6. What two characteristics define an HP-shape?

7. Which of the following definitions generally describes a castellated beam?
   a. a beam that has been made composite with a cast-in-place concrete slab above
   b. a beam with web holes that has been fabricated from a shallow-er shape
   c. a beam that is cantilevered over the top of a column below
   d. a plate girder with periodic transverse stiffening

8. Two limit states for concentrated forces on flanges in LRFD Specification Chapter K are local flange bending and compression buckling of the web. The former is applicable only when the concentrated flange force is tensile and the latter is applicable only when a pair of compressive forces at opposite flanges would tend to pinch the web. True or False?

9. Structurally, is there a difference between a \( \frac{1}{2} \times 4 \) bar and a \( \frac{1}{2} \times \frac{4}{4} \) plate?

10. Square, rectangular, and circular hollow structural sections (HSS) are appropriately ordered to which of the following ASTM Specifications?
   a. A6/A6M
   b. A500
   c. A36
   d. a or c
7. b. Generally speaking, a castellated beam is one that is fabricated from a shallower shape by cutting longitudinally in a zig-zag-like pattern, separating and longitudinally offsetting the resulting sections, and rewelding them back together to form a deeper shape of approximately the same average weight per foot.

8. True. From LRFD Specification Section K1.2, local flange bending applies only to tensile flange forces. From LRFD Specification Section K1.6, compression buckling of the web applies only to a pair of pinching compressive forces at opposite flanges (termed “a pair of compressive single-concentrated forces or the compressive components in a pair of double-concentrated forces”; see LRFD Specification Commentary Section K1.1 and LRFD Manual page 10-35).

9. Structurally no; furthermore, plate is becoming a universally applied term today. However, the historical classification system for such structural material would suggest the following physical difference: all four sides of the \( \frac{1}{2} H_4 \) bar would be rolled edges, i.e., the mill rolled it to that thickness and width; the \( \frac{1}{2} H_4 \) plate might have been cut from a \( \frac{1}{2} \)-in. plate of greater width.

10. b. ASTM A500 is appropriate when specifying square, rectangular, and circular HSS. Note that pipesize rounds (P, PX, and PXX) are also available in material meeting ASTM A53 grade B.