

The following *proofs* will not be asked *as bookwork* in a 2026 exam (May or August) on MA22017. That does not mean that the ideas in them cannot be used, or that you cannot be expected to know them at all. It only means that none of these will appear as pure bookwork: you will not be asked to *reproduce* the proofs from memory. You might be asked to state the result, or need to use the result.

- 1.23 φ is a group homomorphism if it preserves multiplication
- 1.41 S generates G if and only if every element of G can be written as a product of elements of S and their inverses
- 2.16 Multiplication in G/H obeys the group laws
- 2.29 3rd isomorphism theorem
- 3.19 The orbit-stabiliser theorem
- 4.27 Properties of ring homomorphisms
- 4.29 ev is a homomorphism
- 5.50 The relation used to define fields of fractions respects arithmetic operations
- 5.52 Verification of the properties of fields of fractions
- 6.24 R/pR is a field if R is a PID and p is irreducible
- 6.36 Existence of content
- 6.41 Product of primitive polynomials is primitive
- 6.42 $f \in R[X]$ is irreducible if and only if it is either irreducible in R , or else primitive and irreducible in $\mathcal{Q}(R)[X]$
- 6.43 R is a UFD implies $R[X]$ is a UFD
- 7.3 Three characterisations of Noetherian
- 7.26 Submodule of a free module is free
- 7.29 The structure theorem for modules over a PID
- 8.16 Bilinearity of the structure map
- 8.26 Exterior and symmetric power are the only subspaces preserved by the permutation group acting on the tensor power.