EXAM FM QUESTIONS OF THE WEEK

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Week of January 14/08

Deposits are made into a bank account on the first day of each month starting January 1. 2008. The bank account has a nominal annual interest rate of 12% compounded monthly and interest is added to the account on the last day of each month. Throughout 2008 the monthly deposits are each $\$X$ and throughout 2009 the monthly deposits are each $\$Y$. On December 31, 2009, the account balance (including interest) is twice as large as the account balance (including interest) on December 31, 2008. There are no deposits in 2010, but the account balance continues to grow with interest. The account balance (including interest) on December 31, 2010 is \$1,819.
Find X and Y.

The solution can be found below.

Week of January 14/08 - Solution

The balance at the end of 2008 is $X\ddot{s}_{\overline{12}|.01}$, and the balance at the end of 2009 is
$X\ddot{s}_{\overline{12}|.01} \times (1.01)^{12} + Y\ddot{s}_{\overline{12}|.01} = [(1.01)^{12}X + Y] \times \ddot{s}_{\overline{12}|.01}$.
We are given that $[(1.01)^{12}X + Y] \times \ddot{s}_{\overline{12}|.01} = 2X\ddot{s}_{\overline{12}|.01}$, so that
$Y = [2 - (1.01)^{12}] \times X = .8732X$.

We are also given that $[(1.01)^{12}X + Y] \times \ddot{s}_{\overline{12}|.01} \times (1.01)^{12} = 1819$.
Since $(1.01)^{12}X + Y = 2$ this equation becomes
$2X \times \ddot{s}_{\overline{12}|.01} \times (1.01)^{12} = 1819$
from which we get $X = 63.0$, and $Y = .8732X = 55.0$.