UNIT 7

Interest





Interest refers to the additional amount of money charged or earned on a loan, investment, or deposit. It is a percentage of the principal amount, which is the initial sum of money paid. When you borrow money, interest is the cost you pay for using the funds, typically expressed as an annual percentage. On the other hand, when you invest or deposit money, interest is the return or earnings you receive on top of your initial investment. Understanding interest is important as it affects the cost of borrowing and the potential growth of savings or investments.

7.1 Simple Interest

Simple interest is a straightforward method of calculating interest on a principal amount over a set period of time. It is calculated based on the initial sum (the principal), interest rate (usually expressed as a percentage) and the duration for which the interest is calculated (usually in years).

Try the following questions using the following formula:

Simple Interest = Principal x Rate x Time

1. Find the simple interest on a loan of $2,500 at an interest rate of 8% per year for 3 years.
2. If you deposit $1,000 in a savings account that earns 5% interest per year, how much interest will you earn after 2 years?
3. Bob borrowed $3,000 from a friend and agreed to pay an interest rate of 10% per year for 1 ½ years. How much interest will Bob pay?
4. You invested $5,000 in a bond that pays 6% interest per year for 4 years. How much interest will you earn?

5 Sarah borrowed $800 from her parents and agreed to pay an interest rate of 7.5% per year for 2 years. How much interest will Sarah pay?

6 If you deposit $2,500 in a savings account that earns 4% interest per year, how much interest will you earn after 3 years?

7 John borrowed $1,200 from a bank and agreed to pay an interest rate of 9% per year for 2 ½ years. How much interest will John pay?

8 You invested $4,000 in a mutual fund that pays 5.5% interest per year for 5 years. How much interest will you earn?

9 Mary borrowed $2,500 from a friend and agreed to pay an interest rate of 6% per year for 1 ½ years. How much interest will Mary pay?

10 If you deposit $3,000 in a savings account that earns 3.5% interest per year, how much interest will you earn after 4 years?

11 Bob borrowed $4,500 from a bank and agreed to pay an interest rate of 7.25% per year for 3 years. How much interest will Bob pay?

12 You invested $6,000 in a certificate of deposit that pays 4.75% interest per year for 2 ½ years. How much interest will you earn?

13 Sarah borrowed $1,000 from her parents and agreed to pay an interest rate of 6.5% per year for 1 year. How much interest will Sarah pay?

14 If you deposit $5,000 in a savings account that earns 2.25% interest per year, how much interest will you earn after 3 ½ years?

15 John borrowed $1,500 from a bank and agreed to pay an interest rate of 8.75% per year for 2 years. How much interest will John pay?

16 You invested $2,000 in a bond that pays 3.25% interest per year for 4 ½ years. How much interest will you earn?



17 Mary borrowed $2,200 from a friend and agreed to pay an interest rate of 5.5% per year for 3 years. How much interest will Mary pay?

18 If you deposit $4,500 in a savings account that earns 4% interest per year, how much interest will you earn after 2 ½ years?

19 Bob borrowed $3,800 from a bank and agreed to pay an interest rate of 6.25% per year for 1 ½ years. How much interest will Bob pay?

20 You invested $5,500 in a mutual fund that pays 4.5% interest per year for 5 years. How much interest will you earn?

21 Sarah deposits $500 in a savings account that earns annual simple interest at a rate of 5%. How much savings will she have after 3 years?

22 Anna deposits $200 in a savings account that earns annual simple interest at a rate of 4%. How much savings will she have after 2 years?

23 John deposits $1,500 in a savings account that earns annual simple interest at a rate of 2.5%. How much savings will he have after 4 years?

7.2 Compound Interest

Compound interest is a more complex method of calculating interest because it not only takes into account the initial principal and interest rate, but also the interest that accumulates over time.

Use the following formula for calculating compound interest:

$$A = P\left(1 + \frac{r}{n}\right)^{(nt)}$$

$$Interest = A - P$$

Let's define each term in the formula:

A: The future value or total amount, including both the principal amount and the accumulated interest over time.

P: The principal amount, which refers to the initial investment or the initial loan amount.

r: The annual interest rate, represented as a decimal. It is the percentage charged or earned on the principal amount over one year.

n: The number of compounding periods per year. Compounding refers to how frequently the interest is added to the principal. Common values for n include 1 (annual compounding), 2 (semi-annual), 4 (quarterly), or 12 (monthly).

t: The number of years or the time period over which the interest is calculated.

By using this formula, you can determine the future value or total amount after a specific period, taking into account compound interest.

The first question has been solved for you.

1 Calculate the compound interest on $5,000 invested at an annual interest rate of 5% for 3 years, compounded annually.

SOLUTION

$$\text{Compound Interest} = P\left(1 + \frac{r}{n}\right)^{(1*3)} - P$$

$$\text{Compound Interest} = \$5{,}000\left(1 + \frac{0.05}{1}\right)^{(1*3)} - P$$

$$\text{Compound Interest} = \$5{,}000(1.05)^3 - \$5{,}000$$

$$\text{Compound Interest} = \$5{,}000(1.157625) - \$5{,}000$$

$$\text{Compound Interest} = \$5{,}788.13 - \$5{,}000$$

$$\text{Compound Interest} = \$788.13$$

2 If you invest $2,000 at an annual interest rate of 4.5% for 5 years, compounded annually, how much interest will you earn?

3 Calculate the compound interest on $10,000 invested at an annual interest rate of 6% for 2 years, compounded quarterly.

4 If you invest $3,500 at an annual interest rate of 3.75% for 4 years, compounded quarterly, how much interest will you earn?

5 Calculate the compound interest on $7,000 invested at an annual interest rate of 4.25% for 3 years, compounded semi-annually.

6 If you invest $4,200 at an annual interest rate of 5.5% for 6 years, compounded monthly, how much interest will you earn?

7 Calculate the compound interest on $12,000 invested at an annual interest rate of 7% for 5 years, compounded annually.

8 If you invest $6,500 at an annual interest rate of 4.75% for 4 years, compounded quarterly, how much interest will you earn?

9 Calculate the compound interest on $9,500 invested at an annual interest rate of 6.5% for 3 years, compounded monthly.

10 If you invest $8,000 at an annual interest rate of 3.25% for 5 years, compounded semi-annually, how much interest will you earn?

11 Calculate the future investment value (principal plus interest earned) if $11,000 is invested at an annual compound interest rate of 4% for 2 years, compounded annually.

12 If you invest $10,500 at an annual interest rate of 5.75% for 4 years, compounded semi-annually, what will the future value of your investment (principal + interest) be?

13 Calculate the future value of the investment (principal + interest) if $13,500 is invested at an annual interest rate of 6.25% for 3 years, compounded annually.

14 If you invest $15,000 at an annual interest rate of 4.5% for 5 years, compounded annually, what will the future value of your investment (principal + interest) be?

15 Calculate the compound interest on $17,500 invested at an annual interest rate of 5.5% for 3 years, compounded annually.

16 If you invest $20,000 at an annual interest rate of 3.75% for 4 years, compounded semi-annually, how much interest will you earn?

17 Calculate the compound interest on $22,500 invested at an annual interest rate of 4.75% for 3 years, compounded monthly.

18 If you invest $25,000 at an annual interest rate of 4.25% for 5 years, compounded annually, what will the future value of your investment be?

19 Calculate the compound interest on $27,500 invested at an annual interest rate of 5.25% for 4 years, compounded annually.

20 If you invest $30,000 at an annual interest rate of 5.5% for 3 years, compounded monthly, how much interest will you earn?

7.3 Interest on Savings (Simple and Compound)

1 Sarah deposits $500 in a savings account that earns annual simple interest at a rate of 5%. What is her total savings after 3 years?

2 Mark deposits $1,000 in a savings account that earns a monthly compound annual interest at a rate of 3%. What is the future value of her savings after 5 years?

3 Anna deposits $200 in a savings account that earns a simple annual interest rate of 4%. How much will her savings grow to after 2 years?

4 John deposits $1,500 in a savings account that earns a simple annual interest rate of 2.5%. What will his balance be after 4 years?

5 Emma deposits $300 in a savings account that earns an annual simple interest rate of 6%. What will her total savings be after 1 year?

6 David deposits $2,000 in a savings account that earns an annual interest rate of 4.5%, compounded semi-annually. How much money will he have in his account after 3 years?

7 Lisa deposits $400 in a savings account that earns a simple annual interest rate of 2%. How much savings will she have after 5 years?

8 Mike deposits AED 3,500 in a savings account that earns an annual interest rate of 3.5%, compounded monthly. How much savings will he have after 2 years?

9 Rachel deposits $600 in a savings account that earns an annual simple interest rate of 1.5%. What will her total savings be after 4 years?

10 Tom deposits GBP 4,000 in a savings account that earns an annual interest rate of 2%, compounded quarterly. How much savings will he accumulate after 3 years?

11 Lily deposits 500 EUD in a savings account that earns an annual simple interest rate of 4%. What will her total savings be after 5 years?

12 Alex deposits JOD 1,200 in a savings account that earns an annual interest rate of 3.5%, compounded quarterly. How much will he have in his account after 2 years?