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: $x = 1$, $\frac{y-2}{4} = \frac{z-3}{-2}$.

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.