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		Walterday, Supporter 18, 1204 12 20 1921
$A = P\left(1 + \frac{r}{n}\right)^{n \cdot t}$		$P = 5000$ $C = 0.038$ $A = P \left(1 + \frac{r}{n} \right)^{n \cdot t}$
Substitute the known		$\Gamma = 0.038$
values		n = 12 / 0.038
		$ \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	Valuation Superior 11, 2014 12 42 PM V V V V V V V V V V V V V V V V V
division inside the	0.038 + 12 = 0.003166666666666666666666	/ 0.038
parentheses and	DEG F-E MC MR M+ M- MS MV	$A = 5000(1 + \frac{0.030}{12})$
multiplication in the	△ Trigonometry ∨ ∫ Function ∨	// 0000 / 12
exponent.	2^{xt} π e CE $\textcircled{3}$ x^2 $1/x$ $ x $ exp mod	A = 5000(1+0.00317)
	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	A = 5000(1+0.00317)
	10° 4 5 6 -	// 3000// 0333 /
	in */- 0 . =	×
The second operation is	■ Scientific ⑤	Westerland, Expression II, 2024 12-04 PM
addition inside the	0.00316666666666666666666666666666666666	A = 5000 (1+0.00317)
parentheses	DEG F-E MC MR M+ M- MS M~	A = 5 000 (1 + 0.00 31 1)
		A = 5000 (1.00317) ⁶⁰
	x^2 y_x $ x $ exp mod	1 5000 (100317)
	x ^y 7 8 9 ×	H = 5000 (1.00317)
	10° 4 5 6 - log 1 2 3 +	
The third operation is the	in +/- 0 . =	~ ~ A Q ♥ ♥ ♥ ×
exponent.	= Scientific	Westerday, Supervicer 13, 2024 11-01 Part \$50 00 00 00 00 00 00 00 00 00 00 00 00 0
	1.208866357193278776540582857817 DEG F-E	
This is where round-off	MC MR M+ M- MS M~	A = 5000 (1.00317)
errors start to matter.	☐ Trigonometry ✓ ∫ Function ✓ 2 ^M π e CE ③	
	x^2 $\frac{1}{2}x$ $ x $ exp mod $\frac{1}{2}\sqrt{x}$ () $n!$ \div	A = 5000 · 1.20889
	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	M = 3000 1.20001
	log 1 2 3 +	
The fourth and final		The state of the s
operation is	< 2088866357193278776540582857817 × 5000 = 6,044.4331785966393882702914289084	A = 5000 · 1.20889
multiplication.	DEG F-E	M - 3000 1.20001
The fortune reduce !-	MC MR M+ M− MS M∨ ☑ Trigonometry ∨ f Function ∨	
The future value is \$6,044.43	2^{xt} π e CE \odot x^2 $\frac{1}{2}x$ $ x $ exp mod	A = 6044.43318
φυ,υ 44 .43	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	/1 - 60 1 1. 13310
	10° 4 5 6 —	
	in +/- 0 . =	

Example from *Contemporary Mathematics* by Donna Kirk. Access for free at https://openstax.org/books/contemporary-mathematics/pages/1-introduction

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Solution 2

Step	Calculator	Work
Start with the formula		Washaude, Suprestor 13, 2024 12, 217 PM
$A = P\left(1 + \frac{r}{n}\right)^{n \cdot t}$		$P = 18500 \\ C = 0.0625$ $A = P(1 + \frac{C}{D})^{n \cdot \frac{1}{2}}$
Substitute the known		A = P(1+n)
values		$\Gamma = 0.0625$
		$ \begin{array}{ll} N = 4 \\ t = 17 \end{array} A = 8500(1 + \frac{0.0625}{4})^{4.17} $
		$t = 1/A = 18300(1+\frac{1}{4})$
		·
The first operations are	☐ Calculator — □ X	
division inside the	Scientific	Wodnosday, September 18, 2024 12:58 PM
parentheses and	0.015625	1 10500 (1 0.0625
multiplication in the	MC MR M+ M- MS MV	$A = 18300(1+\frac{4}{4})$
exponent.	$\begin{tabular}{ c c c c c c c c c c c c c c c c c c c$	168
	x^2 $\frac{1}{2}x$ $ x $ exp mod	$A = 8500(1 + \frac{0.0625}{4})^{4.17}$ $A = 8500(1 + 0.01563)^{68}$
	x ^y 7 8 9 ×	A = 1 8 300 (1 10.07 3 6 3)
	10° 4 5 6 — 10g 1 2 3 +	
The second energian is	In	
The second operation is addition inside the	■ Scientific ⑤	Wednesder, Ingliender II, 1224 12.30 PM ▼ ▼ ▼ ▼ ▼ ▼ ▼ ▼ ▼ ▼ ▼ ▼ ▼ ▼ ▼ ▼ ▼ ▼
parentheses	0.015625 + 1 = 1.015625	1 1 2 5 2 2 1 1 1 1 1 5 (3)
parentneses	DEG F-E MC MR M+ M- MS MV	$A = 18500 (1+0.01563)^{68}$ $A = 18500 (1.01563)^{68}$
	\triangle Trigonometry \lor f Function \lor 2 st $π$ e CF $③$	/ 1000/68
	x^2 y_x $ x $ exp mod	$\Delta = 18500(1.01563)$
	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	// - / 000 - (. 0 .)
	10° 4 5 6 — 10g 1 2 3 +	
	In */- 0 . =	×
The third operation is the	■ Scientific ⑤	Wednesder, Junglereiter 14, 2024 131 No.
exponent.	1.015625 ^ 68 = 2.8699215199877242898516510162927	(101=63)68
This is where round-off	DEG F-E MC MR M+ M- MS M~	A = 18500(1.01563)
errors start to matter.	∠ Trigonometry ∨ f Function ∨	
endis start to matter.	x^2 $\frac{1}{2}$	1 105.00 0 7.000
	x^y 7 8 9 \times	A = 18500 286993
	10° 4 5 6 -	
	In +/- 0 . =	
The fourth and final	□ Calculator - □ × ≡ Scientific ⑤	50 C D Q 0 V V X X X X X X X X
operation is	< 3699215199877242898516510162927 × 18500 = 53,093.548119772899362255543801415	1050000000
multiplication.	DEG F-E MC MR M+ M- MS M~	A = 18500.2.86993
The future value is	△ Trigonometry ∨ ∫ Function ∨	1 72 100 211 1
\$53,093.55	2^{si} π e CE \mathfrak{B} x^2 $\frac{1}{x}$ $ x $ exp mod	A= 53093.54812
#33,083.33	² √x () n! ÷ x ^y 7 8 9 ×	
	10" 4 5 6 -	
	log 1 2 3 + In ½ 0 . =	

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