Vector/Cartesian equations of lines

6 questions | 12 marks

Equivalent correct methods earn the corresponding marks.

1. Write a line through (2,-1,4) parallel to (1,3,-2). [2 marks]

Use the point as initial position.

Use the stated direction vector.

Answer: $\mathbf{r} = (2, -1, 4) + t(1, 3, -2)$

2. Find the point at t=-2 on $(1, 0, 3) + t(2, -1, 1)$. [2 marks]

Multiply the direction by -2.

Add $(-4, 2, -2)$ to the initial point.

Answer: $(-3, 2, 1)$

3. Is (3,2,4) on $(1, 0, 1) + t(1, 1, 2)$? [2 marks]

The x and y components require t=2.

Then z=5, not 4.

Answer: No.

4. Convert $(1, 2, 3) + t(0, 4, -2)$ to Cartesian form. [2 marks]

Keep x constant.

Eliminate t from the other two components.

Answer: $x = 1$, $(y - 2)/4 = (z - 3)/(-2)$.

5. Parametrise the segment from (0,1,2) to (4,-1,6). [2 marks]

Subtract endpoints.

Restrict t to the segment interval.

Answer: $(0, 1, 2) + t(4, -2, 4)$, $0 \leq t \leq 1$.

6. Lines use points (1,2,3) and (3,1,7), and directions (2,-1,4) and (-4,2,-8). Are they the same line? [2 marks]

The directions are parallel.

The second point lies on the first line at t=1.

Answer: Yes.