Vector operations

6 questions | 12 marks

Equivalent correct methods earn the corresponding marks.

1. For a=(2,-1,3), b=(-1,4,2), find a+b and 3a-2b. [2 marks]

Add components.

For the second result subtract $(-2, 8, 4)$ from $(6, -3, 9)$.

Answer: $(1, 3, 5)$ and $(8, -11, 5)$

2. Find the midpoint of (2,4,-2) and (6,-2,8). [2 marks]

Add coordinates to get $(8, 2, 6)$.

Divide by 2.

Answer: $(4, 1, 3)$

3. Find P one quarter of the way from (0,1,2) to (8,5,-2). [2 marks]

One quarter of displacement $(8, 4, -4)$ is $(2, 1, -1)$.

Add this to the first point.

Answer: $(2, 2, 1)$

4. Are A(1,1,0), B(3,5,2), C(4,7,3) collinear? [2 marks]

AB=$(2, 4, 2) = 2(1, 2, 1)$.

AC=$3(1, 2, 1)$, so the displacements are parallel.

Answer: Yes.

5. Solve $2\mathbf{p} + (1, -1, 3) = (7, 5, -1)$. [2 marks]

Subtract the fixed vector to obtain $2\mathbf{p} = (6, 6, -4)$.

Divide by 2.

Answer: $\mathbf{p} = (3, 3, -2)$

6. For parallelogram ABCD in order, A(1,0,1), B(3,2,0), C(6,1,4), find D. [2 marks]

AD=BC, so $\mathbf{d} = \mathbf{a} + \mathbf{c} - \mathbf{b}$.

Substitute and combine components.

Answer: $(4, -1, 5)$