Compound Interest

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Financial Maths
Log tables Pg 30

$F = P(1+i)^t$

F = Final amount
P = principal – (start amount)
i = interest rate %
t = time in years

Eg 1) Find the compound interest earned when €1,800 is invested for 3 years with a 4% interest rate.

F = ?
P = 1800
t = 3yrs
i = 4%

} sub into formula

$F = P(1+i)^t$

$F = (1800)(1+4\%)^3$

$F = 2024.76$

Interest Earned

$2024.76 - 1800 = €224.76$

T&T2 4.5 Compound...

Applied Arithmetic

chapter 4

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Section 4.5 Compound interest

Example 1

€1200 is invested for 3 years at 4% per annum compound interest.
What will the investment amount to?

Example 2

Use the compound interest formula to find the compound interest which accrues on €2800 invested for 3 years at 7.5% per annum.

Example 3

If €650 amounts to €702 in one year, find the rate.

Example 4

What sum of money, invested at 4% per annum compound interest, will amount to €3149.62 after 3 years?

Example 5

A machine depreciates in value by 10% per annum.
If the machine is worth €58 320 at the end of 3 years, find its value when new.

Exercise 4.5

Find the compound interest earned on the investments in Questions (**1–10**), without using the compound interest formula.

1. €400 for 2 years at 6%

Exercise 4.5

Find the compound interest earned on the investments in Questions (**1–10**), without using the compound interest formula.

2. €800 for 2 years at 8%

Exercise 4.5

Find the compound interest earned on the investments in Questions (**1–10**), without using the compound interest formula.

3. €900 for 2 years at 5%

Exercise 4.5

Find the compound interest earned on the investments in Questions (**1–10**), without using the compound interest formula.

4. €1000 for 2 years at 9%

Exercise 4.5

Find the compound interest earned on the investments in Questions (**1–10**), without using the compound interest formula.

5. €700 for 2 years at 4%

Exercise 4.5

Find the compound interest earned on the investments in Questions (**1–10**), without using the compound interest formula.

6. €850 for 2 years at 10%

Exercise 4.5

Find the compound interest earned on the investments in Questions (**1–10**), without using the compound interest formula.

$F = P(1+i)^t$

7. €800 for 3 years at 5%

Exercise 4.5

Find the compound interest earned on the investments in Questions (**1–10**), without using the compound interest formula.

8. €1200 for 3 years at 12%

Exercise 4.5

Find the compound interest earned on the investments in Questions (**1–10**), without using the compound interest formula.

9. €700 for 3 years at 11%

Exercise 4.5

Find the compound interest earned on the investments in Questions (**1–10**), without using the compound interest formula.

10. €1800 for 3 years at 4%

11. Use the compound interest formula to find the final amount, correct to the nearest cent, of each of the following investments:

F = ?

$F = P(1+i)^t$ Pg 30.

P t i

(i) €600 for 2 years at 5%

(ii) €1800 for 2 years at 9%

(iii) €3500 for 3 years at $7\frac{1}{2}\%$

(iv) €7800 for 3 years at $3\frac{1}{2}\%$

$F = (600)(1+5\%)^2$

calculator

$F = €661.50$

$F = (1800)(1+9\%)^2$

$F = €2138.58$

when given different interest rates

When given different interest rates

12. €4600 was invested for 2 years at compound interest.
If the rate for the first year was 4% and for the second year was 5%, find the total interest for the two years.

You must work out the interest seperately.

1 year → 4600 × 4% = 184

End of yr 1
4600+184
= 4784

2 year → 4784 × 5% = 239.2

End of yr 2
4784+239.2
= 5023.2

Final Amount

Total Interest
184+239.2 = 423.2

OR
5023.2 − 4600 = 423.2

13. €1500 was invested for 2 years at compound interest.
The rate for the first year was 3% and the rate for the second year was 4%.
Find the final amount at the end of the two years.

1 yr 1500 × 3% = 45

End of yr 1
1500+45 = 1545

2yr 1545 × 4% = 61.80

End of yr 2
1545+61.80

F = €1606.80

14. A company borrowed €12 000 from a bank at 11% per annum compound interest. The company repaid €5000 at the end of the first year.
How much was owed to the bank at the end of the second year?

15. €700 will amount to €756 after one year if invested at 8% per annum.

(i) By what number is €700 multiplied to get €756?

(ii) By what number is €756 divided to get €700?

100% + 7%

16. A sum of money is invested at 7% per annum.
If it amounts to €6848 after one year, find the sum invested.

$107\% = 6848$

$1\% = \frac{6848}{107} = 64$

$100\% = 64 \times 100 = €6400$

17. €2500 was invested in a building society.
If it amounted to €2612.50 after one year, calculate the rate of interest.

Interest earned $2612.50 - 2500 = 112.50$

$\frac{112.50}{2500} \times 100 = 4.5\%$

HW Pg 68 New Pg 85 Q 14.

18. What sum of money invested for 3 years at 8% per annum compound interest would amount to €1007.77?

19. What sum of money invested at 5% per annum compound interest would amount to €10 988.78 in 6 years?

20. €8000 is invested for 3 years at compound interest.
The rate for the first year is 5% and for the second year is 6%.
Find the amount of the investment at the end of two years.
At the end of the third year, the money invested amounted to €9260.16.
Calculate the rate of interest for the third year.

21. A person borrows €15 000 for two years.
Interest for the first year is charged at 12% per annum.
The person repays €6000 at the end of the first year.
If the amount owed at the end of the second year is €12 042, find the rate of interest for the second year.

22. A sum of money was invested for 2 years.
The rate of interest for the first year was 4% and for the second year was 5%.
The amount at the end of the second year was €9282.

(i) By what number is €9282 divided to get the amount at the end of the first year?

(ii) By what number is the amount at the end of the first year divided to get the sum invested?
What is the sum of money invested?

23. A person invested €10 000 in a building society.
The rate of interest for the first year was $2\frac{1}{2}$%.
At the end of the first year, the person invested a further €1000.
The rate of interest for the second year was 2%.
Calculate the value of the investment at the end of the second year.

At the end of the second year, a further €2000 was invested.
At the end of the third year, the total investment amounted to €14 014.
Calculate the rate of interest for the third year.

24. A machine cost €15 000.
If it depreciated in value by 15% per annum, find its value at the end of two years.

25. Vans depreciate in value by 20% per annum.

(i) If a van is bought for €23 000, find its value at the end of three years.

(ii) If the value of a van is €11 520 after two years, find its value when new.

26. A new car was bought for €24 000. It decreased in value by 20% in the first year. If its value at the end of the second year was €16 128, by what percentage did its value decrease during the second year?

Answers

Exercise 4.5

1. €49.44
2. €133.12
3. €92.25
4. €188.10
5. €57.12
6. €178.50
7. €126.10
8. €485.91
9. €257.34
10. €224.76
11. (i) €661.50
(ii) €2138.58
(iii) €4348.04
(iv) €8648.00
12. €423.20
13. €1606.80
14. €9235.20
15. (i) 1.08
(ii) 1.08
16. €6400
17. 4.5%
18. €800
19. €8200
20. €8904; 4%
21. $11\frac{1}{2}\%$
22. (i) 1.05
(ii) 1.04; €8500
23. €11 475; 4%
24. €10 837.50
25. (i) €11 776
(ii) €18 000
26. 16%