Fixed Deposit

The monthly interest is computed from the net balance at that point in time compoundedly. An exponential curve can be observed if a graph of the net balance against the duration is plotted. (Note: The derivation below assumes that the interest rates are in their original multiplicative forms, not in percentages.)

Let
$P = Principal$
$n = Duration\ in\ months$
$a = Annual\ interest\ rate$
$i = Monthly\ interest\ rate = \frac{a}{12}$
$T = Net\ value\ or\ total$

The first interest, I_1, is computed as follows:

$$I_1 = Pi$$

Thus, the balance in the first month, T_1, is:

$$\begin{aligned} T_1 &= P + I_1 \\ &= P + Pi \\ &= P(1+i) \end{aligned}$$

The interest in the second month, I_2, is:

$$\begin{aligned} I_2 &= T_1 i \\ &= P(1+i)i \end{aligned}$$

And the second month's balance, T_2, is:

$$\begin{aligned} T_2 &= T_1 + I_2 \\ &= P(1+i) + P(1+i)i \\ &= P(1+i)(1+i) \\ &= P(1+i)^2 \end{aligned}$$

If the balance for each subsequent month is derived similarly, a pattern emerges. The balance of the final month, T, would be as follows:

$$T = P(1+i)^n$$

Using the final formula, the monthly interest rate, i, and the duration, n, can be obtained:

$$i = \sqrt[n]{\frac{T}{P}} - 1$$

$$n = \frac{\log\frac{T}{P}}{\log(1+i)}$$