

1 Let  $A$  and  $B$  be groups, and consider the product group  $G = A \times B$ .

(a) Prove that

$$N = \{(e_A, b) \in A \times B \mid b \in B\}$$

is a subgroup of  $G$ .

(b) Prove that  $N \cong B$ .

(c) Prove that  $N \trianglelefteq G$ .

(d) Prove that  $G/N \cong A$ .

**2** Use the Fundamental Theorem of Finitely Generated Abelian Groups to list all abelian groups, up to isomorphism, of order 120.