Financial Maths

5.1 Compound Interest

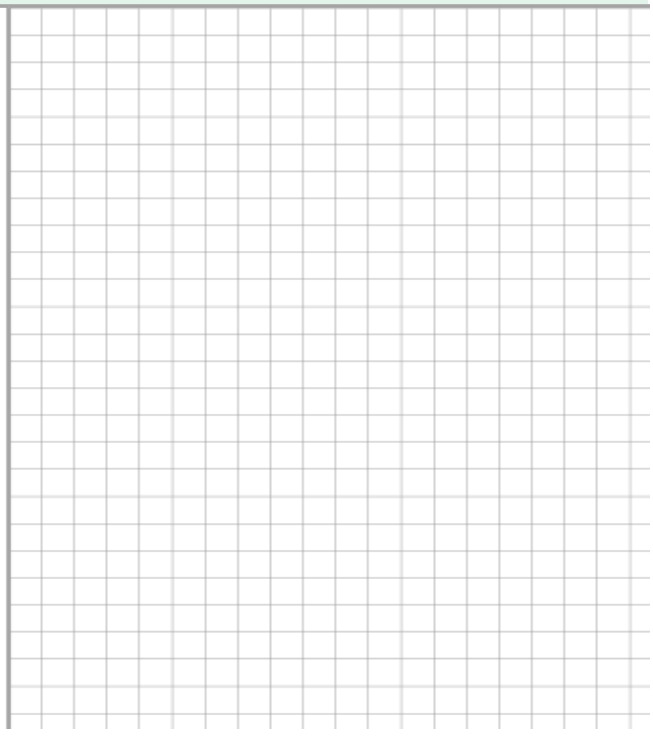
Example 1

Find the future value of €5000 invested at 4% (AER) per annum, compounded annually, for 6 years. Find also the interest earned over the period.

2. Given an AER of 2.5%, find the future value, correct to 2 places of decimals, of €5000 invested for 8 years. What interest would be paid on this investment?

Example 2

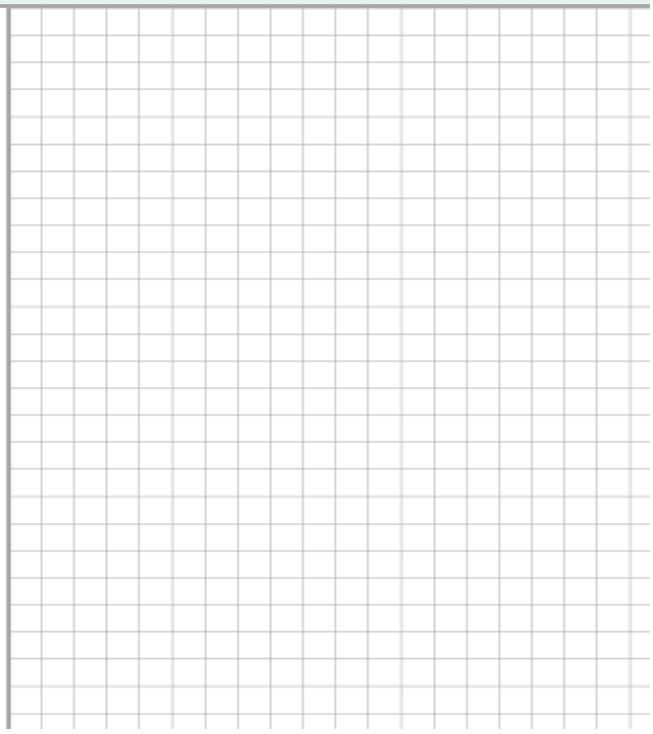
An investment bond offers a return of 15% if invested for 4 years. Calculate the AER (annual equivalent rate) for this bond, correct to two places of decimals.



4. What monthly rate of interest, correct to 2 places of decimals, is equivalent to an annual rate of (i) 6% (ii) 2.5% (iii) 4% ?

Example 3

€5000 is invested at 4% AER. If the interest is added monthly, find the future value of this investment after (i) $3\frac{1}{2}$ years (ii) 5 years 2 months.



Example 4

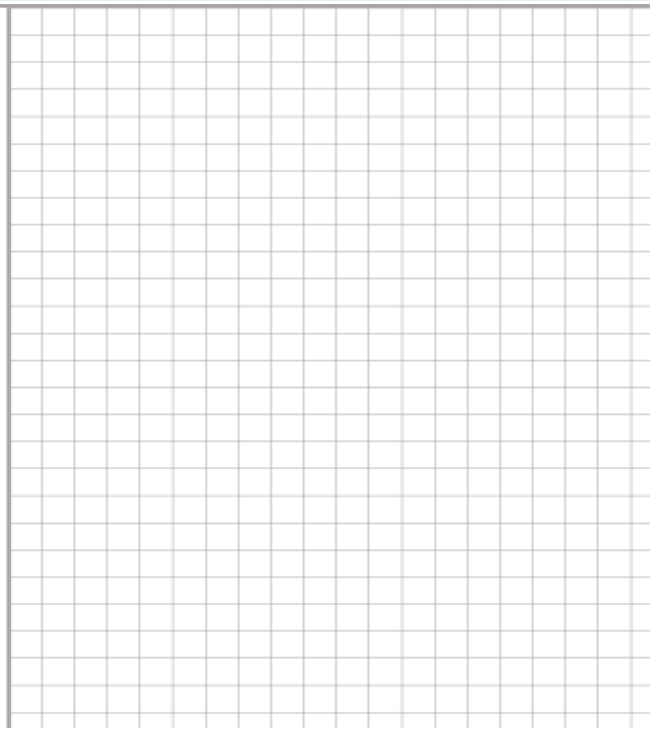
The local GAA club runs a draw.
You win first prize and you are offered
(a) €15 000 now **or**
(b) €18 000 in four years time.
Which prize should you choose
to have the greatest value? Assume a discount rate of 4%.

When calculating present value, the rate $i\%$ is often referred to as the "*discount rate*".

10. If a bank offers a discount rate of 4.2%, find the present value of €10 000 due to be paid in 10 years time.

Example 5

In how many years would €5000 increase in value to €6500 if invested at an AER of 3.5%?



12. €50000 is invested in a bank offering an AER of 3.5%.
How long will it take this investment to double in value?

Financial Maths

5.2 Depreciation

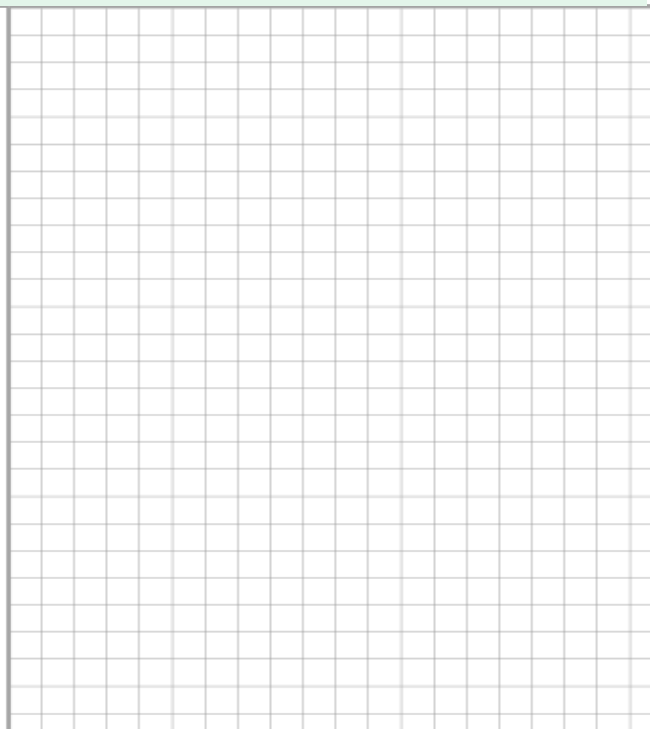
Example 1

A company buys a new machine priced at €35 000.
The machine depreciates by 20% on a reducing balance basis each year.
(i) What will the value of the machine be in 4 years time?
(ii) By how much has the machine depreciated in value during this time?

2. A new television costs €1400. Assuming a depreciation rate of 8% per month, find the value of the television after 15 months.

Example 2

A garage has a petrol stock of 100 000 litres.
If the manager estimates (a) that he will sell 4000 litres a day
(b) that he will sell 5% of his stock per day,
calculate the difference in his estimates after 20 days.



Financial Maths

5.3 Annuities

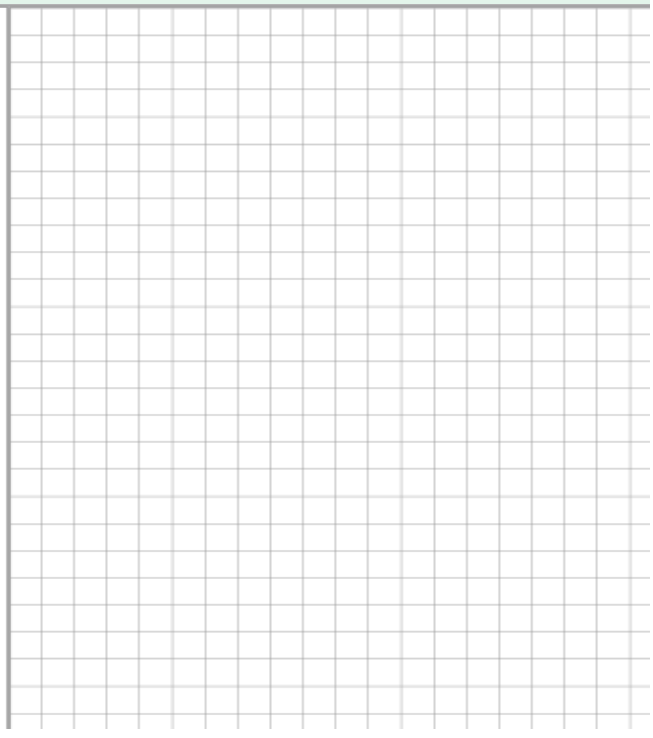
Example 1

Catríona saves €400 every three months for five years at an effective quarterly rate of 0.9%.
(i) Represent her savings by a geometric series
(ii) Find the value of her investment at the end of the period.

3. A special savings account offers an AER of 4% per annum. If I invest €2000 per year in this account, how much will my investment be worth in 5 years time?

Example 2

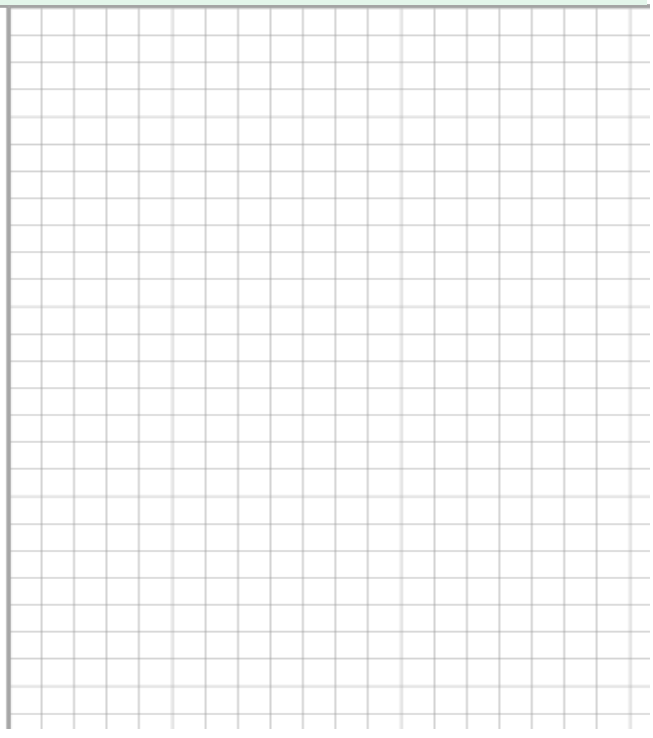
Find the sum of money, €P, that needs to be saved per month to cover the cost of a €1500 holiday in 18 months time. The interest rate on offer is 0.4% per month.



8. George wants to make regular payments into an account that pays 8.5% per annum compound interest in order to have €10 000 after 7 years. Find the amount of each annual payment.

Example 3

What amount of money is needed now to provide a pension of €25 000 a year for 20 years, assuming an AER of 4%?



Example 4

Calculate the future value of an instalment savings plan based on saving €600 at the **start** of each year @ 4% per annum for 5 years.

(i) Calculate the present value of these payments.

(ii) Hence show that if the present value was put on deposit at the same rate for the same length of time, it would have the same future value.

Financial Maths

5.4 Loans and Mortgages

Example 1

Calculate the size of the monthly repayments needed for a car loan of €10 000 if the loan is to be repaid over a 5-year term at an effective monthly rate of 0.72%.

$$\text{€ Payment} = \frac{\text{€ Mortgage } (i)(1+i)^n}{(1+i)^n - 1}$$

1. Calculate the monthly repayments required for a mortgage of €200 000, paid over a 30-year period at an annual interest rate of 6%.

Example 2

Find the monthly repayments required for a mortgage of €150 000, based on an annual rate of 4.5% over 20 years.