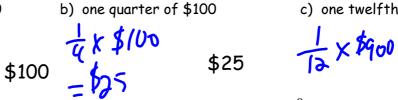
Compound Interest Warm-Up (Not included on the handout)

- 1a) If you received something semi-annually, how often would you receive it? 2 times per year
- 1b) If you received something quarterly, how often would you receive it? 4 times per year
 - 2. Calculate:

a) one half of \$200



c) one twelfth of \$900

3. Use your calculator to evaluate: $A = 575 \left(1 + \frac{0.03}{4}\right)^8$

You may need to input your calculator as follows:

$$575 \times (1 + 0.03 \div 4) \times 8 =$$

\$610.42

Before we begin, are there any questions from last day's work?

Today's Learning Goal(s):

By the end of the class, I will be able to:

- a) Understand the compound interest formula.
- b) Calculate the final amount of money for different compounding period
- c) Determine the total interest earned.

MBF3CI

Compound Interest





Suppose you deposit \$1000 into an investment at a bank that pays you 7%compound interest per year. The original investment of \$1000 is known as the original principal.

Compound interest is calculated on the original principal PLUS any interest that has already been earned! This is a chart that shows how the money grows over the first few years:

Examp	ole:		
X	у		*
Years	Principal @	Compound Interest (\$)	Balance @ end
	start of year (\$)		of year (\$)
0	\$ 1000	1000(0.07) = \$ 70	\$ 1070.00
1	\$ 1070	1070 (0.07) = \$74.90	\$ 1144.90
2	\$1144.90	1144.90(0.07) = \$80.14	\$ 1225.04

Does the money grow linearly, exponentially, or as a quadratic relation? Explain!



The chart above shows how \$1000 grows when the interest is 7% per year, **compounded annually**, for several years.

"Compounded annually" means the interest is calculated on the outstanding principal.

What formula can be made to find the final balance at the end of 2 years?

$$A = 1000(1.07)(1.07)$$

$$A = 1000(1.07)^{2}$$

Compound interest can be calculated more than just once per year! How many mes **per year** is interest calculated, if money is compounded...?

	annually	semi- annually	quarterly	monthly	daily
Number of interest periods	S.	3	7	1 2	365
per year	•		•	' _	000

EX. 1: If a bank states that an investment earns 7% per year, calculate the interest rate per compounding period:

	annually	semi-	quarterly	monthly	daily
		annually	L	L	
	7% = 0.07	5 0.07	0.07	⁶ 0.07	0.07
		2	4	12	365

Rather than using a table or a graph to see how the value of an investment/loan grows, you can use a formula:

$$A = P(1+i)^n$$
 (COMPOUND INTEREST FORMULA)

A is the final amount

P is the principal (original amount)

n is the number compounding periods

i is the interest rate**per** compounding period

EX. 2: State the values that would be substuted into the above formula. **Do not evaluate.**

a) A loan of \$750 is taken out for 3 years at a rate of 7%/a, compounded quarterly

$$A = ?$$
 $P = 750$
 $i = \frac{0.07}{4}$
 $n = 3 \times 4$
 $= 12$

b) \$600 is invested for 5 years at $3\frac{3}{4}$ % per year, compounded semi-annually.

EX. 3: USING THE NEW FORMULA, now evaluate.

a)
$$A = 750 \left(1 + \frac{0.07}{4} \right)^{12}$$

$$\Rightarrow = 923.579$$

$$\Rightarrow = \$923.58$$
b)
$$A = 600 \left(1 + \frac{0.0375}{2} \right)^{10}$$

$$\Rightarrow = 722.482$$

$$\Rightarrow = \$722.48$$

(last) Note: These values are NOT the interest earned!!!

(How would you calculate the interest earned?)

⊕ Don't forget that A = P + I, and I = A - P

EX. 4: Determine the amount of, and total interest earned on a \$1400 investment at 5% per year, compounded monthly for 4 years.

A = ?
$$\Rightarrow$$

P = 1400 \Rightarrow
 $i = \frac{0.05}{12}$
 $\Rightarrow A = 1400 \left(1 + \frac{0.05}{12}\right)^{48}$
 $\Rightarrow \pm 1709.25 - 1400$
 $\Rightarrow \pm 309.25$

If you can't get this on your calculator, ask for help now!

 $\Rightarrow \pm 1709.253$
 $\Rightarrow \pm 1709.253$
 $\Rightarrow \pm 1709.253$

the amount of the investment is \$1709.25 , and total interest earned is \$309.25 .

Entertainment: pp. 432-434 #2, 3, 6, 8, 12, 15

Quiz 8.1 on Tuesday on Simple and Compound Interest