

HSC Standard Mathematics Exam Booklet:
Financial Maths

Financial Maths
Name:

1. 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. $\$ 120$
2. Tom earns a weekly wage of $\$ 1025$. He also receives an additional allowance of $\$ 87.50$ per day when handling toxic substances.
What is Tom's income in a fortnight in which he handling toxic substances on 5 separate days?
A. $\$ 1112.50$
B. $\$ 1462.50$
C. $\$ 2225.00$
D. $\$ 2487.50$
3. A single amount of $\$ 10000$ is invested for 4 years, earning interest at the rate of $3 \%$ per annum, compounded monthly.
Which expression will give the future value of the investment?
A. $10000 \times(1+0.03)^{4}$
B. $10000 \times(1+0.03)^{48}$
C. $10000 \times\left(1+\frac{0.03}{12}\right)^{4}$
D. $10000 \times\left(1+\frac{0.03}{12}\right)^{48}$
4. A company manufactures phones. The company's income equation and cost equation are drawn on the same graph.


Which region of the graph is the profit zone?
A. $W$
B. $X$
C. $Y$
D. $Z$
5. Ariana is charged compound interest at the rate of $0.036 \%$ per day on outstanding credit card balance. She has $\$ 780$ outstanding for 24 days. How much compound interest is she charged?
A. $\$ 6.74$
B. $\$ 6.77$
C. $\$ 786.74$
D. $\$ 786.77$
6. Isabella works a 35 -hour week and is paid at an hourly rate of $\$ 18$. Any overtime hours worked are paid at time-and-a-half. In a particular week, she earned \$1008.
How many hours in total did Isabella work in this week to earn this amount?
A. 37.3
B. 42
C. 49
D. 56

Financial Maths

## Name:

7. The table shows the future value of an investment of $\$ 1000$, compounding yearly, at varying interest rate for different periods of time.

Future values of an investment of $\$ 1000$

| Number <br> of years | Interest rate per annum |  |  |  |  |  |
| :--- | :---: | :---: | :---: | :---: | :---: | :---: |
|  | $1 \%$ | $2 \%$ | $3 \%$ | $4 \%$ | $5 \%$ |  |
| 1 | 1010.00 | 1020.00 | 1030.00 | 1040.00 | 1050.00 |  |
| 2 | 1020.10 | 1040.40 | 1060.90 | 1081.60 | 1102.50 |  |
| 3 | 1030.30 | 1061.21 | 1092.73 | 1124.86 | 1157.63 |  |
| 4 | 1040.60 | 1082.43 | 1125.51 | 1169.86 | 1215.51 |  |
| 5 | 1051.01 | 1104.08 | 1159.27 | 1216.65 | 1276.28 |  |

Based on the information provide, what is the future value of an investment of $\$ 2500$ over 3 years at $4 \%$ pa?
A. $\$ 1124.86$
B. $\$ 2812.15$
C. $\$ 3624.86$
D. $\$ 5312.15$
8. A piece of machinery, initially worth $\$ 56000$, depreciates at $8 \%$ per annum.

Which graph best shows the salvage value of this piece of machinery over time?


## Name:





Financial Maths

## Name:

9. A new car was bought for $\$ 19900$ and one year later its value had depreciated to \$16300.
What is the approximate depreciation, expressed as a percentage of the purchase price?
A. $18 \%$
B. $22 \%$
C. $78 \%$
D. $82 \%$
10. A camera costs $\$ 449$, including $12 \%$ GST. What is the price of the camera without GST, correct to the nearest dollar?
A. $\$ 395$
B. $\$ 401$
C. $\$ 437$
D. $\$ 503$
11. Ari borrowed $\$ 3340$ for a period of 11 months. In total he repaid $\$ 4022$. The simple interest rate per annum is:
A. $\frac{4022-3340}{3340 \times 11} \times 100 \%$
B. $\frac{3340}{4022 \times 11} \times 100 \%$
C. $\frac{12 \times(4022-3340)}{3340 \times 11} \times 100 \%$
D. $\frac{12 \times 3340}{4022 \times 11} \times 100 \%$
12. David earns a gross income of $\$ 890$ per week, $25 \%$ of this income is deducted in taxation. David budgets to save $20 \%$ of his net income.
How much does he budget to save each week?
A. $\$ 44.50$
B. $\$ 133.50$
C. $\$ 489.50$
D. $\$ 534.00$

## Financial Maths

## Name:

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

## Compounded values of $\$ 1$

| Number <br> of periods | Interest rate per period |  |  |  |  |
| :--- | :---: | :---: | :---: | :---: | :---: |
|  | $1 \%$ | $2 \%$ | $3 \%$ | $4 \%$ | $5 \%$ |
| 2 | 1.0201 | 1.040 | 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 $\$ 21000$ 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 calculate the minimum single sum that Amy needs to invest today to ensure she reaches her saving goal?
A. $21000 \times 1.0816$
B. $21000 \div 1.0816$
C. $21000 \times 1.0829$
D. $21000 \div 1.0829$
14. Jenny earns a yearly salary of $\$ 63752$. Her annual loading is $17 \frac{1}{2} \%$ of four weeks pay. Calculate her total pay for her four weeks of annual leave.

Financial Maths Name:
15. Sam purchased 500 company share at $\$ 3.20$ per share. Brokerage fees were $1.5 \%$ of the purchase price. Sam is paid a dividend of 26 cents per share, then immediately sells the share for $\$ 4.80$ each. If he pays no further brokerage fees, what is Sam's total profit?
16. A table of future value interest factors for an annuity of $\$ 1$ is shown.

| Table of future value interest factors |  |  |  |  |  |
| :--- | :---: | :---: | :---: | :---: | :---: |
| Periods | Interest rate per period |  |  |  |  |
|  | $1 \%$ | $2 \%$ | $3 \%$ | $4 \%$ | $5 \%$ |
| 3 | 3.0301 | 3.0604 | 3.0909 | 3.1216 | 3.1525 |
| 4 | 4.0604 | 4.1216 | 4.1836 | 4.2465 | 4.3101 |
| 5 | 5.1010 | 5.2040 | 5.3091 | 5.4163 | 5.5256 |
| 6 | 6.1520 | 6.3081 | 6.4684 | 6.6330 | 6.8019 |

An annuity involves contributions of $\$ 12000$ per annum for 5 years. The interest rate is $4 \%$ per annum, compounded of this annuity.
(i) Calculate the future value of this annuity.

## Financial Maths

## Name:

(ii) Calculate the interest earned on this annuity.
17. Rachel bought a motorcycle advertised for $\$ 4990$. She paid a $\$ 500$ deposit and took out a flat-rate loan to repay the balance. Simple interest was changed at a rate of $7 \%$ per annum on the amount borrowed. She repaid the loan over 2 years, making equal weekly repayment. Calculate the weekly repayment.

## Financial Maths

## Name:

18. Constantine borrows $\$ 8000$ to buy a car. The flat interest rate is $8.6 \%$ p.a. and he repays the loan in equal momthly instalments over five years.
(i) Find the amount of interest charged.
(ii) Find the total amount to be repaid.
(iii) Find the monthly repayment.

Financial Maths

## Name:

19. Calculate the divided on 3500 shares with a market price of $\$ 1.00$ per share if the dividend yield is $4.6 \%$.
20. The table below shoes the monthly repayments per $\$ 1000$ on a bank home loan.

| Term of <br> loan <br> (years) | $6.00 \%$ | $6.25 \%$ | $5.50 \%$ | $6.75 \%$ | $7.00 \%$ | $7.25 \%$ | $7.50 \%$ |
| :--- | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 5 | $\$ 19.33$ | $\$ 19.45$ | $\$ 19.57$ | $\$ 19.68$ | $\$ 19.80$ | $\$ 19.92$ | $\$ 20.04$ |
| 10 | $\$ 11.10$ | $\$ 11.23$ | $\$ 11.35$ | $\$ 11.48$ | $\$ 11.61$ | $\$ 11.74$ | $\$ 11.87$ |
| 15 | $\$ 8.44$ | $\$ 8.57$ | $\$ 8.71$ | $\$ 8.85$ | $\$ 8.99$ | $\$ 9.13$ | $\$ 9.27$ |
| 20 | $\$ 7.16$ | $\$ 7.31$ | $\$ 7.46$ | $\$ 7.60$ | $\$ 7.75$ | $\$ 7.90$ | $\$ 8.06$ |
| 25 | $\$ 6.44$ | $\$ 6.60$ | $\$ 6.75$ | $\$ 6.91$ | $\$ 7.07$ | $\$ 7.23$ | $\$ 7.39$ |

Determine the monthly repayment for a loan of $\$ 120000$ at $6.8 \%$ p.a. interest rate over 20 years.
A. $\$ 7.46$
B. $\$ 89.52$
C. $\$ 895.20$
D. $\$ 7460$

## Financial Maths

## Name:

21. A family currently pays $\$ 320$ for some groceries. Assuming a constant annual inflation rate of $2.9 \%$, calculate how much would be paid for the same groceries in 5 years' time.
22. The table gives the present value interest factors for an annuity of $\$ 1$ per period, for various interest rate ( $r$ ) and numbers of periods ( $N$ ).

| Table of present value interest factors |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| r <br> N | Interest rate per period (as a decimal) |  |  |  |  |
|  | 0.0075 | 0.0080 | 0.0085 | 0.0090 | 0.0095 |
|  | 5430462 | 53.43960 | 53.43960 | 51.76724 | 50.95891 |
| 71 | 54.8929 | 54.00754 | 54.00754 | 52.29657 | 51.46995 |
| 72 | 55.47685 | 54.57097 | 54.57097 | 52.82118 | 51.97618 |
| 73 | 56.05643 | 55.12993 | 55.12993 | 53.34111 | 52.47764 |
| 74 | 56.63169 | 55.68446 | 55.68446 | 53.85641 | 52.97438 |

(i) Oscar plans to invest $\$ 200$ each month for 74 months. His investment will earn interest at the rate of $\$ 0.0080$ (as a decimal) per month. Use the information in the table to calculate the preset value of this annuity.

Financial Maths
Name:
(ii) Lucy is using the same table to calculate the loan repayment for the car loan. Her loan is $\$ 21500$ and will be repaid in equal monthly repayments over 6 years. The interest rate on her loan is $10.8 \%$ per annum. Calculate the amount of each monthly repayment, correct to the nearest dollar.
23. Yanika open a new credit account, with interest and fees as shown.

```
Interest
    - Flat rate of 12.3% per annum
- No interest-free period
Fees
- \$0 for online repayments
- \(\$ 3\) for repayments in cash
(free added to balance immediately after repayment)
```

Yanika makes a single purchase of $\$ 849$ with the credit card.
(i) Show that the balance owing on the credit card 24 days after making the purchase is $\$ 855.87$.

Financial Maths
Name:
(ii) Yanika makes her first repayment 24 days after making the ourchase. She makes a cash repayment of $\$ 450$. What is the balance on the credit card immediately after her repayment is made and the repayment fee has been charged?
24. Andrew borrowed $\$ 20000$ to be repaid in equal monthly repayments of $\$ 243$ over 10 years. Having made this monthly repayment for 4 years, he increased his monthly repayment to $\$ 281$. As a result, Andrew paid off the loan one year earlier. How much less did he repay altogether by making this change?

Financial Maths

## Name:

25. Last year, Luke's taxable income was $\$ 87000$ and the tax payable on this incom was $\$ 19822$. This year, Luke's taxable income has increased by $\$ 16800$.
(i) Use the table to calculate the tax payable by Luke this year.

| Taxable income $(\$)$ | Tax payable |
| :---: | :--- |
| $\$ 0-\$ 18200$ | Nil |
| $\$ 18201-\$ 37000$ | 19 c for each $\$ 1$ over $\$ 18200$ |
| $\$ 37001-\$ 87000$ | $\$ 3572$ plus 32.5 c for each $\$ 1$ over $\$ 37000$ |
| $\$ 87001-\$ 180000$ | $\$ 19822$ plus 37c for each $\$ 1$ over $\$ 87000$ |
| $\$ 180001$ and over | $\$ 54232$ plus 45c for each $\$ 1$ over $\$ 180000$ |

(ii) How much extra money will Luke have this year, after paying tax, as a result of the increase in his taxable income? Ignore the Medicare levy.

Financial Maths
Name:
26. Sabrina's taxable income is $\$ 86725$ in a particular year.

The table below is used to calculate her tax payable. In addition, she pays the Medicare levy, which is $2 \%$ of her taxable income.

| Taxable income (\$) | Tax payable |
| :---: | :--- |
| $\$ 0-\$ 18200$ | Nil |
| $\$ 18201$ |  |
| $-\$ 37000$ | 19 c for each $\$ 1$ over $\$ 18200$ |
| $\$ 37001$ |  |
| $-\$ 87000$ |  |$\quad$| $\$ 3572$ plus 32.5 c for each $\$ 1$ over |
| :--- |
| $\$ 87001$ |
| $-\$ 180000$ |$\quad$| $\$ 19822$ plus 37 c for each $\$ 1$ over |
| :--- |
| $\$ 87000$ |
| $\$ 180001$ and <br> over |
| $\$ 54232$ plus 45 c for each $\$ 1$ over |
| $\$ 180000$ |

Calculate Sabrina's net income in that year.

## Financial Maths

## Name:

27. Theo is completing his tax return. He has a gross salary of $\$ 82521$ and income from a rental property totalling $\$ 10920$. He is claiming $\$ 13420$ in allowable deductions.
(i) Determine Theo's taxable income.
(ii) Using the tax table below, calculate Theo's payable.

| Taxable income $(\$)$ | Tax payable |
| :---: | :--- |
| $\$ 0-\$ 18200$ | Nil |
| $\$ 18201$ | 19 c for each $\$ 1$ over |
| $-\$ 37000$ | $\$ 18200$ |
| $\$ 37001$ | $\$ 3572$ plus 32.5 c for each |
| $-\$ 87000$ | $\$ 1$ over $\$ 37000$ |
| $\$ 87001$ | $\$ 19822$ plus 37 c for each |
| $-\$ 180000$ | $\$ 1$ over $\$ 87000$ |
| $\$ 180001$ | $\$ 54232$ plus 45 c for each |
| and over | $\$ 1$ over $\$ 180000$ |

Financial Maths
Name:
(iii) In addition to the above tax, Theo must also pay a Medicare levy of \$1600.42.
Theo has already paid $\$ 20525$ as Pay As You Go (PAYG) tax.
Should Theo receive a tax refund or will he owe more tax? Justify your answer with calculations.
28. (a) On 20 August, tickets were purchased for $\$ 425$ using a credit card. No other purchases were made using this card in August. Simple interest was charged at a rate of $18.4 \%$ per annum. There was no interest-free period. The period for which interest was charged included the date of purchase and the date of payment. What amount was paid when the account was paid in full on 31 August?

## Financial Maths

## Name:

(b) Jamal borrowed $\$ 350000$ to be repaid over 30 over 30 years, with monthly repayments of $\$ 1880$. However, after 10 years he made a lump sum payment of $\$ 80000$. The monthly repayment remained unchanged. The graph shows the balances owing over the period of the loan.


Over the period of the loan, how much less did Jamal pay by making the lump sum payment?

Financial Maths

## Name:

29. Marge borrowed $\$ 19000$ to buy a used car. Interest on the loan was changed at $4.8 \%$ pa at the end of each month. She made a repayment of $\$ 436$ at the end of every month. The table below se $\$$ ts out her monthly repayment schedule for the first four months of the loan.

| Month | Amount owing <br> at start of <br> month | Interest <br> charged | Repayment | Amount owing <br> at end of <br> month |
| :--- | :---: | :---: | :---: | :---: |
| 1 | $A$ | $\$ 76.00$ | $\$ 436.00$ | $\$ 18640.00$ |
| 2 | $\$ 18640.00$ | $X$ | $\$ 436.00$ | $\$ 18278.56$ |
| 3 | $\$ 18278.56$ | $\$ 73.11$ | $\$ 436.00$ | $\$ 17915.67$ |
| 4 | $\$ 17915.67$ | $\$ 71.66$ | $\$ 436.00$ | $B$ |

(i) Some values in the table are missing. Write the values for $A$ and $B$.
(ii) Calculate the value of $X$.

Financial Maths Name:
(iii) Marge repaid this loan over four years. What is the total amount that Marge repaid?
30. (a) Michelle borrows $\$ 100000$. The interest rate charged is $\$ 12 \%$ per annum compounded monthly. The monthly payment is $\$ 1029$ and the first repayment is made after one month. What is the amount outstanding immediately after the SECOND monthly repayment is made?
(b) Make $y$ the subject of the equation $x=\sqrt{y p-1}$.

HSC Standard Mathematics

Financial Maths
Name:
31. The table gives the contribution per period for an annuity with a future value of $\$ 1$ at different interest and different periods of time.

Contribution per period for an annuity with a future value of \$1

| Number <br> of <br> periods | Interest rate <br> (\%per period) |  |  |  |  |  |
| :--- | :---: | :---: | :---: | :---: | :---: | :---: |
|  | $0.25 \%$ | $0.5 \%$ | $0.75 \%$ | $1 \%$ | $1.25 \%$ | $1.5 \%$ |
| 6 | 0.1656 | 0.1646 | 0.1636 | 0.1625 | 0.1615 | 0.1605 |
| 12 | 0.0822 | 0.0811 | 0.0800 | 0.0788 | 0.778 | 0.0767 |
| 18 | 0.0544 | 0.0532 | 0.0521 | 0.0510 | 0.0499 | 0.0488 |
| 24 | 0.0405 | 0.0393 | 0.0382 | 0.0371 | 0.0360 | 0.0349 |
| 30 | 0.0321 | 0.0310 | 0.0298 | 0.0287 | 0.0277 | 0.0266 |
| 36 | 0.0266 | 0.0254 | 0.0243 | 0.0232 | 0.0222 | 0.0212 |

Margaret needs to save $\$ 75000$ over 6 years for a deposit on a new apartment. She makes regular quarterly contributions into an investment account which pays interest at 3\% pa. How much will Margarent need to contribute each quarter to reach her savings goals?

