## 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.

$t = 18$ months

$S_{18}$ Future Values $= 1500$

$i = 0.4\%$ MER

$F = P(1+i)^t$

$$S_n = \frac{a(1-r^n)}{1-r}$$

$$F_1 = P(1.004)^{18}$$
$$F_2 = P(1.004)^{17}$$
$$\vdots$$
$$F_{17} = P(1.004)^2$$
$$F_{18} = P(1.004)^1$$

$R = 1.004$

$= T_1 = a$

$$\text{Sum} = 1500$$

$$S_{18} = \frac{P(1.004)(1-1.004^{18})}{1-1.004} = 1500$$

$$(18.699)\,P = 1500$$

$$P = 1500/18.699$$

$$P = €\,80.22$$

## Exercise 5.3

1. Calculate the future value of 36 monthly instalments of €20.00 at an interest rate of 0.5% per month. What is the total interest earned on these savings?

$F = P(1+i)^t$

1st Instalment:
2nd Instalment:
⋮

$$F_1 = 20(1.005)^{36}$$
$$+F_2 = 20(1.005)^{35}$$
$$\vdots$$
$$+F_{35} = 20(1.005)^2$$
$$+F_{36} = 20(1.005)^1$$

Geometric Series

$R = 1.005$

$= T_1 = a$

$$S_n = \frac{a(1-r^n)}{1-r}$$

$$\text{Total } F = S_{36} = \frac{20(1.005)(1-1.005^{36})}{1-1.005}$$

$$\text{Total } F = €\,790.66$$

$I = F - P$

Value without interest $= 20 \times 36 = €720$

Interest $= 790.66 - 720 = €\,70.66$

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?

$F = P(1+i)^t$

1st Instalment

$F_1 = 2000(1.04)^5$

$F_2 = 2000(1.04)^4$

$F_3 = 2000(1.04)^3$ $r = 1.04$

$F_4 = 2000(1.04)^2$

$F_5 = 2000(1.04)^1 = T_1 = a$

$S_n = \frac{a(1-r^n)}{1-r}$

$S_5 = ?$

$\text{Sum } F_s = \frac{2000(1.04)(1 - 1.04^5)}{1 - 1.04}$

$= €11,265.95$