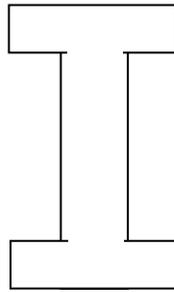


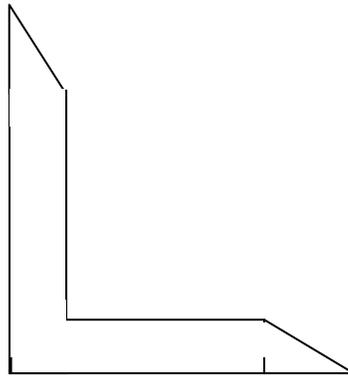
# Test-A-Beam Assessment Sample Answers

- 1.) Students should notice that when applying the same amount of force on a non-symmetric object in two different orientations, the amount of deflection allowed is usually different. It can be drastically different, depending on the variation of the object's dimensions.
- 2.) Generally, when the area moment of inertia increases, the stiffness of a beam increases. The area moment of inertia directly adds to the rigidity of the beam, resulting in smaller deflections for the same amount of weight. The type of material also affects the beam rigidity. Metals are generally a stiffer material than most types of wood. Even if two beams are cut to the same exact dimensions, their deflection under the same weight can be drastically different if one is made out of metal and the other is made out of wood.
- 3.) There are many types of beams used for building construction, along with various types of materials used. However, the following three beam cross-sections are commonly seen:

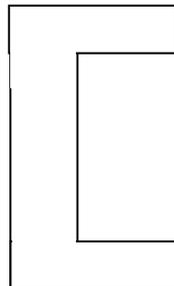
a. I- beam:



b. Angle beam:



c. Channel beam:



The use of the above beam depends on the type of structure that is being built, as well as the amount and type of load that is being placed on the beams. For example, the I-beam would resist bending up and down, since the height of the cross-section is larger than its other dimensions, but it can also resist side-to-side bending because of the flanges at the top and bottom of the cross-section. Depending on what needs to be built, weight may be an issue, which involves consideration of materials. One can achieve certain stiffness with a metal beam of low area moment of inertia, or a wooden beam with a higher area of inertia depending on the orientation of the cross-section of the beam. A structure such as a house may need to be of high stiffness and low weight, so woods or other light materials should be considered. If constructing a large skyscraper building, however, metals should be considered for additional stiffness to handle the weight.