

Lesson 4.2 - Compound Interest

- **simple interest**, where the interest is calculated on only the original sum deposited
- **compound interest**, where the interest is calculated on the original sum plus all the interest previously accumulated.

$$FV = PV \left(1 + \frac{r}{100k} \right)^{kn}$$

FV = future value

PV = present value

n = # of years

r = % annual rate of interest

k = # of times compounded per year

EXAMPLE #1

Twins Paco and Peta are given 12,000 pesos each by an aunt.

- a. Paco decides to invest his money in a bank that is offering 4.8% interest compounded yearly. How much money will he have in the bank after five years?

$$FV = 12000 \left(1 + \frac{4.8}{100(1)}\right)^{1(5)} = \boxed{15170.07 \text{ pesos}}$$

- b. Peta decides to invest her money in another bank that is offering 4.6% interest compounded quarterly. How much money will she have in the bank after five years?

$$FV = 12000 \left(1 + \frac{4.6}{100(4)}\right)^{4(5)} = \boxed{15083.39 \text{ pesos}}$$

- c. Which twin has made the better investment?

Paco made the better investment.

EXAMPLE #2

Jan invests 950 euros in a bank that pays 3.8% interest compounded yearly. How many years will it take for his investment to double?

$$\underbrace{1900}_{Y_1} = \underbrace{950 \left(1 + \frac{3.8}{100}\right)^n}_{Y_2}$$

Use
the
GDC!

→ Intersection = (18.6, 1900)

19 years

EXAMPLE #3

Marie has \$680 to invest. Suppose that she puts it in a bank account that pays 3.7% interest compounded annually.

- a. How much money will she have at the end of 10 years?

$$FV = 680 \left(1 + \frac{3.7}{100}\right)^{10} = \boxed{\$977.90}$$

- b. How long will it take to double her investment?

Use GDC!

$$1360 = 680 \left(1 + \frac{3.7}{100}\right)^n$$

$$\boxed{20 \text{ years}}$$

- c. Marie would like her investment to double in 15 years. At what rate does her account need to earn interest if she is to achieve this?

$$1360 = 680 \left(1 + \frac{r}{100}\right)^{15}$$

$$\boxed{r = 4.73\%}$$

EXAMPLE #4

In part (a) of Worked example 4.4, Marie invested her money at 3.7% compound annually. She could also invest her money at a rate of 3.6% compounded monthly. What would be the difference in her investment amounts under the two schemes after 10 years?

$$\text{Part a} = \$977.90$$

$$FV = 680 \left(1 + \frac{3.6}{1200}\right)^{120} = \$974.14$$

$$977.90 - 974.14 = \boxed{\$3.76}$$