 Year 12 Mathematics Standard 1

Assessment task – buying a car

All outcomes referred to in this unit come from [Mathematics Standard Stage 6](https://syllabus.nesa.nsw.edu.au/mathematics-standard-stage6/) Syllabus
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Assessment type: Assignment

Stage: 6

Total: 60 marks

Due Date:

Outcomes

A student:

* makes informed decisions about financial situations likely to be encountered post-school MS1-12-5
* chooses and uses appropriate technology effectively and recognises appropriate times for such use MS1-12-9
* uses mathematical argument and reasoning to evaluate conclusions, communicating a position clearly to others MS1-12-10

Learning across the curriculum

* General capabilities
	+ Critical and creative thinking
	+ Information and communication technology capability
	+ Literacy
	+ Numeracy
	+ Personal and social capability

Task

Buying a car can be expensive and there are lots of costs involved. When you purchase a car, there are many choices you need to make, such as the exciting things like the type of car you are buying and other more difficult aspects, such as selecting a bank to approach for a loan, the interest rates and repayment periods, and whether you will pay for extra items such as insurance and registration on a credit card or outright. You might be prepared to make decisions and this task will allow you to investigate some of the key factors involved.

Part A – purchasing the car

Section 1 – research the car

Research cars worth between $10,000 and $20,000 that you would be interested in buying. You may use [carsales.com.au](http://www.carsales.com.au/) or another website.

Report the following details:

1. The make/model (1 mark)
2. A photo of the car (1 mark)
3. The website link to the car you are looking (1 mark)
4. Its price (1 mark)

Section 2 – investigating bank websites

Different banks will offer differing interest rates and repayment options. When you buy a car, you should compare the options available to you. In this task, you will research two banks to compare their available interest rate and suggested monthly repayments for a loan amount equivalent to the value of your car.

Report the following details:

1. Names of the two banks/financial institutions with website links to a loan calculator (1 mark per financial institution website provided)
2. The interest rates for both banks for the 3 and 5 year loans along with their corresponding monthly repayment (6 marks in total – see rubric)

Section 3 – using a spreadsheet to calculate loan repayments

Now that you have an interest rate and monthly repayment amount for a 3 year loan and a 5 year loan from two separate banks, choose one of the banks and use their data to enter into the ‘Reducing Balance Loan Spreadsheet’. Use the spreadsheet to verify the repayment amount you have been given.

In your spreadsheet you will need to include:

1. An interest formula (2 marks)
2. A formula for principal plus interest (1 mark)
3. A formula to calculate the principal plus interest minus repayments (1 mark)
4. The calculation of the above for 3 years and 5 years respectively (1 mark)
5. Monthly repayments (2 marks)
6. The amount borrowed (1 mark)

Section 4 – interpreting the spreadsheet

You can now answer the questions below by reading from your spreadsheet:

1. After half of the term of your 3 year loan, how much is owing? (1 mark)
2. After how many months is approximately half of the principal of the loan still owing on the 5 year loan? (1 mark)
3. How much is paid in total after your 3 year loan? (1 mark)
4. How much is paid in total after your 5 year loan? (1 mark)
5. Which would you prefer to take out? A 5 year loan or a 3 year loan? Why? (Refer to your calculations above) (2 marks)

Part B – extra costs

Section 1 – registration and insurance

When purchasing a car, there are more costs involved than just the price of the car. In this section, we will be investigating these fees and costs associated with them, including:

* Registration charges
* Insurance

In your report, you will need to include:

1. The cost of registration fees and charges outlined below. These can be found at [Service NSW’s Calculate Registration Cost](https://myrta.com/myRego/pages/content/rc/RegistrationCalculator.page) website.
	1. Registration fees (1 mark)
	2. Motor vehicle tax (1 mark)
	3. Original yellow – tran fee (1 mark)
	4. Stamp duty (1 mark)
2. Compulsory third party insurance cost by comparing two companies (2 marks). This can be compared at the following websites:
	* [NRMA – NSW CTP Green Slip Insurance](https://www.nrma.com.au/ctp-insurance)
	* [QBE – Compulsory Third Party NSW Green Slip Insurance](https://greenslip.qbe.com/CTP_Internet_Quotes/Greenslips)
3. Comprehensive car insurance cost by comparing two companies (2 marks). This can be compared at the following websites:
	* [NRMA – Comprehensive Car Insurance](https://www.nrma.com.au/car-insurance/comprehensive-car-insurance)
	* [GIO – Car Insurance](https://www.gio.com.au/car-insurance.html)
4. The total extra costs (1 mark)

Section 2 – credit card and interest charges

Your loan in Section 1 covers the cost of your car only. The cost of putting your car on the road will either need to be paid in cash or through a credit card. To pay for these extra costs you will need to purchase them with a credit card. In this section we will be investigating these fees and the costs associated with credit cards. Including:

* Credit card fees
* Interest charges

In your report you need to include:

1. Credit card fees and charges by comparing two banks. These are to be compared at the following websites:
2. Credit card 1 information, fees and interest rates calculated, including annual and daily interest rate (2 marks)
3. Credit card 2 information, fees and interest rates calculated, including annual and daily interest rate (2 marks)
4. Your choice of credit card by comparing the two options, giving reasons (2 marks)

Section 3 – using a spreadsheet to calculate interest charges

(This section can be completed using the Credit Card Interest Calculator Spreadsheet in the Unit of Work.)

In your spreadsheet, you will need to include the following:

1. A suitable table using a spreadsheet (1 mark)
2. A formula for calculating total extra costs (1 mark)
3. A formula for calculating daily interest rate (1 mark)
4. A formula for calculating future value (1 mark)
5. A formula for calculating interest charges (1 mark)
6. A formula for total interest (1 mark)
7. A table calculating the amount owing after 360 days without any repayments (1 mark)

Section 4 – interpreting the spreadsheet

From your spreadsheet, answer the following questions:

1. What is the amount owing on the credit card after 180 days if no repayments have been made? (1 mark)
2. What is the total interest charged for the first 180 days on the credit card? (1 mark)
3. What would be the amount owing after 1 year (365 days) on the credit card? (2 marks)

Marking guideline and rubric

Part A – purchasing the car

Section 1 – research the car

| Criteria | 0 | 1 | 2 |
| --- | --- | --- | --- |
| Make/model | Not present | Present | N/A |
| Picture | Not present | Present | N/A |
| Website | Not present | Present | N/A |
| Price | Not between $10,000 and $20,000 | Between $10,000 and $20,000 | N/A |

Section 2 – investigating bank websites

Bank 1

| Criteria | 0 | 1 | 2 |
| --- | --- | --- | --- |
| URL provided for bank’s loan calculator website | No URL/name provided | Correct URL/name provided | N/A |
| Interest rate | Interest rate not provided | Interest rate provided in table | N/A |
| Monthly repayments | Neither monthly repayments provided | One monthly repayment provided | Both respective monthly repayments provided for both loans (3 years and 5 years) |

Bank 2

| Criteria | 0 | 1 | 2 |
| --- | --- | --- | --- |
| URL provided for bank’s loan calculator website | No URL/name provided | Correct URL/name provided | N/A |
| Interest rate | Interest rate not provided | Interest rate provided in table | N/A |
| Monthly repayments | Neither monthly repayments provided | One monthly repayment provided | Both respective monthly repayments provided for both loans (3 years and 5 years) |

Section 3 – using a spreadsheet to calculate loan repayments

3 year spreadsheet

| Criteria | 0 | 1 | 2 |
| --- | --- | --- | --- |
| Correct interest formula | Incorrect | Uses $I=\frac{P}{26}$ or similar | Uses $I=\frac{P}{12}$ |
| Correct formula for principal plus interest | Incorrect | Correct | N/A |
| Correct formula for $P=I-R$ column | Incorrect | Correct | N/A |
| Spreadsheet shows 3 years’ worth of repayments (36 months) | Incorrect | Correct | N/A |
| Uses monthly repayments in spreadsheet | No calculation | Uses incorrect repayment schedule (such as fortnightly) | Uses monthly repayments |
| Amount borrowed entered | Incorrect | Correct | N/A |

5 year spreadsheet

| Criteria | 0 | 1 | 2 |
| --- | --- | --- | --- |
| Correct interest formula | Incorrect | Uses $I=\frac{P}{26}$ or similar | Uses $I=\frac{P}{12}$ |
| Correct formula for principal plus interest | Incorrect | Correct | N/A |
| Correct formula for $P=I-R$ column | Incorrect | Correct | N/A |
| Spreadsheet shows 5 years’ worth of repayments (60 months) | Incorrect | Correct | N/A |
| Uses monthly repayments in spreadsheet | No calculation | Uses incorrect repayment schedule (such as fortnightly) | Uses monthly repayments |
| Amount borrowed entered | Incorrect | Correct | N/A |

Section 4 – interpreting the spreadsheet

| Criteria | 0 | 1 | 2 |
| --- | --- | --- | --- |
| Amount owing after half the term of a 3 year loan | Incorrect | Correct | N/A |
| Time period when half the principal owing on 5 year loan | Incorrect | Correct | N/A |
| Total paid after the 3 year loan | Incorrect | Correct | N/A |
| Total paid after the 5 year loan | Incorrect | Correct | N/A |
| Reasoning and justification of preferred loan option with reference to calculations | No attempt | Stated preferred loan option without justification or reference to suitable calculations | Stated preferred loan option including reference to suitable calculations in justification |

Part B – extra costs

Section 1 – registration and insurance

| Criteria | 0 | 1 | 2 |
| --- | --- | --- | --- |
| Registration fee | Not present/incorrect | Present/correct | N/A |
| Motor vehicle tax | Not present/incorrect | Present/correct | N/A |
| Original yellow – tran fee | Not present/incorrect | Present/correct | N/A |
| Stamp duty | Not present/incorrect | Present/correct | N/A |
| Compulsory third party insurance | Not present/incorrect | Find fee without comparison | Find fee with comparison |
| Comprehensive car insurance | Not present/incorrect | Find fee without comparison | Find fee with comparison |
| Total amount borrowed | Not present/incorrect | Present/correct | N/A |

Section 2 – credit card and interest charges

| Criteria | 0 | 1 | 2 |
| --- | --- | --- | --- |
| Credit card 1 | Not present/incorrect | All information present but account keeping fee not explained or daily interest rate incorrect | All information present and correct |
| Credit card 2 | Not present/incorrect | All information present but account keeping fee not explained or daily interest rate incorrect | All information present and correct |
| Comparison of the 2 credit cards and a decision on which is the best option | Not present/incorrect | Credit card chosen with no reason | Credit card chosen with reasons given |

Section 3 – using a spreadsheet to calculate interest charges

| Criteria | 0 | 1 | 2 |
| --- | --- | --- | --- |
| Suitable table created using a spreadsheet | Incomplete | Complete | N/A |
| Formula for total of extra costs | Incorrect | Correct | N/A |
| Formula for daily interest rate | Incorrect | Correct | N/A |
| Formula for future value | Incorrect | Correct | N/A |
| Formula for interest | Incorrect | Correct | N/A |
| Formula for total interest | Incorrect | Correct | N/A |
| Table calculated for amount owing after 360 days | Incorrect | Correct | N/A |

Section 4 – interpreting the spreadsheet

| Criteria | 0 | 1 | 2 |
| --- | --- | --- | --- |
| Amount owing after 180 days | Incorrect | Correct | N/A |
| Calculate interest charged for the first 180 days | Incorrect | Correct | N/A |
| Amount owing after 1 year | Not attempted | Attempted but incorrectly calculated | Correct |