# 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 $C = 0.038$ $C = 0.038$ $C = 0.038$
$\frac{n-1}{n}$		$A = f(1 + \overline{n})$
Substitute the known values		C = 0.038
values		$ \begin{array}{ll} \text{C} = 0.038 \\ \text{N} = 12 \\ \text{t} = 5 \end{array} $ $ A = 5000 \left( 1 + \frac{0.038}{12} \right)^{12.5} $
The first operations are	☐ Calculator - □ ×  ■ Scientific ⑤	
division inside the	0.038 + 12 = <b>0.00316666666666666666666666</b>	12.5 0.038
parentheses and	DEG F-E	$A = 5000 \left(1 + \frac{0.038}{12}\right)$
multiplication in the	MC MR M+ M- MS MV	H=3000(1 12)
exponent.	2 <sup>14</sup> π e CE ⊗	, 60
	$x^2$ $\frac{1}{2}$ $ x $ exp mod $\frac{1}{2}\sqrt{x}$ ( ) $n!$ $\div$	A = 5000(1+0.00317)60
	x <sup>y</sup> 7 8 9 × 10 <sup>x</sup> 4 5 6 -	A = 5 000 (1 + 0.00311)
	log 1 2 3 +	
The second operation is	Galculator – 🗆 X	Withfuller, Explication 13, 2014 12 and Park
addition inside the	■ Scientific ⑤ 0.00316666666666666666666666666666666666	Westerdade, Reflector 13, 2024 12-40 PM
parentheses	1.00316666666666666666666666666666666666	A = 5000 (1+0.00317)
	MC MR M+ M- MS MV	
		A = 5000 (1.00317)60
	$x^2$ $\frac{1}{2}x$ $ x $ exp mod $\frac{1}{2}\sqrt{x}$ ( ) $n!$ $\div$	1- 5000 (100317)
	x <sup>y</sup> 7 8 9 ×	H = 3000 (1.00317)
	log 1 2 3 +	
The third operation is the	In +/- 0 . =	
exponent.	■ Scientific	Wednesday, September 18, 2224 12:47 PM
схропона.	1.2088866357193278776540582857817	, 50
This is where round-off	DEG F-E  MC MR M+ M- MS M~	A = 5000 (1.00317)
errors start to matter.		11 0000
	$x^2$ $y_x$ $ x $ exp mod	1 5000 10000
	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	A = 5000 · 1.20889
	10° 4 5 6 — 10g 1 2 3 +	·
<b>T</b>	In +/- 0 . =	
The fourth and final	≡ Scientific ூ	90 C D Q ■ ▼ ▼ ▼ × × ■ × × × ■ × × × ■ × × × ■ × × × ×
operation is	< 2088866357193278776540582857817 × 5000 = 6,044.4331785966393882702914289084	$A = 5000 \cdot 1.20889$
multiplication.	DEG F-E  MC MR M+ M- MS M	71 0000 1.200
The future value is	$\triangle$ Trigonometry $\vee$ $f$ Function $\vee$ $2^{n1}$ $\Pi$ $\Theta$ $\Theta$ $\Theta$ $\Theta$	
\$6,044.43	$x^2$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ exp mod	A = 6044.43318
•	x <sup>y</sup> 7 8 9 ×	71 00 1 15070
	10° 4 5 6 — log 1 2 3 +	
	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		**************************************
$A = P\left(1 + \frac{r}{n}\right)^{n \cdot t}$		$P =  8500 \\ \Gamma = 0.0625 \\ \Gamma = 4 \\ t =  7  A =  8500 (1 + \frac{0.0625}{4})^{9.17}$
Substitute the known		$A = Y(1 + \frac{1}{n})$
values		$\Gamma = 0.0625$
values		n = 4
		$t = 17$ $A = [8500(] + \frac{3.5535}{4}]$
	☐ Calculator — □ ×	x
The first operations are	■ Calculator - □ ×  ■ Scientific ⑤	9 C D Q # 7 7 X
division inside the	0.0625 ÷ 4 = <b>0.015625</b>	( 0.0005 4.17
parentheses and	DEG F-E	$A = [8500/1 + \frac{0.0625}{0.0625}]$
multiplication in the	☑ Trigonometry ∨ f Function ∨	(1 4
exponent.	$2^{\text{sl}}$ $\pi$ e CE $\otimes$ $x^2$ $\frac{1}{2}x$ $ x $ exp mod	$A =  8500(1 + \frac{0.0625}{4})^{68}$ $A =  8500(1 + 0.01563)^{68}$
	$\sqrt[3]{x}$ ( ) $n!$ $\div$ $x^y$ 7 8 9 $\times$	A =  8500(1+0.07567)
	10° 4 5 6 -	
	log 1 2 3 + In +/- 0 . =	
The second operation is	☐ Calculator - □ X  ■ Scientific ⑤	9
addition inside the	0.015625 + 1 =	
parentheses	1.015625	$\Delta = 18500 (1+0.01563)$
	MC MR M+ M- MS MV	$A = 18500 (1+0.01563)^{68}$ $A = 18500 (1.01563)^{68}$
	2 <sup>rd</sup> π e CE ⊗	19500 (1015(3)
	$x^2$ $\sqrt[3]{x}$ $ x $ exp mod $\sqrt[3]{x}$ ( ) $n!$ $\div$	A = 18000(1.01363)
	x <sup>y</sup> 7 8 9 × 10° 4 5 6 -	
	log 1 2 3 +	
The third operation is the	☐ Calculator — □ ×	9 C A Q # V V V X
exponent.	= Scientific 5	Backmarke, Ingelester 18, 2014 1. 1.01 No.
•	2.8699215199877242898516510162927	
This is where round-off	MC MR M+ M- MS M~	A =  8500 (1.01563)
errors start to matter.	$△$ Trigonometry $\lor$ $f$ Function $\lor$ $2^{M}$ $\sqcap$	
	$x^2$ $\frac{1}{2}$ $ x $ exp mod $\frac{1}{2}$	A = 18500.2.86993
	x <sup>y</sup> 7 8 9 × 10 <sup>x</sup> 4 5 6 -	M - 10 300 2.06113
	log 1 2 3 +	
The fourth and final	In 1/- 0 . =	
operation is	= Scientific	Wedendag, Spiles that 18, 2014 1 101 PM
multiplication.	53,093.548119772899362255543801415	A = 18500.2.86993
· •	DEG F-E  MC MR M+ M- MS M~	11 10000 2.00113
The future value is	$△$ Trigonometry $\lor$ $f$ Function $\lor$ 2 <sup>M</sup> $π$ $e$ CE $⊗$	1 [2/192 [4012
\$53,093.55	$x^2$ $y_x$ $ x $ exp mod $\sqrt[3]{x}$ ( ) $n!$ $\div$	A= 53093.54812
	x <sup>y</sup> 7 8 9 ×	
	10° 4 5 6 — 10g 1 2 3 +	
	In	

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