EXERCISE 1

1. Find the amount and the compound interest on ₹ 8000 at 5% per annum for 2 years.

Solution:-

From the question it is given that,

Principal = ₹ 8000

Rate = 5 % per annum

Time = 2 years

We know that, Simple Interest = (Principal × rate × Time)/100

Simple Interest for the first year = (8000 × 5 × 1)/100

$\qquad\qquad\qquad\qquad\qquad\qquad$ = ₹ 400

Then, amount after the first year = ₹ 8000 + ₹ 400

$\qquad\qquad\qquad\qquad\qquad\qquad\quad$ = ₹ 8400

So, principal for the second year = ₹ 8400

Simple Interest for the second year = (8400 × 5 × 1)/100

$\qquad\qquad\qquad\qquad\qquad\qquad\qquad$ = ₹ 420

Then, amount after the second year = ₹ 8400 + ₹ 420

$\qquad\qquad\qquad\qquad\qquad\qquad\qquad$ = ₹ 8820

Therefore, compound interest for 2 years = Final amount – principal (original)

$\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad$ = ₹ 8820 - ₹ 8000

$\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad$ = ₹ 820

2. A person invests ₹ 5600 at 14% p.a. compound interest for 2 years. Calculate:

(i) the interest for the first year.

(ii) the amount at the end of the first year.

(iii) the interest for the 2nd year, correct to the nearest Re.

Solution:-

From the question it is given that,

Principal = ₹ 5600

Rate = 14 % per annum

Time = 2 years

(i) The interest for the first year = (Principal × rate × Time)/100

$\qquad\qquad\qquad\qquad\qquad\qquad\quad$ = (5600 × 14 × 1)/100

$\qquad\qquad\qquad\qquad\qquad\qquad\quad$ = ₹ 784

(ii) The amount at the end of the first year = ₹ 5600 + ₹ 784

$\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad$ = ₹ 6,384

So, principal for the second year = ₹ 6,384

(iii) The interest for the 2nd year = (6,384 × 14 × 1)/100

= ₹ 893.76

The interest for the 2nd year, correct to the nearest Re = ₹ 894

3. A man invests ₹ 46875 at 4% per annum compound interest for 3 years. Calculate:
(i) the interest for the first year.
(ii) the amount standing to his credit at the end of the second year.
(iii) the interest for the third year.
Solution:-
From the question it is given that,
Principal = ₹ 46875
Rate = 4 % per annum
Time = 3 years
(i) The interest for the first year = (Principal × rate × Time)/100
= (46875 × 4 × 1)/100
= ₹ 1,875
So, principal for the second year = ₹ 46,875 + ₹ 1,875
= ₹ 48,750
Then, interest for the second year = (48,750 × 4 × 1)/100
= ₹ 1,950
(ii) The amount standing to his credit at the end of the second year,
= ₹ 48,750 + ₹ 1,950
= ₹ 50,700
(iii) Therefore, the interest for the third year = (50,700 × 4 × 1)/100
= ₹ 2,028

4. Calculate the compound interest for the second year on ₹ 8000 invested for
3 years at 10% p.a.
Also find the sum due at the end of third year.
Solution:-
From the question it is given that,
Principal = ₹ 8000
Rate = 10 % per annum
Time = 3 years
We know that, Simple Interest = (Principal × rate × Time)/100
Simple Interest for the first year = (8000 × 10 × 1)/100
= ₹ 800
Then, amount after the first year = ₹ 8000 + ₹ 800

                                    = ₹ 8800
So, principal for the second year = ₹ 8800
Simple Interest for the second year = (8800 × 10 × 1)/100
                                    = ₹ 880
Then, amount after the second year = ₹ 8800 + ₹ 880
                                    = ₹ 9,680
So, principal for the third year = ₹ 9,680
Simple Interest for the third year = (9,680 × 10 × 1)/100
                                    = ₹ 968
Therefore, amount after the third year = ₹ 9680 + ₹ 968
                                    = ₹ 10,648

5. Ramesh invests ₹ 12800 for three years at the rate of 10% per annum compound interest. Find :
(i) the sum due to Ramesh at the end of the first year.
(ii) the interest he earns for the second year.
(iii) the total amount due to him at the end of three years.
Solution:-
From the question it is given that,
Principal = ₹ 12,800
Rate = 10% per annum
Time = 3 years
We know that, Simple Interest = (Principal × rate × Time)/100
Simple Interest for the first year = (12800 × 10 × 1)/100
                                    = ₹ 1,280
(i) Then, the sum due to Ramesh at the end of the first year = ₹ 12,800 + ₹ 1,280
                                                             = ₹ 14,080
So, principal for the second year = ₹ 14,080
(ii) The interest he earns for the second year.
Simple Interest for the second year = (14,080 × 10 × 1)/100
                                    = ₹ 1,408
Then, amount after the second year = ₹ 14,080 + ₹ 1,480
                                    = ₹ 15,488
So, principal for the third year = ₹ 15,488
(iii) The total amount due to him at the end of three years.
Simple Interest for the third year = (15,488 × 10 × 1)/100
                                    = ₹ 1548.8

Therefore, amount after the third year = ₹ 15,488 + ₹ 1548.8

= ₹ 17,036.8

6. The simple interest on a sum of money for 2 years at 12% per annum is ₹ 1380. Find
(i) the sum of money
Solution:-
From the question it is given that,
Simple interest for 2 years = ₹ 1,380
Rate = 12 % per annum
We know that, Simple Interest = (Principal × rate × Time)/100

1,380 = (P × 12 × 2)/100

(1,380 × 100)/(12 × 2) = P

P = (138000)/24

P = ₹ 5,750

7. A person invests ₹ 10000 for two years at a certain rate of interest, compounded annually. At the end of one year this sum amounts to ₹ 11200. Calculate :
(i) the rate of interest per annum.
(ii) the amount at the end of second year.
Solution:-
From the question it is given that,
Principal = ₹ 10,000
Time = 2 years
Amount = ₹ 11200
So, Interest for one year = 11,200 – 10,000

= ₹ 1,200

(i) the rate of interest per annum.
We know that, Simple Interest = (Principal × rate × Time)/100
Simple Interest for the first year,

1,200 = (10,000 × R × 1)/100

R = (1,200 × 100)/(10,000)

R = 12%

So, principal for the second year = ₹ 11,200
Simple Interest for the second year = (11,200 × 12 × 1)/100

= ₹ 1,344

(ii) Therefore, amount at the end of second year = ₹ 11,200 + ₹ 1,344

= ₹ 12,544

8. A man invests ₹ 5000 for three years at a certain rate of interest, compounded annually. At the end of one year it amounts to ₹ 5600 calculate:
(i) the rate of interest per annum.
(ii) the interest accursed in the second year.
(iii) the amount at the end of the third year.
Solution:-
From the question it is given that,
Principal = ₹ 5,000
Time = 3 years
At the end of one year it amounts to ₹ 5600
So, Interest for one year = 5000 – 5,600
      = ₹ 600
(i) the rate of interest per annum.
We know that, Simple Interest = (Principal × rate × Time)/100
Simple Interest for the first year,
      600 = (5,000 × R × 1)/100
      R = (600 × 100)/(5,000)
      R = 12%
(ii) the interest accursed in the second year.
Given, At the end of one year it amounts to ₹ 5600
So, principal for the second year = ₹ 5,600
Simple Interest for the second year = (5,600 × 12 × 1)/100
      = ₹ 672
Therefore, amount after the third year = ₹ 5600 + ₹ 672
      = ₹ 6,272
So, principal for the third year = ₹ 6,272
(iii) the amount at the end of the third year.
Simple Interest for the third year = (6,272 × 12 × 1)/100
      = ₹ 752.64
Therefore, the amount at the end of the third year = ₹ 6,272 + ₹ 752.64
      = ₹ 7,024.64

9. Find the amount and the compound interest on ₹ 2000 at 10% p.a. for 2½ years.
Solution:-
Given, principal (P) = ₹ 2000

Rate od interest = 10 %

Time = 2½ years

We know that, A = P(1 + (r/100))^n

Where, A = amount, P = principal, r = rate % per year and n = number of years

= 2000 × 11/10 × 11/10 × 21/20

= ₹ 2541

So, interest = ₹ 2541 - ₹2000

= ₹ 541

10. Find the amount and the compound interest on ₹ 50000 for 1½ years at 8% per annum, the interest being compounded semi – annually.

Solution:-

Since the rate of interest is 8 % per annum,

Therefore, the rate of interest half yearly = 4%

Principal for the first half – year = ₹ 50000

Interest for the first half - year = (50000 × 4 × 1)/100

= ₹ 2000

Therefore, amount after the first half – year = ₹ 50000 + ₹ 2000

= ₹ 52000

Principal for the 2nd half-year = ₹ 52000

Interest for the 2nd half - year = (52000 × 4 × 1)/100

= ₹ 2,080

Therefore, amount after the 2nd half – year = ₹ 52000 + ₹ 2,080

= ₹ 54,080

Principal for the 3rd half-year = ₹ 54,080

Interest for the 3rd half - year = (54,080 × 4 × 1)/100

= ₹ 2,163.2

Therefore, amount after the 1½ half – year = ₹ 54,080 + ₹ 2,163.2

= ₹ 56,243.2

Compound interest for 1½ = final amount – principal (original)

= 56243.20 – 5000

= ₹ 6243.20

11. Calculate the amount and the compound interest on ₹ 5000 in 2 years when the rate of interest for successive years is 6% and 8% respectively.

Solution: -

From the question it is given that,

Principal = ₹ 5000

Rate of interest for first year = 6%
Rate of interest for second year = 8%
Then,

$\quad$ Amount for 2 years = P(1 + (R/100))^n

$\qquad\qquad\qquad$ = 5000 (1+ (6/100)) (1 + (8/100))

$\qquad\qquad\qquad$ = 5000 (100+ (6/100)) (100 + (8/100))

$\qquad\qquad\qquad$ = 5000 × (106/100) × (108/100)

$\qquad\qquad\qquad$ = ₹ 5724

Therefore, interest = Amount – Principal

$\qquad\qquad\qquad$ = 5724 – 5000

$\qquad\qquad\qquad$ = ₹ 724

12. Calculate the amount and the compound interest on ₹ 17,000 in 3 years when the rate of interest for successive years is 10%, 10% and 14% respectively.
Solution:-
From the question it is given that,
Principal = ₹ 17,000
Time = 3 years
Rate of interest for successive years is 10%, 10% and 14% respectively
We know that, A = P(1 + (r/100))^n
Where, A = amount, P = principal, r = rate % per year and n = number of years

$\qquad\qquad$ = 17,000 (1 + (10/100)) (1 + (10/100)) (1 + (14/100))

$\qquad\qquad$ = 17,000 × (110/100) × (110/100) × (114/100)

$\qquad\qquad$ = 17,000 × (11/10) × (11/10) × (57/50)

$\qquad\qquad$ = 117249/5

Amount after 3 years = ₹ 23449.80
Then, amount of compound interest = Amount – Principal

$\qquad\qquad\qquad\qquad\qquad$ = 23449.80 – 17000

$\qquad\qquad\qquad\qquad\qquad$ = ₹ 6449.80

13. A sum of ₹ 9600 is invested for 3 years at 10% per annum at compound interest.
(i) What is the sum due at the end of the first year?
(ii) What is the sum due at the end of the second year?
(iii) Find the compound interest earned in 2 years.
(iv) Find the difference between the answer in (ii) and (i) and find the interest on this sum for one year.
(v) Hence, write down the compound interest for the third year.

Solution:-

From the question it is given that,

Principal = ₹ 9,600

Time = 3 years

Rate of interest = 10%

We know that, Simple Interest = (Principal × rate × Time)/100

Interest for the first year = (9,600 × 10 × 1)/100

= ₹ 960

(i) The sum due at the end of the first year = 9,600 + 960

= ₹ 10,560

So, principal for the 2nd year = ₹ 10,560

Then, interest for the 2nd year = (10560 × 10 × 1)/100

= ₹ 1056

(ii) The sum due at the end of the second year = 10,560 + 1,056

= ₹ 11,616

(iii) Therefore, compound interest in 2 years = 960 + 1056

= ₹ 2016

(iv) The difference between the answer in (ii) and (i) = ₹ 11,616 - ₹ 10,560

= ₹ 1,056

So, interest on 1056 for 1 year at the rate of 10 % per annum = (1056 × 10 × 1)/100

= ₹ 105.60

(v) So, principal for the 3rd year = ₹ 11616

Then, interest for 3rd year = (11616 × 10 × 1)/100

= ₹ 1161.60

14. The simple interest on a certain sum of money for 2 years at 10 % per annum is ₹ 1600. Find the amount due and the compound interest on this sum of money at the same rate after 3 years, interest being reckoned annually.

Solution:-

From the question it is given that,

Simple interest = ₹ 1600

Rate = 10% per annum

Time = 3 years

We know that, Simple Interest = (Principal × rate × Time)/100

1600 = (P × 10 × 2)/100

P = (1600 × 100)/(10 × 2)

P = (160000)/20

P = 16000/2

P = ₹ 8000

So, amount after 3 years A = P(1 + (r/100))^n

Where, A = amount, P = principal, r = rate % per year and n = number of years

$= 8000 \times (1 + (10/100))^3$

$= 8000 \times (11/10) \times (11/10) \times (11/10)$

= ₹ 10,648

Therefore, compound interest = amount – principal

= 10,648 – 8000

= ₹ 2648

15. A man invests ₹ 4000 for three years at compound interest. After one year the money amounts to ₹ 4320. Find the amount (to the nearest rupee) due at the end of 3 years.

Solution:-

From the question it is given that,

Principal (P) = ₹ 4000

Amount (A) = ₹ 4320

So, interest = Amount – Principal

= 4320 – 4000

= ₹ 320

Then, rate of interest = (interest × 100)/(principal × time)

= (320 × 100)/(4000 × 1)

= (32000/4000)

= 32/4

= 8%

So, amount after 3 years A = P(1 + (r/100))^n

Where, A = amount, P = principal, r = rate % per year and n = number of years

$= 4000 (1 + (8/100))^3$

$= 4000 \times (27/25) \times (27/25) \times (27/25)$

= 5038 .85

= ₹ 5039

16. A man borrows ₹ 6000 at 5% compound interest. If he repays ₹ 1200 at the end of each year, find the amount outstanding at the beginning of the third year.

Solution:-

From the question it is given that,

Principal = ₹ 6000

Rate = 5 % per annum

We know that, Simple Interest = (Principal × rate × Time)/100

So, interest for the first year = (6000 × 5 × 1)/100

= ₹ 300

Then, amount after the first year = ₹ 6000 + ₹ 300

= ₹ 6300

Given, Amount paid = ₹ 1200

Balance = 6300 – 1200

= ₹ 5100

So, principal for the second year = ₹ 5100

Interest for 2nd year = (5100 × 5 × 1)/100

= ₹ 255

Then, amount after the second year = ₹ 5100 + ₹ 255

= ₹ 5,355

So, amount paid = ₹ 1200

Balance = 5355 – 1200

= ₹ 4155

17. Mr. Dubey borrows ₹ 1,00,000 from State Bank of India at 11% per annum compound interest. He repays ₹ 41000 at the end of first year and ₹ 47700 at the end of second year. Find the amount outstanding at the beginning of the third year.
Solution:-

From the question it is given that,

Principal (p) = ₹ 15000

Rate = 11 %

Interest after 1st year = (Principal × rate × time)/100

= (1,00,000 × 11 × 1)/100

= ₹ 11,000

So, total amount after one year = 1,00,000 + 11,000

= ₹ 1,11,000

Given, amount paid at the end of first year = ₹ 41,000

So, total outstanding after 2 year = 1,11,000 – 41,000

= ₹ 70,000

Then, interest after 2 year = (70,000 × 11)/100

= (7,70,000/100)

= ₹ 7,700

So, total amount after 2 year = 70,000 + 7,700

= ₹ 77,700

Given, amount paid at the end of the second year = ₹ 47,700

Therefore, outstanding at the starting of 3 year = 77,700 – 47,700

= ₹ 30,000

18. Vikram borrowed ₹ 20,000 from a bank at 10% per annum simple interest. He lent it to his friend venkat at the same rate but compounded annually. Find his gain after 2½ years.

Solution:-

From the question it is given that,

Principal = ₹ 20000

Rate = 10% per annum

Time = 2 ½

We know that, Simple interest and compound interest for 1st year = equal

So, simple interest = (20,000 × 10 × 1)/100

= ₹ 2000

Then, principal in the second year = ₹ 20,000 + ₹ 2000

= ₹ 22,000

Simple interest for the second year = (22,000 × 10 × 1)/(100)

= ₹ 2,200

So, additional compound interest = ₹ 200

In the third year only 6 months i.e. 6/12 = ½ = 0.5 year

Then, simple interest for half-year = (20,000 × 10 × 0.5)/100

= ₹ 1000

Then, principal for ½ year = 20,000 + 2000 + 2200 = ₹ 24,200

So, compound interest = (24,200 × 10 × 0.5)/100

= ₹ 1,210

Extra interest in 6 months for 3rd year = 1210 – 1000

= ₹ 210

Therefore, total extra interest = ₹ 200 + ₹ 210 = ₹ 410

So, gain = ₹ 410

19. Sachin invests ₹ 2,00,000 for 2 years at 12% per annum compounded annually. If the interest accrued is subject to income tax at 25% at the end of each year, find the amount he received at the end of 2 years.

Solution:-

From the question it is given that,

Principal = ₹ 2,00,000

Rate = 12% per annum

Time = 2 years

Interest for 1st year = (2,00,000 × 12 × 1)/100

= ₹ 24,000

Then, amount after the first year = ₹ 2,00,000 + ₹ 24,000

= ₹ 2,24,000

Then, Income tax at 25% = 24,000 × (25/100)

= ₹ 6000

Balance sum = 2,24,000 – 6000

= ₹ 2,18,000

Simple Interest for the second year = (2,18,000 × 12 × 1)/100

= ₹ 26,160

Income tax at 25% = 26160 × (25/100)

= ₹ 6,540

Therefore, amount after the second year = ₹ 2,18,000 + ₹ 26160 - ₹ 6540

= ₹ 2,37,620

EXERCISE 2

1. Find the amount and the compound interest on ₹ 5000 for 2 years at 6% per annum, interest payable yearly.
Solution:-
From the question it is given that,
Principal (P) = ₹ 5000
Rate (R) = 6% per annum
Time = 2 years
From the formula, A = $P(1 + (r/100))^n$
Where, A = amount, P = principal, r = rate % per year and n = number of years
Then, A = $5000 (1 + (6/100))^2$

$= 5000 \times (106/100)^2$

$= 5000 \times (53/50)^2$

$= 5000 \times (53/50) \times (53/50)$

= ₹ 5618
Therefore, compound interest = Amount – principal

= 5618 – 5000

= ₹ 618

2. Find the amount and the compound interest on ₹ 8000 for 4 years at 10% per annum, interest reckoned yearly.
Solution:-
From the question it is given that,
Principal (P) = ₹ 8000
Rate (R) = 10% per annum
Time = 4 years
From the formula, A = $P(1 + (r/100))^n$
Where, A = amount, P = principal, r = rate % per year and n = number of years
Then, A = $8000 (1 + (10/100))^4$

$= 8000 \times (110/100)^4$

$= 8000 \times (11/10)^4$

$= 8000 \times (11/10) \times (11/10) \times (11/10) \times (11/10)$

= ₹ 11712.80
Therefore, compound interest = Amount – principal

= 11712.80 – 8000

= ₹ 3712.80

3. If the interest is compounded half yearly, calculate the amount when the principal is ₹ 7400, the rate of interest is 5% and the duration is one year.
Solution:-
From the question it is given that,
Principal (P) = ₹ 7400
Rate (R) = 5% per annum, for half year = 5/2% = 2.5%
Time = 1 years
We know that, half year = 6 months
So, 1 year = 2 half years
From the formula, A = P(1 + (r/100))^n
Where, A = amount, P = principal, r = rate % per year and n = number of years
Then, A = 7400 (1 + (2.5/100))^2
    = 7400 × (102.5/100)^2
    = 7400 × (102.5/100) × (102.5/100)
    = ₹ 77744.625
Therefore, amount is ₹ 77744.625.

4. Find the amount and the compound interest on ₹ 5000 at 10% per annum for 1½ years, compound interest reckoned semi-annually.
Solution:-
From the question it is given that,
Principal (P) = ₹ 5000
Rate (R) = 10% per annum, for half year = 10/2% = 5%
Time = 1½ years
We know that, half year = 6 months
So, 1 year = 2 half years
For 1½ year = 3 half
From the formula, A = P(1 + (r/100))^n
Where, A = amount, P = principal, r = rate % per year and n = number of years
Then, A = 5000 (1 + (5/100))^3
    = 5000 × (105/100)^3
    = 5000 × (21/20)^3
    = 5000 × (21/20) × (21/20) × (21/20)
    = ₹ 5788.12
Therefore, compound interest = Amount – principal
                    = 5788.12 – 5000

= ₹ 788.12

5. Find the amount and the compound interest on ₹ 1,00,000 compounded quarterly for 9 months at the rate of 4% p.a.

Hint

r = ¼ of 4 % = 1% and n = 9/3 = 3

Solution:-

From the question it is given that,

Principal (P) = ₹ 1,00,000

Rate (R) = 4% per annum, for 1 quarter = 1%

Time = 9 months

We know that, 1 quarter =3 months

So, 1 year = 4 quarters

For 9 months = 3 quarters

From the formula, A = P(1 + (r/100))^n

Where, A = amount, P = principal, r = rate % per year and n = number of years

Then, A = 1,00,000 (1 + (1/100))^3

      = 1,00,000 × (101/100)^3

      = 1,00,000 × (101/100) × (101/100) × (101/100)

      = ₹ 103030.10

Therefore, compound interest = Amount – principal

                        = 1,03,030.10 – 1,00,000

                        = ₹ 3,030.10

6. Find the difference between C.I. and S.I on sum of ₹ 4,800 for 2 years at 5% per annum payable yearly.

Solution:-

From the question it is given that,

Principal (P) = ₹ 4,800

Rate (R) = 5% per annum

Time = 2 years

We know that, Simple Interest(S.I.) = (Principal × rate × Time)/100

                              = (4800 × 5 × 2)/100

                              = ₹ 480

Then, compounded yearly,

From the formula, A = P(1 + (r/100))^n

Where, A = amount, P = principal, r = rate % per year and n = number of years

Then, A = 4800 (1 + (5/100))^2

   = 4800 × (105/100)^2

   = 4800 × (21/20)^2

    = 4800 × (21/20) × (21/20)

   = ₹ 5,292

Therefore, compound interest (C.I.) = Amount – principal

          = 5,292 – 4,800

          = ₹ 492

So, the difference between C.I. and S.I = ₹ 492 - ₹ 480

            = ₹ 12

7. Find the difference between the simple interest and compound interest on ₹ 2500 for 2 years at 4% per annum, compound interest being reckoned semi-annually.

Solution:-

From the question it is given that,

Principal (P) = ₹ 2500

Rate (R) = 4% per annum, for half year = 4/2% = 2%

Time = 2 years

We know that, half year = 6 months

So, 1 year = 2 half years

For 2 year = 4 half

We know that, Simple Interest(S.I.) = (Principal × rate × Time)/100

           = (2500 × 4 × 2)/100

           = ₹ 200

Then, compounded semiannually,

From the formula, A = P(1 + (r/100))^n

Where, A = amount, P = principal, r = rate % per year and n = number of years

Then, A = 2500 (1 + (2/100))^4

   = 2500 × (102/100)^4

   = 2500 × (51/50)^4

   = 2500 × (51/50) × (51/50) × (51/50) × (51/50)

   = ₹ 2706.08

Therefore, compound interest (C.I.) = Amount – principal

          = 2,706.08 – 2,500

          = ₹ 206.08

So, the difference between C.I. and S.I = ₹ 206.08 - ₹ 200

            = ₹ 6.08

8. Find the amount and the compound interest on ₹ 2000 in 2 years if the rate is 4% for the first year and 3% for the second year.
Solution:-
From the question it is given that,
Principal (P) = ₹ 2000
Rate (R) = 4% per annum on 1st year and 3% on 2nd year
Time = 2 years
From the formula, A = P(1 + (r/100))^n
Where, A = amount, P = principal, r = rate % per year and n = number of years
Then, A = 2000 (1 + (4/100)) (1 + (3/100))
    = 2000 × (104/100) (103/100)
    = 2000 × (26/25) × (103/100)
    = ₹ 2,142.40
Therefore, compound interest = Amount – principal
             = 2,142.40 – 2000
             = ₹ 142.40

9. Find the compound interest on ₹ 3125 for 3 years if the rates of interest for the first, second and third year are respectively 4%, 5% and 6% per annum.
Solution:-
From the question it is given that,
Principal (P) = ₹ 3,125
Rate (R) = 4% per annum on 1st year, 5% on 2nd year and 6% per annum on 3rd year.
Time = 3 years
From the formula, A = P(1 + (r/100))^n
Where, A = amount, P = principal, r = rate % per year and n = number of years
Then, A = 3125 (1 + (4/100)) (1 + (5/100)) (1 + (6/100))
    = 3125 × (104/100) (105/100) (106/100)
    = 3125 × (26/25) × (21/20) × (53/50)
    = ₹ 3617.25
Therefore, compound interest = Amount – principal
             = 3617.25 – 3125
             = ₹ 492.25

10. What sum of money will amount to ₹ 9261 in 3 years at 5% per annum compound interest?

Solution:-
From the question it is given that,
Amount (A) = ₹ 9,261
Rate (R) = 5% per annum
Time = 3 years
From the formula, A = P(1 + (r/100))^n
Where, A = amount, P = principal, r = rate % per year and n = number of years
Then, 9,261 = P (1 + (5/100))^3
$\qquad$ 9,261 = P × (105/100) (105/100) (105/100)
$\qquad$ 9,261 = P × (21/20) (21/20) (21/20)
$\qquad$ P = 9,261 × (20/21) × (20/21) × (20/21)
$\qquad$ P = ₹ 8,000

11. What sum invested at 4% per annum compounded semi-annually amounts to ₹7803 at the end of one year?
Solution:-
From the question it is given that,
Amount (A) = ₹ 7,803
Rate (R) = 4% per annum
Rate for semi annually = 2%
Time = 1 year
We know that, half year = 6 months
So, 1 year = 2 half years
From the formula, A = P(1 + (r/100))^n
Where, A = amount, P = principal, r = rate % per year and n = number of years
Then, 7803 = P (1 + (2/100))^2
$\qquad$ 7803 = P × (102/100) (102/100)
$\qquad$ 7803 = P × (51/50) (51/50)
$\qquad$ P = 7,803 × (50/51) × (50/51)
$\qquad$ P = ₹ 7,500
Therefore, principal = ₹ 7,500

12. What sum invested for 1½ years compounded half-yearly at the rate of 4% p.a. will amount to ₹ 1,32,651?
Solution:-
From the question it is given that,
Amount (A) = ₹ 1,32,651

Rate (R) = 4% per annum

Rate for half-yearly = 2%

Time = 1 ½ year

We know that, half year = 6 months

So, 1½ year = 3 half years

From the formula, A = P(1 + (r/100))^n

Where, A = amount, P = principal, r = rate % per year and n = number of years

Then, 132651 = P (1 + (2/100))^3

132651 = P × (102/100) (102/100) (102/100)

132651 = P × (51/50) (51/50) (51/50)

P = 132651 × (50/51) × (50/51) × (50/51)

P = ₹ 125000

Therefore, principal = ₹ 1,25,000

13. On what sum will the compound interest for 2 years at 4% per annum be ₹ 5,712?

Solution:-

From the question it is given that,

Compound interest = ₹ 5,712

Rate (R) = 4% per annum

Time = 2 years

From the formula, A = P(1 + (r/100))^n

Where, A = amount, P = principal, r = rate % per year and n = number of years

Compound interest = A − P

= P(1 + (r/100))^n − P

= P ((1 + (r/100))^n − 1)

5,712 = P ((1 + (4/100))^2 − 1)

5,712 = P ((104/100)^2 − 1)

5,712 = P ((26/25)^2 − 1)

5,712 = P ((676/625) − 1)

5,712 = P ((676 − 625)/625)

5,712 = P ((51)/625)

P = (5,712 × 625)/51

P = ₹ 70,000

Therefore, principal is ₹ 70,000

14. A man invests ₹ 1200 for two years at compound interest. After one year the money amounts to ₹ 1275. Find the interest for the second year correct to the nearest rupee.

Solution:-

From the question it is given that,

Principal = ₹ 1200

After one year the money amounts to ₹ 1275

So, interest for one year = 1275 – 1200

= ₹ 75

We know that, Simple Interest = (Principal × rate × Time)/100

Then, rate of interest = (Simple interest × 100)/(Principal × Time)

= (75 × 100)/(1200 × 1)

= 75/12

= 25/4 % per annum

Now, interest for the 2nd year on ₹ 1275 at the rate of 25/4 % per annum.

= (Principal × rate × Time)/100

= (1275 × 25 × 1)/(100 × 4)

= 1275/16

= 79.69

= ₹ 80

Therefore, the interest for the second year is ₹ 80.

15. At what rate percent per annum compound interest will ₹ 2304 amount to ₹ 2500 in 2 years?

Solution:-

From the question it is given that,

Amount (A) = ₹ 2500

Principal (P) = ₹ 2304

Rate (R) = R % per annum

Time = 2 years

From the formula, A = P(1 + (R/100))^n

Where, A = amount, P = principal, r = rate % per year and n = number of years

$(A/P) = (1 + (r/100))^n$

$(2500/2304) = (1 + (R/100))^2$

$(1 + (R/100))^2 = 625/576$

$(1 + (R/100))^2 = (25/24)^2$

$1 + (R/100) = 25/24$

R/100 = (25/24) – 1

R/100 = (25 - 24)/24

R/100 = 1/24

R = 100/24

R = 25/6

R = $4\frac{1}{6}$

16. A sum compounded annually becomes 25/16 times of itself in two years. Determine the rate of interest per annum.

Solution:-

From the question it is given that,

Time = 2 years

A sum compounded annually becomes 25/16 times of itself

So, let us assume the sum (P) = q

So, amount = (25/16)q

From the formula, A = P(1 + (R/100))ⁿ

Where, A = amount, P = principal, r = rate % per year and n = number of years

(A/P) = (1 + (r/100))ⁿ

(25q/16q) = (1 + (R/100))²

(5²/4²) = (1 + (R/100))²

(5/4)² = (1 + (R/100))²

(5/4) = (1 + (R/100))

R /100 = (5/4) – 1

R/100 = ¼

R = 25

Therefore, rate of interest = 25% per annum