

Unit 3 *Loans and Mortgages*

Introduction

Learning objectives

This third unit of the Finance strand complements the second unit, Simple and Compound Interest, as it involves loans and mortgages. After studying this unit you should

- understand the concept of annual percentage rate (APR) when dealing with loans
- be able to calculate the APR for loans, given the amount borrowed, the time period and the repayment amount
- be able to determine the time taken when using a credit purchase for a sum of money, given the interest payable and the yearly (or monthly, etc.) payments made
- understand the concept on which mortgages are based, determine the yearly (or monthly) repayments required to repay a loan, given the interest rate and time period of the loan.

Key points

- The APR (Annual Percentage Rate) is the interest rate that indicates the total cost of borrowing and is helpful when comparing various options
- Note that advertised loans based on what seems a reasonable daily or weekly interest rate can result in excessive APR; e.g. a daily interest rate of $\frac{1}{2}\%$ gives an APR of 517%
- We normally refer to a loan as a sum of money borrowed with a fixed repayment period, fixed interest rate and repaid at a fixed amount per year; this determines the repayment period
- For mortgages, the amount repaid per year (or month, etc.) is calculated from the amount of the loan, the repayment time and the interest rate.

Facts to remember

- For a monthly interest rate of $r\%$, the monthly multiplier is $\left(1 + \frac{r}{100}\right)$ giving, for 12 months, the multiplier $\left(1 + \frac{r}{100}\right)^{12}$. This gives the APR as $\left[\left(1 + \frac{r}{100}\right)^{12} - 1\right] \times 100\%$
- The APR (Annual Percentage Rate) when payments are made yearly, is given by

$$A = C(1 + i)^n$$

where A is the repayment for a loan of C , for a fixed time, n years and APR denoted by i .

Glossary of terms

- **APR (Annual Percentage Rate):** the percentage rate that gives the *total* annual cost of borrowing, including any charges
- **Monthly (weekly, etc.) multiplier:** the multiplier provides you with the multiplier as a formula for the amount owed when the interest rate is charged monthly (weekly, etc.); e.g. if the monthly interest rate is $r\%$, the

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monthly multiplier is $1 + \frac{r}{100}$, so if the amount of the loan is C , after

n months, $C\left(1 + \frac{r}{100}\right)^n$ is owed

- *Credit purchase*: this is when you borrow money at a specified interest rate and with regular repayments until the loan is repaid
- *Mortgage*: similar to a credit purchase but with (monthly) payments calculated so that the loan is repaid in a given time period (e.g. 20 or 25 years).