

Solutions

2.1 The determinant is $2 \times 3 - 1 \times 0 = 6$.

2.2 The first transformed coordinate is $2 \times 1 + 1 \times 2 = 4$.

2.3 This triangular matrix has eigenvalues given by its diagonal entries 2 and 3, so the larger is 3.

2.4 False. Matrix multiplication is usually not commutative. A determinant of zero means the transformation loses a dimension and has no inverse. Eigenvalues and diagonalisation are advanced scope, not ordinary GCSE vector content.

2.5 A A scalar that determines whether a square matrix is invertible and, in two dimensions, its signed area factor.

3.1 λ_2 : eigenvector $(1, 0)$; λ_3 : $(1, 1)$. $A(1, 1) = (3, 3) = 3(1, 1)$. Nonzero scalar multiples also work; the zero vector is excluded.