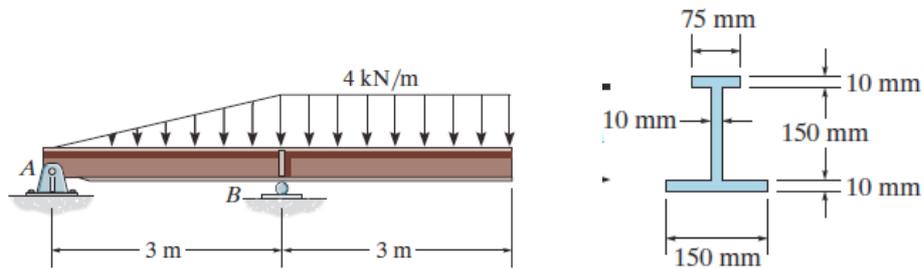


*Exam 3*  
 May 24, 2012  
 60 minutes

**Problem 1 (40 Points)**

For the Beam Shown Below:

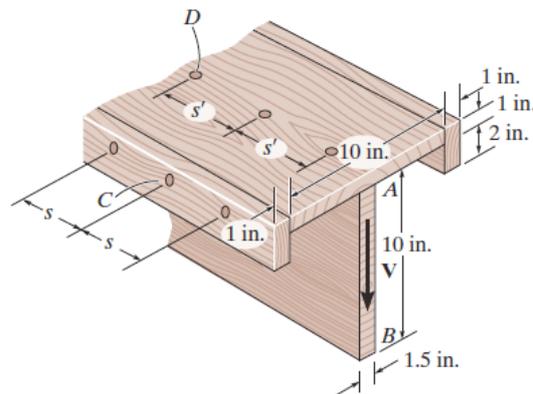
- a) Draw the shear and moment diagrams
- b) Determine the maximum shear stress in the beam at the critical section where the internal shear force is maximum



**Problem 2 (30 Points)**

The beam is made from four wood boards nailed together as shown. The nails can each support a shear force of 100lb, and the allowable shear stress for the wood is 500 psi.

- a) Determine the maximum shear force  $V$  that can be applied to the beam.
- b) Determine the corresponding required nail spacing  $s'$  and  $s$ .



**Problem 3 (30 Points)**

The gear system shown below is made of aluminum ( $G = 26 \text{ GPa}$ ). Compute:

- The maximum shear stress
- The angle of twist at end D

