Inverse transformations

6 questions | 12 marks

Equivalent correct methods earn the corresponding marks.

1. Find the inverse of a dilation of factor 4 about the origin. [2 marks]

Undo the scale using its reciprocal.

Answer: $\frac{1}{4}I$.

2. Find the inverse of $\begin{pmatrix} 0 & -1 \\ 1 & 0 \end{pmatrix}$. [2 marks]

Undo a counterclockwise quarter-turn with a clockwise one.

Answer: $\begin{pmatrix} 0 & 1 \\ -1 & 0 \end{pmatrix}$.

3. Express $(ABC)^{-1}$ using inverse factors. [2 marks]

Reverse the product order.

Adjacent inverse pairs then cancel.

Answer: $C^{-1}B^{-1}A^{-1}$.

4. Find p if $2p + (3, 1) = (9, -3)$. [2 marks]

Subtract $(3, 1)$ to obtain $(6, -4)$.

Divide by 2.

Answer: $p = (3, -2)$.

5. Why is reflection invertible but projection onto the same axis not? [2 marks]

Reflection is one-to-one with non-zero determinant.

Projection is singular.

Answer: Reflection preserves information; projection deletes one component.

6. Rotate $(3, 1)$ through 90° counterclockwise about $(1, 1)$. Find the image and inverse move. [2 marks]

Relative to the centre, the vector is $(2, 0)$.

Rotate it to $(0, 2)$, then add the centre.

Answer: Image $(1, 3)$; rotate clockwise about $(1, 1)$.