

Name: Solutions

Date: \_\_\_\_\_

MBF 3C **Assignment: Simple & Compound Interest**

Answer each of the following in the space provided. If you need them, required formulas are posted in the classroom. Show each step in the process.

Part A-Knowledge & Understanding  $A = P + Prt$  ✓

1. If you invest 1759.76 at 8% **simple interest**, how much will your investment be worth ... [ku]

Time	Amount of the investment
... in 1 year?	$A = \$1759.76 + \$1759.76(0.08)(1) ✓$ $= \$ \quad ✓$
... in 18 months? (Recall: Time is to be in years) $t = 1.5$	$A = \$1759.76 + \$1759.76(0.08)(1.5) ✓$ $= \$ \quad ✓$

2. If you invest 1759.76 at 8% **compound interest**, compounded annually, how much will your investment be worth... [ku]

$\hookrightarrow A = P(1+i)^n$  ✓

Time	Amount of the investment
... in 1 year?	$A = \$1759.76(1.08)^1 ✓$ $= \$$
... in 18 months? (Again, time in years) $t = 1.5$	$A = \$1759.76(1.08)^{1.5} ✓$ $= \$ \quad ✓$

3. When money is invested at 5% per year compounded semi-annually, for five years, in the formula  $A = P(1+i)^n$ ... (circle one)

- a)  $n = 5$  and  $i = 0.05$
- b)  $n = 5$  and  $i = 0.025$
- c)  $n = 10$  and  $i = 0.025$  ✓✓
- d)  $n = 10$  and  $i = 0.05$

$\hookrightarrow i = \frac{0.05}{\textcircled{2}}$   
 $= 0.025$

$n = \textcircled{2} \times 5$   
 $= 10$

(OVER →)

# Solutions

4. Consider the following scenario:

\$13 000 is invested at 7% compounded semi-annually for 4 years.

[KU]

a) How many interest periods ( $f \times t$ ) will there be over the term of this investment?  $2 \times 4 = 8$  ✓

b) What will be the interest rate per interest period,  $\frac{i}{f}$  (as a decimal)?  $\frac{0.07}{2} = 0.035$  ✓

## Part B-Application

→ Choose one with least interest.

[APP]

1. Erik needs to borrow \$2000. Which loan should he take?

A: \$2000 for <sup>3</sup>three years at 10% per year, compounded <sup>2</sup>semi-annually

B: \$2000 for <sup>3</sup>three years at 9.2% per year, compounded <sup>4</sup>quarterly

Justify your response.

A:

$$A = P \left(1 + \frac{i}{f}\right)^{f \times t}$$

$$= \$2000 \left(1 + \frac{0.10}{2}\right)^{2 \times 3}$$

$$= \$2000 (1.05)^6$$

$$\approx \$2680.19$$

B:

$$A = \$2000 \left(1 + \frac{0.092}{4}\right)^{4 \times 3}$$

$$= \$2000 (1.023)^{12}$$

$$\approx \$2627.47$$

∴ Erik should go with Option B, as he'll be paying less interest. ✓  
In fact, he'll pay \$52.72 less.

## Bonus-Challenge

Answer a) or b) or both!

a) About how long would it take \$1 to double if it earns 4% per year, compounded annually?

b) About how long would it take \$1 to double if it earns 4% per year, compounded semi-annually? (2)

Show your thinking.

## Example

a)  $\$2 = \$1 (1.04)^n$

$$2 = 1.04^n$$

n	$1.04^n$	>, <, = 2?
15	$1.04^{15} \approx 1.80$	< 2 (too small)
17	$1.04^{17} \approx 1.95$	< 2 (too small)
18	$1.04^{18} \approx 2.02$	$\approx 2$ (close enough)

b)  $i = \frac{0.04}{2} = 0.02$

$$f \times t = 2t$$

$$\$2 = \$1 (1.02)^{2t}$$

$$2 = 1.02^{2t}$$

z	$1.02^{2t}$	>, <, = 2?
15	$1.02^{(2 \times 15)} \approx 1.81$	< 2 (too small)
17	$1.02^{(2 \times 17)} \approx 1.96$	< 2 (too small)
17.6	2.01	$\approx 2$ (close enough)

→ about 18 years.

→ about 17.5 years.

## REFLECTION:

- i) "Something I'm doing well with..."
- ii) "Something I'm OK with..."
- iii) "Something I'm going to work on..."