**NOMINAL RATE AND EFFECTIVE RATE**

1. Consider a bank deposit of P 1,000.00 to earn 6% compounded quarterly. After one year, the compound amount F is:

Compound interest Formula:

**F = P ( 1 + i )n**

= 1,000 ( 1 + )1(4)

= P 1061.36

Notice that the interest earned is P61.36 of P 1000.00 (not 6% of P 1000.00 ). For this case, 6% compounded quarterly is called the nominal rate and 6.136% is the Effective rate.

Thus, the effective rate of interest (ER) is the actual interest earned in one period.

ER =

ER = ( 1 + )m – 1

1. A Savings association pay 1.5% interest quarterly. What is the effective annual interest rate?

**ER = ( 1 + )m – 1**

ER = ( 1 + 0.015 )4 – 1 = 1.5% = 0.015

= 0.06136 = 6.14% = 0.015

4( )= (0.015)4

r = 0.06 = 6%

1.5% interest quarterly is the same as to 6% compounded quarterly

**Illustrative example**

1. A bank offers 0.5% effective monthly interest. What is the effective annual rate with monthly compounding?

**ER = ( 1 + )m – 1**

ER = ( 1 + 0.005 )12 – 1 = 0.5% = 0.005

ER = 0.062 = 6.2% = 0.005

r = 0.005(12)

r = 0.06 = 6% compounded monthly nominal rate

**Kulang vid ni sir**

**Compound Interest**

1. If P25,000.00 is invested now, P 35,000.00 two years from now, and P 45,000.00 four years from now. What will be the total amount in 10 years? Interest rate is 4%?

F10 = F25k + F35k + F45k

**F= P ( 1 + i )n**

F10 = 25,000( 1 + 0.04 )10 + 35,000( 1 + 0.04 )8 + 45,000( 1 + 0.04 )6

F10 = 37,006.11 + 47899.92 + 56939.36

F10 = P 141,845.39

1. The interest on an account is 13% compounded annually. How many years approximately will it take to triple the amount?

**F= P ( 1 + i )n**

Triple the amount, therefore

F = 3P­

3P = P ( 1 + i )n­

3P = P ( 1 + 0.13 )n

3P = P (1.13)n*cancel out ang P*

3 = 1.13n

log 3 = log 1.13n *basta sa* *rule of logarithm pwede mapanaog ang exponent nga n*

log 3 = n log 1.13

n =

n = 8.99 or 9 years

1. A man is expecting to receive P 450,000.00 at the end of 7 years. If money is worth 14% compounded quarterly, how much is it worth at present?

**F= P ( 1 + i )n**

450,000 = P (1 + )7(4)

450,000 = P (1.035)28

P =

P = P 171,744.4532

**Elements of Compound Interest**

**P** = present worth or the principal

**F** = future worth or compound amount

**i** (small letter i)= effective interest per compounding period (per interest period), I =

**N** = total no. of compounding, N = t \* m where **t** is the number of years of investment

**I** (big letter i) = interest earned, I = F – P

**r** = nominal interest rate

**ER** = effective interest

**t** = no. of years of investment

**m** = no. of compounding per year

after n periods, the compound amount, F is:

**F = P ( 1 + i )n** also denoted as (F/P,I,n) *F in terms of P,i and n,* this is also called the single payment compound-amount factor

The present worth of F is:

**P =** also denoted as (P/F,I,n) *P in terms of F,i and n,* this is also called the single payment present-worth factor

Simple Interest

I = Prt

F = P(1 + rt)

Discount interest

P = F(1-dt)

Compound interest

F = P(1 + )mt

**F= P ( 1 + i )n**

Effective rate

ER = ( 1 + )m – 1