

**Topic 1: Numbers and Algebra**

Maya wants to invest a portion of her paycheck for 15 years into an account paying 2.8% interest, compounded annually. She is expecting the annual inflation rate to be 1.8% per year throughout the 15-year period.

Maya is dreaming of a value of \$10000 to her investment at the end of the 15-year period. The two options she is researching are below.

**Option 1:** Invest \$2000 at the start of the 15-year period and invest \$ $m$  into the account at the end of each year (including the first and last years).

**Option 2:** Make a one-time investment at the start of the 15-year period.

(a) For option 1, find the minimum value of  $m$  Maya would need to invest each year. Give your answer to the nearest dollar. [3 marks]

(b) For option 2, determine the minimum amount Maya would need to invest. Give your answer to the nearest dollar. [3 marks]

Mark scheme:

- (a) First find the FV of the \$10000 desired after 15 years with an annual inflation rate of 1.8%:

$$N = 15$$

$$I = 1.8\%$$

$$PV = 10000$$

$$\mathbf{FV = -13068.227...}$$

$$P/Y = 1$$

$$C/Y = 1$$

(M1)

(A1)

Then find the monthly payment with this new FV:

$$N = 15$$

$$I = 2.8\%$$

$$PV = -2000$$

$$FV = 13068.227...$$

$$P/Y = 1$$

$$C/Y = 1$$

$$\mathbf{PMT = \$547.8767... \approx \$548}$$

A1

[3 marks]

- (b) Using  $FV = 10000$  and a rate of  $2.8\% - 1.8\% = 1\%$

$$N = 15$$

$$I = 1$$

$$FV = 10000$$

$$P/Y = 1$$

$$C/Y = 1$$

$$\mathbf{PV = \$8613.4947... \approx \$8613}$$

(A1)

(M1)

A1

[3 marks]