Worksheet Finance 3: Interest

1. The purpose here is to highlight the importance of reading carefully. Subtle difference in wording can mean very different things.

   For this problem, assume an investment has an initial deposit of $1600 and no other deposits or withdrawals are made.

   Your work should include the expression or calculation you put into the calculating device as well as the numerical answer.

   (a) 5% of the initial deposit is $(1600)(0.05) = \$80$

   (b) The account increased by 5% means the account gained \$ 80.

   (c) The account increased by 5% means the new balance in the account is

   $1600 + 80 = \$1680$

   (d) The new balance is 105% of the original balance means the new balance is

   $(1600)(1.05) = 1680$

   (e) Your final numerical answers in parts (c) and (d) should be the same though your work/calculations should be different. Answer the following by doing both calculations.

   The account increased by 20% means the new balance is

   $1600 + (1600)(0.2) = (1600)(1.2) = \$1920$

   The account increased by 100% means the new balance is

   $1600 + (1600)(1.00) = (1600)(2) = \$3200$

   (f) What is a more common way of saying an account "increased by 100%"?

   The account doubled.

   (g) Suppose you are told that each month the new balance is 104% of the old balance, what percent of the old balance is **gained** each month?

   4% or 0.04 of the previous balance

2. This problem will compare simple interest and compound interest. (Formulas below.)

simple interest: $A = P*(1+\left(\frac{r}{n}\right)*(t*n))$ compound interest: $A = P*\left(1+\frac{r}{n}\right)^{(n*t)}$

You deposit of $2000 into a savings account that pays 6% interest quarterly. Set up a Simple Interest versus Compound Interest calculator. (See below.)

	A	B	C	D	E	F
1	interest rate	times per year	principal	time elapsed (in years)	A (simple)	A (compound)
2	r	n	P	t	A = P(1+(r/n)*(t*n))	A=P(1+r/n)^(t*n)
3	=0.06	=4	=2000	=5	=C3*(1+(A3/B3)*(D3*B3))	=C3*(1+A3/B3)^(D3*B3)

(a) What are the numerical entries in cells E3 and F3 and what do they represent?

Simple: $2600.00

Compound: $2693.71

The balance in each account 5 years after the initial deposit.

(b) For each account (simple and compound), calculate how much of the balance after 5 years is **interest**?

Simple:
$2600 - 2000 = \$600$

Compound:
$2693.71 - 2000 = \$693.71$.

(c) For each account (simple and compound), what is the **percent increase** in the account over 5 years and how does this compare to the interest rate?

Simple: $\frac{600}{2000} = 0.30 = 30\%$

Compound: $\frac{693.71}{2000} = 0.3469 \approx 35\%$

Both are larger than the 4% interest rate

(d) Change the entry in D3 from a 5 to a 30 and answer questions (b) and (c) in this case.

Simple interest gained: 3600

% increase: 180% almost doubled.

compound interest: $9,938.65

% increase: 496.93%

You're a lot

Almost 5 times as much.

(e) Keeping $t = 30$, change P to 4000 and determine the percent increase.

Simple: 180%

compound 496.93%

(f) Make some observations about your previous calculations.

- Compound interest grows much much much faster, especially over longer periods.
  Ex: at 5 years the accounts differed by ~100, at 30 years they differed by ~6000
- The percent increase is the same for all principals.