Marking guide | Financial mathematics

Financial mathematics - Practice 1

16 questions | 44 marks | 60 minutes

Percentages, simple interest, fixed costs, budgets and model checks.

Equivalent correct methods earn the corresponding marks.

1. Find 15% of 80 dollars. [2 marks]

$0.15 \times 80 = 12.$

Answer: AUD 12.00

2. Increase 125 dollars by 12%. [2 marks]

$125 \times 1.12 = 140.$

Answer: AUD 140.00

3. A sale price is 96 dollars after a 20% discount. Find the original price. [3 marks]

$0.8P = 96$, so $P = \frac{96}{0.8} = 120.$

Answer: AUD 120.00

4. A fee falls from 90 to 72 dollars. Find the percentage decrease. [2 marks]

Decrease $= 18.$

$\frac{18}{90} = 0.2 = 20\%.$

Answer: 20%

5. A 600-dollar principal earns 4% simple interest per year for 3 years. [3 marks]

(a) Find the interest. [2 marks]

$I = 600(0.04)(3) = 72.$

Answer: AUD 72.00

(b) Find the final amount. [1 mark]

$A = 600 + 72 = 672.$

Answer: AUD 672.00

6. Find simple interest on 800 dollars at 8% per year for 9 months. [3 marks]

$t = \frac{9}{12} = 0.75$ years.

$I = 800(0.08)(0.75) = 48.$

Answer: AUD 48.00

7. A 960-dollar principal earns 144 dollars simple interest at 5% per year. Find the time in years. [3 marks]

$t = \frac{144}{960 \times 0.05} = 3.$

Answer: 3 years

8. A cost rule is $C = 12 + 4n$ dollars. Find the cost for 5 items. [2 marks]

$C(5) = 12 + 4(5) = 32.$

Answer: AUD 32.00

9. Plan A costs $10 + 3n$ dollars and Plan B costs $22 + n$ dollars. [5 marks]

(a) At what count are costs equal? [3 marks]

$10 + 3n = 22 + n$ gives $2n = 12.$

Both cost 28 at $n = 6.$

Answer: $n = 6$, cost AUD 28.00

(b) Which is cheaper for 4 items? [2 marks]

A costs 22; B costs $26.$

Answer: A by AUD 4.00

10. Income is 200 dollars. Planned expenses are 75, 48 and 32 dollars. Find the balance. [2 marks]

Expenses $= 75 + 48 + 32 = 155.$

$200 - 155 = 45.$

Answer: AUD 45.00 remains

11. Income is 200 dollars. Planned expenses are 75, 48 and 32 dollars, plus a 15-dollar reserve for unexpected costs. What is left to spend? [2 marks]

$45 - 15 = 30.$

Answer: AUD 30.00

12. A stall sells 25 items at 4 dollars each. Costs are 30 dollars plus 1.20 dollars per item. Find the surplus. [3 marks]

Income $= 25(4) = 100.$

Costs $= 30 + 25(1.20) = 60.$

Surplus $= 100 - 60 = 40.$

Answer: AUD 40.00

13. Complete the costs for $C = n^2 + 2n + 5$ at $n = 0, 1, 2$ and classify the model. [3 marks]

Substitution gives $5, 8, 13.$

The non-zero squared term makes it quadratic.

Answer: $5, 8, 13$; quadratic.

14. Revenue is $R = n(18 - n)$ dollars. Find revenue and price per item at $n = 5.$ [3 marks]

Price $= 18 - 5 = 13.$

$R = 5(13) = 65.$

Answer: Revenue AUD 65.00; price AUD 13.00

15. Why is $n = 20$ unsuitable in the selling model $R = n(18 - n)$? [3 marks]

$18 - 20 = -2.$

Use only a domain consistent with non-negative prices and whole-number counts.

Answer: It predicts a negative selling price of -2 dollars.

16. A student calculates 8,000 dollars interest on 1,000 dollars at 4% simple interest for 2 years. Correct the calculation. [3 marks]

The rate is 0.04, not 4.

$1000(0.04)(2) = 80.$

Answer: AUD 80.00 interest