

Consider the cartesian product  $H = \mathbb{Z}_2 \times \mathbb{Z}_n$  (as a set). Define a binary operation on  $H$  to be

$$(\bar{i}, \bar{j}) \cdot (\bar{k}, \bar{l}) = (\bar{i} + \bar{k}, (-1)^{\bar{j}} \bar{l} + \bar{l})$$

Show that  $H$  is a group under this operation, and determine its order.

Let  $G = \langle a, b \mid a^n = 1, b^2 = 1, abab^{-1} = 1 \rangle$ . Show that  $|G| \leq 2n$ .

Show that  $H \cong G$