Topic test | Financial mathematics

Financial mathematics - applications test

Name: _____ Date: _____

16 questions | 55 marks | 60 minutes

All amounts are Australian dollars. Use the stated classroom models; exclude fees, tax and other transactions unless given. Round final currency to cents unless asked otherwise.

A scientific calculator may be used.

1. A club buys an item for 80 dollars and marks it up by 25%. It then discounts the marked price by 10%. Find the sale price. [3 marks]

2. A 360-dollar price includes a 20% increase from last year. Find last year’s price. [2 marks]

3. A fund starts at 2000 dollars. Compare 5% annual simple interest with 5% annual compound interest over 3 years. [5 marks]

(a) Calculate both totals. [3 marks]

(b) Explain what creates the difference. [2 marks]

4. A model uses nominal 8% annually compounded quarterly. Write the one-year effective factor, then find the effective annual percentage to 2 decimal places. [3 marks]

5. A device-value model retains 85% of its current value annually from 1200 dollars. Find its year-4 value to cents. [3 marks]

6. Two 2000-dollar equipment models are proposed: A subtracts 250 dollars per year; B loses 15% of current value each year. [4 marks]

(a) Calculate their year-2 values. [2 marks]

(b) State a limitation of using model A after year 8. [2 marks]

7. A fund loses 30% of its value. Find the percentage increase needed to recover the original value, to 2 decimal places. [3 marks]

8. A saving rule is $B_{n+1} = 1.02B_n + 100$, from $B_0 = 400$. [5 marks]

(a) Find the first three closes, rounding only the final result to cents. [3 marks]

(b) How much of the unrounded final balance is growth rather than starting money and deposits? [2 marks]

9. A loan of 800 dollars adds 1% interest, then receives a 180-dollar payment each month. Find the balance after 2 months. [3 marks]

10. A 1200-dollar balance receives a 100-dollar deposit before 3% interest. A model instead assumes an end deposit. Find the two closes and their difference. [3 marks]

11. A balance starts at 1000 dollars, has 5% interest and a 100-dollar end deposit in year 1, then 4% interest and no deposit in year 2. [5 marks]

(a) Calculate the two closes. [2 marks]

(b) Why is $1000(1.05)^2 + 200$ not the stated model? [3 marks]

12. The table has columns A = period, B = opening, C = decimal rate, D = end deposit and E = closing. Its headers occupy spreadsheet row 1; the two data rows shown are spreadsheet rows 2 and 3. Write the missing formulas for B3 and E3. [3 marks]

Supplied spreadsheet layout

A	B	C	D	E
1	1000	0.05	100	1150
2	missing	0.04	0	missing

13. A fee of 15 dollars is charged at each year end on a 1000-dollar balance earning 5% annually. Find the year-2 balance and compare with the no-fee result. [3 marks]

14. A fee-free model starts at 2000 dollars and grows 5% annually. Find the first whole year at which the balance exceeds 2400 dollars. [3 marks]

15. A spreadsheet repeats the initial 1000 dollars as the opening balance in every row despite showing positive compound interest. Explain the error and its effect. [3 marks]

16. Two savings models have the same rate but different deposits and fees. Explain why comparing only final balances cannot identify which model has the larger interest return. [4 marks]