Simultaneous linear equations and intersection models

6 questions | 12 marks

Equivalent correct methods earn the corresponding marks.

1. Solve $y = 3x + 1$ and $y = x + 9$. [2 marks]

Set $3x + 1 = x + 9$ to obtain $x = 4$, then $y = 13$.

Answer: $(4, 13)$

2. Solve $2x + y = 11$ and $x - y = 1$. [2 marks]

Add equations: $3x = 12$, then $y = 3$.

Answer: $(4, 3)$

3. Solve $3x + 2y = 4$ and $x - y = 3$. [2 marks]

Use $x = y + 3$: $3y + 9 + 2y = 4$, so $y = -1$ and $x = 2$.

Answer: $(2, -1)$

4. Classify $y = 2x + 1$ and $4x - 2y = 6$ by their number of simultaneous solutions. [2 marks]

The second is $y = 2x - 3$: distinct parallel lines.

Answer: No solutions.

5. Classify $x + 2y = 5$ and $3x + 6y = 15$. [2 marks]

The second is three times the first; both describe one line.

Answer: Infinitely many solutions.

6. Plan A costs 18 dollars plus 4 dollars per visit; Plan B costs 6 dollars plus 7 dollars per visit. At what number of visits are their costs equal? [2 marks]

Solve $18 + 4v = 6 + 7v$ to obtain $v = 4$.

Check both original costs.

Answer: 4 visits; both cost 34 dollars.