

Question 1

In order to buy a second-hand scooter, Kim obtained a personal loan of \$5000 with monthly repayments of \$440 to be paid at the end of each month. The table below shows the amount owing at the start of each month, the interest payable for that month, the repayment and the amount owing at the end of each month for the first six months.

Month	Amount owing at the start of the month (\$)	Interest (\$)	Repayment (\$)	Amount owing at the end of the month (\$)
1	5000	40	440	4600
2	4600	36.80	440	4196.80
3	4196.80	33.57	440	3790.37
4	3790.37	30.32	440	3380.70
5	3380.70	27.05	440	2967.74
6	2967.74	23.74	440	2551.48

- (a) Calculate the annual interest rate. (2 marks)
- (b) Write a recursive rule to determine the amount owing at the end of each month. (3 marks)
- (c) In which month would Kim pay off the loan? (1 mark)
- (d) How much is Kim's final repayment? Give your answer to the nearest cent (2 marks)
- (e) How much did Kim actually pay for the scooter? Give your answer to the nearest cent. (2 marks)

Question 2

A car is initially purchased for \$24 000 and depreciates by \$1 700 per year.

- a. Write a recursive relation that gives the value of the car in dollars after $n + 1$ years, in terms of its value after n years. Write both parts of the rule, including for V_0 , on the same line, separated by a comma.

- b. Write down a rule that will give the value of the car after n years.

- c. After how many years will the value of the car fall below \$10,100 ?

(1 + 1 + 1 = 3 marks)

Question 3

Tim is starting up his own business. He has saved \$15 000 to buy equipment and he borrows another \$50 000 from the bank. He is charged interest at the rate of 4.5% per annum, compounding monthly, and makes regular monthly repayments of \$400.

- a. Write down a calculation from which the amount that Tim owes at the end of the first month can be evaluated.

- b. Write a recurrence relation that gives the balance B_{n+1} in terms of the balance in the preceding month B_n .

- c. To the nearest month, how many months does it take for him to pay off his loan?

d. What is the value of Tim's final repayment?

e. How much in total does Tim pay for his equipment?

(1 + 1 + 1 + 1 + 1 = 5 marks)

Question 4

A new car depreciates in value each year according to the recursion relation:

$$V_{n+1} = 0.89V_n, V_0 = 21\,000$$

a. How much was the car purchased for?

1 mark

b. As a percentage, what was the annual depreciation rate?

1 mark

c. Determine the value of the car after 9 years. Give your answer to the nearest dollar.

2 marks

d. When the value of the car reaches \$500, it is considered useful only for parts. At the end of which year will it be considered useful only for parts?

2 marks

Question 6

Michael buys his first house for \$540000. He pays a 5% deposit and receives a first home owners grant of \$15000 from the government. He borrows the remainder from a bank. The interest on the loan is 4.8% per annum on the reducing monthly balance and Michael makes monthly repayments of \$3800.

a. How much is owed at the end of the first month? Give your answer correct to two decimal places.

b. Write a recursive relation, that gives the balance B_{n+1} after $n+1$ months in terms of the balance B_n of the loan at the end of n months and the initial balance B_0 .

c. How many repayments does it take for Michael to pay off the loan?

d. What is the value of Michael's final repayment?

e. How much did Michael actually pay for this house? Give your answer to the nearest dollar.

f. If Michael had doubled his monthly repayments and everything else remained the same, how much less would Michael have paid for the house?