Prove that if $P(x)$ and $Q(x)$ are polynomials over a field F of degree m and n respectively then the degree of $P(x)Q(x) = m + n$ while the degree of $P(x) + Q(x) = max(m, n)$.

Let G be a group and suppose that G satisfies the following property. whenever $b \cdot a = a \cdot c$, then $b = c$ for $a, b, c \in G$. Prove that G must be abelian.

Let $f : G \to H$ be an isomorphism of groups. Prove that $f(1_G) = 1_H$.

Kernel of a homomorphism is a subgroup. Will we get to?

Let p be a prime number and G be a finite group of order p.

a) Show that G is cyclic.

b) Use part (a) to show that there is only one group of order p up to isomorphism.

How many *abelian* groups are there of order 24?

Let $G = \Big\{ (\, a \,) \, a$
$aa : a \in \mathbb{R}^* \Big\}$. G is a group under matrix multiplication.

a) Find the identity element of this group.

b) Find the inverse of $(\, 3 \,) \, 3$
33 in G.

The set $G = \{5, 15, 25, 35\}$ is a group under multiplication modulo 40.

a) Find the identity element in G.

b) Find the inverses of the remaining elements in G.

Let G be the set of rational numbers *except* -1. This forms a group under the following multiplication: $a * b \equiv a + b + ab$, where the operations on the right hand side are as usual.

a) Find the identity element in G.

b) Find the inverse of 2 in G.