Simultaneous equations and break-even situations

6 questions | 13 marks

Equivalent correct methods earn the corresponding marks.

1. Solve $y = 2x + 1$ and $y = 5x - 8$. [2 marks]

Equate: $2x + 1 = 5x - 8$.

Then $x = 3$, $y = 7$.

Answer: $(3, 7)$.

2. Plans cost $10 + 4h$ and $22 + 2h$ dollars. Find equal usage and cost. [2 marks]

Equate to get $2h = 12$.

Substitute $h = 6$.

Answer: 6 h, at 34 dollars.

3. Explain the solutions of $y = 3x + 2$ and $y = 3x - 5$. [2 marks]

Same gradient but distinct intercepts give parallel lines.

Answer: No solution.

4. Compare $y = 2x + 6$ and $2y = 4x + 12$. [2 marks]

Divide the second equation by 2.

It becomes the first equation.

Answer: Infinitely many common solutions.

5. Revenue is $9n$ and cost is $50 + 4n$ dollars. Find break-even. [2 marks]

$9n = 50 + 4n$ gives $5n = 50$.

Answer: 10 items.

6. Revenue is $12n$ and cost is $70 + 5n$. Find the smallest quantity giving at least 35 dollars profit. [3 marks]

Profit $= 7n - 70$.

Solve $7n - 70 \geq 35$, so $n \geq 15$.

Answer: 15 items.