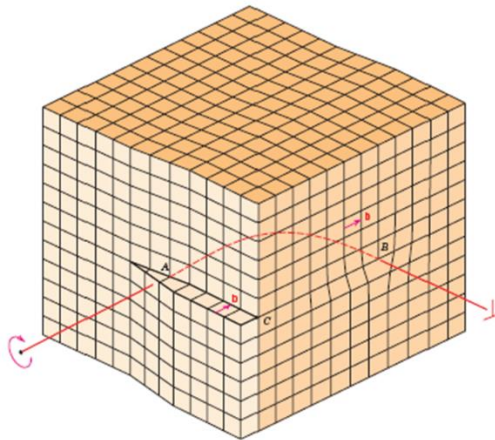


1. For the listed defects/imperfections, identify if they are **point**, **line**, or **area** defects.
 - a. Vacancy Atoms
 - b. Edge Dislocations
 - c. Grain Boundaries
 - d. Interstitial Atoms
 - e. Screw Dislocations
 - f. Twin Boundaries
 - g. Substitutional Atoms
 - h. Mixed Dislocations
 - i. Phase Boundaries
2. Sketch a model of the following:
 - a. Vacancy Defect
 - b. Interstitial Defect
 - c. Substitutional Defect
 - d. Which sketch is typical of carbon in steel?
 - e. Which defect is most mobile? Why?
3. Sketch a material with grain boundaries and twin boundaries.
4. The overall figure represents a mixed dislocation, consisting of both edge and screw dislocations. Identify the parts that are:

- a. Edge Dislocation
- b. Screw Dislocation



5. Describe the mechanism for permanent deformation in crystalline materials. (hint: Think about the defect(s) involved.)
6. How does the concentration of defects affect the behavior of a material in terms of:
 - a. Yield Strength?
 - b. Ductility?
 - c. Work Hardening?
 - d. Conductivity?