Today's Learning Goal(s):

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

a) Calculate simple interest.
b) Use a table to calculate compound interest.

MBF 3CI **Simple and Compound Interest**  Date: Dec. 11/17

Banks pay you interest for the use of your money. When you deposit money in a bank account, the bank reinvests your money to make a profit.
If you borrow money from a bank (a loan), you are charged interest.

Simply put, **interest** is the cost of borrowing money.

Simple Interest is always calculated on just the **original** value invested (or borrowed), which is called the **principal**, P. The annual rate of interest is r, which is always expressed as a decimal. The period of time is t, which must be stated in years.

Simple Interest (I): $I = Prt$

The final value or **amount** (A) of an investment/loan, includes the principal and interest owed.

Amount, (A): $A = P + I$

Compound interest is calculated on the accumulated value of the investment, which includes the principal and the accumulated interest of prior periods.

Investigation:

7%/a

Ex. 1. Let's compare: **Suppose you are invesng $1000 at 7% per year, for 3 years.**

$I = Prt$

I = ?
P = 1000
r = 7 %
= 0.07
t = 1

1 year

$I = (1000)(.07)(1)$

$= 70$

2 years

$I = (1000)(.07)(2)$

$= 140$

Remember: "r" is ALWAYS expressed as a decimal.

F.D.

1. Complete this table, for 7% simple interest.

Year	Amount at the Start of the Year ($)	Simple Interest ($)	Amount at the End of the Year ($)
1	1000	70	1070
2	1070	70	1140
3	1140	70	1210

1140-1070 = 70

1210 - 1140 = 70

Note: We could calculate the final values in one step.

$I = Prt$

$I = (1000)(.07)(3)$

$= 210$

$A = P + I$

$= 1000 + 210$

$= 1210$

2. Complete this table, for 7% COMPOUND interest. *See below chart for calculations.*

Year	Amount at the Start of the Year ($)	Compound Interest ($)	Amount at the End of the Year ($)
1	1000	**70**	1070
2	1070	**74.90**	1144.90
3	1144.90	**80.14**	1225.04

$1144.90 / 1070 = 1.07$

$1225.04 / 1144.90 \approx 1.069$

$I_1 = (1000)(.07)(1) = \mathbf{70}$

$I_2 = (1070)(.07)(1) = \mathbf{74.90}$

No Fade in...do by hand?

$I_3 = (1144.90)(0.07)(1)$

$= 80.143$

$\approx \$80.14$

$I_3 = (1144.90)(.07)(1) = \mathbf{80.14}$

Note: We could calculate the final values in one step, but we'll need a new formula. (***next lesson***)

3. Look at the last/shaded columns in both tables.
How does the growth of money in one table differ from the other table?

Chart 1: Growth is constant at $70 F.D are constant.

Chart 2: Growth is increasing each time. y-ratios are constant.

4. Idenfy the type of growth (linear, quadrac, or exponenal) for…

a) Simple interest

linear growth

Explain.

Simple interest grows by a **constant** amount, so it is linear.

b) Compound interest

exponential growth

Each amount is multiplied by 1.07 to get the next amount.

$(1.07)(1.07)(1.07)...$
$=(1.07)^3$

The **compound growth factor** is **1 + i**, where **i** is the interest rate (as a decimal) per compounding period. In the investigation you just completed, the growth factor was 1 + 0.07, or 1.07.

The number of **compound periods** is denoted by **n**. What is the value of **n** in the investigation you just completed? Answer: 3

100% + 7%
= 107%
= 1.07

Ex. 2. Determine the amount of, **AND** total interest earned on a $2500 investment at 3.45%/*a*, aer 9 years simple interest.

$I = ?$

$P = 2500$

$r = 3.45\% = 0.0345$

$t = 9$

$I = Prt$

$= (2500)(0.0345)(9)$

$= \$776.25$

$A = P + I$

$= 2500 + 776.25$

$= \$3276.25$

∴ the amount of the investment is $3276.25, and total interest earned is $776.25.

Entertainment: p. 428 #4a, 7