Pág. 27

1.1. $35\,000\,€ \times 2,8\% = 980\,€$ **R: (A)**

1.2. $980\,€ \times 4 = 3920\,€$

$3920\,€ + 35\,000\,€ = 38\,920\,€$ **R: (C)**

1.3. $46\,000\,€ - 35\,000\,€ = 11000\,€$

$11000 : 980 = 11,22$ anos < 12 anos **R: (C)**

2. $1564,20 - 1500 = 64,20\,€$

$64,20 : 2 = 32,10\,€$

$\dfrac{32,10}{1500} = 2,14\%$ **R: (C)**

3.1. Seja $x =$ capital inicial investido.

$x + 2 \times 2,35\% \times x = 13\,087,50$

$\Leftrightarrow x + 0,047x = 13\,087,50$

$\Leftrightarrow 1,047x = 13\,087,50$

$\Leftrightarrow x = \dfrac{13\,087,50}{1,047}$

$\Leftrightarrow x = 12\,500$

O montante inicial investido pelo Sr. António foi 12 500 €.

3.2. $2,35\% \times 12\,500 = 293,75\,€ \rightarrow$ juro anual.

$13\,087,50 + 3 \times 293,75 = 13\,968,75\,€$

Daqui a 3 anos, o Sr. António terá um montante acumulado de 13 968,75 €.

4. **a)** $4000\,€ \times 2,7\% = 108\,€$ **R: V**

b) $4000\,€ + 3 \times 108 = 4324\,€$ **R: V**

c) $4000 + 108x > 5000$

$\Leftrightarrow 108x > 1000$

$\Leftrightarrow x > \dfrac{1000}{108}$

$\Leftrightarrow x > 9,3$

São necessários 10 anos, no mínimo. **R: F**

d) $4000 + 108x > 8000$

$\Leftrightarrow 108x > 4000$

$\Leftrightarrow x > \dfrac{4000}{108}$

$\Leftrightarrow x > 37,04$

$\therefore$ Seriam necessários 38 anos para o capital inicial duplicar.

R: F

e) $C_f = 4000 \times (1 + 0,027)^3 \approx 4332,83\,€$ **R: V**

f) $C_f = 4000 \times (1 + 0,027)^9 \approx 5083,86\,€$ **R: V**

Pág. 28

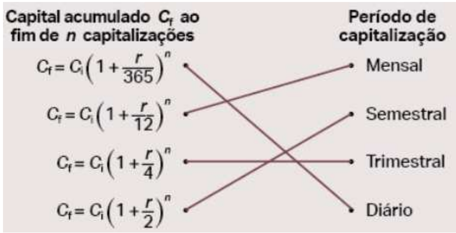
5.1. $C_f = 2700 \times \left(1 + \dfrac{0,025}{12}\right)^6 = 2733,93\,€$

5.2. $C_f = 2700 \times \left(1 + \dfrac{0,025}{12}\right)^4 = 2722,57\,€$

5.3. $C_f = 2700 \times \left(1 + \dfrac{0,025}{12}\right)^{15} = 2785,62\,€$

5.4. $C_f = 2700 \times \left(1 + \dfrac{0,025}{12}\right)^{24} = 2838,28\,€$

6.1.



6.2.

a) $C_f = C_i\,(1 + r)^n$

$18\,752 = x(1 + 0,03)^6$

$\Leftrightarrow x = \dfrac{18\,752}{1,03^6}$

$\Leftrightarrow x \approx 15\,704,50\,€$

b) $C_f = C_i\left(1 + \dfrac{r}{2}\right)^n$ $n = 6 \times 2 = 12$ semestres

$18\,752 = x\left(1 + \dfrac{0,03}{2}\right)^{12}$

$\Leftrightarrow 18\,752 = x \times 1,015^{12}$

$\Leftrightarrow x = \dfrac{18\,752}{1,015^{12}}$

$\Leftrightarrow x \approx 15\,683,94\,€$

c) $C_f = C_i\left(1 + \dfrac{r}{4}\right)^n$ $n = 6 \times 4 = 24$ trimestres

$18\,752 = x\left(1 + \dfrac{0,03}{4}\right)^{24}$

$\Leftrightarrow 18\,752 = x \times 1,0075^{24}$

$\Leftrightarrow x = \dfrac{18\,752}{1,0075^{24}}$

$\Leftrightarrow x \approx 15\,673,51\,€$

d) $C_f = C_i\left(1 + \dfrac{r}{12}\right)^n$ $n = 6 \times 4 = 24$ meses

$18\,752 = x \times \left(1 + \dfrac{0,03}{12}\right)^{72}$

$\Leftrightarrow 18\,752 = x \times 1,0025^{72}$

$\Leftrightarrow x = \dfrac{18\,752}{1,0025^{72}}$

$\Leftrightarrow x \approx 15\,666,51\,€$

7. $c_i = 5200\,€$

$c_f = 5200 + 1350 = 6550€$

$r = 3,5\%$

$n = ?$

$c_i(1+r)^n - c_i \to$ juro composto ao fim de ***n*** anos

$5200(1+0,035)^n - 5200 > 1350$

$\Leftrightarrow 5200 \times 1,035^n > 6550$

$\Leftrightarrow 1,035^n > 1,2596$

Se $n = 6$, $1,035^6 \approx 1,2293 < 1,2596$

Se $n = 7$, $1,035^7 \approx 1,2722 > 1,2596$

R: (B)

Pág. 29

8.1. $n = 5$ $\quad r = 2,4\%$

$c_i = ?$ $\quad c_f = 21375\,€$

$21375 = c_i \times (1+0,024)^5$

$\Leftrightarrow 21375 = c_i \times 1,024^5$

$\Leftrightarrow c_i = \dfrac{21375}{1,024^5}$

$\Leftrightarrow c_i \approx 18\,985\,€$

8.2. $c_i = \dfrac{4}{5} \times 21\,375 = 17\,100\,€$

$c_f = 1,2 \times 17100 = 20\,520\,€$

$r = 2,4\%$

$20\,520 < 17\,100 \times (1+0,024)^n$

$\Leftrightarrow \dfrac{20\,520}{17\,100} < 1,024^n \Leftrightarrow 1,024^n > 1,2$

Por tentativas:

$n = 5$, $1,024^5 \approx 1,1259$

$n = 6$, $1,024^6 \approx 1,1529$

$n = 7$, $1,024^7 \approx 1,1806$

$n = 8$, $1,024^8 \approx \boxed{1,2089} > 1,2$

$n = 9$, $1,024^9 \approx 1,2379$

Serão necessários 8 anos, no mínimo.

9.1. Proposta A:

Juro simples $= c_i \times r \times n$

$= 7500 \times 0,027 \times 3 = 607,5\,€$

Proposta B:

Juro composto $= c_i(1+r)^n - c_i$

$= 7500 \times (1+0,024)^3 - 7500$

$= 7500 \times 1,024^3 - 7500 \approx 553,06$

Juro total $= 607,5\,€ + 553,06\,€ = 1160,56\,€$.

9.2. Proposta A:

Capital acumulado $= c_i + c_i \times r \times n$

$= 7500 + 7500 \times 0,027 \times n$

$= 7500 + 202,5n \quad (1)$

Proposta B:

Capital acumulado $= c_i(1+r)^n$

$= 7500 + (1+0,024)^n$

$= 7500 + 1,024^n \quad (2)$

Com recurso à folha de cálculo, construímos a tabela seguinte, onde foram inseridas as expressões (1) e (2).

n	**(1)** $7500 + 202,5 \times n$	**(2)** $7500 \times 1,024^n$	**(1) + (2)**
1	7702,5	7680	15 382,5
2	7905	7864,32	15 769,32
3	8107,5	8053,06368	16 160,56368
4	8310	8246,337208	16 556,33721
5	8512,5	8444,249301	16 956,7493
6	8715	8646,911285	17 361,91128
7	8917,5	8854,437155	17 771,93716
8	9120	9066,943647	18 186,94365

Serão necessários 6 anos.

9.3. A aplicação mais vantajosa é a A. Durante os 8 anos de vigência do contrato, esta aplicação tem um juro mais elevado do que o da aplicação B.

10.1. Taxa de esforço $= \dfrac{125}{1400} \approx 9\%$

10.2. Taxa de esforço $\leq 30\%$

$\dfrac{x}{1400} \leq 0,3 \Leftrightarrow x \leq 0,3 \times 1400$

$\Leftrightarrow x \leq 420$

R: 420 €

10.3.

a) $\text{MTIC} = 11000 + 7,8\% \times 11000 \times 6 + 1250$

$= 11\,000 + 5148 + 1250 = 17\,398\,€$

b) $17\,398 : (6 \times 12) = 17\,398 : 72 \approx 241,64\,€$

c) Taxa de esforço

$= \dfrac{125 + 241,64}{1400} = \dfrac{366,64}{1400} \approx 26\%$