 Year 12 Mathematics Standard 1

Unit title: MS-F2 Investment 

Duration: 2 weeks (suggested timeframe based on 6 x 40 minute lessons per week)

Rationale

Students develop an awareness of mechanisms to optimise their financial position, but now and into the future, justifying their thinking and reasoning mathematically.

Topic focus

The principal focus of this subtopic is to calculate and compare the value of different types of investments, including shares, over a period of time.

Students develop awareness of mechanisms to optimise their financial position, both now and into the future, justifying their thinking and reasoning mathematically.

Within this subtopic, schools have the opportunity to identify areas of Stage 5 content which may need to be reviewed to meet the needs of students.

Prior knowledge required

* Compound interest
* Simple interest
* Percentages and decimal
* conversion

Language considerations

* Account balance
* Annual fee
* Annual interest rate
* Appreciated value
* Compound interest
* Daily interest rate
* Fee
* Future value
* Inflation
* Interest payable
* Interest rate
* Percentage annual interest rate
* Present value
* Simple interest

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

Assessment

Some strategies for formative assessment could include:

* Reflecting on students’ responses to a class discussion
* Beginning the lesson with a few questions on content from previous lessons before progressing
* Having students write their own questions on a topic or having them write a specific number of questions with the same answer
* [3-2-1 exit slips](http://www.theteachertoolkit.com/index.php/tool/3-2-1)
* [Chalk Talk Routine](http://www.santeesd.net/cms/lib/CA01000468/Centricity/Domain/12/VT_ChalkTalk.pdf)
* [Red, Yellow, Green Cups](http://www.sstr2.org/Downloads/Cups%20as%20student%20feedback.pdf); students could also indicate beside the questions their level of understanding using the letters, R, Y or G.
* [Mindmaps](https://emedia.rmit.edu.au/learninglab/content/how-create-mind-map)

| Content | Teaching and learning strategies and evidence of learning | Resources |
| --- | --- | --- |
| * calculate the future value $(FV) $or present value $(PV) $and the interest rate $(r) $of a compound interest investment using the formula $FV=PV(1+r)^{n}$ **Paperclip icon**  Information and communication technology capability icon
 | Key ideasThere are many different ways to invest money over a period of time. Therefore, it is important for customers to make informed decisions about available schemes to ensure they receive the most out of their chosen investment choice. Such factors that affect any investment scheme are: initial investment amount, interest rate, chosen time period and selected investment pathway.Formulas that are evident in this topic and students will explore as investment scheme options are:* Future value formula (compound interest)
	+
	+
* Simple interest formula
	+
	+

Students will also explore the impact of inflation on wages and prices and calculate the appreciated value of items over a given period of time.* Appreciation formula
	+

‘FV’ and ‘A’ – final value of investment‘PV’ – present value of investment‘P’ – initial value of investment (known as principal)‘r’ – interest rate per period, expressed as a decimal‘n’ and ‘t’ – number of compounding periods‘I’ – interest accumulated | Revision activities could be taken from the ‘[Reaching goals: What’s involved?](https://www.moneysmart.gov.au/media/558606/mst_secondary_maths10_unit.pdf)’ booklet for Year 10 students from ASIC’s Money Smart Program. |
| * + compare the growth of simple interest and compound interest investments numerically and graphically, using technology Critical and creative thinking icon  Information and communication technology capability icon
 | Key enquiry questionWhat is interest and why do we have it?Key ideasRecognising the difference between the future value (compound interest) formula and simple interest formula:* Future value formula
	+
	+
* Simple interest formula
	+
	+

Understand the difference between simple interest and compound interest, numerically and graphically, using technology.Activities* Calculate simple interest and compound interest annually.
* Compare two investments, one using simple interest and another compound interest using the same present value, time period and interest rate.
* Compare two equal investments of simple interest and compound interest by manipulating a digital illustration of their formulas and changing the time period and interest rate.
 | Videos explaining the difference between simple and compound interest:* [Difference between simple interest and compound interest](https://www.youtube.com/watch?v=FsS741Dow30)
* [Investing basics: the power of compounding](https://www.youtube.com/watch?v=immQX0RKFY0)

[Simple vs compound interest](https://www.basic-mathematics.com/simple-vs-compound-interest.html):* Explanation of compound interest and simple interest. It also includes an online quiz.

[An introduction to interest](https://www.mathsisfun.com/money/interest.html):* An introduction to interest with an explanation comparing simple and compound interest with multiple choice questions at the bottom.

[Simple and compound interest graph](https://www.desmos.com/calculator/skjxrjtaer) on Desmos:* A graphical illustration of compound interest and simple interest over time with the ability to manipulate formulas.
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| * + investigate the effect of varying the interest rate, the term or the compounding period on the future value of an investment, using technology  Information and communication technology capability icon
 | Key enquiry questionWhat factors affect the amount of interest accumulated in a compounding investment scheme?Key ideas* Calculate the compound interest earned when the investment is compounded weekly, monthly, bi-annually, quarterly, yearly, and so on.
* Understand the ‘time period’ and ‘interest rate’ need to be ‘altered’ to correctly calculate interest given specific compounding period.

Activities* Use digital technologies to easily compare the effect of varying the interest rate and time period (weekly, monthly, bi-annually, quarterly, yearly). Create a graph of different investment schemes with varied rates and time periods.
* Use graphs to calculate interest accumulated on investment schemes and different compounding periods and compare the results.
 | [Simple vs compound interest spreadsheet](http://www.tvmcalcs.com/uploads/spreadsheets/simple_vs_compound_interest.xls):* Excel spreadsheet where you can manipulate the interest rate and compounding periods.

[Compound interest calculator (MoneySmart)](https://www.moneysmart.gov.au/tools-and-resources/calculators-and-apps/compound-interest-calculator) with graphs |
| * + compare and contrast different investment strategies, performing appropriate calculations when needed Critical and creative thinking icon Personal and social capability icon Work and enterprise icon
 | Key enquiry questionHow can manipulating the time period that interest is compounded and the initial principal effect the future value of an investment?Key ideas* Increased compounding time periods results in more accumulated interest and greater future value amount at the end of the investment period.
* The value of the initial principal and interest rate can significantly affect the investment scheme.

Activities* Use digital technologies to easily compare the effect of varying the interest rate and time period (weekly, monthly, bi-annually, quarterly, yearly). Create a graph of different investment schemes with varied rates and time periods.
* Use tables to calculate interest accumulated on investment schemes and different time periods and compare the results. Complete this activity for both compound and simple interest questions.
 | [Comparing different compounding periods](https://www.moneysmart.gov.au/managing-your-money/saving/compound-interest)[Simple interest calculator (WebMath)](http://www.webmath.com/simpinterest.html) to easily compare interest accumulated over different time periods[Compound interest calculator (WebMath)](http://www.webmath.com/compinterest.html) to easily compare interest accumulated over different time periods |
| * solve practical problems involving compounding, for example determine the impact of inflation on prices and wages or calculate the appreciated value of items, for example antiques **AAM** **Paperclip icon**  Information and communication technology capability icon Personal and social capability icon Work and enterprise icon
 | Key enquiry questionWhy do we pay more for things than our parents did? If a lack of money is a problem, why can’t we just print more of it? Why do some things appreciate in value and others don’t?Key ideas* Understand inflation and the number of different reasons why it occurs.
* Recognise the impact inflation of prices has on everyday items and the impact this has on household budgets and savings regimes.

Activities* Calculate the impact inflation has on prices and wages.
* Calculate the appreciated value of items.
* Compare and discuss the cost of items that have appreciated over a period of time (such as antiques). Why do you think these items have appreciated in value? How much have these items appreciated in value over the given time period?
 | [What is inflation? (And why is it bad?)](https://www.youtube.com/watch?v=XwhFAuBSl9g)* Video on the impact inflation has on savings and purchasing an antique care

[What causes inflation](https://www.youtube.com/watch?v=iiEiRZhfOl8)* Video on the causes of inflation

[Inflation price calculator](http://www.abs.gov.au/websitedbs/d3310114.nsf/home/Consumer%2BPrice%2BIndex%2BInflation%2BCalculator) from the ABS |

Reflection and evaluation