Exercise 2(A)

1. ₹16,000 is invested at 5% compound interest compounded per annum.
Use the table, given below, to find the amount in 4 years.

Year	Initial amount (₹)	Interest (₹)	Final amount
1st	16,000	800	16,800
2nd			
3rd			
4th			
5th			

Solution:

Year	Initial amount (₹)	Interest (₹)	Final amount
1st	16,000	800	16,800
2nd	16,800	840	17,640
3rd	17,640	882	18,522
4th	18,522	926.10	19,448.10
5th	19,448.10	972.405	20,420.505

Thus, the amount in 4 years is ₹19,448.10

2.(i) Calculate the amount and the compound interest on:
₹6000 in 3 years at 5% per year.
(ii) Calculate amount and the compound interest on:
₹8000 in 2½ years at 15% per annum.
Solution:

(i) Given: P = ₹6,000; N = 3 years and R = 5% For

the 1st year
P = ₹6000; N = 1 year and R = 5%
Interest = (6000 x 5 x 1)/100
= ₹300
And, amount = ₹(6000 + 300)
= ₹6,300
For the 2nd year
P = ₹6300; N = 1 year and R = 5%
Interest = (6300 x 5 x 1)/100
= ₹315
And, amount = ₹(6300 + 315)
= ₹6,615
For the 3rd year
P = ₹6,615; N = 1 year and R = 5%
Interest = (6615 x 5 x 1)/100
= ₹330.75
And, amount = ₹(6,615 + 330.75)

= ₹6,945.75

Hence, the C.I. accrued = Final amount – Initial principal
= ₹6,945.75 - ₹6,000
= ₹945.75

(ii) Given: P = 8000; N = 2½ years and R = 15%
For the 1st year
P = ₹8,000; N = 1 year and R = 15%
Interest = (8000 x 15 x 1)/100
= ₹1,200
And, amount = ₹(8,000 + 1,200)
= ₹9,200
For the 2nd year
P = ₹9,200; N = 1 year and R = 15%
Interest = (9200 x 15 x 1)/100
= ₹1,380
And, amount = ₹(9,200 + 1,380)
= ₹10,580
For the next ½ year
P = ₹10,580; N = ½ year and R = 15%
Interest = (10580 x 15 x ½)/100
= ₹793.50
And, amount = ₹(10,580 + 793.50)
= ₹11,373.50

Hence, the C.I. accrued = Final amount – Initial principal
= ₹11,373.50 - ₹8,000
= ₹3,373.50

3. Calculate the amount and the compound interest on:
(i) ₹4,600 in 2 years when the rates of interest of successive years are 10% and 12% respectively.
(ii) ₹6,000 in 3 years, when the rates of the interest for successive years are 10%, 14% and 15% respectively.
Solution:

(i) For 1st year
P = ₹4,600; R = 10% and T = 1 year I
= (4600 x 10 x 1)/100
= ₹460
And,
A = ₹(4,600 + 460)
= ₹5,060

For 2nd year

P = ₹5,060; R = 12% and T = 1 year. I
= (5060 x 12 x1)/100
= 60720/100
= ₹607.20
And,
A = ₹(5,060 + 607.20)
= ₹5,667.20

Compound interest = ₹(5,667.20 – 4,600)
= ₹1,067.20
Amount after 2 years = ₹5,667.20

(ii) For 1st year
P = ₹16,000; R = 10% and T = 1 year I
= (16000 x 10 x 1)/100
= ₹1,600
And,
A = ₹(16,000 + 1,600)
= ₹17,600

For 2nd year
P = ₹17,600; R = 14% and T = 1 year I
= (17600 x 14 x 1)/100
= 246400/100
= ₹2,464
And,
A = ₹(17,600 + 2,464)
= ₹20,064

For 3rd year,
P = ₹20,064; R = 15% and T = 1 year I
= (20064 x 15 x 1)/100
= ₹3,009.60
And,
Amount after 3 years = ₹(20,064 + 3,009.60)
= ₹23,073.60
Hence,
Compound interest = ₹(23,073.60 – 16,000)
= ₹7,073.60

4. Find the compound interest, correct to the nearest rupee, on ₹2,400 for 2½ years at 5 per cent per annum.
Solution:

For 1st year
P = ₹2400; R = 5% and T = 1 year

I = (2400 x 5 x 1)/100
= ₹120
A = ₹(2400 + 120)
= ₹2520

For 2nd year
P = ₹2520; R = 5% and T = 1 year I
= (2520 x 5 x 1)/100
= ₹126
A = ₹(2,520 + 126)
= ₹2,646

For the final ½ year
P = Rs. 2646; R = 5% and T = ½ year
I = (2646 x 5 x 1)/(100 x 2)
= ₹66.15
Amount after 2½ years = ₹2,646 + ₹66.15
= ₹2,712.15
Hence,
Compound interest = ₹(2,712.15 – 2,400)
= ₹312.15

5. Calculate the compound interest for the second year on ₹8,000 invested for 3 years at 10% per annum.
Solution:

For 1st year
P = ₹8,000; R = 10% and T = 1 year I
= (8000 x 10 x 1)/100
= 800
And,
A = ₹(8,000 + 800) = ₹8,800

For 2nd year
P = ₹8,800; R = 10% and T = 1 year I
= (8800 x 10 x 1)/100
= ₹880
Hence,
Compound interest for 2nd years = ₹880

6. A borrowed ₹2,500 from B at 12% per annum compound interest. After 2 years, A gave ₹2,936 and a watch to B to clear the account. Find the cost of the watch.
Solution:

For 1st year
P = ₹2500; R = 12% and T = 1 year

I = (2500 x 12 x 1)/100
= ₹300
And,
Amount = ₹(2,500 + 300) = ₹2,800

For 2nd year
P = ₹2,800; R = 12% and T = 1 year I
= (2800 x 12 x 1)/100
= ₹336
And,
Amount = ₹(2,800 + 336) = ₹3136
Now,
Amount repaid by A to B = ₹2936
The amount of watch = ₹(3136 – 2936) = ₹200

7. How much will ₹50,000 amount to in 3 years, compounded yearly, if the rates for the successive years are 6%, 8% and 10% respectively?
Solution:

Given: P = ₹50,000; T = 3 years
Interest for the 1st year, R = 6%
I = (P x R x T)/100
= (50000 x 6 x 1)/100
= ₹3,000
And,
Amount after the 1st year = ₹(3,000 + 50,000)
= ₹53,000
Now,
Interest for the 2nd year, R = 8% and P = ₹53,000 I
= (P x R x T)/100
= (53000 x 8 x 1)/100
= ₹4,240
And,
Amount after the 2nd year = ₹(4,240 + 53,000)
= ₹57,240
Next,
Interest for the 3rd year, R = 10% and P = ₹57,240 I
= (P x R x T)/100
= (57240 x 10 x 1)/100
= ₹5,724
And,
Amount after the 3rd year = ₹(5,724 + 57,240)
= ₹62,964
Hence, the amount after 3 years will be ₹62,964

8. Meenal lends ₹75,000 at C.I. for 3 years. If the rate of interest for the first two years is

15% per year and for the third year it is 16%, calculate the sum Meenal will get at the end of the third year.
Solution:

Given: P = ₹75,000; T = 3 years
Interest for the 1st year, R = 15%
I = (P x R x T)/100
= (75000 x 15 x 1)/100
= ₹11,250
And,
Amount after the 1st year = ₹(75,000 + 11,250)
= ₹86,250
Now,
Interest for the 2nd year, R = 15% and P = ₹86,250 I
= (P x R x T)/100
= (86250 x 15 x 1)/100
= ₹12,937.50
And,
Amount after the 2nd year = ₹(12,937.50 + 86,250)
= ₹99,187.50
Next,
Interest for the 3rd year, R = 16% and P = ₹99,187.50 I
= (P x R x T)/100
= (99187.50 x 16 x 1)/100
= ₹15,870
And,
Amount after the 3rd year = ₹(15,870 + 99,187.50)
= ₹1,15,057.5
Hence, at the end of 3 years Meenal will get an amount of ₹1,15,057.5

9. Govind borrows ₹18,000 at 10% simple interest. He immediately invests the money borrowed at 10% compound interest compounded half-yearly. How much money does Govind gain in one year?
Solution:

Calculating the simple interest
P = ₹18,000; R = 10% and T = 1year, we have
S.I.= (18000 x 10 x 1)/100
= ₹1,800

Calculating the compound interest (compounded half-yearly)
For 1st half- year
P = ₹18,000; R = 10% and T = ½ year
Interest = (18000 x 10 x 1)/(100 x 2)
= ₹900
So,

Amount = ₹18,000 + ₹900 = ₹18,900
Now,
For 2nd half-year
P = ₹18,900; R = 10% and T = ½ year
Interest = (18,900 x 10 x 1)/(100 x 2)
= ₹945 Rs
So,
Amount = ₹18,900 + ₹945 = ₹19,845
Then,
Compound interest = ₹(19,845 -18,000) = ₹1,845

Therefore,
Govind's gain = ₹(1,845 - 1,800) = ₹45

10. Find the compound interest on ₹4,000 accrued in three years, when the rate of interest is 8% for the first year and 10% per year for the second and the third years.
Solution:

Given: P = ₹4,000; T = 3 years
Interest for the 1st year, R = 8%
I = (P x R x T)/100
= (4000 x 8 x 1)/100
= ₹320
And,
Amount after the 1st year = ₹(4,000 +320)
= ₹4,320
Now,
Interest for the 2nd year, R = 10% and P = ₹4,320 I
= (P x R x T)/100
= (4320 x 10 x 1)/100
= ₹432
And,
Amount after the 2nd year = ₹(432 + 4,320)
= ₹4,752
Next,
Interest for the 3rd year, R = 10% and P = ₹4,752 I
= (P x R x T)/100
= (4,752 x 10 x 1)/100
= ₹475.20
And,
Amount after the 3rd year = ₹(475.20 + 4,752)
= ₹5,227.20
Hence,
The compound interest = ₹(5227.20 – 4,000)
= ₹1,227.20