Financial mathematics - practice test 2

Name: _____ Date: _____

10 questions | 60 marks | 75 minutes

Practice with reverse calculations, stepped contributions and a changing-rate loan.

Use a graphics calculator or appropriate digital tool for labelled tasks.

1. A machine costs AUD 9,000 and loses 15% of its value annually. [6 marks]

(a) Find its modelled value after 4 years. [3 marks]

(b) A seller claims its four-year value is $9000(1 - 4 \times 0.15)$. Explain the error. [3 marks]

2. An effective annual rate is 5.5%. [6 marks]

(a) Find the equivalent monthly rate. [3 marks]

(b) Find its equivalent nominal annual quotation with monthly compounding. [3 marks]

3. AUD 2,500 is saved initially, followed by AUD 600 at each year end for 8 years at 4%. [6 marks]

(a) Find the final balance. [3 marks]

(b) Separate total money deposited from interest. [3 marks]

4. Starting from zero, AUD 900 is deposited at each year end at 3%. The goal is AUD 7,000. [6 marks]

(a) Find the first whole number of deposits that reaches the goal. [3 marks]

(b) Verify the crossing using balances before and at that deposit. [3 marks]

5. A fund starts at AUD 15,000. It earns 4% each year. Gross year-end contributions are AUD 4,000,4,200 and 4,400; a stated 10% deduction applies to each contribution. There are no fees. [6 marks]

Supplied contributions

Year	Gross contribution (AUD)
1	4000
2	4200
3	4400

(a) Find each net contribution. [3 marks]

(b) Find the balance after year 3. [3 marks]

6. AUD 80,000 must provide 12 equal year-end withdrawals, earning 5% annually. [6 marks]

(a) Find the withdrawal amount. [3 marks]

(b) If the withdrawal rises by AUD 500, find the first closing balance. [3 marks]

7. A family wants a purchase with today's price AUD 20,000 in 6 years. Prices are modelled to rise 2% annually. The savings account earns 4% annually. [6 marks]

(a) Find the future-dollar target. [3 marks]

(b) Find the equal year-end deposit needed, starting from zero. [3 marks]

8. A fund needs AUD 12,000 at time 4 and earns 5% annually. Four equal year-end deposits were planned, but the time 2 deposit is missed. [6 marks]

(a) Calculate the originally planned deposit R. [3 marks]

(b) The original deposits at times 1,3 and 4 are paid. How much extra at time 4 replaces the missed time 2 deposit? [3 marks]

9. A loan of AUD 18,000 is to be cleared in 48 monthly payments. Interest is 0.5% per month. Use the unrounded exact repayment throughout. [6 marks]

(a) Find the monthly repayment. [3 marks]

(b) Find the outstanding balance after 18 payments. [3 marks]

10. A loan starts at AUD 20,000 with annual interest 5% and annual repayments AUD 5,000. After the second repayment the rate rises to 7%; it must then be cleared with three equal year-end repayments. [6 marks]

(a) Find the balance just after the second original repayment. [3 marks]

(b) Find the new annual repayment. [3 marks]