Compound Interest

$$A = P(1+r)^{t}$$

P = Principal = Present value

A = Amount = Future Value

I = Interest = A - P

r = Rate of interest

(i = AER = Annual Equivalent Rate)

t = Time (no. of time intervals on which interest is added)

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.

Future value = Amount

$$P = £5000$$

$$r = 4\%$$

$$t = 6 \text{ years}$$

$$A = P(1+r)^t$$

A= 5000 (1.04)6 =€6326.60

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.

t= 4 years Return = 15%

$$P = \text{ imagine } \omega_{e} \text{ invest } \neq 100$$
 $A = \text{ end } \omega_{e} \text{ have } = \neq 115$
 $R = 4\sqrt{115} - 1 = 0.035558$

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.

note this does not mean 4% to be added on monthly.

R=? $(1+R)^{12}=(1+1)$

$$A = P(r+1)^{t}$$

$$R = \binom{12}{1+1} - 1$$
 $R = \frac{12}{1.04} - 1 = 0.003274$

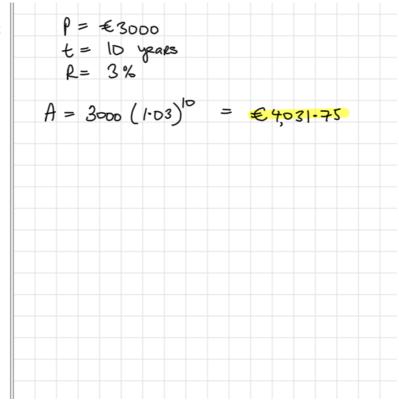
$$A = P(\Gamma + 1)^{t}$$
 (i) $3\frac{1}{2}$ years = $12(3.5) = 42$ months
$$A = 5000(1.003274)^{42} = £5735.77$$

(i) 5 years 2 months =
$$5(12) + 2 = 62$$
 months
 $A = 5000 (1.003274)^{62} = £6123.26$

Exercise 5.1

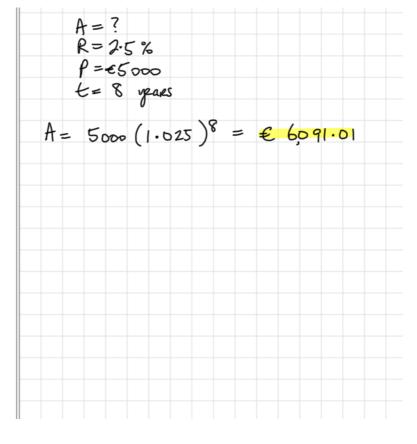
1. Find the future value, correct to 2 places of decimals, of €3000 invested for 10 years at an annual equivalent rate (AER) of 3%.

Future value = Amount



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?

A=P(1+R)t



6. Sandra wins €15 000 in a draw and invests it in a credit union where the AER is 3.5%.
Copy and complete this chart, showing how the value of her money changes over the five years of the investment.

Year	Principal	Interest €
One	€15 000	525
Two	€ 15525	1068.38
Three	€16068.38	1630,77
Four	€16630.77	2212.85
Five	€ 17 212.85	2815.30

$$A = P(1+R)^{t}$$

$$I = A - P$$

lr.I	$A_{i} = 15000 (1.035)' = 15,525$ $I_{i} = 15,525 - 15000 = 525$
yr.z	$A_2 = 15,525(1.035)' = 216,068.38$ $I_2 = 16,068.38 - 15000 = 1068.38$
yr.3	$A_3 = 16,068.38 (1.035)^1 = 216,630.77$ $I_3 = 16630.77 - 15000 = 1636.77$
У <u>к</u> 4	$A_{4} = 16,630.77 (1.035)^{1} = 217,212.85$ $I_{4} = 17212.85 - 15000 = 2212.85$
ye.5	$A_5 = 17,212.85 (1.035)' = £ 17,815.30$ $I_5 = 17.815.30 - 15.000 = 2815.30$