 Year 12 Mathematics Standard 2

Assessment task

MS-F4 Investments and loans, MS-F5 Annuities

Driving question

Is buying your own home a dream or a reality?

Outcomes

* **MS2-12-2** analyses representations of data in order to make inferences, predictions and draw conclusions
* **MS2-12-5** makes informed decisions about financial situations, including annuities and loan repayments
* **MS2-12-9** chooses and uses appropriate technology effectively in a range of contexts, and applies critical thinking to recognise appropriate times and methods for such use
* **MS2-12-10** uses mathematical argument and reasoning to evaluate conclusions, communicating a position clearly to others and justifying a response

All outcomes referred to in this unit come from [Mathematics Standard Sage 6](https://syllabus.nesa.nsw.edu.au/mathematics-standard-stage6/) Syllabus © NSW Education Standards Authority (NESA) for and on behalf of the Crown in right of the State of New South Wales, 2017

Learning across the curriculum

General capabilities

* Critical and creative thinking 
* Ethical understanding 
* Information and communication technology capability 
* Literacy 
* Numeracy 
* Work and enterprise 

Task

Your task is to investigate the affordability of buying your home in today’s housing market. The key objectives for this task are to determine your potential income and savings, the inflation of house prices and alternate income sources (such as shares). As a potential home owner you will need to consider the amount and frequency of loan repayments and managing your finances.

Part A – income

It is time to answer the question everyone has been asking you… “What are you going to do when you leave school?”

1. Your task is to find an occupation and a place to live. You are to research an occupation (of your own choosing) and answer the following questions:
	1. What is your chosen occupation?
	2. What will be your annual income? You must reference where you sourced this information from.
	3. On average, a person can save approximately $30\%$ of their annual income. Calculate how much you could save in a year assuming you could also save $30\%$ of the annual income you have identified in part b.
2. Where will your new occupation be located? When deciding on a location you must consider whether it is feasible for you to both live and work there. For example, it is not practical for you to be a marine biologist in Broken Hill. Justify why you have chosen this location.

Part B – inflation and affordability

Two of the biggest challenges facing first home buyers are the 20% deposit and the cost of stamp duty tax.

1. Research the stamp duty exemptions available for first home owners. State the conditions and process for the exemptions.
2. Determine the stamp duty payable on the house identified in Part A. You may assume you are a first home owner. Show any calculations or references to online sources.
3. In order to get a home loan without having to pay mortgage insurance, most financial institutions will require you to have a deposit of 20% of the value of the house. As you save for your deposit, the value of the house will appreciate and the deposit increases. The predicted average house price appreciation is at 3.25% pa and assume that this trend continues.

Complete Worksheet 1 in the MS-F4 Investment and Loans – Assessment Task – Spreadsheet to determine:

* 1. The number of years required in order for you to save enough money for the house deposit and stamp duty (use the house price at the time of purchase to calculate the stamp duty).
	2. The amount of money required for the deposit including the cost of stamp duty.

Part C – investments

To reduce the length of time required to save the deposit, you have consulted a financial adviser for assistance and together you have come up with a 3 year plan.

The advice given was to invest your first year’s savings into 3 different shares.

1. Select 3 companies from the [ASX list of Listed Companies](http://www.asx.com.au/asx/research/listedCompanies.do). Provide a statement as to why you have chosen each. You may like to use the [Charting](https://www.asx.com.au/prices/charting/?code=&compareCode=&chartType=&priceMovingAverage1=&priceMovingAverage2=&volumeIndicator=&volumeMovingAverage=&timeframe=) feature to help you justify your choices.
2. Determine the amount that you would invest in each company and the number of shares bought.
3. Write the amount you have invested in each company as a ratio and justify why you have chosen to split your earnings in this manner.
4. Visit [ASX’s Search Dividends](http://www.asx.com.au/asx/markets/dividends.do) to determine the dividend yield for each of your selected companies and thus your profit for each share.

At the end of the second year, the total value of your shares plus the second year of savings is to be placed into a term deposit account.

1. Investigate term deposit accounts and find one that suits your needs. Take note of the current interest rate, along with any conditions and fees or charges.

Savings during the third year are to be invested into an annuity as a monthly deposit.

1. Investigate savings accounts that let you make regular deposits and find one that suits your needs. Again, take note of the interest rate (including any bonus interest), along with any conditions and fees or charges.
2. Use an annuity calculator to determine the total value of the annuity at the end of the year.
3. Complete Worksheet 2 in the MS-F4 Investment and Loans – Assessment Task – Spreadsheet Template. Make sure you use formulas to calculate amounts where possible.

Part D – loan repayments

1. Research current home loan interest rates. Find a variable rate product with no monthly fees. Provide a reference to the home loan product and state its interest rate. Comment on why you chose this product, stating any features, like offset accounts, which support your decision.
2. Using the home loan product from part 1, and with a repayment period of 30 years, determine the monthly repayment needed.
3. Calculate the interest saved, over the duration of the loan, if you pay your loan weekly rather than monthly.
4. You are now able to contribute an extra $200 to your monthly home loan repayments. Describe how this changes:
	1. The duration of the loan.
	2. The amount of interest charged.

State any calculations used to support your description.

1. If you were to repay your loan in 20 years, discuss the impacts on the monthly repayments and interest charged.
2. Discuss the impact on the home loan if the interest rate was to double.

Part E – house contents

When moving into a new home, there are always items that need to be purchased.

The average first credit card limit is around $2000. You are to purchase items, using your credit card that would be necessary in your first house. Be careful not to go over your limit.

1. Choose 2 credit card providers and compare the various fees and charges associated with using each credit card.
2. Compare the minimum repayments required, time taken to repay the original purchases and the extra amount payed in interest.
3. Discuss the impact of increasing your minimum repayments and interest rate rises.
4. Comment on the potential saving if the above items were purchased using cash or an alternative scheme such as Afterpay.

Part F – conclusion

After all your research, you have become somewhat of an expert on the topic of purchasing your first home. What advice would you give to a friend or younger sibling who is looking to leave home and purchase their first property?

Part of your advice should be an answer to the question ‘Is buying your own home a dream or reality?’

What to submit

* Evidence of an authentic task. This may take the form of all sources of information referenced correctly; screenshots or files of applications used;
* A completed copy of the MS-F4 Investment and Loans spreadsheet.
* All formula, working and calculations required, either written by hand or typed. If screenshots have been provided, the formulas used need to be clearly annotated.
* All reasoning and justification, either written by hand or typed.

Success criteria

| Fluency, understanding and communication | Problem solving, reasoning and justification |
| --- | --- |

| Criteria | Working towards developing | Developing | Developed | Well developed | Highly developed |
| --- | --- | --- | --- | --- | --- |
| Part AQuestion 1MS2-12-9 | States an occupation, annual income, saving amount and location  | Provides documentation, calculations and justifications supporting the responses.  |  |  |  |
| Part AQuestion 2MS2-12-9 | Provides a list of property locations with their listed prices. | States which property is to be purchased and provides screen shots of three properties and. | Provides one reason why the particular property has been chosen and provides screen shots of three properties. | Provides multiple reasons why the particular property has been chosen making comparisons to the other properties and provides screen shots of three properties. |  |
| Part BMS2-12-9 | States the conditions and process for stamp duty exemptions correctly. | Determines the stamp duty. | Completes the table to determine the number of years to save for the deposit and determines the amount payable. |  |  |
| Part CQuestions 1-3MS2-12-5, MS2-12-10 | Correct ratio given in simplest form | Provides a mathematical statement to justify choice of companies and a simple statement to justify choice of ratio. | Provides a detailed justification that analyses price trends to influence chosen ratio | Provides a sophisticated justification by analysing price trends and future potential of the company. |  |
| Part CQuestions 4-7MS2-12-5, MS2-12-10 | Determines dividend yield for each company and income from term deposit and annuity with a simple error such as not converting interest rate. | Determines overall profit for shares and correctly determines income from term deposit and annuity | Provides reasoning for choice of bank and/or accounts. | Provides sophisticated reasoning for choice of account by considering features, as well as interest rates, fees and conditions. |  |
| Part CQuestion 8MS2-12-9 | Populates cells with correct values without using formulae | Populates cells with mostly correct formulae or one or two omissions | Populates all appropriate cells with correct formulae |  |  |
| Part DQuestions 1 and 2MS2-12-2,MS2-12-5 | Student can locate a variable interest rate. | Student determines monthly repayment. | Student provides a comprehendible attempt to explain the choice of home loan. | Student provides a detailed explanation to support the choice of home loan, with features listed and reference stated.  |  |
| Part D Questions 3 and 4MS2-12-2 | Determines the interest when paying monthly repayments. | Calculates the difference in interest when repaying weekly rather than monthly. | Calculates the difference in duration and interest. |  |  |
| Part D Question 5MS2-12-5 |  |  | Determines the monthly repayments and interest. | Interprets the monthly repayment and interest in terms of amount saved compared to a loan with a duration of 30 years. |  |
| Part D Question 6MS2-12-5 |  |  | Calculates the interest and repayments but does not interpret these results in the context of the question. | Provides explanation of the effect on the interest, the repayments and duration (this may not change). Calculations are provided to support the explanation.  |  |
| Part EQuestions 1MS2-12-5 | Provides a simple statement outlining the difference in interest rates | Provides a statement explaining the difference in fees and charges | Detailed comparison of the two cards considering points for and against each  |  |  |
| Part EQuestion 2MS2-12-5 | Calculates the minimum repayments, time taken to repay purchases and the amount of interest payed. | Provides a statement explaining reasons for the differences between the two cards. |  |  |  |
| Part EQuestion 3MS2-12-5,MS2-12-10 | Identifies a new appropriate repayment amount and/or interest rate | Calculates the new repayment time and interest paid if repayments or interest rates increased. | Provides a simple generalised statement explaining the impact of increasing repayments and interest rate rises. | Provides a detailed statement explaining the impact of increasing repayments and interest rate rises. |  |
| Part EQuestion 4MS2-12-5,MS2-12-10 | States the amount saved by paying cash for their purchases | Provides a basic statement comparing cash with credit cards | Provides a statement outlining the basic features and benefits of each method of payment. | Provides a detailed discussion on the merits of credit cards vs cash vs alternative schemes |  |
| Part FMS2-12-5,MS2-12-10 |  |  | Attempts to explain a number of factors to be considered when purchasing a house.  | Explains in detail the main factors to be considered when purchasing a house and their impact. | Provides a sophisticated response that answers the driving question and supports their decision by providing mathematical calculations and discussion of the essential factors to be considered when purchasing a house. |

Note**s**

* Any non-attempt in a section will be deemed zero. Marks can only be attributed to attempted responses.
* Corresponding question numbers are shown in brackets.

Note to staff

The success criteria above has been designed for students and staff alike to use. Students should be presented the rubric as part of the assessment task package. Students and staff follow the process of the task downwards through the rubric and the depth of responses, for each element, across the rubric. Students should be encouraged to use the rubric to self-assess their progress as an assessment-as-learning strategy.

The aim of the assessment task is to develop students’ deep content knowledge. This is reflected in the descriptors, **working towards developing** through to **highly developed**. The level of skill and understanding required in each part of the task is different; some parts require **highly developed** or **well-developed** skills, other parts only capture a **developing** skill set.

None of the working mathematically elements are distinct and when demonstrating one element, you are invariably demonstrating another. As an example, communication runs concurrently through all the other working mathematically elements. Students cannot respond to this assessment without communicating in some form. However, it is envisaged that there is a general progression through the working mathematically elements, starting with fluency and leading to understanding, problem solving, reasoning and justification, with increasingly higher levels of communication accompanying each element. Careful consideration has been given to the position of the success criteria statements so they reflect the working mathematically elements demonstrated.

This assessment task has been designed to illuminate the style of questions and the types of responses needed to elicit deep content knowledge, however, staff are encouraged to use and adapt the assessment task and the success criteria to their school context. Staff may like to enhance or amend sections of the task. Staff may like to adapt the rubric to assign marks to the descriptors in order to differentiate between responses that address the same statement. All changes are the responsibility of the staff using the assessment.

Adaptation to Year 12 Mathematics Standard 1

Teachers may decide to modify this task for use with a Year 12 Mathematics Standard 1 class. This would be of benefit to teachers who are teaching Mathematics Standard 1 and 2 in the same room or schools where a number of students change to the Mathematics Standard 1 course.

Part C is the only part of the task that would require modifications (due to the fact that Mathematics Standard 1 students do no study shares or annuities) and could be adapted as follows.

Part C – investments

To reduce the length of time required to save the deposit, you have consulted a financial adviser for assistance and together you have come up with a 3 year plan.

The advice given was to invest your first year’s savings into a savings account that pays bonus interest if you don’t make any withdrawals. You will take your monthly savings and deposit it into the account at the end of each month, for the entirety of the first year.

1. Investigate savings accounts that let you make regular deposits and find one that suits your needs. Take note of the interest rate (including any bonus interest), along with any conditions and fees or charges.
2. Use an [online calculator](https://www.calculator.net/annuity-calculator.html) to determine the total amount in your account at the end of the year.

At the end of the first year, the total value of your savings account will be deposited into a Term Deposit for the remaining 2 years.

1. Investigate term deposit accounts and find one that suits your needs. Take note of the current interest rate, minimum investment amounts and any conditions, fees or charges.
2. Complete Worksheet 2 in the MS-F4 Investment and Loans – Assessment Task – Spreadsheet Template. Make sure you use formulas to calculate amounts where possible.

Note: The spreadsheet template would need to be adjusted to reflect these changes.