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Lesson 3.2 - Simple & Compound Interest, Appreciation & Depreciation

I. Comparing Simple & Compound Interest

Interest that is calculated only on the principal amount is called __simple interest_____.

Interest that is calculated on the principal amount *and previous earned interest* is called __compound interest__.

1. Fill in the following chart. Compare which type of interest would give the greater balance.

Simple Interest of 6%			
t	Principal	Annual Interest	Year-End Balance
1	$1000.00	$60.00	$1060.00
2	$1000.00	$60.00	$1120.00
3	$1000.00	$60.00	$1180.00
4	$1000.00	$60.00	$1240.00
5	$1000.00	$60.00	$1300.00
6	$1000.00	$60.00	$1360.00

Compound Interest of 6%			
t	Principal + Prior Interest	Annual Interest	Year-End Balance
1	$1000.00	$60.00	$1060.00
2	$1060.00	$63.60	$1123.60
3	$1123.60	$67.42	$1191.02
4	$1191.02	$71.46	$1262.48
5	$1262.48	$75.75	$1338.23
6	$1338.23	$80.29	$1418.52

Graph the year-end balances for each type of interest and state the mathematical relationship represented.

II. A General Formula for Periodic Compound Interest: $A = P(1 + \frac{r}{n})^{nt}$

A = the future amount

P = the present value or principal amount

r = rate as a decimal

n = number of compounding periods in a year

t = the number of years

2. Suppose $10,000 is placed into an account that pays interest at a rate of 5%. How much will be earned in the account in the first year if the interest is compounded (a) annually? (b) semi-annually? (c) quarterly?

(a) annually

$$A = \$10{,}000(1 + \frac{0.05}{1})^{(1)(1\,yr)} = \$10{,}500$$

(b) semi-annually

$$A = \$10{,}000(1 + \frac{0.05}{2})^{(2)(1\,yr)} = \$10{,}506.25$$

(c) quarterly

$$A = \$10{,}000(1 + \frac{0.05}{4})^{(4)(1\,yr)} = \$10{,}509.45$$

3. Find the accumulated value of a $5000 investment which is invested for 8 years at an interest rate of 12% compounded:

(a) annually

$$A = \$5{,}000(1 + \frac{0.12}{1})^{(1)(8\ yrs)} = \$12{,}379.82$$

(b) semi-annually

$$A = \$5{,}000(1 + \frac{0.12}{2})^{(2)(8\ yrs)} = \$12{,}701.76$$

(c) quarterly

$$A = \$5{,}000(1 + \frac{0.12}{4})^{(4)(8\ yrs)} = \$12{,}875.41$$

(d) monthly

$$A = \$5{,}000(1 + \frac{0.12}{12})^{(12)(8\ yrs)} = \$12{,}996.36$$

4. Mr. Braza won $150,000 in the lottery and decided to invest the money for retirement in 20 years. Find the accumulated value for Mr. Braza's retirement for each of his options:

(a) a certificate of deposit paying 5.4% compounded yearly

$$A = \$150{,}000(1 + \frac{0.054}{1})^{(1)(20\ yrs)} = \$429{,}440.97$$

(b) a money market certificate paying 5.35% compounded semiannually

$$A = \$150{,}000(1 + \frac{0.0535}{2})^{(2)(20\ yrs)} = \$431{,}200.96$$

(c) a bank account paying 5.25% compounded quarterly

$$A = \$150{,}000(1 + \frac{0.0525}{4})^{(4)(20\ yrs)} = \$425{,}729.59$$

(d) a bond issue paying 5.2% compounded daily.

$$A = \$150{,}000(1 + \frac{0.052}{365})^{(365)(20\ yrs)} = \$424{,}351.12$$

Which is the best option for Mr. Braza's retirement?