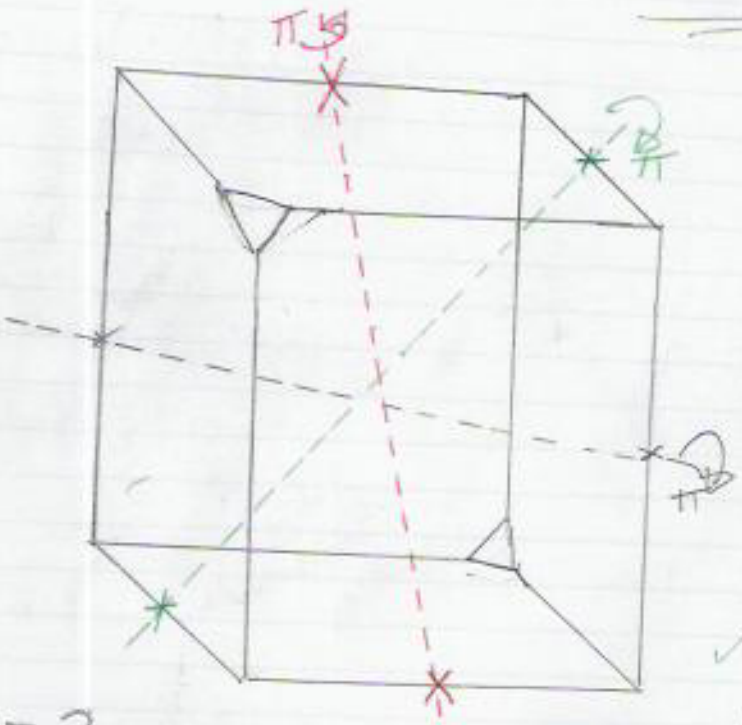
b) Truncating the corner as shown removes all rotational symmetries about the centre of each face, the mid-point of each edge and the axes between opposite vertices except for the rotation axes about the centre of the face formed by truncating the other, and the opposite vertex. The only ~~d~~ directed symmetries left are rotations of order 3 about that axis (there are two such rotations) and the identity. $\Gamma^+(Q_1)$ is therefore isomorphic to C_3. ✓ 3/3

ii) $\Gamma^+(Q_2) \simeq C_2$ ✓ 1/1 $\Gamma^+(Q_3) = C_2$ 0/1

Q4



Q4 has 3 axes permitting rotations order 2 and one axis between centres of faces of the truncated corners permitting rotations of order 3. The order two rotation axes are rotated onto each other by the rotation order 3, but the rotations order two fix the rotation axis order 3 ∴ $\Gamma^+(Q_4)$ is non Abelian, order 6 ie $\Gamma^+(Q_4) \simeq D_3$ ✓ 1/1