EXERCISE 2

1. Mrs. Goswami deposits ₹1000 every month in a recurring deposit account for 3 years at 8% interest per annum. Find the matured value.
Solution:

It is given that
Amount deposited by Mrs. Goswami = ₹1000
Rate of interest = 8% p.a.
Period (x) = 3 years = 36 months

We know that
Total principal for one month = 1000 × [x (x + 1)]/ 2
Substituting the value of x
= 1000 × (36 × 37)/ 2
By further calculation
= ₹666000

Interest = PRT/ 100
Substituting the values
= (666000 × 8 × 1)/ (100 × 12)
So we get
= ₹4440

So the amount of maturity = P × x + SI
= 1000 × 36 + 4440
= 36000 + 4440
= ₹40440

2. Sonia had a recurring deposit account in a bank and deposited ₹600 per month for 2 ½ years. If the rate of interest was 10% p.a., find the maturity value of this account.
Solution:

Its given that,
Amount deposited by Sonia per month = ₹600
Rate of interest (r) = 10% p.a.
Period (n) = 2 ½ years = 30 months

The interest earned during this period is calculated using the formula:
I = P × [n(n + 1)/ (2 × 12)] × r/100
I = 600 × [30(30 + 1)/ (2 × 12)] × 10/100
= 600 × [(30 × 31)/ (2 × 12)] × 1/10
= 60 × [(15 × 31)/ 12]
= 5 × 15 × 31
I = ₹2325

Maturity value (MV) = P × n + I
MV = ₹(600 × 30 + 2325)
= ₹(18000 + 2325)
= ₹20325
Hence, the maturity value of Sonia's account will be ₹20325.

3. Kiran deposited ₹200 per month for 36 months in a bank's recurring deposit account. If the banks pays interest at the rate of 11% per annum, find the amount she gets on maturity?
Solution:

It is given that
Amount deposited by Kiran = ₹200
Rate of interest = 11% p.a.
Period (x) = 36 months
So the amount deposited in 36 months = 200 × 36 = ₹7200

We know that
Total principal for one month = 200 × [x (x + 1)]/ 2
Substituting the value of x
= 200 × (36 × 37)/ 2
By further calculation
= ₹133200
Interest = PRT/ 100
Substituting the values
= (133200 × 11 × 1)/ (100 × 12)
So we get
= ₹1221

So the amount of maturity = P × x + SI
= 7200 + 1221
= ₹8421

4. Haneef has a cumulative bank account and deposits ₹600 per month for a period of 4 years. If he gets ₹5590 as interest at the time of maturity, find the rate of interest per annum.
Solution:

Interest at the time of maturity = ₹5880
Amount deposited by Haneef = ₹600
Period (x) = 4 years = 48 months

We know that
Total principal for one month = 600 × [x (x + 1)]/ 2
Substituting the value of x
= 600 × (48 × 49)/ 2
By further calculation
= ₹705600

Consider r% p.a. as the rate of interest
Interest = PRT/ 100
Substituting the values
5880 = (705600 × r × 1)/ (100 × 12)
So we get
5880 = 588r
By further calculation
r = 5880/588 = 10

Hence, the rate of interest = 10% p.a.

5. David opened a Recurring Deposit Account in a bank and deposited ₹300 per month for two years. If he received ₹7725 at the time of maturity, find the rate of interest per annum.
Solution:

It is given that
Amount deposited per month = ₹300
Period (x) = 2 years = 24 months
Amount received at the time of maturity = ₹7725

Consider R as the rate percent
We know that
Total principal for one month = 300 × [x (x + 1)]/ 2
Substituting the value of x
= 300 × (24 × 25)/ 2
By further calculation
= ₹90000

Interest = PRT/ 100
Substituting the values
= (90000 × R × 1)/ (100 × 12)
So we get
= 75R

So we get
300 × 24 + 75R = 7725
By further calculation
7200 + 75R = 7725
75R = 7725 – 7200 = 525
R = 525/75 = 7

Hence, the rate of interest is 7% p.a.

6. Mr. Gupta opened a recurring deposit account in a bank. He deposited ₹2500 per month for two years. At the time of maturity he got ₹67500. Find:

(i) the total interest earned by Mr. Gupta.
(ii) the rate of interest per annum.
Solution:
It is given that
Amount deposited by Mr. Gupta per month = ₹2500
Period (x) = 2 years = 24 months
Amount got at the time of maturity = ₹67500

We know that
Total principal for one month = 2500 × [x (x + 1)]/ 2
Substituting the value of x
= 2500 × (24 × 25)/ 2
By further calculation
= ₹750000

Interest = Maturity value – x × deposit per month
Substituting the values
= 67500 – 24 × 2500
= 67500 – 60000
= ₹7500

We know that
Period = 1 month = 1/12 year
So the rate of interest = (SI × 100)/ (P × T)
Substituting the values
= (7500 × 100 × 12)/ (750000 × 1)
= 12%

7. Shahrukh opened a Recurring Deposit Account in a bank and deposited ₹800 per month for 1 ½ years. If he received ₹15084 at the time of maturity, find the rate of interest per annum.
Solution:

Amount deposited by Shahrukh per month = ₹800
We know that
No. of months (n) = 1 ½ = 3/2 × 12 = 18 months

We know that
Total principal for one month = 800 × [x (x + 1)]/ 2
Substituting the value of x
= 800 × (18 × 19)/ 2
By further calculation
= ₹136800

Interest = PRT/ 100
Substituting the values
= (136800 × r × 1)/ (100 × 12)

So we get
= 114r

So the amount of maturity = P × x + SI
15084 = 800 × 18 + 114r
By further calculation
114r = 15084 - 14400
114r = 684
r = 684/114 = 6%

Hence, the rate of interest per annum is 6%.

8. Rekha opened a recurring deposit account for 20 months. The rate of interest is 9% per annum and Rekha receives ₹441 as interest at the time of maturity. Find the amount Rekha deposited each month.
Solution:

Here,
The number of months Rekha deposited (n) = 20
Rate of interest per annum (r) = 9%
Let the amount deposited by Rekha each month be ₹x, then P = ₹x
Now, we know that
I = P × [n(n + 1)/ (2 × 12)] × r/100
= x × [20(20 + 1)/ (2 × 12)] × 20/100
= x × [20(21)/ (2 × 12)] × 1/5
= x × [(5 × 21)/6)] × 1/5
According to given,
441 = x × [(5 × 21)/6)] × 1/5
2205 = x × [(5 × 21)/6)]
x = (2205 × 6)/ (5 × 21)
x = 126

Hence, the amount deposited by Rekha each month is ₹126.

9. Mohan has a recurring deposit account in a bank for 2 years at 6% p.a. simple interest. If he gets ₹1200 as interest at the time of maturity, find
(i) the monthly installment.
(ii) the amount of maturity.
Solution:

Interest at the time of maturity = ₹1200
Period (x) = 2 years = 24 months
Rate of interest = 6% p.a.

Consider ₹P p.m. as the monthly deposit
We know that

Interest = P × [x (x + 1)]/ (2 × 12) × r/100
Substituting the value of x
1200 = (P × 24 × 25)/ 24 × 6/100
By further calculation
1200 = 6/4P
By cross multiplication
P = (1200 × 4)/ 6 = 800

Here monthly deposit = ₹800
So the amount of maturity = P × x + SI
= 800 × 24 + 1200
= 19200 + 1200
= ₹20400

10. Mr. R. K. Nair gets ₹6455 at the end of one year at the rate of 14% per annum in a recurring deposit account. Find the monthly installment.
Solution:

Consider ₹P as the monthly installment
Period (x) = 1 year = 12 months

We know that
Total principal for one month = P × [x (x + 1)]/ 2
Substituting the value of x
= P × (12 × 13)/ 2
By further calculation
= 78P

Interest = PRT/ 100
Substituting the values
= (78P × 14 × 1)/ (100 × 12)
So we get
= 0.91P
So the amount of maturity = P × x + SI
6455 = P × 12 + 0.91P
6455 = 12.91P
By further calculation
P = 6455/12.91 = ₹500

11. Samita has a recurring deposit account in a bank of ₹2000 per month at the rate of 10% p.a. If she gets ₹83100 at the time of maturity, find the total time for which the account was held.
Solution:

Amount deposited in the account per month = ₹2000
Rate of interest = 10%
Consider period = n months

We know that
Principal for one month = 2000 × n (n + 1)/ 2 = 1000 n (n + 1)
Interest = [1000n (n + 1) × 10 × 1]/ [100 × 12]
= [100 n (n + 1)]/ 12
So the maturity value = 2000 × n + [100 n (n + 1)]/ 12

Substituting the values
2000n + [100 n (n + 1)]/ 12 = 83100
By further calculation
$24000n + 100n^2 + 100n = 83100 \times 12$
Dividing by 100
$240n + n^2 + n = 831 \times 12$
$n^2 + 241n – 9972 = 0$
We can write it as
$n^2 + 277n – 36n – 9972 = 0$
n (n + 277) – 36 (n + 277) = 0
(n + 277) (n – 36) = 0
Here n + 277 = 0
So we get
n = - 277 which is not possible
Similarly
n – 36 = 0 where x = 36
So the period = 36 months or 3 years

Hence, the total time for which the account was held is 3 years.

CHAPTER TEST

1. Mr. Dhruv deposits ₹600 per month in a recurring deposit account for 5 years at the rate of 10% per annum (simple interest). Find the amount he will receive at the time of maturity.
Solution:

It is given that
Amount deposited by Mr. Dhruv = ₹600
Rate of interest = 10% p.a.
Period (n) = 5 years = 60 months

We know that
Total principal for one month = 600 × n (n + 1)/ 2
Substituting the value of n
= 600 × (60 × 61)/ 2
So we get
= ₹1098000

Here Interest = PRT/ 100
Substituting the values
= (1098000 × 10 × 1)/ (100 × 12)
= ₹9150

So the amount of maturity = 600 × 60 + 9150
= 36000 + 9150
= ₹45150

2. Ankita started paying ₹400 per month in a 3 years recurring deposit. After six months her brother Anshul started paying ₹500 per month in a 2 ½ years recurring deposit. The bank paid 10% p.a. simple interest for both. At maturity who will get more money and by how much?
Solution:

Case 1 – Ankita
Amount deposited per month = ₹400
Period (n) = 3 years = 36 months
Rate of interest = 10%

We know that
Total principal for one month = 400 × n (n + 1)/ 2
Substituting the value of n
= 400 × (36 × 37)/ 2
So we get
= ₹266400

Here Interest = PRT/ 100
Substituting the values

= (266400 × 10 × 1)/ (100 × 12)
= ₹2220

So the amount of maturity = 400 × 36 + 2220
= 14400 + 2220
= ₹16620

Case 2 – Anshul
Amount deposited per month = ₹500
Period (n) = 2 ½ years = 30 months
Rate of interest = 10%

We know that
Total principal for one month = 500 × n (n + 1)/ 2
Substituting the value of n
= 500 × (30 × 31)/ 2
So we get
= ₹232500

Here Interest = PRT/ 100
Substituting the values
= (232500 × 10 × 1)/ (100 × 12)
= ₹1937.50

So the amount of maturity = 500 × 30 + 1937.50
= 15000 + 1937.50
= ₹16937.50

We know that at maturity Anshul will get more amount
So the difference = 16937.50 – 16620 = ₹317.50

3. Shilpa has a 4 year recurring deposit account in Bank of Maharashtra and deposits ₹800 per month. If she gets ₹48200 at the time of maturity, find
(i) the rate of simple interest,
(ii) the total interest earned by Shilpa
Solution:

It is given that
Amount deposited per month (P) = ₹800
Amount of maturity = ₹48200
Period (n) = 4 years = 48 months

Consider R% p.a. as the rate of interest
We know that
Total principal for one month = 800 × n (n + 1)/ 2
Substituting the value of n

= 800 × (48 × 49)/ 2
So we get
= ₹940800

Here the total deposit = 800 × 48 = ₹38400
Amount of maturity = ₹48200
So the interest earned = 48200 – 38400 = ₹9800

(i) Rate of interest = (SI × 100)/ (P × T)
Substituting the values
= (9800 × 100 × 12)/ (940800 × 1)
= 12.5%

(ii) Total interest earned by Shilpa = ₹9800

4. Mr. Chaturvedi has a recurring deposit account in Grindlay's Bank for 4 ½ years at 11% p.a. (simple interest). If he gets Rs 101418.75 at the time of maturity, find the monthly installment.
Solution:

Consider ₹x as the each monthly installment
Rate of interest = 11%
Period (n) = 4 ½ years = 54 months

We know that
Total principal for one month = x × n (n + 1)/ 2
Substituting the value of n
= x × (54 × 55)/ 2
So we get
= 1485x

Here Interest = PRT/ 100
Substituting the values
= (1485x × 11 × 1)/ (100 × 12)
= 13.6125x

So the amount of maturity = 54x + 13.6125x
= 67.6125x

By equating the value
67.6125x = 101418.75
x = 101418.75/67.6125 = ₹1500

Hence, the deposit per month is ₹1500.

5. Rajiv Bhardwaj has a recurring deposit account in a bank of ₹600 per month. If the bank pays simple interest of 7% p.a. and he gets ₹15450 as maturity amount, find the total time for which

the account was held.
Solution:

It is given that
Amount deposited per month (P) = ₹600
Rate of interest = 7% p.a.
Amount of maturity = ₹15450
Consider n months as the period

We know that
Total principal for one month = $600 \times n (n + 1)/ 2$
By further calculation
$= 600 (n^2 + n)/ 2$
$= 300 (n^2 + n)$

Here Interest = PRT/ 100
Substituting the values
$= (300 (n^2 + 1) \times 7 \times 1)/ (100 \times 12)$
$= 7/4 (n^2 + n)$

Amount of maturity = $600n + 7/4 (n^2 + n)$
Substituting the values
$600n + 7/4 (n^2 + n) = 15450$
By further calculation
$2400 + 7n^2 + 7n = 61800$
$7n^2 + 2407n – 61800 = 0$
We can write it as
$7n^2 – 168n + 2575n – 61800 = 0$
$7n (n – 24) + 2575 (n – 24) = 0$
$(n – 4) (7n + 2575) = 0$
Here $n – 24 = 0$ where $n = 24$
Similarly
$7n + 2575 = 0$
Where $7n = -2575$
$n = -2575/7$ which is not possible as it is negative
Period (n) = 24 months or 2 years