1.6 Solving Investment Portfolio Problems

Portfolio: One or more investments held by an individual investor or by a financial organization.

INVESTIGATE the Math

André is 17 years old and in Grade 12. He plans to start a 4-year history degree next year, focusing on the Métis of Western Canada. His goal is to be a curator at Le Musée de Saint-Boniface in Winnipeg. He has the following investments in his post-secondary education savings **portfolio** :

- Starting when he was born, his parents deposited $100 at the end of each month into a savings account, earning an average annual interest rate of 3%, compounded monthly. *} annuity*
- On his ~~eighth~~ seventh birthday, his grandparents bought him a 10-year $5000 GIC that earned 4%, compounded annually. → *assume matured*

{ Guaranteed Investment Certificate → low risk

André plans to redeem both investments now and combine them into one investment account that earns 4.2%, compounded quarterly, for one year until he starts school.

He expects to withdraw money from his investment account each year to cover major expenses, such as tuition, rent, and books. He also plans to work part-time while at university and during the summers.

❓ Will André have enough money to pay for 4 years of university?

A. How much will André's parents' investment be worth when he redeems it? $26 569.27 N=204 Pmt=-100 PV=0

B. How much will his grandparents' investment be worth when he redeems it? $7401.22 N=10 Pmt=0 PV=-5000 P/Y=C/Y=1

C. How much will André's new investment account be worth when he starts school? PV=-(26569.27+7401.22) N=4 $35419.88

D. Suppose that André withdraws a lump sum from his investment account at the beginning of first year to cover his major first-year expenses. His summer job and part-time work during the year will pay for the rest of his first-year expenses. When he starts second year, his investment account has a value of $27 446.17 How much was his withdrawal at the beginning of first year? FV PV≈26 323.07 WD=35419.88 -26323.07 $9096.81

E. Suppose that André withdraws the same amount for his second-year expenses. How much will he have in the account when he starts third year? PV=27446.17 -9096.81 -18349.36 FV=19132.26

F. Suppose that André withdraws the same amount for his third-year expenses. Will he have enough left to withdraw the same amount again for his fourth-year expenses?

G. Suppose that André decides not to work part-time during fourth year because he wants to focus on his studies. What interest rate, compounded quarterly, would his account need to earn during his third year so that he can withdraw $11 500 for his fourth year?

EXAMPLE 2 | Designing and adjusting an investment portfolio to meet a financial goal

John is an avid sailor and dreams about competing in the Olympics. He wants to buy his own Laser sailboat in 6 years, but, in the meantime, he sails on a friend's boat. The cost of a new Laser is about $9660, including taxes. John won $2500 in his most recent race and can save $50 a month from his part-time job.

a) What recommendations for a portfolio of two different investments would you make, based on available investments and interest rates? Explain.

b) Will the portfolio support the cost of the new Laser in 6 years?

c) If not, suggest a solution for John.

Lasers are small boats with only one sail. Of the classes of boats that compete at the Olympics, Laser is the least expensive.

EXAMPLE 3   Comparing the rates of return of two investment portfolios

Jason and Malique are each hoping to buy a house in 10 years. They want their money to grow so they can make a substantial down payment.

Jason's portfolio:

- A 10-year $2000 GIC that earns 4.2%, compounded semi-annually
- A savings account that earns 1.8%, compounded weekly, where he saves $55 every week
- A 5-year $4000 bond that earns 3.9%, compounded quarterly, which he will reinvest in another bond at an interest rate of 4.1%

5-year

Malique's portfolio:

- A tax-free savings account (TFSA) that earns 2.2%, compounded monthly, and has a current balance of $5600
- The purchase, at the end of each year, of a 10-year $500 CSB that earns 3.6%, compounded annually
- A savings account that earns 1.6%, compounded monthly, where she saves $200 every month

In 10 years, whose portfolio will have the greater rate of return on investment?

① N = 2×10
$\quad$ I = 4.2
$\quad$ PV = -2000
$\quad$ Pmt = 0
$\quad$ FV = 3030.71
$\quad$ P/y = 2
$\quad$ C/y = 2

② N = 52×10
$\quad$ I = 1.8
$\quad$ PV = 0
$\quad$ Pmt = -55
$\quad$ FV = 31329.72
$\quad$ P/y = 52
$\quad$ C/y = 52

3a) N = 4×5
$\quad$ I = 3.9
$\quad$ PV = -4000
$\quad$ Pmt = 0
$\quad$ FV = 4856.65
$\quad$ P/y = 4
$\quad$ C/y = 4

b) N = 4×5
$\quad$ I = 4.1
$\quad$ PV = -4856.65
$\quad$ Pmt = 0
$\quad$ FV = 5955.44
$\quad$ P/y = 4
$\quad$ C/y = 4

Homework: pg. 65 #3, 5, 6, 7, 8, 10, 11