

**Simple Interest**

$$\text{Interest Earned} = (\text{Principal}) \times (\text{Yearly Interest Rate}) \times (\text{Years})$$

Where the yearly interest rate is in decimal form.

**Period Interest Rate ( $r$ )**

$$r = \frac{APR}{n}$$

Where  $APR$  is the annual percentage rate and  $n$  is the number of periods per year.

**Note:** In the above equation,  $r$  is a percentage. In the remaining equations,  $r$  is represented in decimal form.

**Compound Interest**

$$\text{Balance After } t \text{ Periods} = (\text{Principal}) \times (1 + r)^t$$

**APY (Annual Percentage Yield)**

$$APY = \left(1 + \frac{APR}{n}\right)^n - 1$$

Where  $APY$  and  $APR$  are in decimal form and  $n$  is the number of compounding periods per year.

**APY Balance Formula**

$$\text{Balance After } y \text{ Years} = (\text{Principal}) \times (1 + APY)^y$$

**Doubling Time**

**Exact:**

$$\# \text{ of Periods to Double} = \frac{\log 2}{\log (\text{Base})} = \frac{\log 2}{\log (1 + r)}$$

**Estimate (Rule of 72):**

$$\text{Estimate of Doubling Time} = \frac{72}{APR}$$

**NOTE**

In all of the above equations,  $t$  can be replaced by  $(n \times y)$ , where  $n$  is the number of periods per year and  $y$  is the number of years.

In all equations on this handout,  $r$  can be replaced by  $\frac{APR}{n}$ , where  $n$  is the number of periods per year.

**Monthly Payment**

$$\text{Monthly Payment} = \frac{(\text{Amount Borrowed}) \times r(1+r)^t}{((1+r)^t - 1)}$$

Where  $t$  is the term in months and  $r$  is the monthly interest rate,  $\frac{APR}{12}$ .

**Note:** This equation can be used to solve for the amount borrowed. For example, if someone knows how much they can afford to pay monthly they can find the amount they would be able to borrow.

**Regular Deposits Balance**

$$\text{Balance After } t \text{ Monthly Deposits} = \frac{(\text{Deposit}) \times ((1+r)^t - 1)}{r}$$

Where  $t$  is the number of deposits and  $r$  is the monthly interest rate.

**Deposit Needed Formula**

$$\text{Needed Monthly Deposit} = \frac{(\text{Goal}) \times r}{((1+r)^t - 1)}$$

Where  $t$  is the number of deposits needed to reach your goal and  $r$  is the monthly interest rate.

**Annuity Yield**

$$\text{Monthly Annuity Yield} = \frac{(\text{Nest Egg}) \times r(1+r)^t}{((1+r)^t - 1)}$$

Where  $r$  is the monthly rate in decimal form and  $t$  is the term in number of months.

**Note:** This equation can be used to solve for the Nest Egg needed if someone has a monthly annuity yield goal.

**Minimum Payment Balance**

$$\text{Balance After } t \text{ Minimum Payments} = (\text{Initial Balance}) \times [(1+r)(1-m)]^t$$

Where  $r$  is the monthly interest rate and  $m$  is the minimum monthly payment as a percent of the balance. Both  $r$  and  $m$  are in decimal form.

**Buying Power**

$$\text{Percent Decrease in Buying Power} = \frac{100i}{100+i}$$

Where  $i$  is the inflation rate as a **percent**. Normally, the decrease in buying power percentage is rounded to one decimal place.

**Inflation**

$$\text{Percent Rate of Inflation} = \frac{100B}{100-B}$$

Where  $B$  is the decrease in buying power expressed as a **percent**.