The Term of a Single Deposit Account

OBJECTIVES

Construct an exponential model of a situation.
Calculate time it will take to reach a financial goal.

You will need:
• Student Papers
• Calculator
• Textbook
• Notebook Paper
• Pen or Pencil
No Ear Buds!!!!

Cell Phones: Down & Dark
How long does it take to reach a financial goal?

• You received a lump-sum inheritance from a distant aunt. (YEA!)
• It is not enough for the down payment on the home that you have your heart set on.
• You want to know how long it will take for the money to grow big enough for the down payment on that home.
• Today we will focus on the time part of the Time Value of Money Formula.
You have $1000.00 in your savings account. It earns 2% interest and compounds semi-annually. You need exactly $1,061.52 to pay for one summer session’s tuition. How long will it take for this account to reach your goal?

Remember the Compound Interest Formula:

\[ B = p \left( 1 + \frac{r}{n} \right)^{nt} \]

- \( B \) = ending balance
- \( p \) = principal or original balance
- \( r \) = interest rate (converted)
- \( n \) = number of compounds annually
- \( t \) = number of years
You have $1000.00 in your savings account. It earns 2% interest and compounds semi-annually. You need exactly $1,061.52 to pay for one summer session’s tuition. How long will it take for this account to reach your goal?

Determine the variables:

$B =$ ending balance 1,061.52
$p =$ principal or original balance 1,000.00
$r =$ interest rate (converted) .02
$n =$ number of compounds annually 2
$t =$ number of years \(_t\)
You have $1000.00 in your savings account. It earns 2% interest and compounds semi-annually. You need exactly $1,061.52 to pay for one summer session’s tuition. How long will it take for this account to reach your goal?

Determine the variables: 

\[ 1061.52 = 1000 \left(1 + \frac{0.02}{2}\right)^{2t} \]

\( B = \) ending balance 1,061.52
\( \rho = \) principal or original balance 1,000.00
\( r = \) interest rate (converted) .02
\( n = \) number of compounds annually 2
\( t = \) number of years \( t \)
You have $1000.00 in your savings account. It earns 2% interest and compounds semi-annually. You need exactly $1,061.52 to pay for one summer session’s tuition. How long will it take for this account to reach your goal?

Use menu, 3, 1 to solve for $t$.

\[
t = 3
\]

It will take 3 years to reach this goal.
Nancy and Bob want to renovate their kitchen sometime in the future. They have deposited $16,000 into an account that compounds interest monthly at a rate of 2.4%. How long will it take until that account reaches $20,000?

Determine the variables:

\[ B = p \left( 1 + \frac{r}{n} \right)^{nt} \]

\[ B = \text{ending balance} \quad 20,000.00 \]
\[ p = \text{principal or original balance} \quad 16,000.00 \]
\[ r = \text{interest rate (converted)} \quad 0.024 \]
\[ n = \text{number of compounds annually} \quad 12 \]
\[ t = \text{number of years} \quad t \]
Example 4 – You try it

Nancy and Bob want to renovate their kitchen sometime in the future. They have deposited $16,000 into an account that compounds interest monthly at a rate of 2.4%. How long will it take until that account reaches $20,000?

\[
20000 = 16000 \left(1 + \frac{.024}{12}\right)^{12t}
\]

Determine the variables:

\( B = \) ending balance \( \underline{20,000.00} \)

\( p = \) principal or original balance \( \underline{16,000.00} \)

\( r = \) interest rate (converted) \( .024 \)

\( n = \) number of compounds annually \( \underline{12} \)

\( t = \) number of years \( \underline{t} \)
Example 4 – You try it

Nancy and Bob want to renovate their kitchen sometime in the future. They have deposited $16,000 into an account that compounds interest monthly at a rate of 2.4%. How long will it take until that account reaches $20,000?

\[
20000 = 16000 \left( 1 + \frac{0.024}{12} \right)^{12t}
\]

Use menu, 3, 1 to solve for \( t \).

\[ t = 9.3 \]

It will take 9.3 years to reach this goal.
Example 4 - You try it #2!

Rudy deposited $500 in an account with 1.2% interest compounded quarterly. How long will it take for that amount to double?

Determine the variables:

\[ B = p \left(1 + \frac{r}{n}\right)^{nt} \]

\[ B = \text{ending balance } 1,000 \]

\[ p = \text{principal or original balance } 500.00 \]

\[ r = \text{interest rate (converted) } 0.012 \]

\[ n = \text{number of compounds annually } 4 \]

\[ t = \text{number of years } t \]
Example 4 - You try it #2!

Rudy deposited $500 in an account with 1.2% interest compounded quarterly. How long will it take for that amount to double?

\[
1000 = 500 \left( 1 + \frac{.012}{4} \right)^{4t}
\]

Determine the variables:

\[B = \text{ending balance } 1,000\]
\[p = \text{principal or original balance } 500.00\]
\[r = \text{interest rate (converted) } .012\]
\[n = \text{number of compounds annually } 4\]
\[t = \text{number of years } t\]
Example 4 - You try it #2!

Rudy deposited $500 in an account with 1.2% interest compounded quarterly. How long will it take for that amount to double?

\[ 1000 = 500 \left(1 + \frac{.012}{4}\right)^{4t} \]

Use menu, 3, 1 to solve for \( t \).

\[ t = 57.8 \]

It will take 57.8 years to reach this goal.
Sheri deposited $8,000 into an account that compounds continuously at a rate of 3.7%. How long will it take for his money to grow to $10,000?

Remember the Continuous Compounding Formula

\[ A = Pe^{rt} \]

\( A \) = ending balance
\( P \) = principal or original balance
\( r \) = interest rate (converted)
\( t \) = number of years
Sheri deposited $8,000 into an account that compounds continuously at a rate of 3.7%. How long will it take for his money to grow to $10,000?

Determine the variables:

\[ A = Pe^{rt} \]

- \( A \) = ending balance \( 10,000 \)
- \( P \) = principal or original balance \( 8,000 \)
- \( r \) = interest rate (converted) \( .037 \)
- \( t \) = number of years \( t \)

\[ 10000 = 8000e^{.037 \cdot t} \]

Menu, 3, 1

6 years
Read Pg: 120 to 126

Please work on your assignment. It is due at the end of next class.