SOME FORMULAE
1. Compound interest formula for interest paid \textit{once a year}:

\[ A = P \times (1 + APR)^Y \]

\begin{align*}
P &= \text{starting principal} \\
APR &= \text{annual percentage rate (as a decimal)} \\
Y &= \text{number of years} \\
A &= \text{accumulated balance after } Y \text{ years}
\end{align*}

2. Compound interest formula for interest paid \textit{n times a year}:

\[ A = P \times (1 + \frac{APR}{n})^{nY} \]

\begin{align*}
P &= \text{starting principal} \\
APR &= \text{annual percentage rate (as a decimal)} \\
Y &= \text{number of years (may be a fraction)} \\
A &= \text{accumulated balance after } Y \text{ years} \\
n &= \text{number of compounding periods per year}
\end{align*}

3. Compound interest formula for \textit{continuous compounding}:

\[ A = P \times e^{APR \times Y} \]

Any of these can be solved for \( P \). If you know the interest rate, how often it is compounded, how much you need to accumulate and you want to know what principal you need, formula 2 becomes

\[ P = \frac{A}{(1 + \frac{APR}{n})^{nY}} \]

4. Loan payment formula (installment loan or \textit{amortized} loan):

\[ PMT = \frac{P \times \left( \frac{APR}{n} \right)}{1 - \left(1 + \frac{APR}{n}\right)^{-nY}} \]

\begin{align*}
P &= \text{starting loan principal (amount borrowed)} \\
APR &= \text{annual percentage rate} \\
PMT &= \text{regular payment amount} \\
n &= \text{number of payment periods per year} \\
Y &= \text{loan term in years}
\end{align*}