

MATH 1010K Personal Finance Formulas

Simple Interest: $i = p * r * t$

i is the **i**nterest, in \$

p is the **p**rincipal, in \$

r is the interest **r**ate in decimal form, and

t is the **t**erm (time in years).

Future Value = $p + I$ or $p(1 + rt)$

Compute the interest and add it to the principal.

An alternative that does both is $p(1 + rt)$. This is the same thing with principal factored out using the Distributive Property.

Example:

What will be the total amount repaid from a \$2000 loan @ 10% simple interest in 4 years?

Type into the calculator:

$$2000(1 + .10 * 4)$$

Press ENTER

Display:

$$2000(1 + .10 * 4) \\ 2800$$

The total amount repaid after 4 years is \$2800.

Two formulas for Compound Interest:

1. compounded periodically : $A = P(1 + (r/n))^{(nt)}$

A is the **A**mount after compounding

P is the **P**rincipal

r is the interest **r**ate in decimal form

n is the **n**umber of times the interest is paid in one year, and

t is the **t**erm (time in years).

Example:

What will be the total amount repaid from a \$2000 loan @ 10% compounded monthly for 4 years?

Using calculator, enter: $2000(1 + (.1/12))^{(12*4)}$ [ENTER]

answer: \$2978.71

To find the interest alone, subtract the principal: $\$2978.71 - 2000 = \978.71

2. compounded continuously: $A = Pe^{(rt)}$

A is the **A**mount after compounding

P is the **P**rincipal

r is the interest **R**ate in decimal form, and **t** is the **t**ime in years.

Example:

What will be the total amount repaid from a \$2000 loan @ 10% compounded continuously for 4 years?

Using calculator, enter: $2000e^{(.1*4)}$ [ENTER]

{To get e^x (on the calculator use [2nd] [LN]}

To find the interest alone, subtract the principal: $\$2983.65 - 2000 = \983.65

answer: \$2983.65

To find the interest alone, subtract the principal: $\$2983.65 - 2000 = \983.65

First Monthly Payment (FMP): Simple Interest with Term of (1/12).

To find the part of the FMP that is Principal = monthly payment – i

Time-Value of Money Solver on TI-83/84 (See TVM Solver Handout)

N: Total number of monthly payments ($12 * \#$ of years: for 15 years, $N = 12 * 15 = 180$)

I%: The interest rate as a percent (for 9% use 9, 11.5% use 11.5)

PV: Present Value (principal, deposit, or mortgage value, in \$)

PMT: Regular monthly payment

FV: Future Value: balance at end of N payments. (If repaying a loan or mortgage, this is zero (0))

P/Y: payments per year, usually 12

C/Y: compounding periods per year, usually 12

PMT: END Begin (ALWAYS keep END highlighted)

Enter values for every variable except one, put cursor on that row, then push [ALPHA] [ENTER] to solve.

For investments, PV and FV MUST have opposite signs.

DO NOT use for simple interest.

PITI: Principal, Interest, Taxes, and Insurance as a monthly payment. (#24, page 7 of Classwork Guide for Unit 4)

Use TVM app to calculate the **Principal** and **Interest** (PI) as usual.

Because **Taxes** and **Insurance** (TI) are given as annual amounts, add the two, then divide by 12, to get the monthly amount. Add this month amount to the monthly payment for PI calculated earlier.