$$\left(\{1,2\} \cup \{2,3\}\right) \times (2,4) = \{1,2,3\} \times \{2,4\}$$

$$= \{1, \{1,2\}, \{1,4\}, 2, \{2,2\}, \{2,4\}, 3, \{3,2\}, \{3,4\}, 4\}$$