



UNIT ONE: COMPOUND INTEREST

1.1

Differentiating Between Compound and Simple Interest

Example (1.1.1)

A Person invested BD1,000 in a bank for four years at 7% annually. Find the simple interest and compound interest at the end of each year.

Years	Simple Interest	Compound Interest
1		
2		
3		
4		



1.2

Future Value and Compound Amount

Example (1.2.1)

A trader borrowed BD3,000 from a bank for 12 years at 8% annually. Find the **future value** and **compound interest** at the end of the period.

$$FV = PV \times (1 + i)^n$$

$$CI = FV - PV$$

$$CI = PV \times [(1 + i)^n - 1]$$

Activity (1.2.1)

1- Find the value of the following (by using the interest table):

a-  $(1.06)^{12}$

b-  $(1.0525)^{60}$

c -  $(1.005)^{125}$

2- Bader deposited BD4,200 for 14 years at 5.6% annually. Find the future value at the end of the period.



3- A trader wants to borrow BD20,000 and pays it after 3 years, he has two choices:

Borrowing on a simple interest at  $5\frac{3}{4}\%$  annually

Borrowing on a compound interest at 4% annually

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Which choice should he choose? Why?

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4- Find the future value of BD1,500 at 9.4% annually for 8 years using a calculator.

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5- Find the future value and compound interest for BD2,400 at 4.5% annually for 74 years by using interest tables.

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6- A person deposited \$6,000 for 4 years at 5.5% annually. Find the future value and the compound interest at the end of the period.

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## 1.3

## Annual and Partial Interest Rate

**Example (1.3.1):**

Shahd invested BD1000 in a bank at 6% annually for 4 years – find the future value if the interest is compounded annually.

**Example (1.3.2):**

Shahd invested BD1000 in a bank at 6% annually for 4 years – find the future value if the interest is compounded semi-annually.

**Example (1.3.3):**

Shahd invested BD1000 in a bank at 6% annually for 4 years – find the future value if the interest is compounded thirdly.

**Example (1.3.4):**

Shahd invested BD1000 in a bank at 6% annually for 4 years – find the future value if the interest is compounded quarterly.

**Example (1.3.5):**

Shahd invested BD1000 in a bank at 6% annually for 4 years – find the future value if the interest is compounded monthly.

**Example (1.3.6):**

A woman deposited BD 5,000 in a bank that pays 3.8% quarterly on saving accounts for 4 years and 6 months. Find the future value.

**Example (1.3.7):**

Ali deposited BD3000 at  $2\frac{3}{4}\%$  every 4 months – find the future value at the end of 4 years and 8 months?

**Activity (1–2–1):**

1- Mariam deposited BD2550 in a bank at an effective rate of 6% annually. If the interest is compounded semi-annually. Calculate her fund at the end of 8 years, and then find the compound interest.

2- Faisal wants to borrow KD7200 from a bank to buy a new car if you know the interest rate is 6% annually compounded monthly. Find how much he will pay to the bank at the end of 10 years.



3- Sakeena Ahmed deposited BD2600 in a bank at 12% annually compounded quarterly. Find her fund at the end of 5 years and 9 months and find the compound interest.

4- A person deposited BD8750 at 3% each quarter – find the future value and the interest at the end of 6 years.

5- A person deposited BD3500 at 4% every 6 months. Find the future value at the end of 8 years and 6 months.

6- Laila borrowed \$6400 from a bank at 5% every 4 months. Find the amount she will pay at the end of three years and 8 months. In addition, calculate the interest.



## 1.4A

## Changeable Interest Rate

**Example (1.4.1):**

Hashim invested BD 5,000 for 6 years at 4% annually for the first two years, 6% annually for the following 3 years and 7% annually for the last year; Find the compound interest at the end of the period?

**Activity (1.2.1):**

1- Find the future value and compound interest for BD10,000 invested for 4 years, if you know that the rate is changing as follows : 3% annually for the first year, 2.5% annually for the second year, 2% annually for the third year and 1% annually for the fourth year.

2- What is the future value for BD2,000 invested at 6% annually for 3 years and 4.8% annually for 5 more years?





- 3- Find the future value that Saad will get if he saves BD2,000 in a bank for 10 years at changing rate, as following: at 5% annually for the first 5 years, 4.6% annually for the sixth year and 6% annually compounded semi-annually for the rest years.

- 4- Find the future value for BD2,000 invested for 7 years at 4.5% annually for the first 3 years and  $5\frac{3}{4}\%$  annually for the rest years.



1.4B

Changeable Principal

**Example (1.4.2):**

Fayez invested BD3500 at 7% annually and after 3 years he withdrew from his account BD1000 and invested the rest at 8% annually - find the future value and the interest at the end of 10 years.

**Activity (1.4.2):**

1- Noora invested BD4000 at Al- Ahli bank at interest rate of 9% annually and after 3 years she deposited BD3000 to her account at 4% every 4 months. Find the future value and the compound interest at the end of 8 years from the first deposit.







1.5A

## Finding The Present Value (Principal)

**Example (1.5.1):**

Hasan deposited an amount of money in a bank at 5% annually. If the compound amount at the end of 12 years is BD8,081.550. Calculate the present value (principal)?

**Example (1.5.2):**

A person deposited an amount of money in a bank at 3% annually. If the compound interest at the end of 10 years was BD171.950 – Find:

- The deposited amount.
- The compound amount at the end of the period.

**Activity (1.5.1):**

- Find the present value (principal), if the amount after 5 years is BD1469.330 and the compound interest rate is 8% annually, then find the interest.



2- Find the present value (principal), if the amount at the end of 7 years is BD6,450 and the compound interest rate is 4.5% annually for the first three years and 5% annually for the rest years.

3- How much was deposited for an investment of 8% annually compounded quarterly to have an amount of BD2, 228.850 in 5 years?

4- A man deposited money in NBB at 3% annually, after 5 years he withdrew BD2796.500 from his account and invested the rest for 5 years at 2% every 6 months – if the amount at the end of the period is BD3657. Find the present value.

5- Find the present value (principal) that generates an interest of BD700 at 2% annually for 5 years.



- 6- Taha calculated the compound interest he will get it if he deposits his money in a bank at 3% annually for 20 years and it was BD 4836.667, find the present value.

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1.5B

Finding Time (n)

**Example (1.5.3):**

A principal of BD3175.309 is invested at 8% annually, how long would it take to make the future value to BD18643.829.

**Example (1.5.4):**

How long will it take for BD1600 at 4% every semi-annual to make the amount to BD2561.652?

**Activity (1.5.2):**

1- A loan of BD2,000 amounted to BD3591.713. Find the borrowing period if the interest rate was 5% annually.





2- Nawal borrowed BD5,000 from a bank at 6% annually. Find the borrowing period if the compound interest was BD 8563.575.

3- How long will it take BD2,000 at 2.5% compounded every semiannually to give an interest of BD 560.169?

4- How long will it take an investment of BD4,000 to amount of BD5,610.400 at 7% annually?

5- How long will it take the money to double itself at 4% annually?



1.5C

Finding Interest Rate % (i)

**Example (1.5.5):**

Mahmood deposited BD3000 in the bank, if the amount at the end of 6 years was BD5031.300 – Find the interest rate.

**Activity (1.5.3):**

1- Saad deposited BD1,400 in a bank that gives compound interest of BD 481.460 at the end of 10 years – Find the interest rate.

2- Tahera borrowed €4,500 from a bank that gives compound interest of €1,916 at the end of 3 years. Find the quarterly interest rate and the annual rate of interest.



3- If BD 6,600 amounts to BD10,750.740 in 10 years. Find the interest rate.

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4- Jawad borrowed BD8,000 for 4 years. If the compound interest was BD 2,948.800 find the semi-annually interest rate, and the annually interest rate.

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5- Find the interest rate for ¥7,730.325 amounts to ¥10,000 after 13 years.

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