**Stage 1 General Mathematics**

**Assessment Type 2: Mathematical Investigation**

**Topic 1: Investing and Borrowing – Buying a car**

A friend has decided to buy a car. Their family are insisting it’s a quality car with a value of between $14000 and $16000 and are prepared to help with a family loan (option two). Your friend already has **$2500** saved towards purchasing the car and has **$330** a month to either save or use on repayments.

They know you’ve been “studying this” in General Mathematics and have asked for your advice. They have done a bit of research and have narrowed the choices to the following four options.

* ***Option one: Lease then buy the car.*** Take up a Financial Lease of $320 a month for 5 years. To purchase the car at the end of the lease, they will need to pay a residual of 10% of the new car price.
* ***Option two: Take out a family loan.*** Pay the $2,500 as a deposit and borrow the balance of the cars price at 6% per annum flat rate over 4 years making weekly repayments.
* ***Option three: Saving up to purchase the car.*** Invest the savings of $2500 in a “Bonus Saver account” returning 6% per annum compounding monthly. Assume your friend deposits the $330 each month into this account.
* ***Option four: Bank Car Loan:***Take out a car loan from a bank where they will pay anywhere between $0 and $2500 as a deposit and they borrow the balance with the payment of at most $330. (Use the banks online car loan calculator for this option). Things you should consider with this option includes timing of the repayment (weekly, fortnightly, monthly), the length of the loan and any establishment fee or ongoing fees.

You agree to explore all these options and to make a recommendation.

**Part 1: Choose a car price**

Select a car price that is within the price range that your friend is considering. Your price must differ from everyone else’s in the class.

**Part 2: Making a prediction**

From your knowledge of leases, investing and loans predict which of these options will provide your friend with the cheapest option as well as a prediction of what the most suitable option when getting a car will be. (what is the cheapest option may not be the same prediction as what will be the most suitable)

**Part 3: Information and mathematical calculations for all four options.**

For each of the four options your friend has identified, create an information page/s that includes the following:

1. Explanation of what the option entails
2. Important definitions that your friend may not understand related to the option (e.g. leasing, residual, compounding, secured and unsecured loan, fixed and variable interest).
3. Information about any costs associated (e.g. Ongoing Fees, Loan Establishment Fees, Registration etc.).
4. Mathematical calculations to determine the total cost that your friend will need to pay. You may use the banks online car loan calculator for option four, to work out the payments your friend will need to make. You must show full calculations even if the loan calculator determines the total cost of the loan.
5. Discuss the advantages and disadvantages of each option (not just financial).

**Part 3: Make a recommendation.**

Drawing on the information and mathematical calculations make a recommendation about which of the four options you investigate your friend should consider when making their final choice. Discuss any assumptions you have made in making this recommendation or any limitations to the information you could access that may affect the reasonableness of your recommendation.

Is your prediction in Part 2 the recommended option for your friend? Why? Why not?

**Your report on the mathematical investigation should include the following:**

* **Introduction:** Write an introduction in your own words outlining the task including the car price chosen in part 1. State any assumptions you have made.
* **Mathematical calculations and analysis:** the information and calculations on each option from part 2. Discuss how reasonable your model would be for any borrower to use to choose between options. Discuss any limitations to your calculations.
* **Conclusion:** State your key findings in terms of the cheapest option and the most suitable option for a young person in your friend’s situation. Summarise the limitations and advantages of loans, leases and investing to achieve the “best” method to own a car. Reflect on the relevance of this task to young people.
* **bibliography and appendices:** this must include screen prints of online calculators as well as URL of sites used.

Reflect on if your prediction in part 2 was the best option you found in part 3.

State your key findings in terms of the cheapest optiona dn the most suitable option for a young person in a smilar situation. Summarise the limitation and advantage

The format of an investigation report may be written or multimodal.

The investigation report should be a **maximum of 8 pages** if written, or the equivalent in multimodal form.

**Useful websites:**

* Lease: <https://www.mortgagechoice.com.au/car-loans/lease-or-buy/>
* Bank Loans calculators [www.commbank.com.au/personal](http://www.commbank.com.au/personal) <https://www.anz.com.au/personal/personal-loans/calculators-tools/> <https://www.nab.com.au/personal/calculators-and-financial-tools/>

Performance Standards for Stage 1 General Mathematics

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| --- | --- | --- |
|  | Concepts and Techniques | Reasoning and Communication |
| **A** | Comprehensive knowledge and understanding of concepts and relationships.  Highly effective selection and application of mathematical techniques and algorithms to find efficient and accurate solutions to routine and complex problems in a variety of contexts.  Successful development and application of mathematical models to find concise and accurate solutions.  Appropriate and effective use of electronic technology to find accurate solutions to routine and complex problems. | Comprehensive interpretation of mathematical results in the context of the problem.  Drawing logical conclusions from mathematical results, with a comprehensive understanding of their reasonableness and limitations.  Proficient and accurate use of appropriate mathematical notation, representations, and terminology.  Highly effective communication of mathematical ideas and reasoning to develop logical and concise arguments.  Formation and testing of appropriate predictions, using sound mathematical evidence. |
| **B** | Some depth of knowledge and understanding of concepts and relationships.  Mostly effective selection and application of mathematical techniques and algorithms to find mostly accurate solutions to routine and some complex problems in a variety of contexts.  Attempted development and successful application of mathematical models to find mostly accurate solutions.  Mostly appropriate and effective use of electronic technology to find mostly accurate solutions to routine and some complex problems. | Mostly appropriate interpretation of mathematical results in the context of the problem.  Drawing mostly logical conclusions from mathematical results, with some depth of understanding of their reasonableness and limitations.  Mostly accurate use of appropriate mathematical notation, representations, and terminology.  Mostly effective communication of mathematical ideas and reasoning to develop mostly logical arguments.  Formation and testing of mostly appropriate predictions, using some mathematical evidence. |
| **C** | Generally competent knowledge and understanding of concepts and relationships.  Generally effective selection and application of mathematical techniques and algorithms to find mostly accurate solutions to routine problems in different contexts.  Application of mathematical models to find generally accurate solutions.  Generally appropriate and effective use of electronic technology to find mostly accurate solutions to routine problems. | Generally appropriate interpretation of mathematical results in the context of the problem.  Drawing some logical conclusions from mathematical results, with some understanding of their reasonableness and limitations.  Generally appropriate use of mathematical notation, representations, and terminology, with reasonable accuracy.  Generally effective communication of mathematical ideas and reasoning to develop some logical arguments.  Formation of an appropriate prediction and some attempt to test it using mathematical evidence. |
| **D** | Basic knowledge and some understanding of concepts and relationships.  Some selection and application of mathematical techniques and algorithms to find some accurate solutions to routine problems in context.  Some application of mathematical models to find some accurate or partially accurate solutions.  Some appropriate use of electronic technology to find some accurate solutions to routine problems. | Some interpretation of mathematical results.  Drawing some conclusions from mathematical results, with some awareness of their reasonableness.  Some appropriate use of mathematical notation, representations, and terminology, with some accuracy.  Some communication of mathematical ideas, with attempted reasoning and/or arguments.  Attempted formation of a prediction with limited attempt to test it using mathematical evidence. |
| **E** | Limited knowledge or understanding of concepts and relationships.  Attempted selection and limited application of mathematical techniques or algorithms, with limited accuracy in solving routine problems.  Attempted application of mathematical models, with limited accuracy.  Attempted use of electronic technology, with limited accuracy in solving routine problems. | Limited interpretation of mathematical results.  Limited understanding of the meaning of mathematical results, their reasonableness or limitations.  Limited use of appropriate mathematical notation, representations, or terminology, with limited accuracy.  Attempted communication of mathematical ideas, with limited reasoning.  Limited attempt to form or test a prediction. |