Compound Interest – Annotated Examples

Liberal Arts Mathematics

Introduction

There is a lot going on in the compound interest formula. It looks complicated and has several steps. Once you learn to focus on working one step at a time, it becomes more manageable. Here are two examples shown step-by-step with the corresponding calculator steps.

Examples

The following example is Example 6.41 from *Contemporary Mathematics* by Donna Kirk.

The main tip I suggest to students is to keep your work in your calculator. It is easy to get round-off errors in these problems. I am showing how I type the calculations in the Microsoft Windows calculator. Almost all scientific calculators are similar.

Example

In the following, compute the future value of the investment with the given conditions.

- 1. Principal is \$5,000, annual interest rate is 3.8%, compounded monthly, for 5 years.
- 2. Principal is \$18,500, annual interest rate is 6.25%, compounded quarterly, for 17 years.

Solution 1

Step	Calculator	Work
Start with the formula $A = P\left(1 + \frac{r}{n}\right)^{n \cdot t}$		P = 5000 $C = 0.038$ $C = 12$
n Substitute the known		H= (1+n)
values		$\Gamma = 0.038$
vatacs		$ \begin{array}{ll} \Gamma = 0.038 \\ N = 12 \\ t = 5 \end{array} $ $ A = 5000 \left(1 + \frac{0.038}{12}\right)^{12.5} $
The first operations are	☐ Calculator — □ × ☐ Scientific ⑤	Washing Superior II JUST 124 7W
division inside the	0.038 ÷ 12 = 0.003166666666666666666667	12.5
parentheses and	DEG F-E	$A = 5000 \left(1 + \frac{0.038}{12}\right)$
multiplication in the	MC MR M+ M- MS Mv	A=3000(1 12)
exponent.	2d Ingonometry ♥ J Function ♥ 2 rd π e CE ③	A = 5000(1+0.00317)60
	x^2 $\frac{1}{2}x$ $ x $ exp mod $\frac{1}{2}\sqrt{x}$ () $n!$ \div	1 5000/1,0002/2
	x ^y 7 8 9 × 10 ^x 4 5 6 -	A = 5000(1+0.00311)
	log 1 2 3 +	
The second operation is	Calculator – 🗆 X	Withfully, Superdor 11, 2014 11 41 747
addition inside the	■ Scientific □ 0.00316666666666666666666666666666666666	Wadrados, September II, 2014 12 43 PM
parentheses	1.003166666666666666666666666666666	A = 5000 (1+0.00317)
p.m.c.m.	DEG F-E MC MR M+ M- MS M	
		A = 5000 (1.00317) ⁶⁰
	x ²	1 [100 (100317)
	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	A = 5000 (1.00317)
	10° 4 5 6 — 109 1 2 3 +	
	In	×
The third operation is the	■ Scientific ⑤	Welfordin, Segretor 13, 2014 12 d Prof
exponent.	1.00316666666666666666666666666666666666	\60
- 1	DEG F-E MC MR M+ M- MS M~	A = 5000 (1.00317)
This is where round-off	△ Trigonometry ∨ f Function ∨	71 - 3000 (1.000)
errors start to matter.	2^{nd} π e CE \otimes x^2 y_X $ x $ exp mod	4
	x^y () $n!$ \div	A = 5000 · 1.20889
	x ^y 7 8 9 × 10 ^x 4 5 6 -	71 000 1120
	log 1 2 3 +	
The fourth and final	☐ Calculator - □ × ≡ Scientific ⑤	
operation is	= Scientific	1 5 000 1 100 000
multiplication.	0,044.4331763906393662702914269064 DEG F-E	A = 5000 · 1.20889
	MC MR M+ M- MS MV A Trigonometry of Function of	
The future value is	2 Ingonometry ♥ J Function ♥ 2 Ingonometry ♥ J Function ♥ 2 Ingonometry ♥ J Function ♥	1 (01111112710
\$6,044.43	$\begin{array}{c cccc} x^2 & larta x & x & \exp & \mod \\ \hline \sqrt[3]{x} & (&) & n! & \div \end{array}$	A = 6044.43318
	x ^y 7 8 9 × 10° 4 5 6 -	
	log 1 2 3 +	
	In +/- 0 . =	

Solution 2

Step	Calculator	Work
Start with the formula		Westerday, Supporter IA, 2024 13.37 PM
$A = P\left(1 + \frac{r}{n}\right)^{n \cdot t}$		$P = 18500$ $A = P(1 + \frac{r}{n})^{n+t}$
$\frac{n-1}{n}$		$P = 18500 \qquad A = P(1 + \frac{r}{2})$
Substitute the known values		r= 0.0625
values		N = 4
		$ \begin{array}{l} \text{f} = 0.0625 \\ \text{n} = 4 \\ \text{t} = 17 \text{A} = 8500(1 + \frac{0.0625}{4})^{4.17} \end{array} $
The first operations are	□ Calculator - □ × □ Scientific ⑤	Washoulin, Jugliesbor 25, 2024 12.20 N W ♥ ♥ ♥ ▼ ▼ ×
division inside the	0.0625 + 4 = 0.015625	(0.0005 4.17
parentheses and	DEG F-E MC MR M+ M- MS MY	$A = [8500/1 + \frac{0.0625}{11}]$
multiplication in the	△ Trigonometry ∨ f Function ∨	(4
exponent.	$\frac{2^{M}}{x^{2}}$ $\frac{\pi}{\sqrt{x}}$ $\frac{e}{ x }$ $\frac{e}{\exp}$ $\frac{e}{mod}$	$A = 8500(1 + \frac{0.0625}{4})^{4.17}$ $A = 8500(1 + 0.01563)^{68}$
	$\sqrt[3]{\pi}$ () $n!$ \div x^y 7 8 9 \times	A = 8500(1+0.0756)
	10° 4 5 6 —	
	log 1 2 3 + In */- 0 . =	
The second operation is		Wherede, Suprester 3, 2224 12.59 M
addition inside the	0.015625 + 1 = 1.015625	Violendes, Segrenter 13, 2021 12, 2074
parentheses	DEG F-E	$A = 18500 (1+0.01563)^{68}$ $A = 18500 (1.01563)^{68}$
	MC MR M+ M− MS M∨ ⊿ Trigonometry ∨ f Function ∨	168
	2^{st} π e CE \odot x^2 $\frac{1}{2}$ $$	1-10500(101563)
	$\sqrt[3]{x}$ () $n!$ \div x^y 7 8 9 \times	A = 18300 (1.013 03)
	10° 4 5 6 -	
	log 1 2 3 + In +/- 0 . =	
The third operation is the	☐ Calculator — □ × ☐ Scientific ⑤	The Books of the Application 14, 2254 1.20 Feb.
exponent.	1.015625 ^ 68 = 2.8699215199877242898516510162927	(68
	DEG F-E	A = 18500(1.01563)
This is where round-off	MC MR M+ M− MS M∨ ⊿ Trigonometry ∨ f Function ∨	// 5 / 60 6 5 (1 6 1)
errors start to matter.	2^{M} π e CE \odot x^2 $\frac{1}{2}$ π exp mod	
	₹√x () n! ÷	A = 18500 2.86993
	10° 4 5 6 -	71 1000 0000
	log 1 2 3 + In +/- 0 . =	
The fourth and final	☐ Calculator - □ × ≡ Scientific ⑤	Westerday, Supported 14, 1224 122 PM
operation is	< 3699215199877242898516510162927 × 18500 = 53,093.548119772899362255543801415	105000000
multiplication.	DEG F-E	A = 18500.2.86993
The future velve :-	MC MR M+ M- MS M \checkmark A Trigonometry \checkmark f Function \checkmark	
The future value is	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	A= 53093.54812
\$53,093.55	$\sqrt[2]{x}$ () $n!$ \div x^y 7 8 9 \times	71 000 10.0 1010
	10° 4 5 6 -	
	log 1 2 3 +	