#### Time payments (1)

QUESTION  $\mathbf{1}$  Find the value of M, giving the answer correct to two decimal places:

a 
$$M = \frac{80\,000(1.03)^{12}(0.03)}{1.03^{12}-1}$$

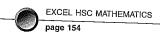
$$\mathbf{b} \qquad M = \frac{150\,000(1.005)^{240}\,(0.005)}{1.005^{240}\,-\,1}$$

QUESTION **2** Assume  $A_n$  is the amount owing on a loan at the end of n months.

- a If a loan is to be repaid with equal monthly instalments over five years write down the value of  $A_{60}$  briefly justifying your answer.
- **b** If  $A_{60} = \$20\ 000(1.007)^{60} M\left(\frac{1.007^{60} 1}{0.007}\right)$  find the value of M, to the nearest cent.

QUESTION **3** Use the formula for the sum of a geometric series to simplify  $1 + 1.004 + 1.004^2 + 1.004^3 + ... + 1.004^{n-1}$ .

#### Time payments (2)



QUESTION 1 Steven borrows \$120 000. Compound interest of 0.5% per month is charged monthly and repays an amount of M every month. If  $A_n$  is the amount owing at the end of n months:

- **a** Write down an expression for  $A_1$
- **b** Show that  $A_2 = \{[120\ 000(1.005)^2 M(1+1.005)]\}$

c Show that  $A_3 = \$[120\ 000(1.005)^3 - M(1 + 1.005 + 1.005^2)]$ 

- **d** Write down a similar expression for  $A_n$
- e Show that  $A_n = \$ \left[ 120\,000(1.005)^n M \left( \frac{1.005^n 1}{0.005} \right) \right]$

**f** Find M, to the nearest whole number, if  $A_{144} = 0$ 

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#### Time payments (3)

- QUESTION **1** Gabi invested an amount of \$40 000 in an account that earns 6.5% p.a. interest compounded annually. Gabi intends to withdraw \$Y from the account at the end of each year, immediately after the interest has been paid. If  $A_n$  is the amount in the account immediately after the nth withdrawal:
- **a** Write an expression for  $A_1$
- **b** Show that  $A_{10} = \$ \left[ 40\,000\,(1.065)^{10} Y \left( \frac{1.065^{10} 1}{0.065} \right) \right]$

 ${f c}$  If the account is empty immediately after the 10<sup>th</sup> withdrawal, find the value of  ${\it Y}$ 

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Time payments (4)

QUESTION 1	What are the monthly repayments on a loan of \$75 000 over 20 years at an interest rate of 0.7% per month compound interest?

Que

3

Que

a

d

Page 165 1 a 8036.97 b 1074.65 2 a  $A_{60} = 0$ . The loan will be repaid after 5 years (60 months), so the amount owing at that time will be zero. **b** \$409.37 **3**  $\frac{1.004^n - 1}{0.000}$ 0.004

Page 166 1 a \$120 000(1.005) - M d  ${[120 000(1.005)^n - M(1 + 1.005 + 1.005^2 + ... + 1.005^{n-1}]}$  f 1171 Page 167 1 a \$40 000(1.065) - Y c 5564

Page 168 1 \$646.13