

## How to make money???

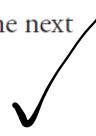


**EXAMPLE 4**  
**p. 463**

**Comparing interest on investments with different compounding periods**

Céline wants to invest \$3000 so that she can buy a new car in the next 5 years. Céline has the following investment options:

- A. 4.8% compounded annually
- B. 4.8% compounded semi-annually
- C. 4.8% compounded monthly
- D. 4.8% compounded weekly
- E. 4.8% compounded daily



$$3000(1+0.048/1)^5 = 3792.518151$$

$$3000(1+0.048/2)^{10} = 3802.951801$$

$$3000(1+0.048/12)^{60} = 3811.922156$$

$$3000(1+0.048/52)^{(52*5)} = 3813.325288$$

$$3000(1+0.048/365)^{(365*5)} = 3813.687273$$

p. 465

EXAMPLE 5 Estimating doubling times for investments

Both Berta and Kris invested \$5000 by purchasing Canada Savings Bonds. Berta's CSB earns 8%, compounded annually, while Kris's CSB earns 9%, compounded annually.

- a) Estimate the doubling time for each CSB.

**Rule of 72**

A simple formula for estimating the doubling time of an investment; 72 is divided by the annual interest rate as a percent to estimate the doubling time of an investment in years.

The Rule of 72 is most accurate when the interest is compounded annually.

$$\text{Rule of 72} = \frac{72}{\text{Rate}}$$

Berta

Kris

Doubling Time  $\rightarrow$   $\frac{72}{8}$   
9 years

$\frac{72}{9}$   
8 years

## Present Value...

\$ needed to invest NOW to get a fixed amount later

$$P = \frac{A}{\left(1 + \frac{r}{n}\right)^{nt}}$$

$$A = P \left(1 + \frac{r}{n}\right)^{nt}$$

Handwritten purple annotations: A red circle around 'P' in the original formula, a red question mark above it, and a red arrow pointing to the 'P' in the boxed formula. The handwritten equation above has a red circle around 'P', a red arrow pointing to the 'P' in the boxed formula, and a red arrow pointing to the left.

# 8.4

## Compound Interest: Present Value

### GOAL

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

EXAMPLE 2  
p. 475

Determining the present value of an investment that is compounded quarterly

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? ← P = ?
- b) How much interest will they earn over the term of their investment?

$$\begin{aligned}
 a) \quad P &= \frac{A}{(1 + \frac{r}{n})^{nt}} \\
 &= \frac{40000}{(1 + \frac{0.096}{4})^{4 \times 3}}
 \end{aligned}$$

$$\begin{aligned}
 b) \quad I &= A - P \\
 &= 40000 \\
 &\quad - 30092.66 \\
 &= \boxed{\$9907.34}
 \end{aligned}$$

|  |
|--|
| $  \begin{aligned}  &= \frac{40000}{(1 + 0.096/4)^{12}} \\  &= 30092.65538  \end{aligned}  $ |
|--|

$P = \$30092.66$

## **HOMEWORK...**

p. 468: **Rule of 72...**

#3 (only estimate the doubling time)

#5a & #8

**Compound Interest (Future Value)**

#10 & #12

p. 478: **Compound Interest (Present Value)**

#4, #6, #7, & #9