

Answers to Examples Class 1: Stereographic Projections

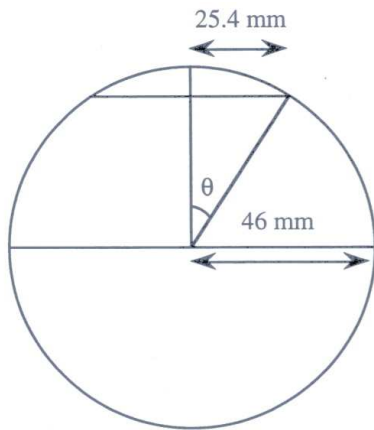


Figure 1: A small circle of radius 25.4 mm would correspond to an angle $\theta = \sin^{-1}(25.4/46) = 33.5^\circ$.

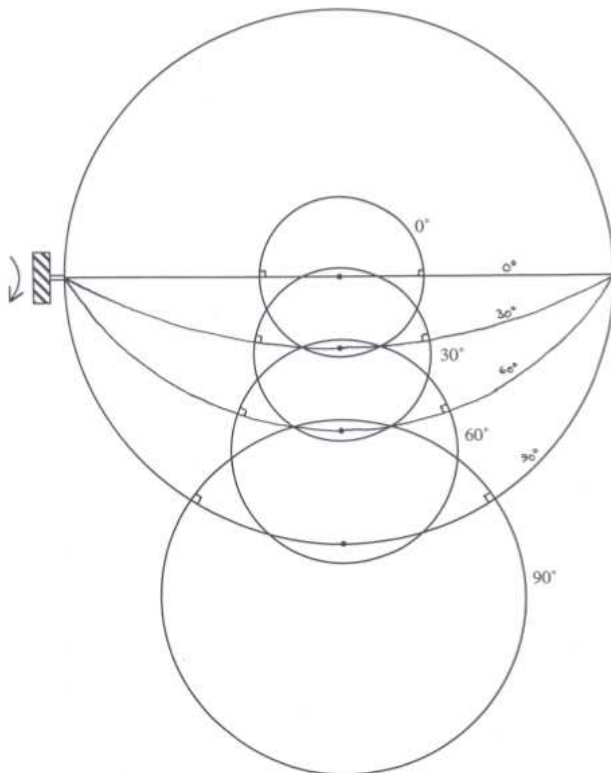


Figure 2: The primitive circle has radius 105 mm on the tracing paper clipped on to the perspex screen.

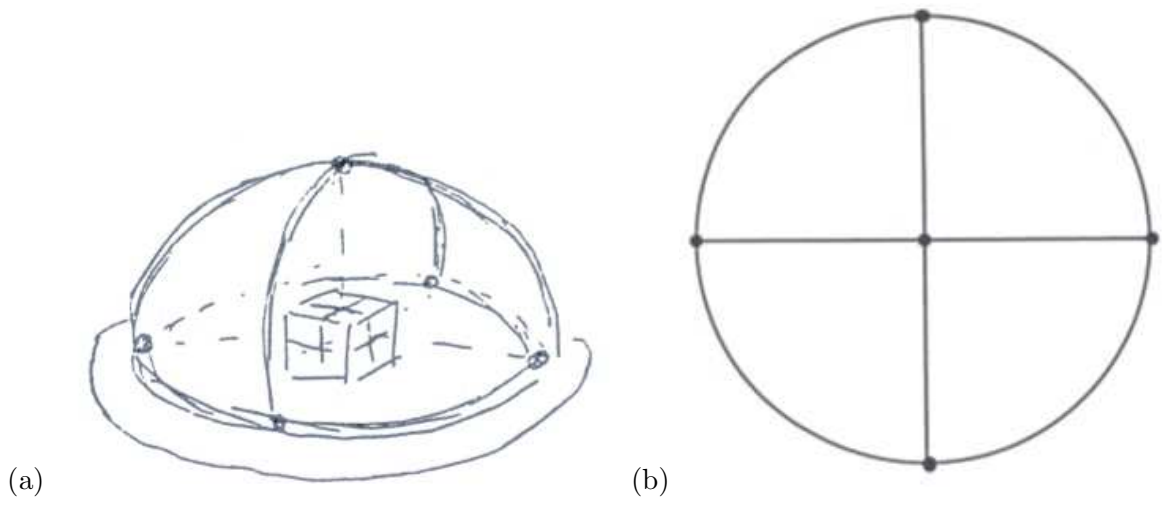


Figure 3: The features represent $\{100\}$ poles and the mirror planes parallel to the cube faces.

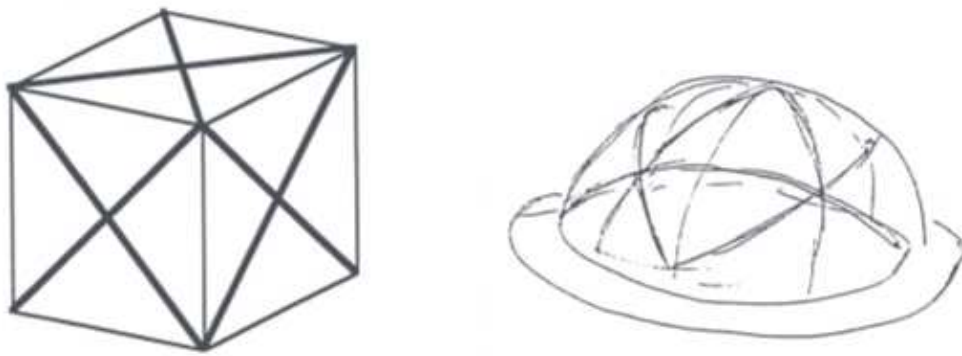


Figure 4: $\{110\}$ planes.

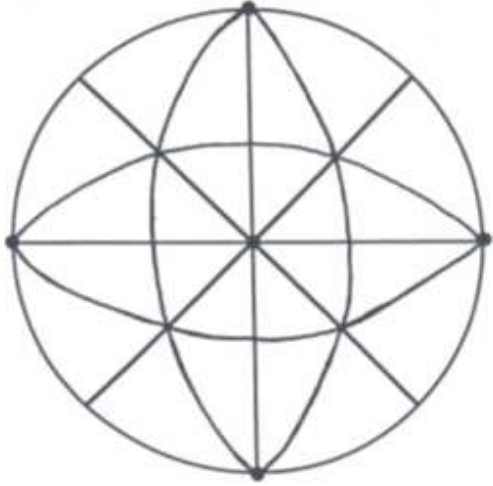


Figure 5: The stereographic projection

Use of sketch stereograms

The first four faces are cut in the order (111) , $(11\bar{1})$, $(\bar{1}11)$ and $\bar{1}\bar{1}\bar{1}$.

- The first cut leaves a single triad along $[111]$ and three $\{110\}$ mirror planes in that zone. The crystal system is trigonal, defined by the single triad.
- After the second cut, the (001) and $(1\bar{1}0)$ mirror planes remain in the zone $[110]$ (the latter is a diad). The crystal system is orthorhombic, defined by three mutually perpendicular diads (which can include inverse diads, equivalent to mirror planes).
- Only the $(\bar{1}01)$ mirror remains after three cuts, leaving the crystal system monoclinic.
- The fourth cut increases symmetry, with a tetrad along $[010]$ and four mirror planes (100) , (001) , $(\bar{1}01)$ and $(10\bar{1})$. The crystal system is tetragonal.