

$$\mathbf{A} \times \mathbf{B} = \{ \langle 1, \mathcal{P} \rangle, \langle 2, \mathcal{P} \rangle, \langle 3, \mathcal{P} \rangle, \langle 4, \mathcal{P} \rangle, \langle 1, \mathcal{Q} \rangle, \langle 2, \mathcal{Q} \rangle, \langle 3, \mathcal{Q} \rangle, \langle 4, \mathcal{Q} \rangle \}$$