

Key

### Exponential Growth and Decay Equations

**Definition:**

Compound Interest – with an initial Principle  $P$  deposited in an account that pays interest at an annual rate  $r$  (expressed as a decimal), compounded  $n$  times per year. The amount  $A$  in the account after  $t$  years is given by the equation:

$$A = P \left( 1 + \frac{r}{n} \right)^{nt}$$

**Example 4.)** You deposit \$4000 in an account that pays 2.92% annual interest. Find the balance after 1 year if the interest is compounded quarterly.

$$A = 4000 \left( 1 + \frac{.0292}{4} \right)^{4 \cdot 1}$$

$$A = \$4118.09$$

**Definition:**

Exponential Decay Models – when a real-life quantity decreases by a fixed percent each year (or other time period), the amount  $y$  of the quantity after  $t$  years can be modeled by the equation:

$$y = a(1 - r)^t$$

where  $a$  is the initial amount and  $r$  is the percent decrease expressed as a decimal

**Example 4.)** A new snowmobile costs \$4200. The value of the snowmobile decreases by 10% each year, what is the value of the snowmobile after 3 years.

$$y = 4200(1 - .10)^3$$

$$y = \$3061.80$$