UNIT 8

Investing





8.1 Return on Investments

Return on investment (ROI) is a financial metric used to measure the profitability and efficiency of an investment. It provides a way to evaluate the financial performance of an investment by comparing the return (gain or profit) generated from the investment to the initial cost or investment amount.

ROI is typically expressed as a percentage or ratio and represents the net gain or loss from an investment relative to the initial investment amount. The formula for calculating ROI is as follows:

$$ROI = \left(\frac{Net\ Gain\ from\ Investment}{Initial\ Investment\ Cost} \right) \times 100$$

The net gain from the investment is calculated by subtracting the initial investment cost from the final value of the investment, which includes any income, dividends, or capital appreciation.

For example, if you invest $10,000 in a stock and sell it after a year for $12,000, your net gain would be $2,000. Using the ROI formula, the calculation would be:

ROI = ($2,000/$10,000) x 100 = 20%

This means that your ROI for the investment is 20%. In other words, for every dollar invested, you earned a 20% return.

ROI is a useful metric for evaluating the profitability of investments and comparing different investment opportunities. A higher ROI indicates a more favorable investment, as it represents a greater return relative to the initial investment cost. However, it's important to consider the time frame, risk, and other factors associated with the investment to make a comprehensive assessment of its performance.

ROI can be applied to various types of investments, including stocks, bonds, real estate, business ventures, and more. It helps investors and businesses make informed decisions regarding

the allocation of resources and the potential profitability of their investments.

Let's try some questions now.

1. An investment of $5,000 grows to $7,500 after 3 years. Calculate the rate of return on this investment.
2. John invested $2,000, and after 2 years, his investment grew to $2,500. What is the rate of return on his investment?
3. An investment of $10,000 increased to $12,500 after 5 years. Determine the rate of return on this investment.
4. Samantha invested $1,500, and her investment grew to $2,000 after 4 years. What is the rate of return on her investment?
5. An investment of $20,000 yields a final value of $24,000 after 2 years. Determine the rate of return on this investment.
6. Jane invested $3,000, and after 3 years, her investment grew to $3,600. Calculate the rate of return on her investment.
7. An investment of $15,000 increased to $19,500 after 4 years. Determine the rate of return on this investment.
8. Mike invested $4,000, and his investment grew to $4,800 after 5 years. What is the rate of return on his investment?
9. An investment of $25,000 yields a final value of $32,500 after 3 years. Calculate the rate of return on this investment.
10. Mark invested $10,000, and after 4 years, his investment grew to $12,000. Determine the rate of return on his investment.
11. An investment of $7,500 increased to $9,000 after 2 years. What is the rate of return on this investment?
12. Rachel invested $6,000, and her investment grew to $7,500 after 3 years. Calculate the rate of return on her investment.
13. An investment of $12,000 yields a final value of $15,000 after 4 years. Determine the rate of return on this investment.

14 Ibrahim invested $8,000, and after 2 years, his investment grew to $9,600. What is the rate of return on his investment?

15 An investment of $20,000 increased to $24,000 after 3 years. Calculate the rate of return on this investment.

16 Sarah invested $3,500, and her investment grew to $4,200 after 2 years. Determine the rate of return on her investment.

17 An investment of $15,000 yields a final value of $18,750 after 5 years. What is the rate of return on this investment?

18 David invested $5,000, and after 3 years, his investment grew to $6,500. Calculate the rate of return on his investment.

19 An investment of $10,000 increased to $13,000 after 4 years. Determine the rate of return on this investment.

20 Emily invested $2,500, and her investment grew to $3,000 after 2 years. What is the rate of return on her investment?

21 You invested $5,000 in a stock, and after one year, the value dropped to $4,500. What is the rate of return?

22 You purchased a bond for $10,000, and after two years, its value decreased to $8,500. What is the rate of return?

23 You invested $2,000 in a mutual fund, and after three years, your investment value dropped to $1,500. What is the rate of return?

24 You purchased a cryptocurrency for $1,000, and after six months, its value declined to $600. What is the rate of return?

25 You acquired 100 shares of a company's stock for $50 per share, and after four years, the stock price dropped to $30 per share. What is the rate of return?

26 You invested $10,000 in residential property, and over five years, its value declined to $8,000. What is the rate of return?

27 You purchased a collectible item for $1,500, and after three years, its value dropped to $1,200. What is the rate of return?

28 You invested $1,000 in a savings account, and after two years, the balance dropped to $800. What is the rate of return?

29 You purchased a vintage car for $20,000, and after four years, its value declined to $16,000. What is the rate of return?

30 You acquired 500 shares of a company's stock for $5 per share, and after three years, the stock price dropped to $3 per share. What is the rate of return?

8.2 Compounding Investments

Compounding investments refer to a strategy where the returns or earnings generated from an investment are reinvested to generate additional returns over time. In simple terms, it means earning returns not only on the initial investment but also on the accumulated earnings from previous periods. (We calculated compounding investments earlier when we learned about compound interest).

The power of compounding lies in the fact that as the investment grows, the potential for earning returns also increases. The returns earned in one period become part of the principal amount for the next period, allowing for exponential growth over an extended period.

Here's an example to illustrate the concept of compounding investments:

Let's say you invest $10,000 in a compounding investment with an annual interest rate of 5%. At the end of the first year, you would earn $500 in interest (5% of $10,000). Instead of withdrawing the interest, you reinvest it back into the investment, resulting in a new principal amount of $10,500 for the second year. In the second year, you would earn 5% interest on this new amount, which is $525. The process continues, with the interest earned each year being added to the principal and earning additional returns.

Over time, compounding can have a significant impact on the growth of investments, especially when compounded over long

periods. As the investment grows and compounds, the rate of growth can accelerate, leading to exponential growth and larger returns in later years.

It's important to note that compounding can occur with various types of investments, such as stocks, bonds, mutual funds or savings accounts. The specific compounding frequency (e.g. annually, quarterly, monthly) and the interest rate or investment returns will determine the rate at which the investment grows.

Let's try some questions. The first one has been solved for you.

1 John invests $5,000 in a savings account that earns an annual interest rate of 4.5%. How much will his investment be worth after 5 years, assuming the interest is compounded annually?

SOLUTION

Future value (FV) = $P \times \left(1 + \frac{r}{n}\right)^{(nt)}$

Principal amount (P) = $5,000

Annual interest rate (r) = 4.5% = 0.045

Number of compounding periods per year (n) = 1

Number of years (t) = 5

Future value *(FV)* = $P \times \left(1 + \frac{r}{n}\right)^{(nt)}$

FV = $5,000 *x* $(1 + 0.045/1)^{(1*5)}$

FV = $5,000 *x* (1.246181938)

FV ≈ $6,230.91

After 5 years, John's investment will be worth approximately $6,230.91.

2 Emma invests $10,000 in a mutual fund that has an annual growth rate of 7%. If the growth is compounded quarterly, what will be the value of her investment after 3 years?

3 Sarah invests $2,500 in a bond that offers a fixed annual interest rate of 6.25%. If the interest is compounded semi-annually, what will be the value of her investment after 2 years?

4 Michael invests $1,000 in a stock that has an annual return of 9%. If the returns are compounded monthly, what will be the value of his investment after 5 years?

5 Linda invests $7,500 in a certificate of deposit that offers an annual interest rate of 3.75%. If the interest is compounded annually, what will be the value of her investment after 4 years?

6 Assume that you invest $1, 000,000 at 20% interest per year. Calculate the future value of your investment after one year based on a varying number of compounding periods.

- **A** Annual compounding interest
- **B** Semi-annual compounding interest
- **C** Quarterly compounding interest
- **D** Monthly compounding interest

7 Maryam and Josh each have $5,000 to invest separately. Maryam decides to invest her money with a financial institution that will offer her 7% annual interest rate, compounded monthly. Josh decides to invest his money at 7% annual interest rate, compounded annually. Calculate the future value of each investment after two years.

8 Assume you invest $1,000 at a 6% annual interest rate, compounded annually. If you reinvest all your money at the same interest rate, how much would you have in total by the end of the (a) first year and (b) second year?

Let's Explore

9 The "rule of 72" is a quick way to learn how long it will take to double your money. The rule of 72 factors in the length of time and interest rate you have your money invested at. To apply this rule, you multiply the number of years you plan to invest your money for by the interest rate. When the product is 72, your money is doubled. However, please note that the rule of 72 only provides a rough estimate and may not be accurate for different compounding frequencies.

Let's try the rule of 72 in the following scenarios:

A You have $2,000 saved at a 4% annual interest rate. (i) How long will it take to double your money? (ii) What if the interest rate was 10%?

B You have $700 and want to double your money in 10 years. At what annual interest rate would your money double in (i) 5 years, (ii)10 years or (iii) 15 years?

8.3 Cryptocurrency

Cryptocurrency is a digital or virtual form of currency that does not use banks to verify transactions. It uses cryptography to secure financial transactions and operates on decentralized networks called blockchain, which ensure transparency, security, and immutability.

Let's try some questions related to cryptocurrency.

1 Bob bought 5 Bitcoins at a price of $10,000 per Bitcoin. The transaction fee for buying and selling Bitcoins is 2% of the total transaction value. If Bob sells all his Bitcoins when the price reaches $15,000 per Bitcoin, what is his total profit or loss after considering the transaction fees?

2 Alice invested $5,000 in a cryptocurrency that offers an annual interest rate of 8%. How much money will Alice have after 2 years if the interest is compounded annually?

3 A cryptocurrency has a total supply of 10 million coins. In the first year, the mining rewards are set at 1,000 coins per day. What is the percentage of the mining rewards compared to the total supply in the first year?

4 Sarah purchased 500 units of a cryptocurrency at a price of $0.50 per unit. If the price of the cryptocurrency increases to $1.20 per unit, what is the percentage increase in Sarah's investment?

5 Jackson purchased 100 units of a cryptocurrency at a price of $0.20 per unit. The price later increased to $0.40 per unit, but Jackson decided to sell only 50% of his holdings. What is the amount Jackson profited from selling the cryptocurrency?

6 Emma bought 200 units of a cryptocurrency at a price of $1.00 per unit. The price later decreased to $0.80 per unit, and she decided to sell all her holdings. What is the percentage loss on her investment?

7 Alex invested $5,000 in a cryptocurrency and earned a return of 15% over one year. What is the final investment value after one year?

8 Lily purchased 50 units of a cryptocurrency at a price of $2.50 per unit. The price later increased to $3.75 per unit, and she decided to sell 43 units. What is the total amount Lily received from selling the cryptocurrency?

9 Ethan invested $3,000 in a cryptocurrency and experienced a growth rate of 10% per month, compounded monthly. After 6 months, what is the total investment value?

10 Ethan makes another investment of $3,000 in cryptocurrency. However, this one experiences a growth rate of 10% annually, compounded monthly. After 6 months, what is the total investment value?