Marking guide | Financial mathematics

Financial mathematics - Practice 2

16 questions | 44 marks | 60 minutes

A different mix of reverse percentages, model comparisons and financial assumptions.

Equivalent correct methods earn the corresponding marks.

1. Find 18% of 250 dollars. [2 marks]

$0.18 \times 250 = 45.$

Answer: AUD 45.00

2. A price rises from 64 to 80 dollars. Find the percentage increase. [2 marks]

Increase $= 16.$

$\frac{16}{64} = 0.25 = 25\%.$

Answer: 25%

3. After a 12% increase, a fee is 112 dollars. Find the original fee. [3 marks]

$1.12P = 112$, so $P = 100.$

Answer: AUD 100.00

4. A 100-dollar price rises by 20%, then falls by 5%. Find the final price and net percentage increase. [3 marks]

$100(1.20)(0.95) = 114.$

Net increase $= 14$ dollars from a 100-dollar base.

Answer: AUD 114.00; 14% increase.

5. A 1,500-dollar principal earns 180 dollars simple interest over 2 years. Find the annual percentage rate. [3 marks]

$r = \frac{180}{1500 \times 2} = 0.06 = 6\%.$

Answer: 6% per year

6. How long does 500 dollars take to earn 75 dollars at 5% simple interest per year? [2 marks]

$t = \frac{75}{500 \times 0.05} = 3.$

Answer: 3 years

7. Find the final amount for 1,200 dollars at 5.5% simple interest per year for 2 years. [3 marks]

$I = 1200(0.055)(2) = 132.$

$A = 1200 + 132 = 1332.$

Answer: AUD 1,332.00

8. Hire A costs $35 + 2h$ dollars and B costs $11 + 5h$ dollars. Find their equal-cost time and cost. [3 marks]

$35 + 2h = 11 + 5h$ gives $24 = 3h$.

At $h = 8$, both cost 51.

Answer: 8 hours; AUD 51.00

9. Hire A costs $35 + 2h$ dollars and B costs $11 + 5h$ dollars. Compare their costs for 10 hours. [2 marks]

$35 + 2(10) = 55.$

$11 + 5(10) = 61.$

Answer: A costs AUD 55.00; B AUD 61.00. A is AUD 6.00 cheaper.

10. A class sells 30 tickets at 14 dollars each. Costs are 160 dollars plus 6 dollars per ticket. Find the surplus. [3 marks]

Income $= 420$.

Costs $= 160 + 180 = 340$.

$420 - 340 = 80$.

Answer: AUD 80.00

11. An event sells 20 tickets at 14 dollars each. Costs are 160 dollars fixed plus 6 dollars for each ticket sold. Find the balance. [3 marks]

Income $= 20(14) = 280$.

Costs $= 160 + 20(6) = 280$.

The fixed 160-dollar cost stays unchanged.

Answer: Zero; the event breaks even.

12. Assume each rule is either linear or quadratic. Classify the models consistent with the table and explain the first and second differences. [3 marks]

Equal input steps

n	P	Q
0	10	10
1	15	12
2	20	16
3	25	22

P changes by 5 at every step.

Q changes by $2, 4, 6$, with constant second difference 2.

Answer: P is linear; Q is quadratic.

13. Costs are $C_A = 5n + 20$ and $C_B = n^2 + 20$. Find all equal-cost counts, then state the positive one. [3 marks]

$5n = n^2$ gives $n(n-5) = 0$.

For a positive order, use $n = 5$.

Answer: $n = 0, 5$; positive count 5.

14. Find both counts giving revenue 35 dollars in $R = n(12 - n)$. [3 marks]

$n^2 - 12n + 35 = (n-5)(n-7) = 0$.

Both counts give positive prices.

Answer: $n = 5, 7$

15. An account has principal 800 dollars and interest 64 dollars. A report labels 64 dollars as the final balance. Correct it. [2 marks]

Interest is the increase, not the entire amount.

$A = 800 + 64 = 864$.

Answer: Final balance AUD 864.00

16. Compare net first-year gains on 1,000 dollars: A pays 4% simple interest but charges a 5-dollar fee; B pays 3.8% with no fee. [4 marks]

A: $1000(0.04) - 5 = 35$.

B: $1000(0.038) = 38$.

Compare after the supplied fee, not only the percentage rates.

Answer: A: AUD 35.00; B: AUD 38.00. B gives AUD 3.00 more under these assumptions.