

2-7 FUTURE VALUE OF INVESTMENTS

OBJECTIVES

Calculate the future value of a multiple deposit investment.
Discover & Calculate the meaning and power of periodic

You will need:

- Student Notes
- Textbook
- Calculator
- Notebook Paper
- Formula Cheat Sheet
- Pen or Pencil

Red Items are needed during the lecture.

How will you know how much money will you have in the future:

- Your Aunt leaves you money. You put it into a savings account. How much will you have in the account when you want to buy a car in two years?
- You decide to put away \$150 each month towards retirement. How much will you have in the account when you retire?

Future value of a periodic deposit investment

periodic means
regularly scheduled

$$B = \frac{P \left(\left(1 + \frac{r}{n} \right)^{nt} - 1 \right)}{\frac{r}{n}}$$

B = future value

P = periodic deposit amount

r = annual interest rate (converted)

n = number of times interest is compounded annually

t = length of investment in years

Future value of a periodic deposit investment

$$B = \frac{P \left(\left(1 + \frac{r}{n} \right)^{nt} - 1 \right)}{\frac{r}{n}}$$

Where is this formula on the formula cheat sheet?

4a

Example 1

Rich and Laura are both 45 years old.

They open an account at the Rhinebeck Savings Bank for their retirement in 20 years.

They deposit \$5,000 each year into an account that pays 1.25% interest, compounded annually.

What is the account balance when Rich and Laura retire?

Which formula on the formula cheat sheet? 4a

•Q1) One or multiple?

Multiple: Middle

•Q2) Which key word?

Deposit: 4

Q3) What are you looking for?

Ending balance: a

Example 1

Rich and Laura are both 45 years old. They open an account at the Rhinebeck Savings Bank for their retirement in 20 years. They deposit \$5,000 each year into an account that pays 1.25% interest, compounded annually. What is the account balance when Rich and Laura retire?

B = future value B

P = periodic amount \$5,000

r = rate (converted) .0125

n = number of compounds 1

t = years 20

$$B = \frac{P \left(\left(1 + \frac{r}{n} \right)^{nt} - 1 \right)}{\frac{r}{n}}$$

Example 1

Rich and Laura are both 45 years old. They open an account at the Rhinebeck Savings Bank with the hope that it will gain enough interest by their retirement at the age of 65. They deposit \$5,000 each year into an account that pays 1.25% interest, compounded annually. What is the account balance when Rich and Laura retire?

$$\begin{aligned} B &= \text{future value } \underline{B} \\ P &= \text{periodic amount } \underline{\$5,000} \\ r &= \text{rate (converted)} \underline{.0125} \\ n &= \text{number of compounds } \underline{1} \\ t &= \text{years } \underline{20} \end{aligned} \quad B = \frac{5000 \left(\left(1 + \frac{.0125}{1} \right)^{1 \cdot 20} - 1 \right)}{\frac{.0125}{1}}$$

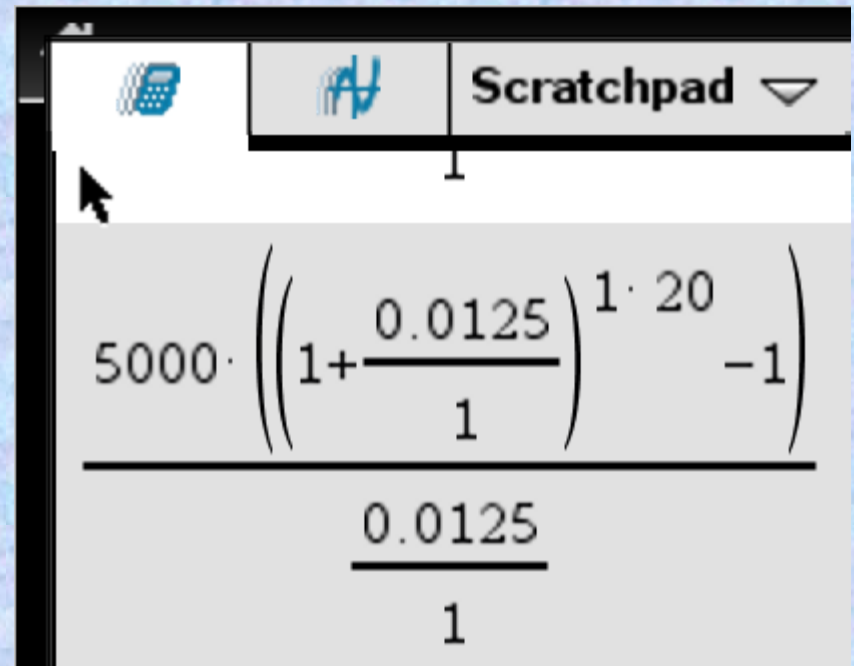
Example 1

To enter it into the Nspire start with “control divide”

$$B = \frac{5000 \left(\left(1 + \frac{.0125}{1} \right)^{1 \cdot 20} - 1 \right)}{\frac{.0125}{1}}$$

Compare your
answer to a neighbor.

\$112,814.89



The screenshot shows a TI-Nspire calculator interface. At the top, there is a toolbar with icons for a calculator, a pencil, and a dropdown menu labeled "Scratchpad". Below the toolbar, the number "1" is entered. The main display area shows the formula for B being entered: $5000 \cdot \left(\left(1 + \frac{0.0125}{1} \right)^{1 \cdot 20} - 1 \right)$ over $\frac{0.0125}{1}$. The formula is entered in a single line, with the denominator $\frac{0.0125}{1}$ positioned below the numerator.

Example 1 - You try it!

How much more would Rich and Laura have in their account if they decide to hold off retirement for an extra year?

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How much more would Rich and Laura have in their account if they decide to hold off retirement for an extra year?

The only change in the formula is $t=21$

$$B = \frac{5000 \left(\left(1 + \frac{.0125}{1} \right)^{1 \cdot 21} - 1 \right)}{\frac{.0125}{1}}$$

\$119,225.08

**Does this
answer the
question?**

No

$$119,225.08 - 112,814.89 = \mathbf{\$6,410.19}$$

Future interest of a periodic deposit investment

$$I = \frac{P \left(\left(1 + \frac{r}{n} \right)^{nt} - 1 \right)}{\frac{r}{n}} - (P \cdot n \cdot t)$$

I = Interest Earned

P = periodic deposit amount

r = annual interest rate (converted)

n = number of times interest is compounded annually

t = length of investment in years

Where is this formula on the formula cheat sheet?

4b

Example 2

Rich and Laura are both 45 years old.

They open an account at the Rhinebeck Savings Bank for their retirement in 20 years. They deposit \$5,000 each year into an account that pays 1.25% interest, compounded annually.

How much interest will Rich and Laura earn?

Which formula on the formula cheat sheet? 4b

•Q1) One or multiple?

Multiple: Middle

•Q2) Which key word?

Deposit: 4

Q3) What are you looking for?

Interest: b

Example 2

Rich and Laura are both 45 years old.

They open an account at the Rhinebeck Savings Bank for their retirement in 20 years. They deposit \$5,000 each year into an account that pays 1.25% interest, compounded annually.

How much interest will Rich and Laura earn?

$$I = \frac{P \left(\left(1 + \frac{r}{n} \right)^{nt} - 1 \right)}{\frac{r}{n}} - (P \cdot n \cdot t)$$

I = Interest Earned 1

P = periodic amount \$5,000

r = rate (converted) .0125

n = number of compounds 1

t = years 20

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Rich and Laura are both 45 years old.

They open an account at the Rhinebeck Savings Bank for their retirement in 20 years. They deposit \$5,000 each year into an account that pays 1.25% interest, compounded annually.

How much interest will Rich and Laura earn?

$$I = \frac{5000 \left(\left(1 + \frac{.0125}{1} \right)^{1 \cdot 20} - 1 \right)}{\frac{.0125}{1}} - 5000 \cdot 1 \cdot 20$$

I = Interest Earned

P = periodic amount \$5,000

r = rate (converted) .0125

n = number of compounds 1

t = years 20

\$12,814.89

Example 2 - You try it!

Use Example 1 - You Try It information.

How much more interest would Rich and Laura earn by retiring after 21 years?

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How much more interest would Rich and Laura earn by retiring after 21 years?

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How much more interest would Rich and Laura earn by retiring after 21 years?

$$I = \frac{5000 \left(\left(1 + \frac{.0125}{1} \right)^{1 \cdot 21} - 1 \right)}{\frac{.0125}{1}} - 5000 \cdot 1 \cdot 21$$

I = Interest Earned

P = periodic amount \$5,000

r = rate (converted) .0125

n = number of compounds 1

t = years 21

\$14,225.08

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

Grade goes here	Read Pg: 109 to 112 Do Pg 113: #2-5, 8, 9a-f, 11	Last First P__ A:2-7