



Name: _____

Teacher: _____

Mathematics Standard 2 HSC

Task 1 2024-25

PREPARATION TASK

Task Number:	Weighting:	Due Date:
1	20%	Tuesday 26 th November (Term 4 Week 7)
Nature and description of the task: <p>As a result of completing this preparation activity, students should have an understanding that:</p> <ul style="list-style-type: none">Financial Mathematics involves the application of knowledge, skills and understanding of numbers to earning, spending, investing, saving and borrowing money.Knowledge of financial mathematics enables students to analyse different financial situations, to calculate the best options for given circumstances, and to solve financial problems.Study of financial mathematics is important in developing students' ability to make informed financial decisions, to be aware of the consequences of such decisions, and to manage personal financial resources effectively. <p>On Tuesday 26th November, you will:</p> <ol style="list-style-type: none">Hand in your Preparation Task at the beginning of class Period 2.Complete a 40-minute in-class Validation Task on a selection of questions similar to those in this Preparation Task. PLEASE NOTE: You will NOT have access to your Preparation Task during this time. <p>The final mark for this assessment will be determined according to the following split:</p> <p style="text-align: center;">Preparation Task: 70% Validation Task: 30%</p>		
Non-Completion of Task: <p>If you know you are going to be away on the day the Assessment Task is due and are unable to hand in Assignment on the due day, then you must have supportive documentation. <i>Zero marks will apply if the Assessment Task is submitted/completed late, unless an Illness/ Misadventure or Application for Extension form has been submitted.</i></p>		

Outcomes assessed:

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

Preparation Total Mark**/56**

Attempt Questions 1 –5.

Questions 1 to 5 – Circle the correct answer.

1 mark each

1. An interest rate of 4.8% p.a. is equivalent to which percentage per month?
 - A. 0.4%
 - B. 0.18%
 - C. 1.2%
 - D. 2.4%

2. What is the interest paid on a loan of \$300 000 with fortnightly repayments of \$741.33 over 25 years?
 - A. \$18 533.25
 - B. \$181 864.50
 - C. \$318 533.25
 - D. \$481 864.50

3. A motorbike is purchased for \$22 000. The value of the motorbike is depreciated by 12.2% each year using the declining balance method.
By how much has the motorbike depreciated by after 3 years?
 - A. \$7109.60
 - B. \$8052.00
 - C. \$12 448.90
 - D. \$14 890.40

4. A credit card has an outstanding balance of \$400, which is charged 22 days interest at a rate of 17% p.a. compounded daily.
What is the interest charged on this balance?
 - A. \$4.10
 - B. \$4.12
 - C. \$404.12
 - D. \$1496

5. The table below shows the future value of a \$1 annuity.

<i>Future value of \$1</i>							
<i>Period</i>	2%	2.5%	3%	3.5%	4%	4.5%	5%
1	1.000	1.000	1.000	1.00	1.000	1.000	1.000
2	2.020	2.025	2.030	2.035	2.040	2.045	2.050
3	3.060	3.076	3.091	3.106	3.122	3.138	3.153
4	4.122	4.153	4.184	4.215	4.246	4.277	4.310
5	5.204	5.256	5.309	5.362	5.416	5.470	5.526
6	6.308	6.388	6.468	6.55	6.633	6.716	6.802

Oscar deposits \$3600 into an investment account every 6 months over a period of 3 years. Interest is added to Oscar's account at the rate of 5% p.a., compounded biannually.

How much interest will Oscar earn on his investment ?

- A. \$550.80
- B. \$1 396.80
- C. \$12 196.80
- D. \$22 996.80

Attempt Questions 6 –21.

Show all working in the space provided.

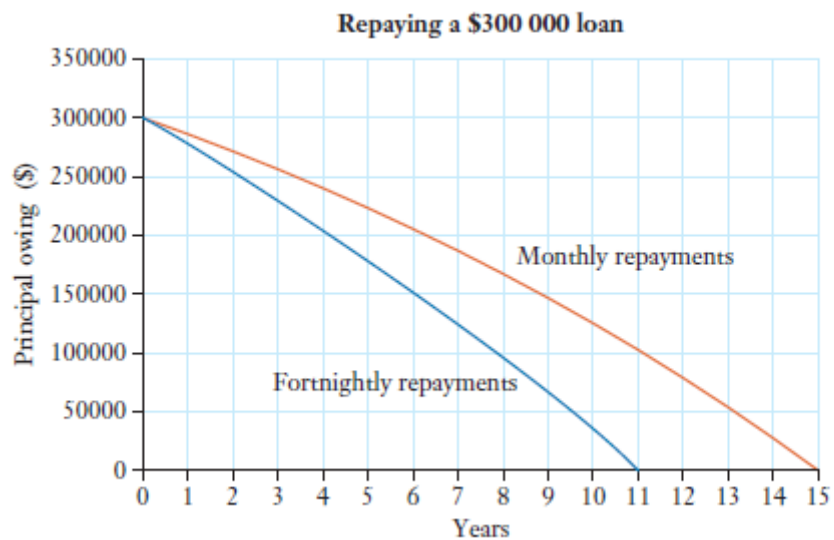
6. What is the future value of \$800 invested at 5% p.a. for 3 years? 1

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7. The graph shows the progress of a \$300 000 loan at 4.9% p.a. reducible interest over 15 years for monthly and fortnightly repayments.



- a) How much sooner can you repay the loan by making fortnightly repayments? 1

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- b) After how many years was a principal of \$100 000 owing if repayments were made:
- i. monthly? 1

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- ii. fortnightly? 1

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- c) If making fortnightly repayments, when is the loan half paid? 1

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8. What amount must be invested now at 5% per annum, compounded monthly, so that in four years' time it will have grown to \$50 000?

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9. Tom and Jerry each receive a \$75 000 inheritance and decide to invest it for seven years.
Tom invests his money at 7% p.a. simple interest.
Jerry invests his money at 6.5% p.a. compound interest, compounded biannually.
Who made a better investment, and by how much?

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10. Using technology, develop a graph to compare \$4000 compounding annually at a rate of 3.25% p.a. with \$2000 compounding annually at a rate of 6.5% p.a.

Print your graph and glue it in the space below.

When is the second option worth more as an investment than the first?

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11. The graph below shows BHP share prices:



a) What was the highest price of the shares during the period shown on the graph? **1**

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b) What was the share price on 25 October 2024? **1**

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c) On the 12 September 2024 dividends were paid out at a value of \$0.74.

i. If James was paid a total of \$414.40, how many shares did he have? **1**

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ii. If the market price of shares on this day was \$38.80, what was the dividend yield? Answer correct to two decimal places. **2**

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d) Clare purchased 200 shares on the 29 July 2024. If the brokerage fee is 2.35% what is the total cost of the shares? **2**

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12. Lisa purchased a new car two years ago for \$ 48000. During the first year, it had depreciated by 15% and during the second it had depreciated 20% of its value after first year. What is the current value of the car? **2**

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13. You are going to borrow \$500 000 to purchase an apartment at 8.9% interest to be repaid monthly over 30 years. Use the Commonwealth Bank loan repayment calculator to answer the following questions

<https://www.commbank.com.au/digital/home-buying/calculator/home-loan-repayments#>

a) What is the size of each monthly repayment? **1**

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b) After 5 years, how much have you paid off the loan? **1**

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c) How does increasing the monthly repayment by \$50 affect the term of the loan? **1**

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d) How much interest would you save if you were to make fortnightly repayments instead of monthly? **1**

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14. The table below shows the present value interest factors of an annuity with a contribution of \$1.

Present value of \$1									
Period	1.0%	1.5%	2.0%	2.5%	3.0%	3.5%	4.0%	4.5%	5.0%
1	0.9901	0.9852	0.9804	0.9756	0.9709	0.9662	0.9615	0.9569	0.9524
2	1.9704	1.9559	1.9416	1.9274	1.9135	1.8997	1.8861	1.8727	1.8594
3	2.9410	2.9122	2.8839	2.8560	2.8286	2.8016	2.7751	2.7490	2.7232
4	3.9020	3.8544	3.8077	3.7620	3.7171	3.6731	3.6299	3.5875	3.5460
5	4.8534	4.7826	4.7135	4.6458	4.5797	4.5151	4.4518	4.3900	4.3295
6	5.7955	5.6972	5.6014	5.5081	5.4172	5.3286	5.2421	5.1579	5.0757
7	6.7282	6.5982	6.4720	6.3494	6.2303	6.1145	6.0021	5.8927	5.7864
8	7.6517	7.4859	7.3255	7.1701	7.0197	6.8740	6.7327	6.5959	6.4632

Use the table to show the present value (to the nearest dollar) of the following annuities:

- a) \$7 000 for 2 years at 1.0% p.a. compounded annually. 1

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- b) \$20 000 per half-year for 2 years at 8.0% p.a. compounded biannually. 1

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15. The minimum payment for a credit card account is calculated as follows:

- \$25 or 2% of the closing balance, whichever is greater
- If the balance is less than \$25, then the minimum payment is the balance
- If the balance exceeds the limit, then the minimum payment is the exceeded amount plus 2% of the balance.

Calculate the minimum payment due for a credit card balance of \$4 850 with a \$4 000 credit limit, correct to the nearest dollar.

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16. The table below 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

Janet is saving for a trip and estimates that she needs \$3 000. She opens an account earning 4% per annum and compounded annually for 5 years.

Calculate Janet’s total savings if she contributes \$500 each year. Does she have enough for her trip?

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17. Ken borrows \$450 000 at a reducible interest rate of 12% per annum, over a term of 14 years. The repayments have been set at \$6000 per month.

The table shows the progress of the loan.

No. of months (n)	Principal (P)	Interest (I)	Repayment (R)	Balance Owing ($P + I - R$)
1	\$450 000	\$ 4 500	\$6 000	\$448 500
2	\$448 500	A	\$6 000	B

- a) Calculate the missing values in the table, **A** and **B**, for the second month. 2

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- b) After 40 months of repaying the loan, Ken makes a lump sum payment of \$50 000 and continues to make the monthly repayment of \$6 000. The loan would be fully repaid after a further 75 monthly repayments.

How much less would Ken pay overall by making the lump sum payment? 3

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18. Eleanor uses a credit card with no interest-free period and a compound interest rate of 21% p.a. from the purchased date. Interest is charged from the purchase day (included) to the last day of the month (included). During May, she makes the following transactions.

	Transaction Details	
10 May	Target	\$245.00
12 May	Chaos & Karma	\$189.00
27 May	Blue Illusion	\$220.00
	Balance payable, including interest on 31 st May	?

a) What is the daily compound interest rate, as a percentage, correct to four decimal places? **1**

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b) What is Eleanor's total outstanding balance payable, on 31st May? **4**

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19. Tahani inherits \$60 000 and invests it in an account earning interest at a rate of 0.75% per month. Immediately after the interest has been paid, Tahani withdraws \$900.

The amount in the account immediately after the n^{th} withdrawal can be determined using the recurrence relation

$$A_n = A_{n-1}(1.0075) - 900$$

Where $n = 1, 2, 3, \dots$ 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

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

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20. The table shows the present values of an annuity of \$1 for periods between 58 and 62 months, for different interest rates.

Months	Interest Rate Per Month				
	0.4%	0.5%	0.6%	0.7%	0.8%
58	51.67171	50.23911	48.86109	47.53525	46.25932
59	52.46186	50.98419	49.56370	48.19786	46.88425
60	53.24887	51.72556	50.26213	48.85587	47.50421
61	54.03274	52.46324	50.95639	49.50931	48.11926
62	54.81348	53.19726	51.64651	50.15820	48.72942

Use the table to calculate the monthly repayment needed on a loan of \$25 000 at 6% per annum to be repaid over 5 years.

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21. Michael deposited a lump sum into a bank account which earns 2.5% per annum compound interest.

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

Table of present value interest factors

$N \backslash r$	<i>Interest rate per period as a decimal</i>			
	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

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

- \$1 500 at the end of each year for 10 years (starting one year after the account opened)
- \$2 000 each year for 20 years starting 11 years after the account is opened.

Calculate the minimum lump sum Michael must have deposited when he opened the new account.

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END OF TASK