Exercise 3(A)

1. Find the amount and the compound interest on ₹12,000 in 3 years at 5% compounded annually.
Solution:

Given: P = ₹12,000: n = 3 years and r = 5%
We know that,
Amount = $P(1 + r/100)^n$
$= 12000 (1 + 5/100)^3$
$= 12000 (21/20)^3$
= ₹13,891.50
Therefore,
Compound Interest (C.I.) = ₹13,891.50 - ₹12,000
= ₹1,891.50

2. Calculate the amount of ₹15,000 is lent at compound interest for 2 years and the rates for the successive years are 8% and 10% respectively.
Solution:

Given: P ... ars; r_1 = 8% and r_2 = 10%
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Ther... ears is ₹17,820

3. Calcu... d interest accrued on ₹6,000 in 3 years, compounded yearly, if the rates for t... successive years are 5%, 8% and 10% respectively.
Solution:

Given: P = ₹ 6,000; n = 3 years; r_1 = 5%; r_2 = 8% and r_3 =10%
We know that,
Amount = $P(1 + r_1/100)(1 + r_2/100)$
$= 6000(1 + 5/100)(1 + 8/100)(1 + 10/100)$
$= 6000(21/20)(27/25)(11/10)$
= ₹7,484.40
Therefore,
C.I. = ₹7,484.40 - ₹6,000 = ₹1,484.40

4. What sum of money will amount to ₹5,445 in 2 years at 10% per annum compound interest?
Solution:

Given: Amount = ₹5,445; n = 2 years and r = 10%
We know that,

$A = P(1 + r/100)^n$
$5445 = P(1 + 10/100)^2$
$5445 = P(11/10)^2$
$P = 5445(10/11)^2$
$= ₹4,500$
Therefore, the principal amount is ₹4,500

5. On what sum of money will the compound interest for 2 years at 5% per annum amount to ₹768.75?
Solution:

Given: C.I. = ₹768.75; n = 2 years and r = 5%
We know that,
$A = P(1 + r/100)^n$
$= P(1 + 5/100)^2$
$= P(21/20)^2 = 441P/400$
Thus,
A - P = C.I
441P/400 –
41P/400
P = (7
=
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6. F compound interest for 3 years at 10% per annum amounts to ₹
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Given: C.I. = 3 years and r = 10%
We know that,
$A = P(1 + r/100)^n$
$= P(1 + 10/100)^3$
$= P(11/10)^3$
$= 1331P/ 1000$
So,
C.I. = A - P
1655 = 1331P/ 1000 – P
1655 = 331P/ 1000
P = (1655 x 1000)/ 331
= 5000
Therefore, the initial sum is ₹5,000

7. What principal will amount to ₹9,856 in two years, if the rates of interest for successive years are 10% and 12% respectively?
Solution:

Given: Amount = ₹9,856; n = 2 years; r_1 =10% and r_2 =12% We know that,
Amount = $P(1 + r_1/100) (1 + r_2/100)$
$9856 = P(1 + 10/100) (1 + 12/100)$
$9856 = P(11/10) (28/25)$
So,
$P = (9856 \times 10 \times 25)/(11 \times 28)$
$= 8000$
Therefore, the principal is ₹8,000

8. On a certain sum, the compound interest in 2 years amounts to ₹4,240. If the rate of interest for the successive years is 10% and 15% respectively, find the sum.
Solution:

Given: C.I. = ₹4,240; n = 2 years; r_1 = 10% and r_2 = 15%
We know that,
$A = P(1 + r_1/100) (1 + r_2/100)$
Now,
A = P + C.I
So,
(P + 4 + 15/100)
(P +
P +
1.2
P =
=
There 6,000

9. At what p annum will ₹6,000 amount to ₹6,615 in 2 years when interest is compounded annually?
Solution:

Given: P = ₹6000; A = ₹6,615 and n = 2 years
We know that,
$A = P(1 + r/100)^n$
$6615 = 6000(1 + r/100)^2$
$(1 + r/100)^2 = 6615/6000$
$(1 + r/100)^2 = 1.1025$
Taking square root on both sides, we get
$(1 + r/100) = 1.05$
$1 + r/100 = 21/20$
$r/100 = 21/20 – 1$
$r/100 = 1/20$
$r = 5$
Therefore, the rate of compound interest is 5%

10. At what rate per cent compound interest, does a sum of money become 1.44 times of itself in 2 years?
Solution:

Let's assume the principal to ₹y
Then, the amount will be ₹1.44y
And, n = 2 years
We know that,
$A = P(1 + r/100)^n$
$1.44y = y(1 + r/100)^2$
$1.44y/y = (1 + r/100)^2$
$1.44 = (1 + r/100)^2$
Taking square root on both sides, we get
$1 + r/100 = 1.2$
$r/100 = 1.2 – 1 = 0.2$
$r/100 = 2/10$
$r = 20$
Therefore, th… mpound interest is 20%

11. At … a sum of ₹4,000 yield ₹1,324 as compound interest in 3 year…
Sol…

Give… and n = 3 Now,
A = …
So,
A = ₹4,0…
We know th…
$A = P(1 + r/100)^n$
$5324 = 4000(1 + r/100)^3$
$5324/4000 = (1 + r/100)^3$
$1331/1000 = (1 + r/100)^3$
Taking cube root on both sides, we get
$11/10 = (1 + r/100)$
$r/100 = 11/10 – 1$
$r/100 = 1/10$
$r = 10$
Therefore, the rate of compound interest is 10%

12. A person invests ₹5,000 for three years at a certain rate of interest compounded annually. At the end of two years this sum amounts to ₹6,272. Calculate:
(i) the rate of interest per annum.
(ii) the amount at the end of the third year.
Solution:

Given: P = ₹5,000; A = ₹6,272 and n = 2years
(i) We know that,
$A = P(1 + r/100)^n$
$6272 = 5000(1 + r/100)^2$
$6272/5000 = (1 + r/100)^2$
$784/625 = (1 + r/100)^2$
$(28/25)^2 = (1 + r/100)^2$
Taking square root on both side, we get
$28/25 = 1 + r/100$
$r/100 = 28/25 – 1 = 3/25$
$r = (3 \times 100)/25$
Thus, r = 12%

(ii) Amount at the third year
$A = 5000(1 + 12/100)^3$
$= 5000(28/25)^3$
Therefore,
A = ₹7,024.64

13. In ... ₹7,000 amount to ₹9,317 at 10% per annum compound inter...
Sol...

Giv... d r = 10% We know...
A = P...
9317 = ...
9317/700...
1331/1000 = (11/10)^n
$(11/10)^3 = (11/10)^n$
On comparing, we have
n = 3
Therefore, the number of years is 3

14. Find the time, in years, in which Rs4,000 will produce Rs630.50 as compound interest at 5% compounded annually.
Solution:

Given: P = ₹4,000; C.I. = ₹630.50 and r = 5%
We know that,
$C.I. = P[(1 + r/100)^n - 1]$
$630.50 = 4000[(1 + 5/100)^n - 1]$
$630.50/4000 = (1 + 5/100)^n – 1$
$1261/8000 = (21/20)^n – 1$
$1261/8000 + 1 = (21/20)^n$
$9261/8000 = (21/20)^n$

$(21/20)^3 = (21/20)^n$
On comparing, we have
n = 3
Therefore, the time in years is 3

15. Divide ₹28,730 between A and B so that when their shares are lent out at 10% compound interest compounded per year, the amount that A receives in 3 years is the same as what B receives in 5 years.
Solution:

Let's assume the share of A as ₹y
Share of B = ₹(28,730 - y)
Rate of interest = 10%
Then, according to question
Amount of A in 3 years = Amount of B in 5 years
$y(1 + 10/100)^3 = (28730 - y)(1 + 10/100)^5$
$y = (28730 - y)(1 + 10/100)^2$
$y = (28730 - y)(11/10)^2$
$y = (121/100)$
$100y =$
$100y$
$221y$
$y =$
$=$
The 30 and share of B = ₹28,730 - ₹15,730 = ₹13,000

16. A ed between John and Smith, 12 years and 14 years old respect y that if their portions be invested at 10% per annum compound ey will receive equal amounts on reaching 16 years of age.
(i) What is the share of each out of ₹44,200?
(ii) What will each receive, when 16 years old?
Solution:

(i) Let's assume the share of John = ₹y
So, the share of Smith = ₹(44,200 - y)
Rate of interest = 10%
According to question, we have
Amount of John in 4 years = Amount of Smith in 2 years
$y(1 + 10/100)^4 = (44200 - y)(1 + 10/100)^2$
$y(1 + 10/100)^2 = (44200 - y)$
$y(11/10)^2 = (44200 - y)$
$121y/100 = (44200 – y)$
$121y = 100(44200 - y)$
$121y + 100y = 4420000$
$221y = 4420000$
$y = 20000$

Therefore, share of John = ₹20,000 and Share of Smith= ₹44,200 - ₹20,000 = ₹24,200

(ii) Amount that each will receive
= $20000(1 + 10/100)^4$
= $20000(11/10)^4$
= 29282
Therefore, the amount that each will receive is ₹29,282

17. The simple interest on a certain sum of money and at 10% per annum is ₹6,000 in 2 years, Find:
(i) the sum.
(ii) the amount due to the end of 3 years and at the same rate of interest compounded annually.
(iii) the compound interest earned in 3 years.
Solution:

(i) Given: S.I. = ₹6000; n = 2 years and R = 10%
We know th
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So,
P = (
=
=
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(ii) No ars and r = 10%
We kno
A = P(1 + r/
= $30000(1 + 10/100)^3$
= $30000(11/10)^3$
= 30×11^3
= 39930
Thus, the amount is ₹39,930

(iii) The C.I. earned in 3 years = A – P = ₹39,930 – ₹30,000 = ₹9,930

18. Find the difference between compound interest and simple interest on ₹8,000 in 2 years and at 5% per annum.
Solution:

Given: P = ₹8000, R = 5% and T = 2 years
To calculate simple interest,
S.I. = (P x R x T)/100
= (8000 x 5 x 2)/100
= ₹800

To calculate compound interest,

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

$= 8000(1 + 5/100)^2$

$= 8000(105/100)^2$

$= 8000(21/20)^2$

$= 8820$

Thus, the amount is ₹8820

So,

C.I. = A – P

= ₹(8820 – 8000)

= ₹820

Thus, the compound interest is ₹820