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Year 12- General Mathematics
Financial Mathematics

A collage of mathematical and scientific concepts. At the top center is the vector equation $F = qv \times B$. To its left is the kinematic equation $V_f = V_i + at$. Below that is a chemical structure of a protein chain with the label $\frac{dy}{dx} = f(x)$. To the right of $F = qv \times B$ is the binomial theorem $\left(\frac{a}{b}\right)^n = \frac{a^n}{b^n}$ and the function $y = f(x)$. Below the binomial theorem is the equation $\Delta u = d$. To the right of $\Delta u = d$ is a circular diagram with radial lines and labels, including $(am)^n = a^n m^n$. Below the circular diagram is a flowchart with diamond-shaped decision points. In the center is the integral equation $\int t^n dt = \frac{t^{n+1}}{n+1} + C$. To the left of the integral is a Bohr-style atomic model with the label $\cos e^x$. Below the atomic model is the equation $s_a = \frac{1}{6}k\left(\frac{\Delta t}{2}\right)^3 + v_0 \frac{\Delta t}{2}$. To the right of the atomic model is the differential equation $v \frac{du}{dt} = u \frac{dv}{dt}$. Below the differential equation is a chemical structure of a protein chain with labels 'OFF' and 'ON'. At the bottom center is the trigonometric identity $\theta \sin u = \theta \sin u$. To the right of the trigonometric identity is another chemical structure of a protein chain with labels 'OFF' and 'ON'. At the bottom right is a chemical structure of a protein chain with labels 'ON' and 'OFF'.

Financial mathematics questions

1. **(2 marks)**
Find the simple interest charged on \$3560 at 5% p.a. for 8 months
2. **(2 marks)**
You want to earn \$1600 a year in interest. How much must you lend at an interest rate of 12% p.a.?
3. **(4 marks)**
I borrow \$170000 at an interest rate of 8% p.a. fixed for 4 years and I have to pay back the interest only during this time.
 - i) Find how much interest is paid in 5 years?
 - ii) after 4 years, the bank will drop the rate to 4% with a fee of \$1600. Find which method will save you more money.
4. **(2 marks)**
Girgis borrows \$1000 to buy a new computer and has 2 different payment plans to choose from. Plan A has 30 repayments at \$25 per payment and Plan B has 60 repayments at \$12 per payment. Find how much more interest Girgis will pay using plan B rather than plan A.
5. **(5 marks)**
I take out a loan from the bank to buy a car worth \$15000. I had already saved \$5000 as a deposit. The loan was to be repaid after 3 years with an interest rate at 8% p.a., Find:
 - i) price paid for car
 - ii) monthly loan repayment
 - iii) the effective annual rate of interest
6. **(4 marks)**
Abhi takes out a loan of \$20000 for 60 months and repayments are made per month of \$500.00. How much will Abhi pay back? What is the interest rate for the loan?
7. **(4 marks)**
You are enquiring about getting a loan of \$9000 and find that the interest rate is 8.2% p.a. and that there is a security fee of \$1 per \$100 borrowed. If you decide to pay off this loan in 5 years, find:
 - i) the principal
 - ii) the interest over this whole period
 - ii) the monthly repayments
8. **(2 marks)**
The table shows monthly repayments for a variety of amounts borrowed and with different interest rates for 10 years.

Amount borrowed (\$)	5%	6%	7%	8%
2000	\$13.2	\$14	\$14.5	\$15.2
4000	\$16	\$17.1	\$18.6	\$19.8
6000	\$19.1	\$20.3	\$21.2	\$22.7

Find the total interest paid over 10 years on an amount borrowed of \$4000 at 7%p.a.

9. (2 marks)

Find the amount paid per month of an interest-free fridge worth \$900 over 3 years if one-third of it is paid in deposit?

10. (2 marks)

Find the interest rate per year if \$5000 is invested and earns \$150 simple interest for 3 years.

11. (3 marks)

You invest \$2000 for 5 years compounded annually at a rate of 7%p.a., Find the value after 5 years and the interest earned after 5 years.

12. (4 marks)

\$15000 is borrowed at 5%p.a. for 6 years, find:

i) the simple interest

ii) the compound interest, compounded annually

iii) the difference between simple and compounding interest

13. (3 marks)

you invest \$5000 for 5 years at 6% compounded monthly, Find the value at the end of 5 years and hence the compound interest earned.

14. (3 marks)

you invest \$5000 for 5 years at 6% compounded quarterly, Find the value at the end of 5 years and hence the compound interest earned.

15. (3 marks)

you invest \$5000 for 5 years at 6% compounded weekly, Find the value at the end of 5 years and hence the compound interest earned.

16. (3 marks)

you invest \$5000 for 5 years at 6% compounded fortnightly, Find the value at the end of 5 years and hence the compound interest earned.

17. (3 marks)

you invest \$5000 for 5 years at 6% compounded daily, Find the value at the end of 5 years and hence the compound interest earned.

18. (2 marks)

you invest \$5000 for 5 years at 6% compounded semi-annually, Find the value at the end of 5 years and hence the compound interest earned.

19. (2 marks)

looking at the previous 5 questions, comment on the highest and lowest interests earned and why these are so.

20. (4 marks)

Find the rate of interest compounded monthly that would triple \$5000 over

5 years.

21. (4 marks)

Abhi invests \$5000 at the beginning of each year into a fund. if the interest rate is 7%p.a., how much will Abhi have in 35 years?

beg. of period= $(1+r)$

22. (4 marks)

Abhi invests \$5000 at the beginning of each year into a fund. if the interest rate is 7%p.a. compounded quarterly, how much will Abhi have in 35 years?

23. (3 marks)

Find the total amount invested after 12 years if i receive regular yearly payments of \$6000 for 12 years at the end of the year at 6%p.a.

24. (3 marks)

You are planning to retire in 30 years time make payments of \$1934 per year at the end of the year at an interest rate of 7.5%p.a. Find how much you will have after 30 years.

25. (4 marks)

Abhi invests \$5000 at the end of each year into a fund. if the interest rate is 7%p.a. compounded monthly, how much will Abhi have in 35 years?

26. (4 marks)

You are planning to retire in 30 years time and plan to have \$200000 for a new and small apartment for yourself, if payments are made at the end of each year for 30 years at 7.5%p.a. find how much each payment is.

27. (4 marks)

you want to buy a boat and so take out a loan of \$15000 at 18% p.a. per month compound interest and repay this over 6 years with equal monthly installments, find the value of the monthly installment.

28. (4 marks)

you decide to borrow \$300000 for a house and agree to repay the loan in weekly installments over 15 years. Find the amount of each installment if interest is 7%p.a.

29. (4 marks)

a father wants to leave \$400000 for inheritance for his children on his death. Assuming a rate of 6%p.a. and that he dies in 30 years time, what is the value of the equal installments he needs to make?

30. (4 marks)

Abhi invested \$1500 at the end of each year for the first 10 years, then stopped and left the money to earn interest and grow for the next 30 years with an interest rate of 5%p.a. over 40 years. Calculate the value of this investment over the entire 40 years.

31. (3 marks)

Find the book value of a car with straight-line depreciation with original cost \$30000, depreciating at 12% of its purchase price each year after 5 years.

32. (2 marks)

Find the annual depreciation of a \$10000 boat with scrap value \$200 and estimated life of 10 years.

- 33. (2 marks)**
Find the percentage rate of depreciation for the previous question.
- 34. (3 marks)**
Find the book value of a car with straight-line depreciation original cost \$25000, depreciating at 45% of its purchase price each year after 2 years.
- 35. (3 marks)**
A new plasma television costs \$3000 and has a useful life of 6 years at which point it will be worth \$300 and will be sold. Find the annual depreciation and the percentage rate of depreciation.
- 36. (3 marks)**
A car is bought for \$10000 and is depreciated using the reducing-balance method at a rate of 15% of its value in the previous year. Find its salvage value after 10 years.
- 37. (3 marks)**
If the number of road animal death in 2000 was 1500 and placing new signs reduced the number of animals dieing by 10% each year for the next 6 years. find the number of deaths in 2006.
- 38. (3 marks)**
Find the book value of a motorbike bought for \$8000 and depreciated by 25% each year after 8 years
- 39. (3 marks)**
A machine was bought for \$40000 with scrap value \$4000 after 10 years. Find its reducing-balance depreciation rate.
- 40. (3 marks)**
A refirdgerator was bought for \$3000 with scrap value of \$500 after 6 years. Fiund its straight-line depreciation rate and its reducing-balance depreciation rate.
- 41. (3 marks)**
Alex has \$4864.77 in his money market account currently. If the annual interest rate os 3.9%, and the interest is compounded fortnightly, how much money was in his account 2 years ago?
- 42. (3 marks)**
Jeff has one savings account with the interest rate of 3.3%, and one money market account with the interest rate of 5.1% in a bank. If he deposits \$1200.00 to the savings account, and \$1800.00 to the money market account, how much money will he have after 6 years?
Savings account:
- 43. (2 marks)**
Ann invested a certain sum of money in a bank that paid simple interest. The amount grew to \$240 at the end of 2 years. She waited for another 3 years and got a final amount of \$300. What was the principal amount that she invested at the beginning?
- 44. (3 marks)**
At the beginning of each year for 10 years, karam invests \$1000. Find:
i) the future value of his first investment at the end of 10 years if compound interest is 7%p.a.

ii) the future value of the annuity after the last payment has been made with interest 7%p.a.

45. (2 marks)

you borrow \$10000 at a rate of 15%p.a. over 15 years. Find the yearly installment amount.

46. (3 marks)

Find the simple interest rate p.a. of the previous question.

47. (2 marks)

Find the effective interest rate for a rate of 6.25%p.a. over 3 years

48. (2 marks)

Find the effective interest rate for a rate of 6.25% compounded monthly over 3 years

49. (2 marks)

Find the salvage value of a truck using the reducing-balance method originally costing \$60000 with a depreciation rate of 25% over 10 years

50. (2 marks)

Find the present value of an investment of \$5000 made 5 years ago with interest rate 4% compounded quarterly.