9. €12 000 is invested at an AER of 3.5%.
Find the value of the investment after
(i) 5 years 3 months (ii) 8 years 2 months (iii) 10 years 6 months.

$(1+i)^1 = (1+R)^{12}$ ⇒ R=?

let i = AER & R = MER

$1+R = \sqrt[12]{1+i}$

$R = \sqrt[12]{1+i} - 1$

$= \sqrt[12]{1.035} - 1 \simeq 0.00287$

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

5yrs 3 months = 5(12)+3 = 63

$A = 12000(1.00287)^{63}$

$= €14,375$

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*".

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

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

$\text{Present value} = \frac{\text{Future value}}{(1+i)^t}$ ✓

$P = \frac{18000}{(1.04)^4} = €15,386$

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.

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

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

$A = 10\,000 \qquad R = 4.2\% \qquad t = 10$

$P = \frac{10000}{(1.042)^{10}} = €\ 6,627.09$

Example 5

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

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

$A = 6500$

$P = 5000$

$R = 3.5\%$ $\Big\}$ $t = ?$

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

$\Rightarrow \frac{6500}{5000} = (1.035)^t$

$1.3 = 1.035^t$

If $a = b^n$ then $n = \log_b a$

$t = \log_{1.035} 1.3 = 7.626$ years

13. I plan to borrow €175 000 to buy a house.
If the bank charges an AER of 4.5%, what would this loan amount to in 20 years, assuming no repayments?

HW 5.1 Q13

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

$P = 175\,000$
$R = 4.5\%$
$t = 20$ years
$\Big\}$ $A = ?$

$A = 175\,000(1.045)^{20}$

$= €422,049.95$

14. Using ~~(a) trial and error and~~ (b) logs, find how many years it will take €1130 to have a future value of €3000 if invested at 5% per annum compound interest.

HW 5.2 Q14

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

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

If $a = b^n$
$n = \log_b a$

$A = 3000$
$P = 1130$
$R = 5\%$
$\Big\}$ $t = ?$

$1.05^t = \frac{3000}{1130}$

$1.05^t = 2.655$

$t = \log_{1.05} 2.655 = 20$ years