

Exploring Compound Interest

YOU WILL NEED

- calculator
- spreadsheet software (optional)

compound interest

The interest that is earned or paid on both the principal and the accumulated interest.

GOAL

Compare simple interest with compound interest.

EXPLORE the Math

Guaranteed investment certificates (GICs) can earn either simple or compound interest. If a GIC earns simple interest annually, the same amount of interest is earned every year. If a GIC earns **compound interest** annually, the interest at the end of the first year is earned on the principal, but the interest at the end of the second year is earned on the principal plus the interest from the first year. Each year after that, the interest is earned on the principal plus all the accumulated interest from the previous years.

Both Ewan and Rena received a \$1000 prize in a story-writing contest.

- Ewan bought a \$1000 simple interest GIC with his prize money. It has a 5-year term and earns 3.6% paid annually.
- Rena bought a \$1000 compound interest GIC with her prize money. It also has a 5-year term and earns 3.6% paid annually.



- ?** How do the future values of Ewan's and Rena's investments compare at maturity?

Reflecting

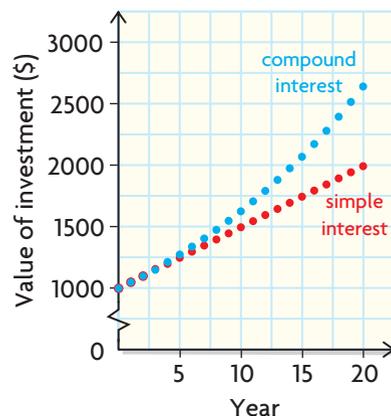
- With a partner, compare your answers and the strategies you used to determine the difference between the two investments at maturity.
- Graph both investments on the same coordinate grid. How are the shapes of the graphs different? Explain why.
- How much would Ewan need to invest at 3.6% simple interest to earn the same as Rena in 5 years?

In Summary

Key Ideas

- Compound interest is determined by applying the interest rate to the sum of the principal and any accumulated interest. Previously earned interest is reinvested over the course of the investment.
- If the same principal is invested in a compound interest account and a simple interest account, with the same interest rate for the same term, the compound interest investment will grow faster (non-linear) than the simple interest investment (linear). For example, the graphs show principal of \$1000 invested over 20 years at 5% simple interest (red graph) and 5% compound interest (blue graph), both paid annually.

Comparing Simple and Compound Interest Investments at 5%



Need to Know

- Financial institutions pay compound interest on investments at regular equal intervals. If interest is paid annually, it is calculated at the end of the first year on the principal and then added to the principal. At the end of the second year, the interest is calculated on the balance at the end of the first year (principal plus interest earned from the previous year). This pattern continues every year until the end of the investment term.

FURTHER Your Understanding

1. Determine the difference in the interest earned at maturity on these two investments. Explain any discrepancies.
 - Eve invested \$3000 in a GIC for a term of 5 years with a simple interest rate of 4%, paid annually.
 - Larry invested \$3000 in a GIC for a term of 5 years with a compound interest rate of 4%, paid annually.
2. Sydney wants to open a savings account. He has \$6500 to deposit. He intends to keep the account for 4 years and then use the money to rebuild the engine of his car. Which account should he choose? Justify your choice.
 - A. 5.1% simple interest, paid weekly
 - B. 4.8% compound interest, paid annually
3. The amount of interest that an investment earns is sometimes called the return on the investment.
 - a) Without determining the future value of each investment below, is it possible to predict, with confidence, which investment will have the greatest return? Explain.
 - A. \$6000 invested for 4 years at a compound interest rate of 1.2%
 - B. \$5000 invested for 5 years at a simple interest rate of 5%
 - C. \$4000 invested for 6 years at a compound interest rate of 6%
 - b) Determine which investment will have the greatest return.

