

Compound Interest: Present Value

Recall:

$$A = P(1+i)^n$$

A = Future value

P = Present value,

i = interest rate

n = # of compounding periods

Investigate:

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 principal does Cal need to invest now to have a future value of \$15 000 in 5 years?

$$15000 = P(1+0.07)^5$$

$$P = \frac{15000}{(1.07)^5}$$

$$= \$10\,694.79$$

Example: Nora wants to have \$5000 at the end of 3 years for college.

a) How much does she need to invest now at 4% compounded monthly?

$$5000 = P \left(1 + \frac{0.04}{12}\right)^{3(12)}$$

$$P = \frac{5000}{\left(1 + \frac{0.04}{12}\right)^{36}}$$

$$= \$4435.49$$

b) What is the rate of return?

$$\frac{5000 - 4435.49}{4435.49} = 0.12727 = 12.7\%$$

Example: Paula has invested \$15 000 in a GIC. She wants her investment to grow to at least \$25 000 in 10 years so she can have a down payment for an apartment. What interest rate, compounded annually, will result in a future value of \$25 000?

$$25\,000 = 15\,000(1+i)^{10}$$

$$(1+i)^{10} = \frac{25\,000}{15\,000}$$

$$(1+i)^{10} = \frac{5}{3}$$

$$1+i = \sqrt[10]{\frac{5}{3}}$$

$$i = \sqrt[10]{\frac{5}{3}} - 1$$

$$i = 0.05241$$

$$= 5.24\%$$