**Trust Fund** Grandparents decide to put a lump sum of money into a trust fund on their granddaughter’s 10th birthday so that she will have $1,000,000 on her 60th birthday. If the fund pays 11%, compounded monthly, how much money must they put in the account?  

To find such a value we use this formula:

### Future Value of an Investment with Periodic Compounding

If \( P \) dollars are invested for \( t \) years at the annual interest rate \( r \), where the interest is compounded \( k \) times per year, then the interest rate per period is \( \frac{r}{k} \), the number of compounding periods is \( k t \), and the future value that results is given by

\[
S = P \left( 1 + \frac{r}{k} \right)^{kt} \text{ dollars}
\]

We have been given the following:

- The future value, \( S = 1,000,000 \).
- The annual interest rate written as a decimal, \( r = 0.11 \).
- We are compounding monthly so the number of compoundings per year is \( k = 12 \).
- Because the difference between the granddaughter’s 10th and 60th birthdays is 50 years, the number of years for the money to be invested is \( t = 50 \).

We’ll plug these values into the formula and to solve for \( P \) which represents the amount of the original investment.

\[
1,000,000 = P \left( 1 + \frac{0.11}{12} \right)^{(12 \cdot 50)}
\]

\[
1,000,000 = P \left( 1 + \frac{0.11}{12} \right)^{600}
\]

\[
1,000,000 = P \left( 1.00916667 \right)^{600}
\]

\[
1,000,000 = P \left( 238.6373092 \right)
\]

\[
\frac{1,000,000}{238.6373092} = P
\]

\[
4190.459587 = P
\]

The grandparents must put $4190.46 into the granddaughters account on her 10th birthday.

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1 Harshbarger/Yocco, *College Algebra In Context*, 5e, p. 385, #42.