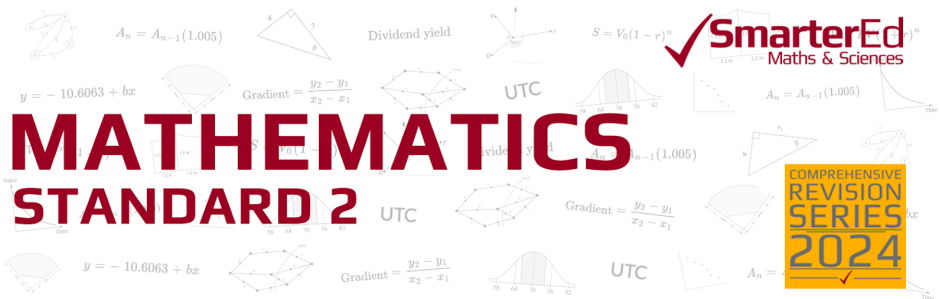


Thank you for subscribing to SmarterMaths Teacher Edition (Silver) in 2024.

Key features of the Standard 2 "2024 HSC Comprehensive Revision Series" include:

- ~14 hours of cherry picked HSC revision questions by topic
- Targeted at motivated students aiming for a Band 5 or 6 result
- Weighting toward more difficult examples
- Mark allocations given to each topic area reflect its historical (new syllabus) HSC exam allocation
- Std2/Adv common questions are key areas for high band results and this is reflected in question choices
- ***Attempt, carefully review and annotate*** this revision set in Term 3
- This question set provides the foundation of a concise and high quality revision resource for the run into the HSC exam.

Our analysis on each topic, the common question types, past areas of difficulty and recent HSC trends all combine to create this revision set that ensures students cover a wide cross-section of the key areas.

IMPORTANT: If students have been exposed to questions in these worksheets during the year, we say great. Many top performing students attest to the benefits of doing quality questions 2-3 times before the HSC. This type of revision set is aimed at creating confidence and *speed through the exam*, with cherry picked questions that cover all important elements of revision while avoiding low percentage rabbit hole excursions.

HSC Final Study – STD2 Financial Maths (estimated ~22.4% of exam)

Key Areas addressed by this worksheet

F1 Money Matters (Y11)

- *Simple Interest:* usually examined with a comparison question involving compound interest. We review *2019 9 MC* which caused problems along with a harder comparison example.
- *Tax and Percentage Discounts:* tax tables are the most common question type (examined in 7 of the last 8 years) and represent key revision.
- *GST* caused problems in 2023 and 2019. We revise numerous examples including *2019 Q29* which is novel in that students must know that *GST* doesn't apply to fresh food.
- Insurance definitions are covered including harder Medicare examples. *2013 Q27b* is reviewed, where many students were not clear that Medicare is deducted from "taxable income" and not "gross income". Stamp duty covered.
- *Earning money and budgeting:* Allocated marks in the last decade have ranged from 0 (in 2023 and 2020-21) to 7 (in 2010).
- We highly recommend students take heed of *Marker's Comments* in this topic area for minimising errors and set out their answers in small bite size pieces!

F4 Investments and Loans (Y12)

- *Compound Interest:* The use of the compound formula $FV = PV(1 + r)^n$ has been examined in 8 of the last 10 years and is the most common question type.
- Questions involving *Compounded Value of $1* tables have traditionally caused students problems and we note they were last examined in 2018.
- *Shares:* dividend yield attracted a dedicated questions each year between 2019-22 and its revision importance is reflected in the worksheet (notably absent in 2023).
- *Depreciation:* tested 9 years of the last decade in questions worth anywhere from 1-6 marks. A comparison of declining balance and straight-line depreciation is common (examined in 2023 and 2022) and is featured in this revision.
- *Credit Cards:* asked in three new syllabus exams (most recently in 2023). Sub-50% mean marks are common, making this a key revision area.
- Calculating daily interest rates and applying the correct number of days has proven very challenging for the majority of students. Multiple revision questions address this.
- *Loans:* Exposure to different loan payment table styles is critical. Covered by numerous examples including the very challenging *2023 Q29*.
- "*Home Loan P+I-R Table*" is very important and well covered.

F5 Annuities (Y12)

- *Annuities* has attracted huge allocations of between 5-8 marks in the last 4 exams. It is an important area for Std2/Adv common questions and is treated as a revision focus area.
- *Future Value of an Annuity Table* has been the most regularly asked question type is well covered (producing sub-50% mean marks a majority of the time).
- We include the very important *2021 Q40* and *2019 Q42* which require a deeper understanding of these tables than in previous years.
- Exposure to other types of annuity tables that have been poorly answered such as *Present Value Annuity Tables (2021 and 2020)* and the *Contribution per period for a future value of $1 table (2016).*
- Recurrence relations within annuities had its first appearance and the 2020 exam, causing problems – this is a "must review" question.

STANDARD 2

Stage 6

2024 Comprehensive Revision Series - FINANCIAL MATHS

F1 Money Matters (Y11)
F4 Investments and Loans (Y12)
F5 Annuities (Y12)

Exam Equivalent Time: 135 minutes *(based on allocation of 1.5 minutes per mark)*

Questions

1. Financial Maths, STD2 F1 2023 HSC 4 MC

A delivery truck was valued at $65 000 when new. The value of the truck depreciates at a rate of 22 cents per kilometre travelled.

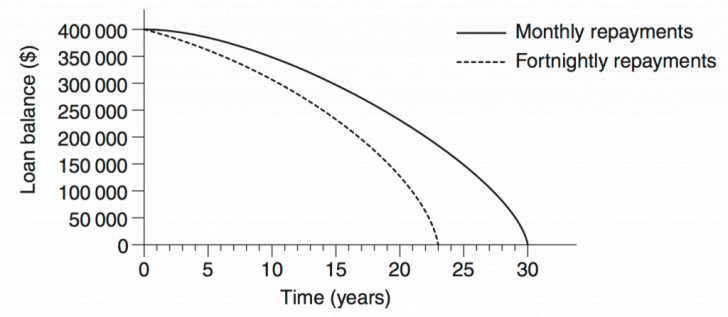
What is the value of the truck after it has travelled a total distance of 132 600 km?

A. $35 828
B. $29 172
C. $14 872
D. $14 300

2. Financial Maths, STD2 F4 2012 HSC 24 MC

A $400 000 loan can be repaid by making either monthly or fortnightly repayments.

The graph shows the loan balances over time using these two different methods of repayment.



The monthly repayment is $2796.86 and the fortnightly repayment is $1404.76.

What is the difference in the total interest paid using the two different methods of repayment, to the nearest dollar?

A. $51 596
B. $166 823
C. $210 000
D. $234 936

3. Financial Maths, STD2 F1 2013 HSC 3 MC

Luke's normal rate of pay is $24.80 per hour. In one week he worked 14 hours at the normal rate, 4 hours at time-and-a-half, and 3 .5 hours at double time. He was also paid a wet weather allowance of $50 for the week.

What was his pay for the week?

A. $583.20
B. $620.40
C. $669.60
D. $719.60

4. Financial Maths, STD2 F1 2013 HSC 9 MC

Lynne invests $1000 for a term of 15 months. Simple interest is paid on the investment at a rate of 3.75% per annum.

How much will Lynne's investment be worth at the end of the term?

A. $1046.88

B. $1047.09

C. $1296.88

D. $1468.75

---

5. Financial Maths, STD2 F4 2005 HSC 10 MC

The table is used to calculate monthly loan repayments.

Monthly loan repayments (in dollars) per $1000 borrowed

Interest rate % pa	*5 years*	*10 years*	*15 years*	*20 years*
5%	18.87	10.61	7.91	6.60
6%	19.33	11.10	8.44	7.16
7%	19.80	11.61	8.99	7.75
8%	20.28	12.13	9.56	8.36
9%	20.76	12.67	10.14	9.00

Samantha has borrowed $70 000 at 8% per annum for 15 years.

What is her monthly loan repayment?

A. $143.40

B. $669.20

C. $8030.40

D. $10 038.00

---

6. Financial Maths, STD2 F4 2022 HSC 11 MC

In ten years, the future value of an investment will be $150 000. The interest rate is 4% per annum, compounded half-yearly.

Which equation will give the present value (PV) of the investment?

A. $PV = \dfrac{150\ 000}{(1+0.04)^{10}}$

B. $PV = \dfrac{150\ 000}{(1+0.04)^{20}}$

C. $PV = \dfrac{150\ 000}{(1+0.02)^{10}}$

D. $PV = \dfrac{150\ 000}{(1+0.02)^{20}}$

---

7. Financial Maths, STD2 F4 2023 HSC 10 MC

An amount of $25 000 is invested for six years. Interest is earned at a rate of 8% per annum, compounding quarterly.

Which expression gives the value of the investment after 6 years, in dollars?

A. $25\ 000 \times 1.02^{24}$

B. $25\ 000 \times 1.02^{6}$

C. $25\ 000 \times 1.08^{24}$

D. $25\ 000 \times 1.08^{6}$

---

8. Financial Maths, STD2 F1 2017 HSC 11 MC

A new car was bought for $19 900 and one year later its value had depreciated to $16 300.

What is the approximate depreciation, expressed as a percentage of the purchase price?

A. 18%

B. 22%

C. 78%

D. 82%

---

9. Financial Maths, STD2 F5 2014 HSC 21 MC

A table of future value interest factors is shown.

Table of future value interest factors

Period	*Interest rate per period*				
	1%	*2%*	*3%*	*4%*	*5%*
1	1.0000	1.0000	1.0000	1.0000	1.0000
2	2.0100	2.0200	2.0300	2.0400	2.0500
3	3.0301	3.0604	3.0909	3.1216	3.1525
4	4.0604	4.1216	4.1836	4.2465	4.3101

A certain annuity involves making equal contributions of $25 000 into an account every 6 months for 2 years at an interest rate of 4% per annum.

Based on the information provided, what is the future value of this annuity?

A. $50 500

B. $51 000

C. $103 040

D. $106 162

---

10. Financial Maths, STD2 F1 2011 HSC 19 MC

Simon is a mechanic who receives a normal rate of pay of $22.35 per hour for a 40-hour week.

When he is needed for emergency call-outs he is paid a special allowance of $150 for that week. Additionally, every time he is called out to an emergency he is paid for a minimum of 4 hours at double time.

In the week beginning 2 February, 2011 Simon worked 40 hours normal time and was needed for emergency call-outs. His emergency call-out log book for the week is shown.

Employee: Simon
Week: 2/2/11 to 8/2/11

Date	*Duration of call-out*
3/2/11	5 hours
5/2/11	1.5 hours

What was Simon's total pay for that week?

A. $1189.28

B. $1296.30

C. $1334.55

D. $1446.30

---

11. Financial Maths, STD2 F4 2016 HSC 17 MC

Ariana is charged compound interest at the rate of 0.036% per day on outstanding credit card balances. She has $780 outstanding for 24 days.

How much compound interest is she charged?

A. $6.74

B. $6.77

C. $786.74

D. $786.77

---

12. Financial Maths, STD2 F1 2018 HSC 8 MC

A nanny charges $15 per hour, or part thereof, for looking after a child.

What does the nanny charge for looking after a child from 8 am until 3.20 pm on a particular day?

A. $105
B. $108
C. $110
D. $120

13. Financial Maths, STD2 F4 2018 HSC 19 MC

The table shows the compounded values of $1 at different interest rates over different periods.

Compounded values of $1

Number of periods	*Interest rate per period*				
	1%	2%	3%	4%	5%
2	1.0201	1.0404	1.0609	1.0816	1.1025
4	1.0406	1.0824	1.1255	1.1699	1.2155
6	1.0615	1.1262	1.1941	1.2653	1.3401
8	1.0829	1.1717	1.2668	1.3686	1.4775
10	1.1046	1.2190	1.3439	1.4802	1.6289
12	1.1268	1.2682	1.4258	1.6010	1.7959

Amy hopes to have $21 000 in 2 years to buy a car. She opens an account today which pays interest of 4% pa, compounded quarterly.

Using the table, which expression calculates the minimum single sum that Amy needs to invest today to ensure she reaches her savings goal?

A. 21 000 × 1.0816
B. 21 000 ÷ 1.0816
C. 21 000 × 1.0829
D. 21 000 ÷ 1.0829

14. Financial Maths, STD2 F5 2020 HSC 14 MC

An annuity consists of ten payments, each equal to $1000. Each payment is made on 30 June each year from 2021 through to 2030 inclusive.

The rate of compound interest is 5% per annum.

The present value of the annuity is calculated at 30 June 2020.

The future value of the annuity is calculated at 30 June 2030.

Without performing any calculations, which of the following statements is true?

A. Present value of the annuity < $10 000 < future value of the annuity
B. $10 000 < present value of the annuity < future value of the annuity
C. Future value of the annuity < $10 000 < present value of the annuity
D. $10 000 < future value of the annuity < present value of the annuity

15. Financial Maths, STD2 F1 2023 HSC 6 MC

An item was purchased for a price of $880, including 10% GST.

What is the amount of GST included in the price?

A. $8.00
B. $8.80
C. $80.00
D. $88.00

16. Financial Maths, STD2 F4 2020 HSC 11 MC

An asset is depreciated using the declining-balance method with a rate of depreciation of 8% per half year. The asset was bought for $10 000.

What is the salvage value of the asset after 5 years?

A. $1749.01
B. $4182.12
C. $4343.88
D. $6590.82

17. Financial Maths, STD2 F1 2019 HSC 9 MC

What is the interest earned, in dollars, if \$800 is invested for x months at a simple interest rate of 3% per annum?

A. $2x$

B. $24x$

C. $200x$

D. $2400x$

---

18. Financial Maths, STD2 F1 2022 HSC 21

A real estate agent's commission for selling houses is 2% for the first \$800 000 of the sale price and 1.5% for any amount over \$800 000.

Calculate the commission earned in selling a house for \$1 500 000. *(2 marks)*

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19. Financial Maths, STD2 F1 2023 HSC 37

The table shows personal income tax rates for different taxable incomes for a particular country.

Taxable income	*Tax payable*
\$0 – \$11 000	Nil
\$11 001 – \$42 400	20 cents for each \$1 over \$11 000
\$42 401 – \$78 800	\$6280 plus 33 cents for each \$1 over \$42 400
\$78 801 – \$108 400	\$18 292 plus X cents for each \$1 over \$78 800
\$108 401 and over	\$31 316 plus 48 cents for each \$1 over \$108 400

A person with a taxable income of \$90 000 pays 25.8% of that income in tax (excluding any levies).

What is the value of X in the table? *(3 marks)*

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20. Financial Maths, STD2 F4 2023 HSC 28

A plumber leases equipment which is valued at $60 000.

The salvage value of the equipment at any time can be calculated using either of the two methods of depreciation shown in the table.

Method of depreciation	*Rate of depreciation*
Straight-line method	$3500 per annum
Declining balance method	12% per annum

Under which method of depreciation would the salvage value of the equipment be lower at the end of 3 years? Justify your answer with appropriate mathematical calculations. *(3 marks)*

21. Financial Maths, STD2 F4 2008 HSC 27c

A plasma TV depreciated in value by 15% per annum. Two years after it was purchased it had depreciated to a value of $2023, using the declining balance method.

What was the purchase price of the plasma TV? *(2 marks)*

22. Financial Maths, STD2 F4 2021 HSC 26

Nina plans to invest $35 000 for 1 year. She is offered two different investment options.

Option *A*: Interest is paid at 6% per annum compounded monthly.

Option *B*: Interest is paid at r % per annum simple interest.

a. Calculate the future value of Nina's investment after 1 year if she chooses Option *A*. *(2 marks)*

b. Find the value of r in Option B that would give Nina the same future value after 1 year as for Option A. Give your answer correct to two decimal places. *(2 marks)*

23. Financial Maths, STD2 F5 2020 HSC 34

Tina inherits $60 000 and invests it in an account earning interest at a rate of 0.5% per month. Each month, immediately after the interest has been paid, Tina withdraws $800.

The amount in the account immediately after the nth withdrawal can be determined using the recurrence relation

$$A_n = A_{n-1}(1.005) - 800,$$

where $n = 1, 2, 3, \ldots$ and $A_0 = 60\ 000$

a. Use the recurrence relation to find the amount of money in the account immediately after the third withdrawal. *(2 marks)*

b. Calculate the amount of interest earned in the first three months. *(2 marks)*

24. Financial Maths, STD2 F5 2022 HSC 25

The table shows the future value of an annuity of $1.

Future values of an annuity of $1

YEARS	INTEREST RATE PER ANNUM			
	1%	*2%*	*3%*	*4%*
4	4.060	4.122	4.184	4.246
5	5.101	5.204	5.309	5.416
6	6.152	6.308	6.468	6.633

Zal is saving for a trip and estimates he will need $15 000. He opens an account earning 3% per annum, compounded annually.

a. How much does Zal need to deposit every year if he wishes to have enough money for the trip in 4 years time? *(2 marks)*

b. How much interest will Zal earn on his investment over the 4 years? Give your answer to the nearest dollar. *(2 marks)*

25. Financial Maths, STD2 F4 2014 HSC 30a

Chandra and Sascha plan to have $20 000 in an investment account in 15 years time for their grandchild's university fees.

The interest rate for the investment account will be fixed at 3% per annum compounded monthly.

Calculate the amount that they will need to deposit into the account now in order to achieve their plan. ***(3 marks)***

26. Financial Maths, STD2 F4 2010 HSC 25b

William wants to buy a car. He takes out a loan for $28 000 at 7% per annum interest for four years.

Monthly repayments for loans at different interest rates are shown in the spreadsheet.

	A	B	C	D	E
1		Monthly repayments			
2		Term of loan (in months)		48	
3					
4	Amount	Interest rate p.a.			
5	borrowed	6%	7%	8%	9%
6	$27 000	$634.10	$646.55	$659.15	$671.90
7	$27 500	$645.84	$658.52	$671.36	$684.34
8	$28 000	$657.58	$670.49	$683.56	$696.78
9	$28 500	$669.32	$682.47	$695.77	$709.22
10	$29 000	$681.07	$694.44	$707.97	$721.67
11	$29 500	$692.81	$706.41	$720.18	$734.11
12	$30 000	$704.55	$718.39	$732.39	$746.55

Sheet 1 Sheet 2

How much interest does William pay over the term of this loan? ***(2 marks)***

27. Financial Maths, STD2 F1 2013 HSC 27b

The table shows the tax payable to the Australian Taxation Office for different taxable incomes.

Taxable income	*Tax on this income*
$0 – $18 200	Nil
$18 201 – $37 000	19c for each $1 over $18 200
$37 001 – $80 000	$3572 plus 32.5c for each $1 over $37 000
$80 001 – $180 000	$17 547 plus 37c for each $1 over $80 000
$180 001 and over	$54 547 plus 45c for each $1 over $180 000

Peta has a gross annual salary of $84 000. She has tax deductions of $1000 for work-related travel and $500 for stationery. The Medicare levy that she pays is calculated at 1.5% of her taxable income.

Peta has already paid $18 500 in tax.

Will Peta receive a tax refund or will she owe money to the Australian Taxation Office? Justify your answer by calculating the refund or amount owed. ***(4 marks)***

28. Financial Maths, STD2 F1 SM-Bank 1

Ralph buys a utility vehicle with a market value of $63 500.

Stamp duty is calculated on the vehicle as follows:

- 3% of market value up to $45 000
- 5% of market value over $45 000

Calculate the amount of stamp duty payable by Ralph. ***(2 marks)***

29. Financial Maths, STD2 F1 2019 HSC 29

Part of a supermarket receipt is shown.

SUPERMARKET

RECEIPT

Date: 22/09/2019

Description	$
*Chocolates 300 g	A
Tomatoes 1 kg	5.00
Natural almonds 400 g	B
Cheese slices 500 g	8.50
Milk 2 L	3.20
Bananas 570 g	2.85
Total for 6 items	**36.25**
GST included in total	0.70

*GST of 10% is included in the price of item.

Determine the missing values, A and B, to complete the receipt. *(2 marks)*

30. Financial Maths, STD2 F1 2023 HSC 30

A receipt from a supermarket shows a total of $124.87. The GST shown on the receipt is $3.86.

GST, at a rate of 10%, is only charged on some items.

What was the value of the items which did NOT have GST charged? *(3 marks)*

31. Financial Maths, STD2 F4 2019 HSC 27

Ashley has a credit card with the following conditions:

- There is no interest-free period.
- Interest is charged at the end of each month at 18.25% per annum, compounding daily, from the purchase date (included) to the last day of the month (included).

Ashley's credit card statement for April is shown, with some figures missing.

1 April to 30 April

Date	Details	Amount ($)
1 April	Opening balance	0
20 April	Furniture	3700
30 April	Interest charged	***
30 April	Closing balance	***

Minimum payment: ☐

The minimum payment is calculated as 2% of the closing balance on 30 April.

Calculate the minimum payment. ***(3 marks)***

32. Financial Maths, STD2 F4 2020 HSC 29

Jana owns a share portfolio. Details of her share portfolio at 30 June 2020 are given in the table.

Company name	*Numbers of shares in Jana's portfolio*	*Dividend yield (per annum)*	*Market price per share*
ABC	200	6.0 %	$5.50
XYZ	?	4.0 %	$6.00

Jana received a total annual dividend of $149.52 from her share portfolio.

Calculate the number of shares Jana has in company ***XYZ*** on 30 June 2020. ***(3 marks)***

33. Financial Maths, STD2 F4 2023 HSC 32

Ali has a credit card which has no interest-free period. Interest is charged at 13.5% per annum, compounding daily, on the amount owing.

During the month, Ali made only one purchase of $450 using the credit card. The full amount owing was repaid 21 days later.

a. Calculate the amount of interest charged on the purchase, assuming that interest is charged for the 21 days. ***(2 marks)***

b. What percentage of the full amount repaid is the interest? Give the answer to two decimal places. ***(2 marks)***

34. Financial Maths, STD2 F5 2021 HSC 21

Julie invests $12 500 in a savings account. Interest is paid at a fixed monthly rate. At the end of each month, after the monthly interest is added, Julie makes a deposit of $500.

Julie has created a spreadsheet to show the activity in her savings account. The details for the first 6 months are shown.

Month	*Amount in account at beginning of month*	*Monthly interest*	*Deposit*	*Amount in account at end of month*
1	12 500.00	18.75	500	13 018.75
2	13 018.75	19.53	500	13 538.28
3	13 538.28	20.31	500	14 058.59
4	14 058.59	21.09	500	14 579.68
5	14 579.68	21.87	500	15 101.55
6	15 101.55	22.65	500	15 624.20
7			500	

By finding the monthly rate of interest, complete the final row above for the 7th month. ***(3 marks)***

35. Financial Maths, STD2 F5 2021 HSC 31

Present value interest factors for an annuity of $1 for various interest rates (r) and numbers of periods (N) are given in the table.

Table of present value interest factors

N \ r	*Interest rate per period as a decimal*			
	0.001	0.00125	0.0015	0.00175
300	259.07072	250.03980	241.43789	233.24180
330	280.95771	270.26900	260.13532	250.52386
360	302.19816	289.75411	278.01062	266.92278

A bank lends Martina $500 000 to purchase a home, with interest charged at 1.5% per annum compounding monthly. She agrees to repay the loan by making equal monthly repayments over a 30-year period.

How much should the monthly payment be in order to pay off the loan in 30 years?

Give your answer correct to the nearest cent. ***(2 marks)***

36. Financial Maths, STD2 F5 2022 HSC 30

Eli is choosing between two investment options.

Option 1: Depositing a single amount of $40 000 today, earning interest of 1.2% per annum, compounded monthly.

Option 2: Depositing $1000 at the end of each quarter, earning interest of 2.4% per annum, compounded quarterly.

A table of future value interest factors for an annuity of $1 is shown.

N \ r	*Interest rate per period as a decimal*					
	0.002	0.006	0.020	0.024	0.060	0.240
10	10.09048	10.27437	10.94972	11.15211	13.18079	31.64344
20	20.38460	21.18211	24.29737	25.28909	36.78559	303.60062
30	30.88646	32.76227	40.56808	43.20983	79.05819	2640.91639
40	41.60026	45.05630	60.40198	65.92708	154.76197	22 728.80260

a. What is the value of Eli's investment after 10 years using Option 1 ? ***(2 marks)***

b. What is the difference between the future values after 10 years using Option 1 and Option 2? ***(2 marks)***

37. Financial Maths, STD2 F1 2016 HSC 27a

Alice intends to buy a car and insure it.

Briefly describe what each of these types of insurance covers:

- Compulsory third-party insurance (CTP)
- Non-compulsory third-party property insurance. *(2 marks)*

38. Financial Maths, STD2 F4 2013 HSC 28d

Adhele has 2000 shares. The current share price is $1.50 per share. Adhele is paid a dividend of $0.30 per share.

i. What is the current value of her shares? *(1 mark)*

ii. Calculate the dividend yield. *(1 mark)*

39. Financial Maths, STD2 F4 2022 HSC 36

Frankie borrows $200 000 from a bank. The loan is to be repaid over 23 years at a rate of 7.2% per annum, compounded monthly. The repayments have been set at $1485 per month.

The interest charged and the balance owing for the first three months of the loan are shown in the spreadsheet below.

Month	*Principal (at start of month)*	*Interest charged*	*Monthly repayment*	*Balance (at end of month)*
1	$200 000	$1200	$1485	$199 715
2	$199 715	$\boldsymbol{A}$	$1485	$199 428.29
3	$199 428.29	$1196.57	$1485	$\boldsymbol{B}$

a. What are the values of $\boldsymbol{A}$ and $\boldsymbol{B}$? *(2 marks)*

b. After 50 months of repaying the loan, Frankie decides to make a lump sum payment of $ 40 000 and to continue making the monthly repayments of $1485. The loan will then be fully repaid after a further 146 monthly repayments.

How much less will Frankie pay overall by making the lump sum payment? *(3 marks)*

40. Financial Maths, STD2 F4 2023 HSC 29

The table shows monthly repayments for each $1000 borrowed.

Monthly repayment table

Principal and Interest per $1000 borrowed

Interest rate (per annum)	*Term of loan* (years)					
	5	10	15	20	25	30
6.5%	19.57	11.35	8.71	7.46	6.75	6.32
7.0%	19.80	11.61	8.99	7.75	7.07	6.65
7.5%	20.04	11.87	9.27	8.06	7.39	6.99
8.0%	20.28	12.13	9.56	8.36	7.72	7.34

a. A couple borrows $520 000 to buy a house at 8% per annum over 25 years.

How much does the couple repay in total for this loan? ***(3 marks)***

b. Chris borrows some money at 7% per annum. Chris will repay the loan over 15 years, paying $3596 per month.

How much money does Chris borrow? ***(1 mark)***

41. Financial Maths, STD2 F5 2020 HSC 37

Wilma deposited a lump sum into a new bank account which earns 2% per annum compound interest.

Present value interest factors for an annuity of $1 for various interest rates (***r***) and numbers of periods (***N***) are given in the table.

Table of present value interest factors

r / *N*	*Interest rate per period as decimal*			
	0.01	0.015	0.02	0.025
10	9.471	9.222	8.983	8.752
20	18.046	17.169	16.351	15.589
30	25.808	24.016	22.396	20.930

Wilma was able to make the following withdrawals from this account.

- $1000 at the end of each year for twenty years (starting one year after the account is opened)
- $3000 each year for ten years starting 21 years after the account is opened.

Calculate the minimum lump sum Wilma must have deposited when she opened the new account. ***(3 marks)***

Worked Solutions

1. Financial Maths, STD2 F1 2023 HSC 4 MC

$$\begin{aligned}\text{Depreciation} &= 0.22 \times 132\ 600 \\ &= \$29\ 172\end{aligned}$$

$$\begin{aligned}\text{Truck value} &= 65\ 000 - 29\ 172 \\ &= \$35\ 828\end{aligned}$$

$\Rightarrow A$

---

2. Financial Maths, STD2 F4 2012 HSC 24 MC

$$\text{Monthly repayment} = \$2796.86$$

$$\begin{aligned}\#\text{ Repayments} &= 30 \times 12 = 360 \\ \text{Total repaid} &= 360 \times 2796.86 \\ &= \$1\ 006\ 869.60 \\ \text{Total interest} &= 1\ 006\ 869.60 - 400\ 000 \\ &= \$606\ 869.60\end{aligned}$$

$$\begin{aligned}\text{Fortnightly payment} &= \$1404.76 \\ \#\text{ Repayments} &= 23 \times 26 = 598 \\ \text{Total repaid} &= 598 \times 1404.76 \\ &= \$840\ 046.48 \\ \text{Total interest} &= 840\ 046.48 - 400\ 000 \\ &= \$440\ 046.48\end{aligned}$$

$$\begin{aligned}\therefore\ \text{Difference in interest} &= 606\ 869.60 - 440\ 046.48 \\ &= \$166\ 823 \quad \text{(nearest dollar)}\end{aligned}$$

$\Rightarrow B$

---

3. Financial Maths, STD2 F1 2013 HSC 3 MC

$$\begin{aligned}\text{Pay} &= (14 \times 24.80) + (4 \times 1.5 \times 24.80) + (3.5 \times 2 \times 24.80) + 50 \\ &= 347.20 + 148.80 + 173.60 + 50 \\ &= \$719.60\end{aligned}$$

$\Rightarrow D$

---

4. Financial Maths, STD2 F1 2013 HSC 9 MC

$$I = Prn = 1000 \times \frac{3.75}{100} \times \frac{15}{12} = \$46.88$$

$$\therefore\ \text{Investment worth} = 1000 + 46.88 = \$1046.88$$

$\Rightarrow A$

---

5. Financial Maths, STD2 F4 2005 HSC 10 MC

$$\begin{aligned}&\text{Monthly repayment of \$1000 at 8\% for 15 years} \\ &= \$9.56\end{aligned}$$

$$\begin{aligned}\therefore\ &\text{Monthly repayment of \$70 000} \\ &= 70 \times \$9.56 \\ &= \$669.20\end{aligned}$$

$\Rightarrow B$

---

6. Financial Maths, STD2 F4 2022 HSC 11 MC

$$\text{Compounding periods} = 10 \times 2 = 20$$

$$\text{Compounding rate} = \frac{4\%}{2} = 2\% = 0.02$$

$$PV = \frac{150\ 000}{(1 + 0.02)^{20}}$$

$\Rightarrow D$

---

7. Financial Maths, STD2 F4 2023 HSC 10 MC

$$\text{Interest rate } = \frac{8}{2} = 2\% \text{ per quarter}$$

$$\text{Compounding periods } = 6 \times 4 = 24$$

$$\therefore FV = 25\ 000 \times 1.02^{24}$$

$$\Rightarrow A$$

---

8. Financial Maths, STD2 F1 2017 HSC 11 MC

$$\text{Net Depreciation} = 19\ 900 - 16\ 300$$
$$= \$3600$$

$$\therefore \%\ \text{Depreciation} = \frac{3600}{19\ 900} \times 100$$
$$= 18.09\ldots\%$$

$$\Rightarrow A$$

---

9. Financial Maths, STD2 F5 2014 HSC 21 MC

♦ *Mean mark 43%*

4 contributions of \$25 000 made.

Annuity period = 6 months

$$\text{Rate (per annuity period)} = \frac{4\%}{2} = 2\%$$

$$\#\ \text{Periods} = 4 \quad (4 \text{ x } 6 \text{ months} = 2 \text{ years})$$

Table value = 4.1216

$$\therefore\ \text{Annuity Value} = 4.1216 \times 25\ 000 = \$103\ 040$$

$$\Rightarrow\ C$$

---

10. Financial Maths, STD2 F1 2011 HSC 19 MC

♦ *Mean mark 41%*
COMMENT: To reduce errors, calculate each element of pay separately in your working and then add up the total, as per the Worked Solution.

$$\text{Normal pay} = 40 \times 22.35$$
$$= 894.00$$

$$\text{Special Allowance} = 150.00$$

$$\text{Emergency Calls} = (5 \times 2 \times 22.35) + (4 \times 2 \times 22.35)$$
$$= 223.50 + 178.80$$
$$= 402.30$$

$$\text{Total Weekly Pay} = 894.00 + 150.00 + 402.30$$
$$= 1446.30$$

$$\Rightarrow D$$

---

11. Financial Maths, STD2 F4 2016 HSC 17 MC

♦ *Mean mark 38%.*
COMMENT: Credit card problems consistently produce sub-50% mean marks. Important review area.

Total owing

$$= P(1 + r)^n$$
$$= 780\left(1 + \frac{0.036}{100}\right)^{24}$$
$$= 786.77$$

$\therefore$ Interest charged

$$= 786.77 - 780$$
$$= \$6.77$$

$$\Rightarrow B$$

---

12. Financial Maths, STD2 F1 2018 HSC 8 MC

8 am – 3:20 pm = 7 hrs 20 mins

Since part of an hour is charged as a full hour,

$\therefore$ Charge $= 8 \times 15$

$= \$120$

$\Rightarrow$ D

---

13. Financial Maths, STD2 F4 2018 HSC 19 MC

4% annual

$\Rightarrow \frac{4\%}{4} = 1\%$ compounded quarterly

♦♦ *Mean mark 33%.*

$\Rightarrow n = 8$

$\Rightarrow$ Factor $= 1.0829$

$\therefore$ Minimum sum $= 21\ 000 \div 1.0829$

$\Rightarrow$ D

---

14. Financial Maths, STD2 F5 2020 HSC 14 MC

Mean mark 53%.

PV (30 June 2020) $< \$10\ 000$ (each payment discounted to 30-Jun-20 value)

FV (30 June 2030) $\Rightarrow$ annuity has received $10 \times \$1000$

payments plus interest

$\therefore$ FV (30 June 2030) $> \$10\ 000$

$\Rightarrow A$

---

15. Financial Maths, STD2 F1 2023 HSC 6 MC

Let $C =$ Original cost

♦ Mean mark 41%.

$C + 0.1 \times C = 880$

$1.1C = 880$

$C = \frac{880}{1.1}$

$= \$800$

$\therefore$ GST $= 800 \times 0.1 = \$80$

$\Rightarrow C$

---

16. Financial Maths, STD2 F4 2020 HSC 11 MC

$V_0 = 10\ 000$, $r = 0.08$, $n = 10$

$S = V_0(1-r)^n$

$= 10\ 000(1-0.08)^{10}$

$= 10\ 000(0.92)^{10}$

$= \$4343.88$

$\Rightarrow C$

♦ *Mean mark 43%.*
COMMENT: 8% depreciation is applicable every 6 months here (n=10). Read carefully!

---

17. Financial Maths, STD2 F1 2019 HSC 9 MC

Interest $= 800 \times \frac{x}{12} \times \frac{3}{100}$

$= 2x$

$\Rightarrow A$

♦♦♦ *Mean mark 20%!*

---

18. Financial Maths, STD2 F1 2022 HSC 21

$$\begin{aligned}\text{Commission} &= 800\ 000 \times 2\% + (1\ 500\ 000 - 800\ 000) \times 1.5\% \\ &= 800\ 000 \times 0.02 + 700\ 000 \times 0.015 \\ &= 16\ 000 + 10\ 500 \\ &= \$26\ 500\end{aligned}$$

19. Financial Maths, STD2 F1 2023 HSC 37

$\text{Tax paid } = 90\ 000 \times 0.258 = \$23\ 220$

Equating with tax payable formula in the table:

$$\begin{aligned}23\ 220 &= 18\ 292 + X(90\ 000 - 78\ 800) \\ X(11\ 200) &= 23\ 220 - 18\ 292 \\ X &= \frac{4928}{11\ 200} \\ &= 0.44 \text{ dollars} \\ &= 44 \text{ cents}\end{aligned}$$

20. Financial Maths, STD2 F4 2023 HSC 28

Straight-line method:

$$\begin{aligned}S &= V_0 - Dn \\ &= 60\ 000 - 3500 \times 3 \\ &= \$49\ 500\end{aligned}$$

Declining-balance method:

$$\begin{aligned}S &= V_0(1-r)^n \\ &= 60\ 000(1-0.12)^3 \\ &= 60\ 000(0.88)^3 \\ &= \$40\ 888.32\end{aligned}$$

Salvage value is lower for the declining-balance method.

21. Financial Maths, STD2 F4 2008 HSC 27c

$$\begin{aligned}S &= V_0(1-r)^n \\ 2023 &= V_0(1-0.15)^2 \\ 2023 &= V_0(0.85)^2 \\ V_0 &= \frac{2023}{0.85^2} \\ &= 2800\end{aligned}$$

$\therefore$ The purchase price $= \$2800$

22. Financial Maths, STD2 F4 2021 HSC 26

a. $r = \dfrac{6\%}{12} = 0.5\% = 0.005$ per month

$n = 12$

$$\begin{aligned}FV &= PV(1+r)^n \\ &= 35\ 000(1+0.005)^{12} \\ &= \$37\ 158.72\end{aligned}$$

b. $I = Prn$

$2158.72 = 35\ 000 \times r \times 1$

$$\begin{aligned}r &= \frac{2158.72}{35\ 000} \\ &= 0.06167\ldots \\ &= 6.17\% \text{ (to 2 d.p.)}\end{aligned}$$

♦♦ *Mean mark part (b) 36%.*

23. Financial Maths, STD2 F5 2020 HSC 34

a. $A_1 = 60\ 000(1.005) - 800 = \$59\ 500$

$A_2 = 59\ 500(1.005) - 800 = \$58\ 997.50$

$A_3 = 58\ 997.50(1.005) - 800 = \$58\ 492.49$

♦ *Mean mark part (a) 41%.*

b. Amount (not interest)

$= 60\ 000 - (3 \times 800)$

$= \$57\ 600$

♦♦ *Mean mark part (b) 33%.*

$\therefore$ Interest earned in 3 months

$= A_3 - 57\ 600$

$= 58\ 492.49 - 57\ 600$

$= \$892.49$

---

24. Financial Maths, STD2 F5 2022 HSC 25

a. Using the table: $r = 3\%, \quad n = 4$

Annuity factor $= 4.184$

Let $A =$ amount invested each year

$FV = A \times 4.184$

$15\ 000 = A \times 4.184$

$\therefore A = \dfrac{15\ 000}{4.184}$

$= \$3585.09$

b. Total payments $= 4 \times 3585.09 = \$14\ 340.36$

Interest earned $= FV -$ total payments

$= 15\ 000 - 14\ 340.36$

$= 659.64$

$= \$660 \quad (\text{nearest } \$)$

♦♦ Mean mark 33%.

---

25. Financial Maths, STD2 F4 2014 HSC 30a

$FV = \$20\ 000, \quad n = 15 \times 12 = 180,$

$r = \dfrac{0.03}{12} = 0.0025$

♦ *Mean mark 49%*

$FV = PV(1 + r)^n$

$20\ 000 = PV(1 + 0.0025)^{180}$

$PV = \dfrac{20\ 000}{(1.0025)^{180}}$

$= 12\ 759.73\ldots$

$\therefore$ They need to deposit $\$12\ 760$ (nearest \$)

---

26. Financial Maths, STD2 F4 2010 HSC 25b

Loan $= \$28\ 000, \quad r = 7\%$ p.a.

Monthly repayment $= \$670.49$

Repayments $= 4 \times 12 = 48$

Total repaid $= 48 \times 670.49$

$= \$32\ 183.52$

$\therefore$ Interest paid $= 32\ 183.52 - 28\ 000$

$= \$4183.52$

♦ *Mean mark 42%*
MARKER'S COMMENT: An incorrect table value used correctly in the following calculations received half-marks here. *Show your working!*

---

27. Financial Maths, STD2 F1 2013 HSC 27b

$$\begin{aligned}\text{Total Deductions} &= 1000 + 500 \\ &= \$1500 \\ \text{Taxable Income} &= \text{Gross Income} - \text{Total Deductions} \\ &= 84\,000 - 1500 \\ &= \$82\,500\end{aligned}$$

Using the tax table:

$$\begin{aligned}\text{Tax} &= 17\,547 + 0.37 \times (82\,500 - 80\,000) \\ &= 17\,547 + 925 \\ &= \$18\,472\end{aligned}$$

♦ *Mean mark 44%*
IMPORTANT: Note that 'Tax' and the 'Medicare Levy' are calculated ***separately*** using the 'Taxable Income' figure and added together to find the amount owed to the ATO.

$$\begin{aligned}\text{Medicare owing} &= 1.5\% \times 82\,500 \\ &= \$1237.50\end{aligned}$$

$$\begin{aligned}\text{Owed to ATO} &= 18\,472 + 1237.50 \\ &= \$19\,709.50\end{aligned}$$

$$\text{Tax paid} = \$18\,500$$

$$\begin{aligned}\text{Difference owing} &= 19\,709.50 - 18\,500 \\ &= \$1209.50\end{aligned}$$

$\therefore$ Peta owes the tax office \$1209.50.

---

28. Financial Maths, STD2 F1 SM-Bank 1

$$\begin{aligned}\text{Stamp Duty} &= 3\% \times 45\,000 + 5\% \times (63\,500 - 45\,000) \\ &= 3\% \times 45\,000 + 5\% \times 18\,500 \\ &= \$2275\end{aligned}$$

---

29. Financial Maths, STD2 F1 2019 HSC 29

Chocolate is the only item where GST applies.

$$\text{GST on chocolate} = 0.70$$

♦♦ *Mean mark 25%.*

$$\Rightarrow \text{Cost of chocolate} = \$7.00$$

$$\therefore A = 7.00 + 0.70 = \$7.70$$

$$\begin{aligned}\therefore B &= 36.25 - (7.70 + 5.00 + 8.50 + 3.20 + 2.85) \\ &= \$9.00\end{aligned}$$

---

30. Financial Maths, STD2 F1 2023 HSC 30

Let $X =$ cost of goods that attract GST (before GST added)

♦ Mean mark 46%.

$$10\,\% \times X = 3.86$$

$$X = \$38.60 \quad \text{(before GST added)}$$

$$\begin{aligned}\text{Items with no GST} &= 124.87 - 38.60 - 3.86 \\ &= \$82.41\end{aligned}$$

---

31. Financial Maths, STD2 F4 2019 HSC 27

$$\begin{aligned}\text{Daily interest} &= \frac{18.25}{100 \times 365} \\ &= 0.0005\end{aligned}$$

$$\begin{aligned}\text{Closing balance} &= 3700(1.0005)^{11} \\ &= 3720.40\end{aligned}$$

♦ *Mean mark 39%.*

$$\begin{aligned}\therefore \text{Minimum payment} &= 3720.40 \times 0.02 \\ &= \$74.408\ldots \\ &= \$74.41 \quad \text{(nearest cent)}\end{aligned}$$

---

32. Financial Maths, STD2 F4 2020 HSC 29

$$\begin{aligned} ABC \text{ Dividend} &= \text{Value of shares} \times \text{dividend yield} \\ &= (200 \times 5.5) \times 0.06 \\ &= \$66.00 \end{aligned}$$

$$\begin{aligned} XYZ \text{ Dividend} &= 149.52 – 66.00 \\ &= \$83.52 \end{aligned}$$

♦ *Mean mark 43%.*

Let $x =$ number of XYZ shares

$$83.52 = \text{Value of } XYZ \text{ shares} \times \text{dividend yield}$$

$$83.52 = (x \times 6.0) \times 0.04$$

$$6x = \frac{83.52}{0.04}$$

$$\therefore\ x = \frac{2088}{6}$$

$$= 348$$

---

33. Financial Maths, STD2 F4 2023 HSC 32

a. $\text{Daily interest rate } (r) = \dfrac{13.5}{365}\,\% = \dfrac{0.135}{365}$

♦ Mean mark (a) 45%.

$n =$ 21 days

$$FV = PV(1+r)^n$$

$$= 450\left(1 + \frac{0.135}{365}\right)^{21}$$

$$= \$453.51$$

$$\therefore\ \text{Interest charged } = 453.51 - 450 = \$3.51$$

b. $\text{Interest as \% total repaid} = \dfrac{3.51}{453.51} \times 100$

$$= 0.007739\ldots$$

$$= 0.77\,\%\ \text{(to 2 d.p.)}$$

♦ Mean mark (b) 49%.

---

34. Financial Maths, STD2 F5 2021 HSC 21

$$\text{Monthly interest rate} = \frac{18.75}{12\ 500} = 0.0015 = 0.15\%$$

♦ *Mean mark 43%.*

Row 7 calculations:

$$\text{Beginning balance} = 15\ 624.20$$

$$\begin{aligned} \text{Monthly interest} &= 15\ 624.20 \times 0.0015 \\ &= 23.44 \end{aligned}$$

$$\begin{aligned} \text{End of month balance} &= 15\ 624.20 + 23.44 + 500 \\ &= 16\ 147.64 \end{aligned}$$

---

35. Financial Maths, STD2 F5 2021 HSC 31

$$\text{Monthly interest rate } (r) = \frac{1.5}{12} = 0.125\% = 0.00125$$

$$N = 30 \times 12 = 360$$

♦ *Mean mark 43%.*

$$\Rightarrow\ \text{PV annuity factor} = 289.75411$$

$$\therefore\ \text{Monthly payment} = \frac{500\ 000}{289.75411}$$

$$= \$1725.60$$

---

36. Financial Maths, STD2 F5 2022 HSC 30

a. $\text{Monthly r/i} = \dfrac{1.2}{12} = 0.1\% \quad \Rightarrow \quad r = 0.001$

$\text{Compounding periods } (n) = 12 \times 10 = 120$

$$\begin{aligned} FV &= PV(1+r)^n \\ &= 40\ 000(1+0.001)^{120} \\ &= \$45\ 097.17 \end{aligned}$$

♦ Mean mark 48%.

b. $\text{Quarterly r/i} = \dfrac{2.4}{4} = 0.6\% \quad \Rightarrow \quad r = 0.006$

$\text{Compounding periods } (N) = 4 \times 10 = 40$

$\text{Annuity factor (from table)} = 45.05630$

$$\begin{aligned} FV &= 1000 \times 45.05630 \\ &= 45\ 056.30 \end{aligned}$$

$$\begin{aligned} \text{Difference} &= 45\ 097.17 - 45\ 056.30 \\ &= \$40.87 \end{aligned}$$

♦ Mean mark 43%.

37. Financial Maths, STD2 F1 2016 HSC 27a

CTP Insurance:

This insures a driver against liability

if their car injures or kills a person

in an accident.

Non-compulsory TP Insurance:

This insurance covers damage to

other people's property in an accident,

but does not cover the driver's own vehicle.

♦♦♦ *Mean mark 13%.*
MARKER'S COMMENT: Again, car insurance causes major issues for students.

38. Financial Maths, STD2 F4 2013 HSC 28d

i. $\#\ \text{Shares} = 2000$

$\text{Share price} = \$1.50$

$$\begin{aligned} \therefore\ \text{Current value} &= 2000 \times 1.50 \\ &= \$3000 \end{aligned}$$

ii. $\text{Dividend yield} = \dfrac{\text{Dividend}}{\text{Share price}}$

$$\begin{aligned} &= \frac{0.30}{1.50} \\ &= 20\% \end{aligned}$$

♦♦♦ *Mean mark 13%*
MARKER'S COMMENT: A *large majority* of students had a poor understanding of the term dividend yield.

39. Financial Maths, STD2 F4 2022 HSC 36

a. Monthly interest rate $= \dfrac{7.2}{12} = 0.6\%$

$$A = 199\ 715 \times \frac{0.6}{100}$$
$$= \$1198.29$$

$$B = P + I - R$$
$$= 199\ 428.29 + 1196.57 - 1485$$
$$= \$199\ 139.86$$

b. Total payments if lump sum not paid

$$= (23 \times 12) \times 1485$$
$$= \$409\ 860$$

♦♦♦ Mean mark (b) 17%.

Total payments if lump sum paid

$$= 40\ 000 + (50 + 146) \times 1485$$
$$= \$331\ 060$$

Savings by paying the lump sum

$$= 409\ 860 - 331\ 060$$
$$= \$78\ 800$$

40. Financial Maths, STD2 F4 2023 HSC 29

a. 8.0% interest over a 25 year loan

♦ Mean mark (a) 50%.

Monthly repayments to borrow \$1000 = \$7.72

Total months $= 25 \times 12 = 300$

Monthly repayments $= 520 \times 7.72$
$= \$4014.40$

$\therefore$ Total repayments $= 4014.40 \times 300$
$= \$1\ 204\ 320$

b. 7.0% interest over a 15 year loan

♦♦♦ Mean mark (b) 11%.

Monthly repayments to borrow \$1000 = \$8.99

$\therefore$ Amount borrowed $= \dfrac{3596}{8.99} \times \$1000$
$= 400\ 000$

41. Financial Maths, STD2 F5 2020 HSC 37

♦♦♦ *Mean mark 23%.*

Annuity 1: PV **of \$1000 annuity for 20 years at** $r = 0.02$

PV **factor** $= 16.351$

$$\therefore\ PV \text{ Annuity } 1 = 16.351 \times 1000$$
$$= \$16\ 351$$

Annuity 2: PV **of \$3000 annuity for years 21-30 at** $r = 0.02$

$$PV \text{ Annuity } 2 = PV(30 \text{ years}) - PV(20 \text{ years})$$
$$= 3000 \times 22.396 - 3000 \times 16.351$$
$$= \$18\ 135$$

$$\therefore\ \text{Lump sum required} = 16\ 351 + 18\ 135$$
$$= \$34\ 486$$