

1.4 Compound Interest: Present Value p. 34

Name _____

Date _____

Goal: Determine the principal or present value of an investment, given its future value and compound interest rate.

- present value:** The amount that must be invested now to result in a specific future value in a certain time at a given interest rate.

INVESTIGATE the math

In 5 years, after graduating from college, Cal wants to spend a year travelling in Canada's three territories. He plans to start in Yukon and then travel east to the Northwest Territories and Nunavut. Cal has determined that he will need at least \$15 000 for his trip. To reach this goal, he wants to invest money now. He has chosen a GIC at 7%, compounded annually.

How much does Cal need to invest now so that he will have \$15 000 in 5 years?



Example 1: Determining the present value of investments earning compound interest (p.35)

Ginny is 18 years old. She has inherited some money from a relative. Ginny wants to invest some of the money so that she can buy a home in Milk River, Alberta, when she turns 30. She estimates that she will need about \$170 000 to buy a home.

- a) How much does she have to invest now, at 6.5% compounded annually?
- b) What is the ratio of future value to present value for Ginny's investment?
- c) How would the ratio change if the interest rate decreased to 6% but was compounded semi-annually?

Example 2: Determining the present value of an investment that is compounded quarterly
(p. 37)

Agnes and Bill are musicians. They have researched the costs to set up a small recording studio. They estimate that \$40 000 will pay for the soundproofing, recording equipment, and computer hardware and software that they need. They plan to set up the studio in 3 years and have invested money at 9.6%, compounded quarterly, to save for it.

- a) How much money should they have invested?
- b) How much interest will they earn over the term of their investment?

Example 3: Determining an unknown interest rate and unknown term (p. 38)

Laura has invested \$15 500 in a Registered Education Savings Plan (RESP). She wants her investment to grow to at least \$50 000 by the time her newborn enters university, in 18 years.

- a) What interest rate, compounded annually, will result in a future value of \$50 000? Round your answer to two decimal places.
- b) Suppose that Laura wants her \$15 500 to grow to at least \$60 000 at the interest rate from part a). How long will this take?

In Summary

Key Idea

- The present value of an investment that earns compound interest can be determined using the formula

$$P = \frac{A}{(1 + i)^n}$$

where P is the present value (or principal), A is the amount (or future value), i is the interest rate per compounding period (expressed as a decimal), and n is the number of compounding periods.

Need to Know

- Any equivalent form of the compound interest formula may be used to solve a compound interest problem.

$$A = P(1 + i)^n \quad P = \frac{A}{(1 + i)^n} \quad \frac{A}{P} = (1 + i)^n$$

- To compare investments, usually with the same term or principal, the ratio of the future value to the present value can be determined using the form: $\frac{A}{P} = (1 + i)^n$
- Using a formula, using the financial application on a graphing calculator, and using spreadsheet software are all valid strategies for solving a compound interest problem.

HW: 1.4 pp. 40-42 #3, 5, 6, 7, 9, 10 & 14