# 1.7 Loan repayment and amortization\_P\_11

**1a.** *[3 marks]*

**In this question, give all answers to two decimal places.**

Bryan decides to purchase a new car with a price of €14 000, but cannot afford the full amount. The car dealership offers two options to finance a loan.

**Finance option A:**

A 6 year loan at a nominal annual interest rate of 14 % **compounded quarterly**. No deposit required and repayments are made each quarter.

Find the repayment made each quarter.



**1b.** *[2 marks]*

Find the total amount paid for the car.



**1c.** *[2 marks]*

Find the interest paid on the loan.



**1d.** *[2 marks]*

**Finance option B:**

A 6 year loan at a nominal annual interest rate of  % **compounded monthly**. Terms of the loan require a 10 % deposit and monthly repayments of €250.

Find the amount to be borrowed for this option.



**1e.** *[3 marks]*

Find the annual interest rate, .



**1f.** *[2 marks]*

State which option Bryan should choose. Justify your answer.



**1g.** *[3 marks]*

Bryan’s car depreciates at an annual rate of 25 % per year.

Find the value of Bryan’s car six years after it is purchased.



**2a.** *[3 marks]*

Find the repayment made each quarter.



**2b.** *[2 marks]*

Find the total amount paid for the car.



**2c.** *[2 marks]*

Find the interest paid on the loan.



**2d.** *[2 marks]*

Find the amount to be borrowed for this option.



**2e.** *[3 marks]*

Find the annual interest rate, .



**2f.** *[2 marks]*

State which option Bryan should choose. Justify your answer.



**2g.** *[4 marks]*

Bryan chooses option B. The car dealership invests the money Bryan pays as soon as they receive it.

If they invest it in an account paying 0.4 % interest per month and inflation is 0.1 % per month, calculate the real amount of money the car dealership has received by the end of the 6 year period.



**3a.** *[3 marks]*

Paul wants to buy a car. He needs to take out a loan for $7000. The car salesman offers him a loan with an interest rate of 8%, compounded annually. Paul considers two options to repay the loan.

Option 1: Pay $200 each month, until the loan is fully repaid

Option 2: Make 24 equal monthly payments.

Use option 1 to calculate

the number of months it will take for Paul to repay the loan.



**3b.** *[2 marks]*

the total amount that Paul has to pay.



**3c.** *[2 marks]*

Use option 2 to calculate

the amount Paul pays each month.



**3d.** *[2 marks]*

the total amount that Paul has to pay.



**3e.** *[1 mark]*

Give a reason why Paul might choose

option 1.



**3f.** *[1 mark]*

option 2.



**4a.** *[2 marks]*

Sophie is planning to buy a house. She needs to take out a mortgage for $120000. She is considering two possible options.

Option 1: Repay the mortgage over 20 years, at an annual interest rate of 5%, compounded annually.

Option 2: Pay $1000 every month, at an annual interest rate of 6%, compounded annually, until the loan is fully repaid.

Calculate the monthly repayment using option 1.



**4b.** *[2 marks]*

Calculate the total amount Sophie would pay, using option 1.



**4c.** *[3 marks]*

Calculate the number of months it will take to repay the mortgage using option 2.



**4d.** *[2 marks]*

Calculate the total amount Sophie would pay, using option 2.



**4e.** *[1 mark]*

Give a reason why Sophie might choose

option 1.



**4f.** *[1 mark]*

option 2.



**4g.** *[2 marks]*

Sophie decides to choose option 1. At the end of 10 years, the interest rate is changed to 7%, compounded annually.

Use your answer to part (a)(i) to calculate the amount remaining on her mortgage after the first 10 years.



**4h.** *[2 marks]*

Hence calculate her monthly repayment for the final 10 years.



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