



Using a finance solver to find the balance and final payment

Year 12 General Maths
Units 3 and 4

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Learning Objectives

By the end of the lesson, I would hope that you have an understanding and be able to apply to questions the following concepts:

- To be able to use the finance solver to find the value of a compounding interest investment with additional payments.
- To be able to use the finance solver to find the balance and final payment of a reducing balance loan.
- To be able to use the finance solver to find the balance of an annuity.



Recap

In the last couple of lessons we have been looking at how to read values from an amortisation table and how to find the missing values from Amortisation tables.

We're now heading into the most examinable section of the course looking at using the Financial Solver on the CAS.

This is a powerful tool which makes life a lot easier.

However, it's a bit of a beast and needs lots of practice to master.

Note: The devil is in the detail and your comprehension of the questions is key to success.



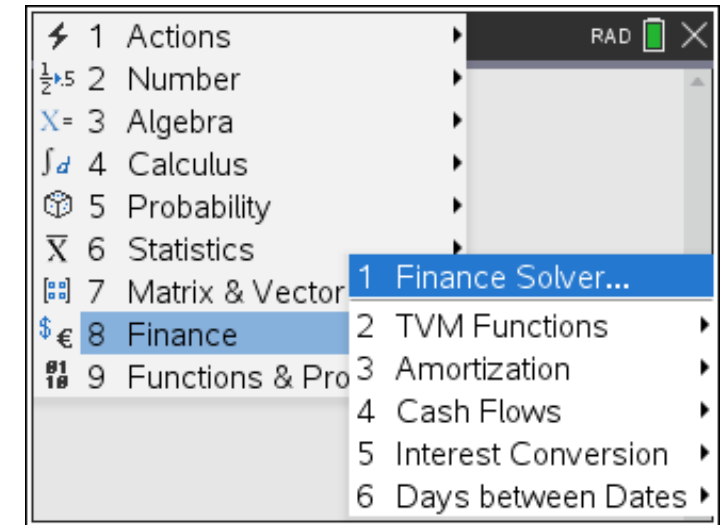
The CAS

Knowing how to load the Financial Solver is important.

It is not possible to do the Maths we are about to cover using a conventional calculator.

A massive proportion of the SAC will ask questions which can only be solved using the Financial Solver.

You have been warned.



Understanding the screen

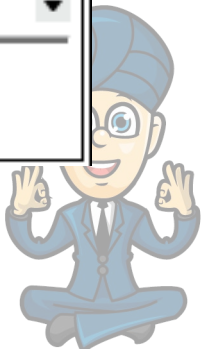
30 x 12

Knowing what each of the letters means will allow you to interrogate each question and extract what information you need to place in each field.

- Number of payments being made
- Annual** interest rate being charged
- The principal value of the investment or loan
- The payment being made or taken
- The future/final value of the investment or loan
- The number of payments being made per year
- The number of times interest is being compounded

Finance Solver	
N:	0. 30 x 12
I(%):	0.
PV:	0.
Pmt:	0.
FV:	0.
PpY:	1
CpY:	1
PmtAt:	END

Press ENTER to calculate
Number of Payments, N



The most important bit

When you give a bank money it hurts. It makes you sad. It makes you feel pretty **negative**.

When you get money from the bank it make you happy. It makes you feel pretty **positive**.

The values for PV, PMT and FV can be either positive or negative depending on the context of the question.

Get this wrong, and the whole thing will not work (or will give you very wrong answers)

The principal value of the investment or loan

The payment being made or taken

The future/final value of
the investment or loan

Finance Solver	
N:	0.
I(%):	0.
PV:	0.
Pmt:	0.
FV:	0.
PpY:	1
CpY:	1
PmtAt:	END

Press ENTER to calculate
Number of Payments, N



An example

Lars invests \$500 000 at 5.5% per annum, compounding monthly. He makes a regular deposit of \$500 per month into the account. What is the value of his investment after 5 years? Round your answer to the nearest cent.

Note:

I always, always, always list the letters when answering a question.

This will be asked of you in a SAC.

You need to complete every box **except one** for the CAS to work.

Finance Solver	
N:	0. 5×12
I(%):	0. 5.5
PV:	0. $-500\ 000$
Pmt:	0. -500
FV:	0.
PpY:	12
CpY:	12
PmtAt:	END

Press ENTER to calculate
Number of Payments, N

$$\underline{\underline{\$692\ 292.30}}$$



An example

Andrew borrows \$20 000 at an interest rate of 7.25% per annum, compounding monthly.

This loan will be repaid over 4 years with regular payments of \$481.25 each month for 47 months followed by a final payment to fully repay the loan.

- a How much does Andrew owe after 3 years? Round your answer to the nearest cent.
- b What is the final payment amount that Andrew must make to fully repay the loan within 4 years (48 months)? Round your answer to the nearest cent.

Note:

The context is always in the question. Just extract the correct information, put it in the CAS and let it do all the work.

You need to interpret the answers though.

Finance Solver	
N:	0. 48 12
I(%):	0. 7.25
PV:	0. 20 000
Pmt:	0. - 481.25
FV:	0.
PpY:	12
CpY:	12
PmtAt:	END

Press ENTER to calculate
Number of Payments, N

$$\$5554.36$$

$$\$481.25 - 0.11$$

$$\underline{\underline{\$481.14}}$$



An example

Charlie invests \$300 000 into an annuity, paying 5% interest per annum, compounding monthly. Over the next ten years, Charlie receives a payment of \$3182 per month from the annuity for each month except the final month.

- a Find the value of the annuity after five years. Round your answer to the nearest cent.
- b Find the final payment from the annuity. Round your answer to the nearest cent.

Note:

The context is always in the question. Just extract the correct information, put it in the CAS and let it do all the work.

You need to interpret the answers though.

Finance Solver	
N:	0. 10×12
I(%):	0. 5
PV:	0. $-300\ 000$
Pmt:	0. 3182
FV:	0.
PpY:	12
CpY:	12
PmtAt:	END

Press ENTER to calculate
Number of Payments, N

$$\begin{array}{r} \$168\ 612.25 \\ 3182 \\ - 5.36 \\ \hline \$317\ 6.64 \end{array}$$



VCAA Questions

VCAA 2022 Further Maths
Exam 1

The balance of a loan, V_n , in dollars, after n months is modelled by the recurrence relation

$$V_0 = 400\,000, \quad V_{n+1} = 1.003 V_n - 2024$$

Question 19

With a small change to the final payment, the loan is expected to be repaid in full in

- A. 25 years.
- B. 26 years.
- C. 28 years.
- D. 29 years.
- E. 30 years.

N : 300
 I : 3.6%
 PV : 400 000
 Pmt : - 2024
 FV : 0
CAY (PPY) : 12

$$R = 1.003$$

$$1.003 = 1 + \frac{r}{100}$$

$$r = \frac{0.3\%}{\times 12}$$

$$3.6\%$$

$$\frac{300}{12} = 25$$



VCAA Questions

VCAA 2022 Further Maths
Exam 2

To purchase additional workplace equipment, Pina took out a reducing balance loan of \$580 000 with interest calculated monthly.

The balance of the loan, in dollars, after n months, L_n , can be modelled by the recurrence relation

$$L_0 = 580\,000, \quad L_{n+1} = 1.002L_n - 3045.26$$

- c. The final repayment that is required to fully pay off the loan is smaller than all other repayments by an amount less than one dollar.

Determine this small amount in dollars, rounded to the nearest cent.

1 mark

$$\begin{array}{ll} N & : 240 \\ i & : 2.4\% \\ PV & : 580\,000 \\ Pmt & : -3045.26 \\ FV & : 0 \\ CPY/PPY & : 12 \end{array}$$

$\therefore 15 \text{ cents}$

$$R = 1.002$$

$$1.002 = 1 + \frac{r}{100}$$

$$\begin{aligned} r &= 0.2\% \\ &\times 12 \\ &= 2.4\% \end{aligned}$$



VCAA Questions

VCAA 2021 Further Maths
Exam 1

Question 22

Joanna deposited \$12 000 in an investment account earning interest at the rate of 2.8% per annum, compounding monthly.

She would like this account to reach a balance of \$25 000 after five years.

To achieve this balance, she will make an extra payment into the account each month, immediately after the interest is calculated.

The minimum value of this payment is closest to

- A. \$113.85
- ☒ B. \$174.11
- C. \$580.16
- D. \$603.22
- E. \$615.47

$$\begin{array}{ll} N & : 5 \times 12 \\ I & : 2.8 \\ PV & : -12\,000 \\ Pmt & : \\ FV & : 25\,000 \\ CPY / PPY & : 12 \end{array}$$



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VCAA exam questions

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