Financial mathematics - practice test 2

16 questions | 43 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.

Equivalent correct methods earn the corresponding marks.

1. Write the factor for losing 12% of current value. [2 marks]

$1-0.12=0.88$.

Answer: 0.88

2. Find the total of 2500 dollars after 2 years at 4% simple interest. [2 marks]

$2500(1+0.04\times 2)=2700$.

Answer: 2700 dollars

3. Find the total of 2500 dollars after 2 years at 4% annual compound interest. [2 marks]

$2500(1.04)^2=2704$.

Answer: 2704 dollars

4. An annual-compounding model grows 1600 dollars to 1936 dollars in 2 years. Find its annual rate. [3 marks]

$(1+r)^2=\frac{1936}{1600}=1.21$. Use positive factor 1.1.

Answer: 10%

5. A nominal rate is 10% annually, compounded every half-year for 3 years. State the period rate and exponent. [2 marks]

$\frac{0.10}{2}=0.05$ and $2\times 3=6$.

Answer: 5% per half-year; exponent 6.

6. An initial 800 dollars grows at 1% per month for 4 months. Find the balance and interest to cents. [3 marks]

$800(1.01)^4=832.483208$. Subtract the original 800 dollars.

Answer: 832.48 dollars; interest 32.48 dollars.

7. A reducing-balance model is $V = 4500(0.9)^t$. Find its year-3 value and state the annual loss rate. [3 marks]

$4500(0.9)^3 = 3280.5$; the retained proportion is 90%.

Answer: 3280.50 dollars; 10%.

8. A straight-line asset model is $V = 2100 - 350t$. Give the largest whole year for a nonnegative model value. [2 marks]

$2100 - 350t \geq 0$ gives $t \leq 6$.

Answer: 6 years

9. A price rises by 25%, then falls by 20%. Find the combined percentage change. [2 marks]

$1.25 \times 0.8 = 1$.

Answer: 0%; no overall change.

10. What percentage increase restores an amount after a 20% loss? [2 marks]

The reverse multiplier is $\frac{1}{0.8} = 1.25$.

Answer: 25%

11. Compare two deposit timings for an opening 600 dollars, a 50-dollar deposit and 2% period interest. [4 marks]

(a) Find the close if the deposit is made at the end. [2 marks]

$600(1.02) + 50 = 662$.

Answer: 662 dollars

(b) Find the close if the deposit is made before interest. [2 marks]

$(600 + 50)(1.02) = 663$.

Answer: 663 dollars

12. A loan rule is $L_{n+1} = 1.01L_n - 200$, beginning at $L_0 = 1000$. [6 marks]

(a) Find its first two closing balances. [3 marks]

$L_1 = 1010 - 200 = 810$; $L_2 = 810(1.01) - 200 = 618.1$.

Answer: 810 dollars; 618.10 dollars.

(b) A separate loan has an opening balance of 150 dollars and the same 1% monthly interest rate. What exact final payment clears it after that month’s interest? [3 marks]

The amount owed after interest is $150(1.01) = 151.5$; a full 200-dollar payment is unnecessary.

Answer: 151.50 dollars

13. A spreadsheet enters 4 in its decimal-rate column instead of 0.04. Explain the factor error. [2 marks]

$1 + 4 = 5$; the input represents 400%, not 4%.

Answer: It uses factor 5 instead of 1.04.

14. For an opening 750, rate 0.02 and end deposit 60, find the close and the next opening. [2 marks]

$750(1.02) + 60 = 825$. Carry this to the next row.

Answer: 825 dollars; next opening 825 dollars.

15. Compare 1000 dollars at 6% with a 20-dollar final fee against 1000 dollars at 5% without a fee, both for one year. Which model ends higher? [3 marks]

$1000(1.06) - 20 = 1040$, while $1000(1.05) = 1050$.

Answer: The 5% fee-free model: 1050 dollars versus 1040 dollars.

16. An advertisement says a 6% rate is always better than a 5% rate. Give two pieces of missing information needed for a fair mathematical comparison. [3 marks]

Also match initial amounts, payment timing, duration and extra transactions. The headline rate alone does not define a complete model.

Answer: For example: compounding convention and fees.