

12. (a) $A_1 = 1.004x$ **A1**
 $A_2 = 1.004(1.004x + x)$ **A1**
 $= 1.004^2x + 1.004x$ **AG**

Note: Accept an argument in words for example, first deposit has been in for two months and second deposit has been in for one month.

[2 marks]

- (b) (i) $A_3 = 1.004(1.004^2x + 1.004x + x) = 1.004^3x + 1.004^2x + 1.004x$ **(M1)A1**
 $A_4 = 1.004^4x + 1.004^3x + 1.004^2x + 1.004x$ **A1**

- (ii) $A_{120} = (1.004^{120} + 1.004^{119} + \dots + 1.004)x$ **(A1)**

$$= \frac{1.004^{120} - 1}{1.004 - 1} \times 1.004x$$
 M1A1

$$= 251(1.004^{120} - 1)x$$
 AG

[6 marks]

- (c) $A_{216} = 251(1.004^{216} - 1)x \left(= x \sum_{t=1}^{216} 1.004^t \right)$ **A1**

[1 mark]

- (d) $251(1.004^{216} - 1)x = 20000 \Rightarrow x = 58.22\dots$ **(A1)(M1)(A1)**

Note: Award **(A1)** for $251(1.004^{216} - 1)x > 20000$, **(M1)** for attempting to solve and **(A1)** for $x > 58.22\dots$

$$x = 59$$
 A1

Note: Accept $x = 58$. Accept $x \geq 59$.

[4 marks]

- (e) $r = 1.004^{12} (= 1.049\dots)$ **(M1)**
 $15000r^n - 1000 \frac{r^n - 1}{r - 1} = 0 \Rightarrow n = 27.8\dots$ **(A1)(M1)(A1)**

Note: Award **(A1)** for the equation (with their value of r), **(M1)** for attempting to solve for n and **(A1)** for $n = 27.8\dots$

$$n = 28$$
 A1

Note: Accept $n = 27$.

[5 marks]

Total [18 marks]