Compound Interest Derivation

$$A_1 = P + rP \quad \text{or} \quad A_1 = P(1+r)$$

The second interest period would take the funds (A_1) and add interest to it.

Substituting $P(1 + r)$ for A_1 Factoring out $P(1 + r)$

$$A_2 = A_1 + rA_1$$

$$A_2 = P(1+r) + rP(1+r)$$

$$A_2 = P(1+r)[1+r]$$

$$A_2 = P(1+r)^2$$

The third interest period would take the total funds (A_2) and add interest to it.

$A_3 = A_2 + rA_2$ Substituting $P(1+r)$ for A_2

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Factoring out $P(1 + r)$

$A_3 = P(1+r) + rP(1+r)$ $A_3 = P(1+r)^2[1+r]$

$$A_3 = P(1+r)^3$$

The formulas for A_1, A_2, and A_3 suggest a generalization for the k^{th} period.

$$A_k = P(1+r)^k$$