on the sales over ₹ 50000
∴ sale over ₹ 50000
$\rightarrow = \frac{2400}{8\%} = \frac{2400 \times 100}{8}$
= ₹ 30000

∴ The sale made by Priya in a certain month
= ₹ (50000 + 30000)= ₹ 80000.

6. The income of a broker remains unchanged through the rate of commission is increased from 4% to 5%. Find the percentage reduction in the value of the business.

Solution:
Let the initial value of the business be ₹ 100
Then the original income of the broker at 4% = ₹ 4
Let the new value of the business be ₹ x.
Commission at 5% on ₹ x
$\rightarrow = ₹ x \times \frac{5}{100}$
$= ₹ \frac{x}{20}$
It is given that the income remains unchanged.
$\therefore 4 = \frac{x}{20}$
$\rightarrow \therefore x = 80$
The original value of the business is ₹ 100
The new value of the business is ₹ 80
∴ the reduction in the value of the business is ₹ 20
This reduction is over ₹ 100
∴ the reduction in the value of the business is 20%

7. Mr. Pavan is paid a fixed weekly salary plus commission based on percentage of sales made by him. If on the sales of ₹ 68000 and ₹ 73000 in two successive weeks he received in all ₹ 9880 and ₹ 10180. find his weekly salary and the rate of commission paid to him.

Solution:
Income of Mr. Pavan = weekly salary + commission on sales
Salary + commission on ₹ 68000 = ₹ 9880 ... (1)
Salary + commission on ₹ 73000 = ₹ 10180 ... (2)
Subtracting (1) and (2)
Commission on ₹ 5000 [₹ 73000 = ₹ 68000]
= ₹ 300 [₹ 10180 - ₹ 9880]
∴ the rate of commission

$$\rightarrow = \frac{300}{500} \times 100 = 6\%.$$

$$= ₹\,68000 \times \frac{6}{100}$$

$$\rightarrow = ₹\,4080.$$

From (1) and (3),
Salary = ₹ (9880 – 4080) = ₹ 5800
Fixed weekly salary is ₹ 5800.
The rate of commission is 6%.

8. Deepak's salary was increased from ₹ 4000 to ₹ 5000. The sales being the same, due to reduction in the rate of Commission from 3% to 2%, his income remained unchanged. Find his sales.

Solution:
Let Deepak's sale be ₹ x.
Commission at 3%

$$\rightarrow = ₹\,x \times \frac{3}{100}$$

$$\rightarrow = ₹\,\frac{3x}{100}$$

∴ his income is

$$\rightarrow ₹\left(₹\,4000 + \frac{3x}{100}\right) ... (1)$$

Now, the commission is 2%
∴ Commission

$$\rightarrow = ₹\,x \times \frac{2}{100}$$

$$\rightarrow = ₹\,\frac{2x}{100}$$

But now the salary is

$\rightarrow ₹\left(5000+\frac{2x}{100}\right)\ldots(2)$

There is no change in his income.

$\therefore \left(4000+\frac{3x}{100}\right)$

$\rightarrow =\left(5000+\frac{2x}{100}\right)$

... [From 1 and 2]

$\therefore \frac{3x}{100}-\frac{2x}{100}$

$= 5000 - 4000$

$\rightarrow \therefore \frac{x}{100}=1000$

$\therefore x = 100000$

Deepak's sales is ₹ 100000.

9. An Agent is paid a commission of 7% on cash sales and 5% on Credit sales made by him. If on the sale of ₹ 102000 the agent claims A total commission of ₹ 6420.Find his cash sales and credit sales.

Solution:

Let the agent's cash sales be ₹ x.

Commission at 7% on cash sales

$= ₹x\times\frac{7}{100}$

$\rightarrow = ₹\frac{7x}{100}\ldots(1)$

Total sales is ₹ 102000.

∴ Commission at 5% on credit sales

$= ₹(102000-x)\times\frac{5}{100}$

$\rightarrow =\frac{₹(510000-5x)}{100}\ldots(2)$

Total commission is given to be ₹ 6420. ...(3)

From (1), (2) and (3).

$\frac{7x}{100}+\frac{(510000-5x)}{100}$

$= 6420$

$\therefore 7x + 510000 - 5x = 642000$

$\therefore 2x = 132000 \quad \therefore x = 66000$

The agents cash sales is ₹ 66000 and his credit sales
is ₹ (102000 – 66000) = ₹ 36000.

10. Three cars were sold through an agent for ₹ 240000 ₹ 222000 and ₹ 225000 respectively.
The rates of commission were 17.5% on the first 12.5% on the second. If the agent overall received 14% commission on the total sales, find the rate of commission paid on the third car.

Solution:
Commission at 17.5% on ₹ 240000

$$= ₹\,240000 \times \frac{17.5}{100}$$

$$\rightarrow = ₹\,42000 \ldots. (1)$$

Commission at 12.5% on ₹ 222000

$$= ₹\,222000 \times \frac{12.5}{100}$$

$$\rightarrow = ₹\,27750 \ldots. (2)$$

Let the commission in third car be x%
Commission at x% on ₹ 225000

$$= ₹\,225000 \times \frac{x}{100}$$

$$\rightarrow = ₹\,2250 \ldots. (3)$$

Overall commission is 14%
= 14% × ₹ (240000 + 222000+ 225000) … (4)
From (1), (2) (3), and (4),
42000+ 27750+ 2250x = 96180
∴ 2250x = 96180 – 42000 – 27750
∴ 2250x = 26430

$$\therefore \frac{26430}{2250}$$

∴ x = 17.5
The commission paid on third car is 11.75%

11. Swatantra Distribution allows 15% discount on the list prices of washing machine. Further 5% discount is given for cash payment. Find the list prices of the washing machine, if it was sold for the net amount of ₹ 38356.25

Solution:
List the price of the washing machine be ₹ x.
15% discount

$\rightarrow = ₹ x \times \frac{15}{100}$

$\rightarrow = ₹ \frac{15x}{100}$

Invoice price = list price - trade discount

∴ invoice prices

$\rightarrow = ₹ \left(x - \frac{15x}{100}\right)$

$\rightarrow = ₹ \frac{85x}{100}$

5% discount on invoice price

$= ₹ \frac{85x}{100} \times \frac{5}{100}$

$\rightarrow = ₹ \frac{425x}{10000}$

∴ net amount

$\rightarrow = ₹ x - ₹ \left(\frac{5x}{100} + \frac{425x}{10000}\right)$

Net amount is given to be ₹ 38356.25

$\therefore \frac{8075x}{10000} = 38356.25$

$\rightarrow \therefore x = \frac{38356.25 \times 10000}{8075}$

∴ x = 4.75 × 10000

∴ x = 47500

The list price of the washing machine is ₹ 47500.

12. A bookseller received ₹ 1530 as 15% commission on list price. Find list price of the books.

Solution:

Let the list price of the books be ₹ x.

Commission at 15% on ₹ x

$= ₹ x \times \frac{15}{100}$

$\rightarrow = ₹ \frac{15x}{100}$

The commission given is ₹ 1530

$\therefore \frac{15x}{100} = 1530$

$\therefore \quad x \frac{1530 \times 100}{15}$

$\rightarrow \times x = 10200$

The list of price of the books is ₹ 10200.

13. A retailer sold a suit for ₹ 8832 after allowing 8% Discount on marked price and future 4% cash discount. If the made 38% profit find the cost price and the market price of the suit.

Solution:

Let the market price of the suit be ₹ x.

8% discount =

$\rightarrow ₹ x \times \frac{8}{100}$

$\rightarrow = ₹ \frac{8x}{100} \quad \ldots (1)$

IP = LP – TP

∴ invoice price =

$\rightarrow ₹ x - ₹ \frac{8x}{100} = ₹ \frac{92x}{100}$

∴ 4% discount of invoice price =

$₹ \frac{92x}{100} \times \frac{4}{100}$

$\rightarrow = ₹ \frac{368x}{100} \ldots (2)$

From (1), and (2) total amount.

$= ₹ \frac{8x}{100} + ₹ \frac{368x}{100}$

$\rightarrow = ₹ \frac{1168x}{10000}$

∴ selling price =

$\rightarrow ₹ x - ₹ \frac{1168x}{10000}$

$\therefore x - \frac{1168x}{10000} = 8832$

$\therefore \frac{8832x}{10000} = 8832$

$\therefore x = 10000$

∴ Marked price of the suit is ₹ 10000.

38% profit on selling price ₹ 8832

∴ cost price

$= \frac{8832}{138} \times 100 = ₹\,6400.$

Cost price of the suit is ₹ 6400.

Marked price of the suit is ₹ 10000.

14. An agent charges 10% commission plus 2% delcredere. If he sells goods worth ₹ 37200 find his total earning.

Solution:

10% commission on sale ₹ 37200

$= ₹\,37200 \times \frac{10}{100} = ₹\,3720$

2% del credere on ₹ 37200

$= ₹\,37200 \times \frac{2}{100} = ₹\,744$

Agents total earning = ₹ (3720+ 744) = ₹ 4464.

15. A wholesaler allows 25% trade discount and 5% cash discount. What will be the net price of an articles marked at ₹ 1600.

Solution:

25% trade discount on ₹ 1600

$= ₹\,1600 \times \frac{25}{100} = ₹\,400$

∴ Invoice price = ₹ (1600 – 400)

= ₹ 1200

5% cash discount on invoice price

$= ₹\,1200 \times \frac{5}{100} = ₹\,60$

∴ Net price of the article.

= ₹ 1600 - ₹ (400+60)

= ₹ (1600 – 460) = 1140

The net price of the articles is ₹ 1140.

Exercise 1.2

1. What is the present worth of a sum of ₹ 10920 due six months hence at 8% p.a simple interest?

Solution:

SD = ₹ 10920, n = 6

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

r = 8%

$$\text{SD} = \text{PW}\left(1+\frac{nr}{100}\right)$$

$$\therefore\ 10920 = \text{PW}\left(1+\frac{\frac{1}{2}\times 8}{100}\right)$$

$$\therefore\ 10920 = \text{PW}\left(1+\frac{4}{100}\right)$$

$$\therefore\ 10920 = \text{PW}\left(1+\frac{1}{25}\right)$$

$$\therefore\ 10920 = \text{PW}\left(\frac{26}{25}\right)$$

$$\therefore PW = \frac{10920\times 25}{26}$$

$= 420 \times 25$

∴ PW= ₹ 10500

The present worth is ₹ 10500

2. What is sum due of ₹ 8000 due 4 months hence at 12.5% simple interest?

Solution:

PW= ₹ 8000,n=4 months

$$\text{months} = \frac{1}{3}\ years,$$

r=12.5%.

$$\text{SD} = \text{PW}\left(1+\frac{nr}{100}\right)$$

$$\therefore\ \text{SD} = 8000\left(1+\frac{\frac{1}{3}\times 12.5}{100}\right)$$

$$= 8000\left(1+\frac{125}{3000}\right)$$

$$= 8000\left(1+\frac{1}{24}\right)$$

$$= 8000\times\frac{25}{24}$$

$$= \frac{200000}{24} = 8333.33$$

Sum due is ₹ 8333.33

3. The true discount on the sum due 8 months hence at 12% p.a is ₹ 560. Find the sum due and present worth of the bill.

Solution:

Trade discount = ₹ 560, r = 12%

N = 8

→ months $= \frac{8}{12}$

$= \frac{2}{3}$ years

Trade discount

→ $= \frac{PW \times n \times r}{100}$

$\therefore 560 = \frac{PW \times \frac{2}{3} \times 12}{100}$

$\therefore 560 \times 100 = PW \times 8$

$\therefore PW = \frac{560 \times 100}{8} =$ ₹ 7000

$\therefore PW =$ ₹ 7000

Present worth of the bill is ₹ 7000

Sum due = PW + 560

= 7000 + 560

= ₹ 7560

The sum due of the bill is ₹ 7560

Present worth of the bill is ₹ 7000

4.The true discount on a sum is $\frac{3}{8}$ of the sum due at 12% p.a .find the period of the bill.

Solution:

Trade discount $= \frac{3}{8}$ (sum due),

r = 12%

Sum due = PW + TD

$\therefore$ Same due $=$ PW $+ \frac{3}{8}$ (sum due),

$\therefore$ Same due $- \frac{3}{8}$ (sum due) = PW

$\therefore$ PW $= \frac{5}{8}$ (Sum due)

Trade discount $= \frac{PW \times n \times r}{100}$

$\therefore \frac{3}{8}(sum\ due)$

$\rightarrow = \frac{\frac{5}{8}(sum\ due) \times n \times 12}{100}$

$\therefore \frac{3}{8}(sum\ due)$

$\rightarrow = \frac{8}{5(sum\ due)} = \frac{12n}{100}$

$\therefore \frac{3}{5} = \frac{12n}{100}$

$\therefore \frac{3 \times 100}{5 \times 12} = n$

$\therefore n = 5$

The period of the bill is 5 years.

5. 20 copies of a book can be purchased for a certain Sum payable at the end of 6 months and 21 copies for the Same sum in ready cash. Find the rate of interest.

Solution:

Let the cost of one book be ₹ x.

Then the cost of 20 books = ₹ 20x.

Now, cost of 20 books is same at the cost of 21 books

∴ Interest on ₹ 20x for 6 months at the rate r% will be same as the cost of one book.

$\therefore x = 20x \times \frac{1}{2} \times \frac{r}{100}$

$\therefore r = \frac{x \times 2 \times 100}{20x}$

$\therefore r = 10$

The rate of the interest is 10% per annum.

6. Find the true discount, bankers discount and bankers gain on a bill of ₹ 4240 due 6 months hence at 9% p.a

Solution:

Sum due = ₹ 4240,

N = 6 months,

$\frac{1}{2}$ years, r = 9%

Banker's discount

$BD = \frac{SD \times n \times r}{100}$

$= \frac{4240 \times \frac{1}{2} \times 9}{100}$

$= \frac{4240 \times 9}{100}$

$= \frac{38160}{200}$

$\therefore$ BD = 190.86

Banker's discount is ₹ 190.86

True Discount:

Let TD be ₹ x.

Then BD = TD + interest on TD

for $\frac{1}{2}$ years at 9%

$= x + \left(x + \frac{1}{2} \times \frac{9}{100}\right)$

$\therefore\ 190.86 = x + \frac{9x}{200}$

$\therefore\ 190.86 = x + \frac{209x}{200}$

$\therefore x = \frac{190.86 \times 200}{209}$

$\therefore x = \frac{38160}{209}$

$\therefore$ x = 182.58 = 182.60

True discount is ₹ 182.60

Banker's Gain:

BG = BD – TD

= ₹ (190.86 – 182.60)

$\therefore$ BG = ₹ 8.20

Hence, banker's gain is ₹ 8.20

7. True discount on a bill is ₹ 2200 and bankers discount is ₹ 2310 if the bill is due 10 months hence, find the rate of interest

Solution:

TD = ₹ 2200, BD = ₹ 2310

$N = 10\,months = \frac{10}{12}$

$= \frac{5}{6}\ years$

BD=TD+ interest on TD for

→ $\frac{5}{6}$ years at rate r%

$\therefore$ 2310 = 2200 +

→ $\left(2200 \times \frac{5}{6} \times \frac{r}{100}\right)$

$\therefore\ 2310 - 2200 = \frac{55}{3}r$

$\therefore 110 = \frac{55}{3} r$

$\therefore r = \frac{110 \times 3}{55}$

$\therefore$ r = 6

The rate of interest is 6%

8. A Bill of ₹ 6395 drawn on 19th January 2015 for 8 months Was discounted on 28th February 2015 at 8% p.a interest. What is the banker's discount? What is the cash value of the bill?

Solution:

FV of the bill = ₹ 6395, r = 8%

Date of drawing the bill = 19th January 2015

Period of the bill = 8 months

Nominal due date = 19th September 2015

Legal due date = 22th September 2015

Date of discount = 28th February 2015

$\therefore$ Number of days from the date of discounting to the legal due date is as follows:

Mar.	Apr	May	June	July	Aug	Sept	Total
31	30	31	30	31	31	22	206

$\therefore Period\ n = \frac{206}{365}$

BD = interest on FV ₹ 6395 for 206 days at 8%

$\therefore BD = \frac{fV \times n \times r}{100}$

$= 6395 \times \frac{206}{365} \times \frac{8}{100}$

$\therefore$ BD = 288.74

$\therefore$ Banker's discount is ₹ 288.74

Cash value (CV) of the bill:

CV= FV = BD

= ₹ (6395 – 288.74)

= ₹ 6106.26

The cash value of the bill is ₹ 6106.26

9. A Bill of ₹ 8000 drawn on 5th January 1998 for 8 months was discounted for ₹ 7680 on a certain date. Find the date on which it was discounted at 10% p.a

Solution:
Face value (FV) (SD) = ₹ 8000,
r= 10%
CV = ₹ 7680
Now, BD = SD – CV
= 8000 – 7680
= ₹ 320

$$Also, BD = \frac{SD \times n \times r}{100}$$

$$\therefore 320 = \frac{8000 \times n \times 10}{100}$$

$\therefore$ 320 = 800n

$$\therefore n = \frac{320}{800} = \frac{2}{5}\ years$$

$$\therefore n = \frac{2}{5} \times 365$$

$\therefore$ n = 146 days
Date of drawing the bill = 5th January 1998
Period of the bill = 8 months
Nominal due date= 5th September 1998
Legal due date = 8th September 1998
The number of days from the date of discounting to the Legal date is 146 days.
$\therefore$ The date of discounting the bill is obtained by deducting 146 days from the legal due date, i.e. 8th September 1998.

Sept	Aug	July	June	May	April	Total
8	31	31	30	31	15	146

$\therefore$ The bill was discounted on15th April 1998.

10. A bill drawn on 5th June for 6 months was dis-counted At the rate of 5% p.a. on 19th October if the cash value of the Bill is ₹ 43500. Find the face value of the bill.

Solution:
Cash value = ₹ 43500, r = 5%
Date of drawing = 5th June
Period of the bill = 6 months
Nominal due date = 5th December
Legal due date = 8th December
Date of discounting = 19th October
$\therefore$ Number of days from the date of discounting to the legal due date is as follow.

Oct	Nov	Dec	Total
12	30	8	50

$\therefore\ Period\ n = \frac{50}{365}\ years$

Let the face value (SD) of the bill be ₹ x.

$BD = \frac{FV \times n \times r}{100}$

$= x \times \frac{50}{365} \times \frac{5}{100} = \frac{x}{146}$

Also, BD = FV – CV = x – 43500

$\therefore \frac{x}{146} = x - 43500$

$\therefore 43500 = x - \frac{x}{146}$

$\therefore 43500 = \frac{146x - x}{146}$

$\therefore 43500 \times 146 = 145x$

$\therefore x = \frac{43500 \times 146}{145}$

∴ x = 43800

The face value of the bill is ₹ 43800.

11. A bill was drawn on 14th April for ₹ 7000 and was Discounted on 6th July at 5% p.a. The Bankers paid ₹ 6930 For the bill. Find the period of the bill.

Solution:

Face value (FV) or (SD) = ₹ 7000, r = 5%

Cash value (CV) = ₹ 6930

BD = SD – CV

= 7000 – 6930

= ₹ 70

$Also, BD = \frac{SD \times n \times r}{100}$

$\therefore 70 = \frac{7000 \times n \times 5}{100}$

∴ 70 = 350n

$\therefore n = \frac{70}{350} = \frac{1}{5}\ years$

$\therefore\ n = \frac{1}{5} \times 365 = 73\ days$

To find the legal due date, 73 days are to be counted from the date of discounting i.e. 6th July

July	Aug	Sept	Total
25	31	17	73

Hence, the legal due date is 17th September
∴ Nominal due date is 14th September
Now, date of drawing is 14th April.
Hence, the period of the bill is from 14th April to
14th September, i.e. 5 months

12. If difference between true discount and bakers discount On a sum due 4 months hence is ₹ 20, Find true discount, bankers Discount and amount of the bill, the rate of simple interest charged Being 5% p.a.

Solution:
True Discount:
Let TD be ₹ x.
Bankers gain (BG) = BD – TD
= Interest on TD for 4 months at 5% p.a.

$$\therefore 20 = x \times \frac{4}{12} \times \frac{5}{100}$$

$$\therefore 20 = \frac{x}{60}$$

∴ 20 × 60 = x.
∴ x = 1200
Trade discount is ₹ 1200
Bankers Discount:
BD = BG + TD
= 20 + 1200
∴ BD = 1220
Bankers discount is ₹ 1220.
Amount of bill:
Let amount of the bill (Face value) be ₹ y.
BD = Interest on FV for 4 months at 5% p.a

$$\therefore 1220 = y \times \frac{4}{12} \times \frac{5}{100}$$

$$\therefore \ 1220 \ = \frac{y}{60}$$

∴ 1220 × 60= y
∴ y = 73200
The amount of the bill is ₹ 73200.

13. A bill of ₹ 51000 was drawn on 18th February 2010 for 9 months. It was encashed on 28th June 2010 5% p.a.

Calculate the bankers gain and true discount.

Solution:
FV of the bill = ₹ 51000, r = 5%
Date of drawing the bill = 18% February 2010
Period of bill = 9 months
Nominal due date = 18th November 2010
Legal due date = 21% November 2010
Date of discounting = 28th June 2010
∴ Number of days from the date of discounting to the legal due date is as follows:

June	July	Aug	Sept	Oct	Nov	Total
2	31	31	30	31	21	146

$$\therefore period\ n = \frac{146}{365}$$
$$= \frac{2}{5}\ years.$$
$$BD = \frac{fV \times n \times r}{100}$$
$$= 51000 \times \frac{2}{5} \times \frac{5}{100}$$
= ₹ 1020
$$Also, BD = TD + interest\ on$$
$$TD\ for\ \frac{2}{5}\ years\ at\ 5\%$$
Let TD be ₹ x.
$$\therefore 1020 = x + \left(x \times \frac{2}{5} \times \frac{5}{100}\right)$$
$$\therefore 1020 = x + \frac{x}{50}$$
$$\therefore 1020 = \frac{50x + x}{50}$$
∴ 1020 × 50 = 51x
$$\therefore x = \frac{1020 \times 50}{51}$$
∴ x = 1000
True Discount is ₹ 1000.
Banker's Gain:
BG = BD – TD
= 1020 – 1000
∴ BD = 20
Banker's gain is ₹ 20.

14. A certain sum due 3 months hence is $\frac{21}{20}$ of

The present worth. What is the rate of interest?

Solution:

$SD = \frac{21}{20}(PW),$

$n = 3\,months = \frac{1}{4}\,years$

$\mathrm{SD} = \mathrm{PW} + \mathrm{TD}$

$\therefore PW + TD = \frac{21}{20}\,PW$

$\therefore TD = \frac{21}{20}\,PW - PW$

$\therefore TD = PW\left(\frac{21}{20} - 1\right)$

$\therefore TD = PW\left(\frac{21 - 20}{20}\right)$

$\therefore TD = \frac{1}{20} \times PW$

$Also, TD = \frac{PW \times n \times r}{100}$

$= PW \times \frac{1}{4} \times \frac{r}{100}$

$\therefore \frac{1}{20} \times PW$

$= PW \times \frac{1}{4} \times \frac{r}{100}$

$\therefore \frac{1}{20} = \frac{r}{400}$

$\therefore \frac{400}{20} = r$

$\therefore r = 20$