



# MATHEMATICS

## FINANCIAL MATH

### QUESTION 1

- 8.1 The purchase price of a car five years ago was R200 000. The current book value of the car is R85 000. Using the reducing-balance method of depreciation, calculate the annual rate of depreciation. (3)
- 8.2 An amount of money was invested at a rate of 8,5% p.a., compounded quarterly. Calculate the effective interest rate per annum of this investment. (3)
- 8.3 Susan made an initial deposit of R28 000 into an investment account. Three years later she made another deposit of R12 000. She withdrew R6 500 from the account 5 years after the initial deposit was made. The interest rate for the first 4 years was 12% p.a., compounded monthly. Thereafter the interest rate changed to 12,9% p.a., compounded half-yearly.
- 8.3.1 Calculate how much Susan had in this investment account 2 years after the initial deposit was made. (2)
- 8.3.2 How much will the investment be worth 8 years after the initial deposit was made? (5)
- [13]

### QUESTION 2

- 8.1 Lethabo has TWO investment option offers:
- Option A: 8,2% p.a. compounded daily (365 days per year)
  - Option B: 8,3% p.a. compounded monthly
- 8.1.1 Calculate the effective interest rate of Option A. (2)
- 8.1.2 Which investment option is better for Lethabo to take? Justify your answer with the necessary calculations. (2)
- 8.2 Sam wins R300 000 in a lottery and decides to invest the full amount in to buy a car for each of his two sons when they turn 21.
- His first son, Peter, turns 21 exactly 2 years after the investment was made. On Peter's 21<sup>st</sup> birthday, Sam withdraws R175 000 to buy Peter a car.
  - The investment earns 9% p.a. compounded quarterly for the first four years.
  - After that, the interest rate changes to 8.5% p.a. compounded monthly.
  - The second son turns 21 six years from Sam's initial investment.
- 8.2.1 How much money will Sam have available at the end of six years, when his second son turns 21? (5)
- 8.2.2 The average inflation rate over this period is 8% p.a. Would Sam be fair and consistent towards his two sons if the same amount calculated in QUESTION 8.2.1 is used for his second son's car? Justify your answer with the necessary calculations. (4)
- 8.2.3 Peter sells his car after 4 years for R79 120. What is the annual rate of depreciation, if calculated using the reducing balance method? (4)
- [17]



## MATHEMATICS FINANCIAL MATH

### QUESTION 3

- 8.1 A motorbike costs R250 000 and depreciates by 13% p.a. annually, calculated on the reducing balance method.

Calculate what the motorbike will be worth after 6 years.

(3)

- 8.2 Convert an annual effective rate of 7,5% per annum to a nominal rate per annum compounded quarterly.

(3)

- 8.3 Rodney starts an investment with a deposit of R25 000. Two years later, he deposits another R10 000. Exactly four years after he started the investment, he withdraws R5 000. For the first two years, the interest is calculated at 4% per annum, compounded monthly and thereafter it is calculated at 7% per annum, compounded semi-annually.

What is the accumulated amount of the investment exactly five years after the initial deposit?

(5)

- 8.4 Brian borrows R  $x$  at an annual interest rate of 12% p.a. He has two options to repay the loan.

**OPTION 1:** Pay R5 000, 2 years after the loan was granted and the remaining amount, 4 years after the loan was granted. The interest is compounded annually.

**OPTION 2:** Pay R3 000, 1 year after the loan was granted and the remaining amount, 3 years after the loan was granted. The interest is compounded semi-annually.

If the total amount paid in both options is the same, calculate the value of  $x$ .

(6)

[17]

### QUESTION 4

- 8.1 A Google Chromebook costs R14 500 and depreciates by 13% p.a. compounded annually calculated on the reducing-balance method.

Calculate what a Google Chromebook will be worth after exactly 5 years.

(3)

- 8.2 Koza deposits R15 000 into a bank account for a period of 10 years. The interest rate for the first four years is 6% per annum compounded monthly. For the next six years, the interest rate changes to 10% per annum compounded semi-annually.

8.2.1 Convert the nominal rates to annual effective rates. (Answers correct to FOUR decimal places)

(4)

8.2.2 Hence, use the effective rates or otherwise, calculate the future value of the savings at the end of the ten-year period.

(4)

8.2.3 The interest rate for the first 4 years remains at 6% p.a. compounded monthly. For the next 2 years the interest rate is  $x$  % p.a. compounded quarterly. For the last 4 years the interest rate is  $x$  % p.a. compounded semi-annually.

If Koza receives R48 897,03 at the end of the 10-year period, determine the interest rate for the last 6 years, i.e. the value of  $x$ .

(5)

[16]



## MATHEMATICS FINANCIAL MATH

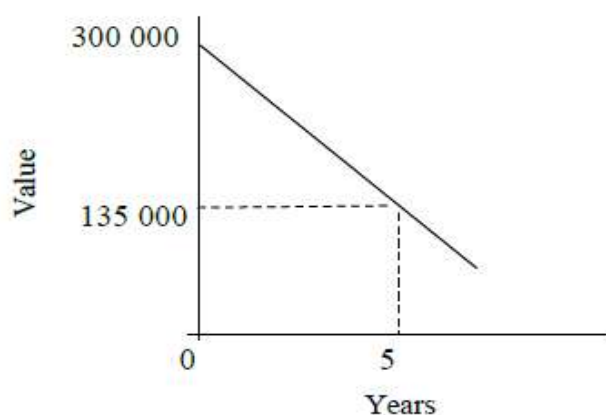
### QUESTION 5

- 8.1 Miss Gwala invested R30 000 at an interest rate of 12% p.a., simple interest. After  $n$  years, the accumulated value of her investment was R51 600. Calculate the value of  $n$ . (2)
- 8.2 The total number of bees in an apiary are declining each year at the rate of 2,5% of the total number of the previous year. There are currently 20 416 bees in the apiary. How many bees in total were in the apiary 8 years ago? (Round off your answer to the nearest whole number). (3)
- 8.3 Mrs Howard invested R10 050 on 1 January 2020 in an account that paid interest at the rate of  $x$  % p.a., compounded quarterly. The accumulated amount in the account on 1 January 2024 was R13 867. Calculate the value of  $x$ . (4)
- 8.4 Mr Mnqayi invested R50 000 in a savings account for 7 years. The investment earned interest at the rate of 14% p.a., compounded monthly for the first three years. The rate of interest changed to 13% p.a., compounded half-yearly, for the remaining four years. Mr Mnqayi withdrew R6 032 from the account 5 years after making the initial deposit.
- 8.4.1 Calculate the accumulated amount in the account three years after making the initial deposit. (3)
- 8.4.2 Calculate the accumulated amount in the savings account at the end of the seven-year period. (4)
- [16]



### QUESTION 6

- 5.1 Computers are purchased for R 300 000. It depreciates as shown in the diagram below. Determine the rate at which the depreciation was calculated.



(3)





## MATHEMATICS FINANCIAL MATH

- 5.2 Peter is a farmer and he made a profit of R3,5 million. He decides to buy a new tractor for R2 250 000 and he invests the rest of the money. With this investment, the tractor has to be replaced 6 years later.

- 5.2.1 How much money does Peter have available to invest? (1)
- 5.2.2 If the average inflation rate is 4% per year over the next 6 years, what is the estimated cost of a new tractor after 6 years? (2)
- 5.2.3 The old tractor depreciates on a reducing balance at a rate of 14% p.a. Calculate the value of the old tractor after 6 years. (3)
- 5.2.4 Peter invests the amount calculated in 5.2.1 for 6 years. For the first 4 years the interest on his investment is 9% p.a. compounded monthly and thereafter, it is reduced to 8,5% p.a. compounded quarterly. One year before the end of the 6 year period, Peter has to withdraw R100 000 for unexpected expenses. Assume that the old tractor will be traded in at its reduced value after 6 years to partially finance the new tractor. Determine with the necessary calculations if Peter will have enough money from his investment after 6 years to replace the tractor. (6)  
[15]



### QUESTION 7

- 7.1 A car rental company bought a fleet of 15 cars for R3000 000. They calculate the depreciation at a rate of 15% p.a on a reducing-balance method. Calculate the value of the fleet of cars at the end of 5 years. (2)
- 7.2 An investment earns 7,5% p.a compounded quarterly. Calculate the effective annual interest rate on this investment. (3)
- 7.3 Amanda deposits R50 000 into a savings account which pays 11% p.a compounded monthly. She wants to buy a car in 5 years time. Calculate how much money is available to her in 5 years time, if a further payment of R10 000 was made exactly 2 years after her initial deposit. (5)

[10]





## MATHEMATICS FINANCIAL MATH

### QUESTION 8

- 8.1 Calculate the effective interest rate per annum if an investment earns interest at a rate of 9,3% p.a. compounded monthly. (3)
- 8.2 A school buys a bus that costs R312 000 at the start of 2023. The average inflation over the next 5 years is 6,91%. Calculate the cost of replacing the school bus at the end of 5 years. (3)
- 8.3 Lwandi made an initial deposit of R23 000 into an investment account that paid an interest rate of 9,25% compounded quarterly. After 3 years since the start of his investment, he deposited R13 500 and the interest rate changed to 8,2% p.a. compounded monthly. Exactly 5 years after his initial deposit, Lwandi withdrew R9 000.
- 8.3.1 Calculate the total value of the investment in Lwandi's account at the end of the 5<sup>th</sup> year. (5)
- 8.3.2 At the end of 8 years after the initial deposit, Lwandi decided to withdraw and use the money.  
Calculate the annual interest rate of the investment in the final 3 years if his final balance was R64 487,24 and the interest was compounded monthly. (4)
- [15]



### QUESTION 9

- 7.1 A construction vehicle was bought for R625 000. The value of the vehicle depreciates annually at a rate of 10,25% p.a. on the reducing-balance method. Calculate the book value of the vehicle 6 years after it was bought. (2)
- 7.2 Calculate the effective interest rate if an investment earns interest at the rate of 8% p.a., compounded half-yearly. (3)
- 7.3 A house was bought  $4\frac{1}{2}$  years ago. The value of the house increased at 14% p.a., compounded quarterly. If the value of the house is now R1 671 650,74, calculate the purchase price of the house. (3)
- 7.4 Mr Nsele invested R  $x$  into a savings account. He withdrew R15 000 from the account two years after making the initial deposit. Four years after making the initial deposit, the accumulated amount in the savings account was R75 000. The account earned interest at the rate of 12% p.a., compounded monthly for the first three years. Thereafter the interest rate changed to 8% p.a., compounded half-yearly.
- 7.4.1 Calculate the amount that Mr Nsele had in the account three years after making the initial deposit. (3)
- 7.4.2 Calculate the value of  $x$ , the amount Mr Nsele initially deposited into the account. (4)
- [15]



## MATHEMATICS FINANCIAL MATH

### QUESTION 10

- 8.1 The interest rate on an investment is  $x\%$  per annum compounded monthly. Calculate the value of  $x$  given that the corresponding effective interest rate is 9,92%. (3)
- 8.2 A printer's value depreciates according to the reducing balance method, over a period of 7 years at a rate of 12% p.a., to R28 607,30. Calculate, to the nearest rand, the original price for the printer. (3)
- 8.3 Pratham made an initial deposit of R32 000 into an investment account that paid interest at 8,6% p.a. compounded monthly. Another deposit of R23 000 was made 3 years later. The interest rate changed to 10,5% p.a. compounded quarterly 4 years after the initial deposit.
- 8.3.1 How much was in Pratham's investment account at the end of 4 years? (5)
- 8.3.2 At the end of 6 years since he started his investment, Pratham decided to use all his balance as a deposit for a car that cost R220 000 and borrow the rest from a bank.
- How much did he need to borrow? (4)
- [15]

### QUESTION 11

- 5.1 Calculate the effective interest rate, if the nominal interest rate is 13,5% compounded monthly. (4)
- 5.2 Using simple interest, how long would it take (to the nearest month) for R6 800 to grow to R7 500 at an interest rate of 7,5% per annum? (3)
- 5.3 Simone invested R5 000 into a savings account with an interest rate of 5% per annum, compounded semiannually. How much will Simone have after 6 years? (3)
- 5.4 Given:  $A = P(1 + in)$  where  $P$  and  $i$  are positive constants.
- 5.4.1 State whether the graph of  $A$ , as a function of  $n$ , is linear, quadratic, exponential or none of these. (1)
- 5.4.2 Draw a possible graph of  $A$ , as a function of  $n$  in your ANSWER BOOK. (2)
- 5.4.3 If  $n$  increases by 1, determine the increase in  $A$ . (1)
- [14]

