Analysing financial situations using amortisation tables

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 find the final payment in a reducing balance loan and an annuity.
- To be able to find the total payment made/received and the total interest paid/earned.
- To be able to plot points using an amortisation table for a reducing balance loan, an annuity and a compound interest investment with additional payments.

Recap

In the last lesson we looked at examples of reading and finding missing values from amortisation tables. These are increasing important in the course and have been given much greater relevance in the new VCE study design.

We are going to look more at Amortisation tables and the financial situations they might help.

Payment number	Payment	Interest	Principal reduction	Balance
0	0.00	0.00	0.00	1000.00
1	250.00	12.50	237.50	762.50
2	250.00	9.53	240.47	522.03
3	250.00	6.53	243.47	278.56

Payment number	Payment	Interest	Principal increase	Balance
0	0.00	0.00	0.00	1200.00
1	50.00	3.00	53.00	1253.00
2	50.00	3.13	53.13	1306.13
3	50.00	3.27	53.27	1359.40

Finding the final payment for reducing balance loans and annuities

We have, in the previous lesson, looked at the elements of an amortisation table and how we might be asked to find certain information.

In none of the previous examples have we been asked to find the final payment. Isn't it always the same?

Well no … and we are now going to look at this SAC and Exam given.

Payment number	Payment	Interest	Principal reduction	Balance
0	0.00	0.00	0.00	1000.00
1	250.00	12.50	237.50	762.50
2	250.00	9.53	240.47	522.03
3	250.00	6.53	243.47	278.56

An example

Look at the amortisation table shown.

If we make a payment of 5th payment of $5009.12 will this clear the loan?

It is important to note that we always have to pay interest. Any final loan payment must take account of this.

Payment number	Payment	Interest	Principal reduction	Balance
0	0.00	0.00	0.00	20 000.00
1	5009.12	1600.00	3409.12	16 590.88
2	5009.12	1327.27	3681.85	12 909.03
3	5009.12	1032.72	3976.40	8932.63
4	5009.12	714.61	4294.51	4638.12

5 5009.12 371.05 4638.07

$\frac{1600}{20\,000} \times 100 = 8\%$

8% of 4638.12

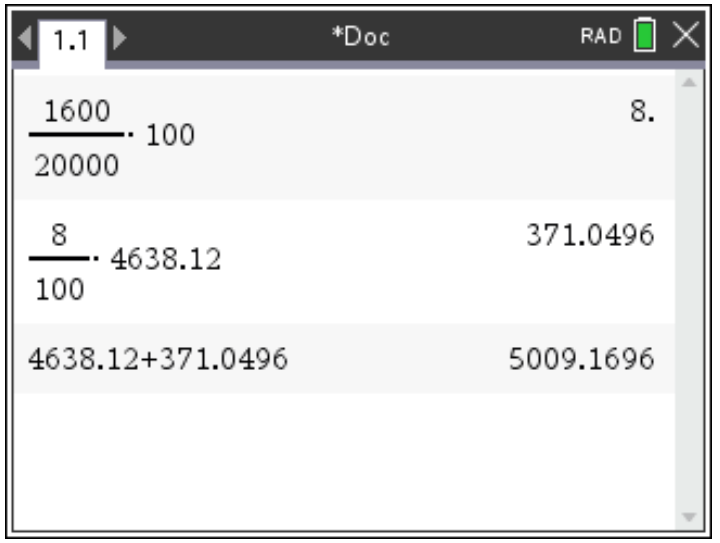
∴ FP = 5009.12 + 0.05 = 5009.17

An example

Consider the following amortisation table for a reducing balance loan of $20 000 with an interest rate of 8% per annum, compounding annually. Regular payments of $5009.12 are made for the first four years as shown in the amortisation table.

Payment number	Payment	Interest	Principal reduction	Balance
0	0.00	0.00	0.00	20 000.00
1	5009.12	1600.00	3409.12	16 590.88
2	5009.12	1327.27	3681.85	12 909.03
3	5009.12	1032.72	3976.40	8932.63
4	5009.12	714.61	4294.51	4638.12

Let's calculate the interest payable and then the final amount needed to clear the loan.



Notice that I still worked out the interest rate even though it was given in the question

An example

Consider the following amortisation table for a reducing balance loan of $20 000 with an interest rate of 8% per annum, compounding annually. Regular payments of $5009.12 are made for the first four years as shown in the amortisation table.

Payment Num	Payment	Interest	Principal reduction	Balance
$0.00	$0.00	$0.00	$0.00	$20,000.00
$1.00	$5,009.12	$1,600.00	$3,409.12	$16,590.88
$2.00	$5,009.12	$1,327.27	$3,681.85	$12,909.03
$3.00	$5,009.12	$1,032.72	$3,976.40	$8,932.63
$4.00	$5,009.12	$714.61	$4,294.51	$4,638.12
$5.00	$5,009.12	$371.05	$4,638.07	$0.05

If I don't make the final payment larger, then we will still owe money.
It makes sense to pay this final amount off with the 5th payment to clear the debt.

Finding the last row of an Amortisation table

Consider the following amortisation table for a reducing balance loan of $10 000 with an interest rate of 8% per annum, compounding quarterly. Three quarterly payments of $2626 are made.

Payment number	Payment	Interest	Principal reduction	Balance
0	0.00	0.00	0.00	10 000.00
1	2626.00	200.00	2426.00	7574.00
2	2626.00	151.48	2474.52	5099.48
3	2626.00	101.99	2524.01	2575.47
4	*A*	*B*	*C*	0.00

50.51 2575.47

$\frac{8}{4} = 2\%$

2% of 2575.47

We might be asked to find all values in the final row of an Amortisation table. We have all the tools at our disposal to be able to do this.

Let's find the values of A, B and C.

A: 2625.98

B: 51.51

C: $2575.47

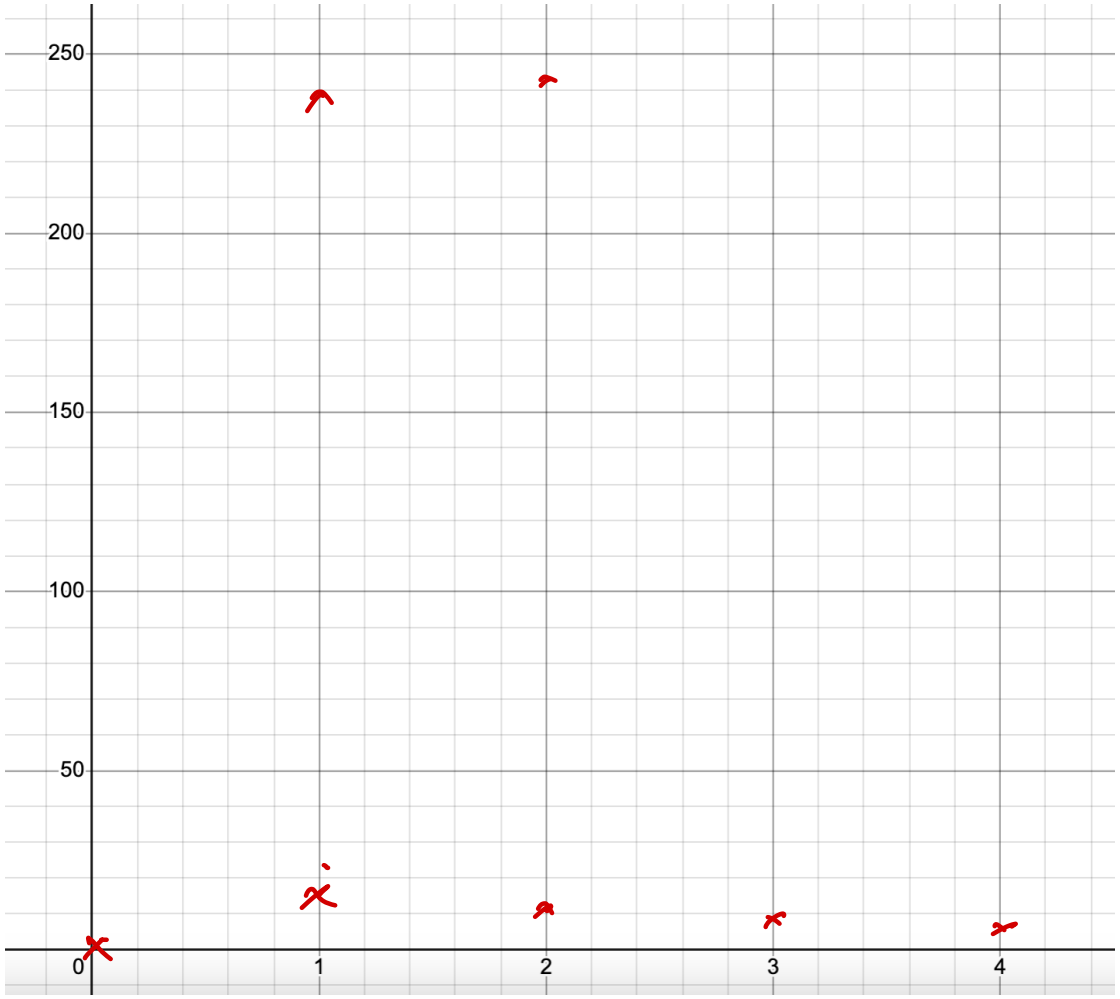
Graphing values from an Amortisation table

We need to be able to graph values from an Amortisation table.

Consider the following amortisation table for a reducing balance loan.

Payment number	Payment	Interest	Principal reduction	Balance
0	0.00	0.00	0.00	1000.00
1	257.85	12.50	245.35	754.65
2	257.85	9.43	248.42	506.23
3	257.85	6.33	251.52	254.71
4	257.89	3.18	254.71	0.00

Plot a graph of the interest and principal reduction on the same graph.



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