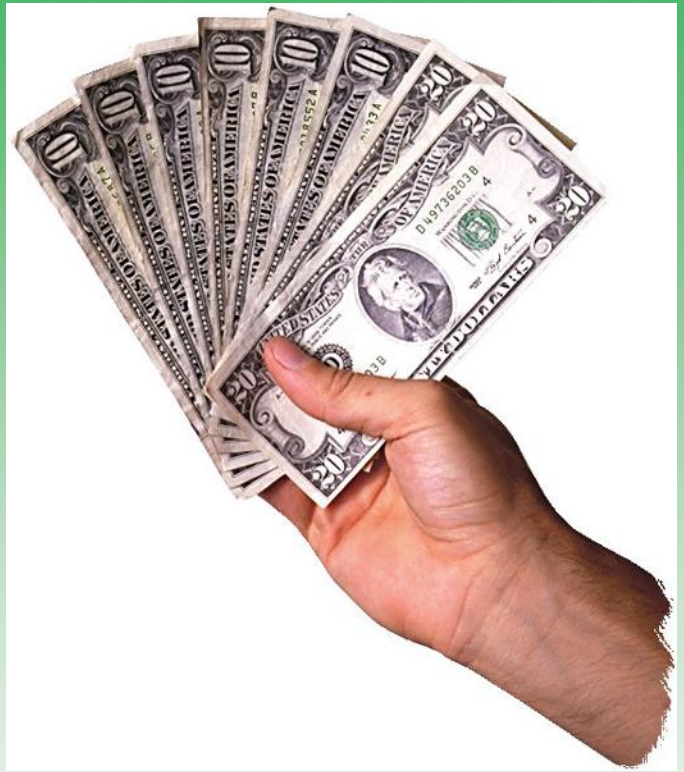
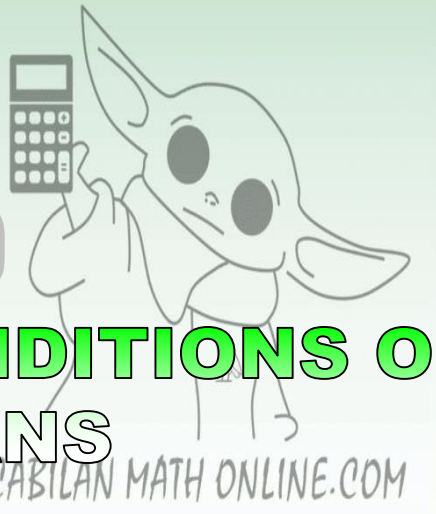
# ST. JEAN DE BREBEUF MATHEMATICS



# CHAPTER 8.5

## EFFECTS OF CHANGING THE CONDITIONS OF INVESTMENTS AND LOANS

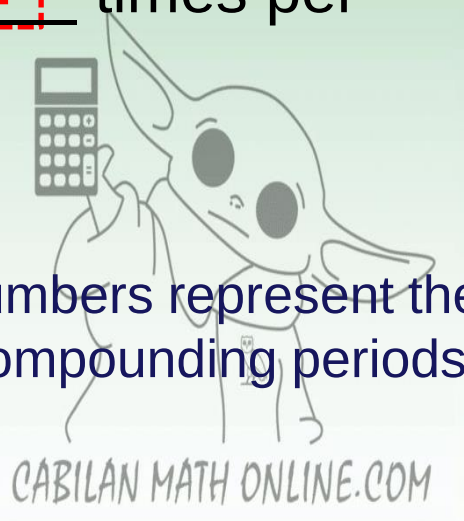


# CHAPTER 8.5 EFFECTS OF CHANGING THE CONDITIONS OF INVESTMENTS AND LOANS

## *REVIEW OF BASIC TERMS*

| FREQUENCY | DEFINITION | # OF TIMES PER YEAR |
|---|---|---|
| YEARLY Commonly known as **annually** | Every year | 1 times |
| MONTHLY | Every month | 12 times |
| SEMI-ANNUALLY | *Twice* a year or every six months | 2 times |
| QUARTERLY | *Four* times a year or every three months | 4 times |

***Weekly**, although less common, occurs 52 times per year




These numbers represent the **N** (# of compounding periods *per year)*

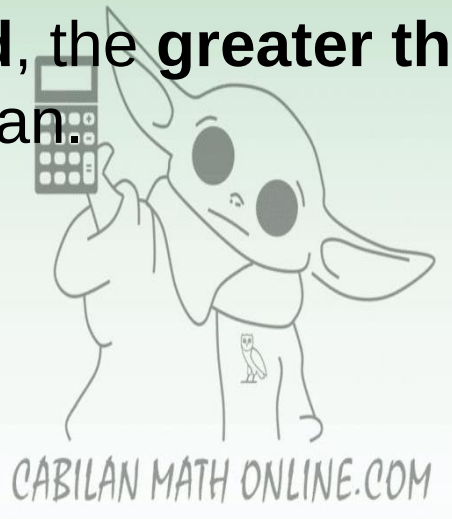
# CHAPTER 8.5 EFFECTS OF CHANGING THE CONDITIONS OF INVESTMENTS AND LOANS

## *KEY CONCEPTS*

When changing any conditions of an investment or loan, **the amount or principal will also change**.

Doubling an interest rate or term **more than doubles the total interest**
→This is due to the effects of compounding.

The **more frequent the compounding period**, the **greater the effects** of any changes to the investment or loan.



# CHAPTER 8.5 EFFECTS OF CHANGING THE CONDITIONS OF INVESTMENTS AND LOANS

***EXAMPLE 1*** *Effect of Interest Rate and Principal Investment*

Tyler wants to have **$5000** in **six years time**.

4 / 100
= **0.04**

(a) How much would Tyler need to invest today at **4%** **per year**, **compounded quarterly**? **N = 4**

Use **present value** formula!!!

A = **5000**

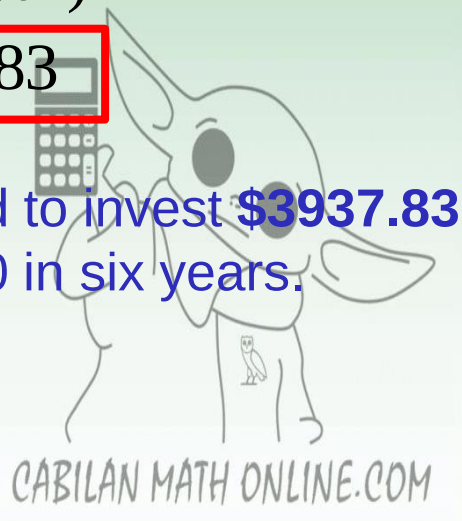
i = r / N
= 0.04 / 4
= **0.01**

Represents *quarterly* compounding

n = yN
= 6(4)
= **24**

$$P = A(1+i)^{-n}$$
$$P = 5000(1+0.01)^{-24}$$
$$P = 5000\,(1.01)^{-24}$$
$$P = \$3937.83$$

Tyler will need to invest **$3937.83** to have $5000 in six years.



# CHAPTER 8.5 EFFECTS OF CHANGING THE CONDITIONS OF INVESTMENTS AND LOANS

***EXAMPLE 1*** *Effect of Interest Rate and Principal Investment*

Tyler wants to have **$5000** in **six years time**.

4.5 / 100
= **0.045**

(b) How much would Tyler need to invest today at **4.5%** **per year**, **compounded quarterly**? **N = 4**

Use **present value** formula!!!

A = **5000**

i = r / N
= 0.045 / 4
= **0.01125**

Represents *quarterly* compounding

n = yN
= 6(4)
= **24**

$$P = A(1+i)^{-n}$$
$$P = 5000(1+0.01125)^{-24}$$
$$P = 5000(1.01125)^{-24}$$
$$P = \$3822.66$$

Tyler will need to invest **$3822.66** to have $5000 in six years.

# CHAPTER 8.5 EFFECTS OF CHANGING THE CONDITIONS OF INVESTMENTS AND LOANS

***EXAMPLE 1*** *Effect of Interest Rate and Principal Investment*

Tyler wants to have **$5000** in **six years time**.

(a) How much would Tyler need to invest today at **4% per year**, **compounded quarterly**?

Tyler will need to invest **$3937.83** to have $5000 in six years.

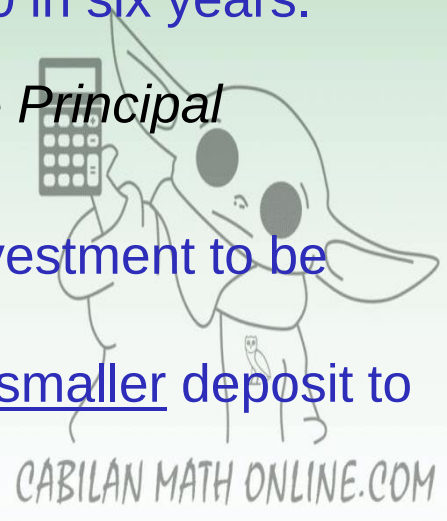
(b) How much would Tyler need to invest today at **4.5% per year**, **compounded quarterly**?

Tyler will need to invest **$3822.66** to have $5000 in six years.

(c) What effect did the **higher interest rate** have on the *Principal* investment?

The higher interest rate caused the Principal investment to be smaller

→ At a higher interest rate, Tyler would make a smaller deposit to obtain the same amount after six years



# CHAPTER 8.5 EFFECTS OF CHANGING THE CONDITIONS OF INVESTMENTS AND LOANS

***EXAMPLE 2*** *Investments*

10.7 / 100
= **0.107**

Kendra deposited **$500** into an investment fund that has historically earned **10.7% per year**, **compounded annually**. She intends to leave the money in the fund for at least **five years**.

**N = 1**

How much will Kendra's investment be worth in **five years**?

P = **500**

Compounded **annually**

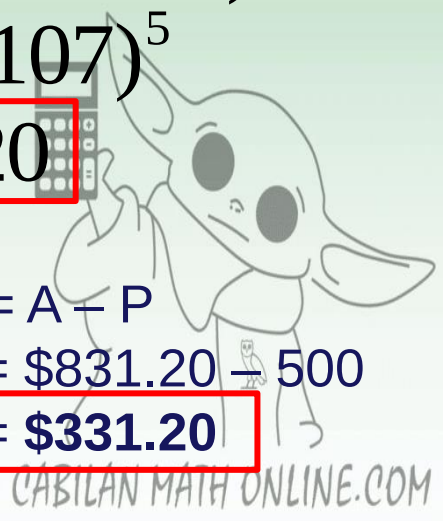
i = r / N
= 0.107 / 1
= **0.107**

n = yN
= 5(1)
= **5**

$$A = P(1+i)^n$$
$$= 500(1+0.107)^5$$
$$= 500(1.107)^5$$
$$= \$831.20$$

After five years, Kendra will have **$831.20** and earn **$331.20** in interest

Interest earned = A – P
= $831.20 – 500
= **$331.20**



# CHAPTER 8.5 EFFECTS OF CHANGING THE CONDITIONS OF INVESTMENTS AND LOANS

10.7 x 2
= **21.4%**

21.4 / 100
= **0.214**

***EXAMPLE 2*** *Investments*

Kendra deposited **$500** into an investment fund that has historically earned **10.7% per year**, **compounded annually**. She intends to leave the money in the fund for at least **five years**. **N = 1**

How much will Kendra's investment be worth in **five years** if the **interest rate was doubled?**

P = **500**

Compounded **annually**

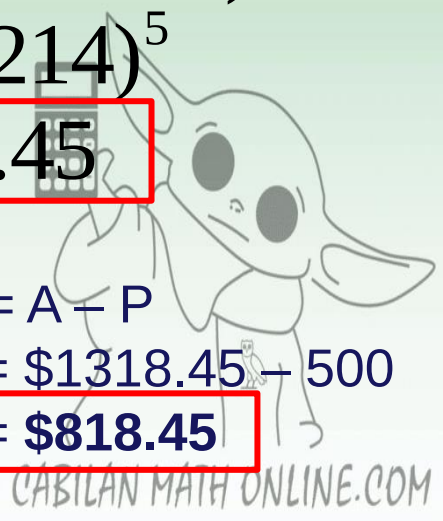
i = r / N
= 0.214 / 1
= **0.214**

n = yN
= 5(1)
= **5**

$$A = P(1+i)^n$$
$$= 500(1+0.214)^5$$
$$= 500(1.214)^5$$
$$= \$1318.45$$

After five years, Kendra will have **$1318.45** and earn **$818.45** in interest

Interest earned = A – P
= $1318.45 – 500
= **$818.45**



# CHAPTER 8.5 EFFECTS OF CHANGING THE CONDITIONS OF INVESTMENTS AND LOANS

***EXAMPLE 2*** *Investments*

Kendra deposited **$500** into an investment fund that has historically earned **10.7% per year**, **compounded annually**. She intends to leave the money in the fund for at least **five years**.

Did **doubling** the interest rate **more than double** the *total interest*? **YES**

Interest earned = A – P
= $831.20 – 500
= **$331.20**

Interest earned = A – P
= $1318.45 – 500
= **$818.45**

When the interest rate was doubled, the interest earned was almost triple

# Homework:

Page 450 – 453

#1 – 9, 12, 14, 17