Exercise 3(C)

1. If the interest is compounded half-yearly, calculate the amount when principal is ₹7,400; the rate of interest is 5% per annum and the duration is one year.
Solution:

Given: P = ₹7,400; r = 5% p.a. and n = 1 year
As the interest is compounded half-yearly, we have
$A = P\,[1 + r/(2 \times 100)]^{n \times 2}$
$= 7400\,[1 + 5/(2 \times 100)]^{1x2}$
$= 7400\,(1 + 1/40)^2$
$= 7400\,(41/40)^2$
$= 7774.63$
Hence, the amount is ₹7,774.63

2. Find the difference between the compound interest compounded yearly and half-yearly on ₹10,000 for 18 months at 10% per annum.
Solution:

Given: P = ₹10,000; n = 18 months = 1½ year and r = 10%p.a. Now,
(i) When interest is compounded yearly
For 1 year,
A = P(1 + r/100)^n
= 10000(1 + 10/100)^1
= 10000(11/10)^1
= 11000
Hence, the amount is ₹11,000

For ½ year,
P = ₹11,000; n = 1/2 year and r = 10% A
$= P[1 + r/(2 \times 100)]^{n \times 2}$
$= 11000\,[1 + 10/(2 \times 100)]^{1/2 \times 2}$
$= 11000\,(21/20)^1$
$= 11550$
So, after 1½ year the amount is ₹11,550
Hence, the C.I = ₹11,550 – ₹10,000 = ₹1,550

(ii) When interest is compounded half-yearly
$A = P\,[1 + r/(2 \times 100)]^{n \times 2}$
$= 10000[1 + 10/(2 \times 100)]^{3/2 \times 2}$
$= 10000(21/20)^3$
$= 11,576.25$
Hence, after 1½ years the amount when compounded half-yearly is ₹11,576.25
So,
C.I = ₹11,576.25 – ₹10,000 = ₹1,576.25

Therefore, the difference between both C.I = ₹1,576.25 – ₹1,550
= ₹26.25

3. A man borrowed Rs.16,000 for 3 years under the following terms:
(i) 20% simple interest for the first 2 years.
(ii) 20% C.I. for the remaining one year on the amount due after 2 years, the interest being compounded half-yearly.
Find the total amount to be paid at the end of the three years.
Solution:

Given: P = ₹16,000; N = 3 years
For the first 2 years, R = 20%
So,
S.I = (P x N x R)/100
= (16000 x 2 X 20)/100
= 6400
Hence, the amount after 2 year will be (P + S.I) = ₹(16,000 + 6400) = ₹22,400 This is the amount at the end of 2 years.

Now, fo r the interest is compounded half-yearly
So,
A = P
=
=
=

There
The tota at the end of the three years is ₹27,104.

4. What sum of money will amount to ₹27,783 in one and a half years at 10% per annum compounded half yearly?
Solution:

Given: A = ₹27,783; N = 1½ years and R = 10% compounded half-yearly So,
$A = P[1 + r/(2 \times 100)]^{n \times 2}$
$27783 = P[1 + 10/200]^{3/2 \times 2}$
$27783 = P(1 + 1/20)^3$
$27783 = P(21/20)^3$
$P = 27783 \times (20/21)^3$
= 24000

Therefore,
The sum of ₹24,000 amounts to ₹27,783 in one and a half years if compounded half yearly at 10% per annum.

5. Ashok invests a certain sum of money at 20% per annum, compounded yearly. Geeta invests an equal amount of money at the same rate of interest per annum compounded half-yearly. If Geeta gets ₹33 more than Ashok in 18 months, calculate the money invested.
Solution:

Let P = Rs y; n = 18 months= 1½ year and r = 20% p.a.
(i) For Ashok (interest is compounded yearly)
For 1 year,
$A = P(1 + r/100)^n$
$= y(1 + 20/100)^1$
$= (6/5)y$

For ½ year,
Now, P = (6/5)y; n = ½ year and r = 20%
$A = P[1 + r/(2 \times 100)]^{n \times 2}$
$= (6/5)y[1 + 20/(2 \times 100)]^{1/2 \times 2}$
$= (66/50)y$

(ii) For C mpounded half-yearly)
A = P
=
=
=

Ther
(1331
(11/100
y = (33 x 10
= 3000
Therefore, the money invested by each person is ₹3,000

6. At what rate of interest per annum will a sum of ₹62,500 earn a compound interest of ₹5,100 in one year? The interest is to be compounded half-yearly.
Solution:

Given: P = ₹62,500; C.I = ₹5100 and N = 1 (compounded half-yearly) So,
$C.I = P[1 + r/(2 \times 100)^{2xn} - 1]$
$5100 = 62500[(1 + r/200)^2 - 1]$
$(1 + r/200)^2 = 67600/62500$
$1 + r/200 = 260/250$
$r = 8$

Therefore, the rate of interest is 8%

7. In what time will ₹1,500 yield ₹496.50 as compound interest at 20% per year compounded half-yearly?
Solution:

Given: P = ₹1,500; C.I. = ₹496.50 and r = 20% (compounded semi-annually) Then,
C.I. = $P[\{1 + r/(2 \times 100)^{nx2}\} - 1]$
$496.50 = 1500\{[1 + 20/(2 \times 100)]^{nx2}) – 1\}$
$496.50/1500 = (11/10)^{2n} – 1$
$331/1000 + 1 = (11/10)^{2n}$
$1331/1000 = (11/10)^{2n}$
$(11/10)^3 = (11/10)^{2n}$
On comparing, we get
2n = 3
n = 1½ years

Therefore, the time taken is 1½ years.

8. Calculate the C.I. on ₹3,500 at 6% per annum for 3 years, the interest being compound[illegible]rly.
Do not [illegible]tables. Use the necessary information from the following:
(1.06)[illegible] 1.092727
(1.0[illegible] 194[illegible]2
Sol[illegible]

Give[illegible] = 3 years
As t[illegible]nded half-yearly,
Then,
C.I. = P[illegible]
= 3500 [illegible]00)]$^{3 \times 2}$ - 1}
= 3500 [(103/100)^6 - 1]
= 3500 [(1.03)^6 – 1]
= 3500 (1.194052 - 1)
= 3500 x 0.194052
= 679.18

Therefore,
The C.I. is ₹679.18

9. Find the difference between compound interest and simple interest on ₹12,000 and in 1½ years at 10% compounded yearly.
Solution:

Given: P = ₹12,000; n = 1½ years and r = 10% So,
S.I. = (P x R x T)/100

= (12000 x 10 x 3/2)/100
= 1800
Hence, the S.I. is ₹1,800

Now, calculating C.I.
For 1 year
P= ₹12,000; n = 1 year and r = 10%
Then,
$A = P(1 + r/100)^n$
$= 12000(1 + 10/100)^1$
= 13200

And, for next 1/2 year
P = ₹13,200; n = ½ year and r = 10%
Then,
$A = P[1 + r(2 \times 100)]^{n \times 2}$
$= 13200\ [1 + 10/(2 \times 100)]^{1/2 \times 2}$
= 13860

Hence, t 12,000 = ₹1,860
So, Di d S.I = ₹1,860 - ₹1,800
₹60

10. n compound interest and simple interest on ₹12,000 and in 1 ed half-yearly.
Solu

Given: P years and r = 10%
Then,
S.I. = (P x R x T)/100
= (12000 x 10 x 3/2)/100
= 1800

Next,
Calculating C.I.(compounded half-yearly)
$A = P[1 + r/(2 \times 100)]^{n \times 2}$
$= 12000[1 + 10/(2 \times 100)]^{3/2 \times 2}$
$= 12000(21/20)^3$
= 13891.50
So, the C.I. = ₹13,891.50 - ₹12,000 = ₹1891.50

Hence, the difference between C.I. and S.I = ₹1,891.50 - ₹1,800
= ₹91.50