Question 9 **(16 marks)**

Sonia secures a bank loan to buy a professional gaming computer. The loan has reducible interest. Information about the loan is shown below.

Loan issued: Start of October 2023.
Starting balance: $9200.
Interest: Compounded monthly.
Repayments: $290 per month.

After the first monthly payment at the end of October 2023, Sonia's balance is $8992.80.

(a) Use the information above to show that the annual interest rate is 10.8%. (2 marks)

(b) Determine a recursive rule to model the balance of the loan at the end of each month. (2 marks)

(c) Determine

(i) the balance of the loan at the end of November 2023. (1 mark)

(ii) the total amount of interest incurred in the first three months. (2 marks)

(iii) the balance of the loan at the end of May 2024. (1 mark)

(d) Determine how many months it takes to repay the loan. (1 mark)

(e) Determine the final repayment and the total amount repaid. (2 marks)

(f) Calculate the total interest paid on the loan. (1 mark)

(g) Sonia is paid every fortnight in her employment. Instead of monthly repayments of $290, she is now considering making fortnightly repayments of $145, with the interest calculated fortnightly. Use mathematical evidence to show what difference this would make and advise Sonia what her savings might be. (4 marks)