ME 323: Mechanics of Materials ***Homework Set H14***

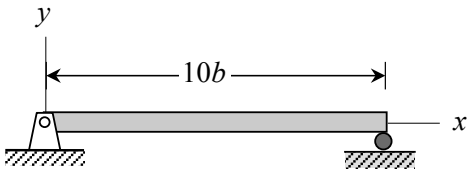
Summer 2025 ***Assigned/Due: July 3/July 9***

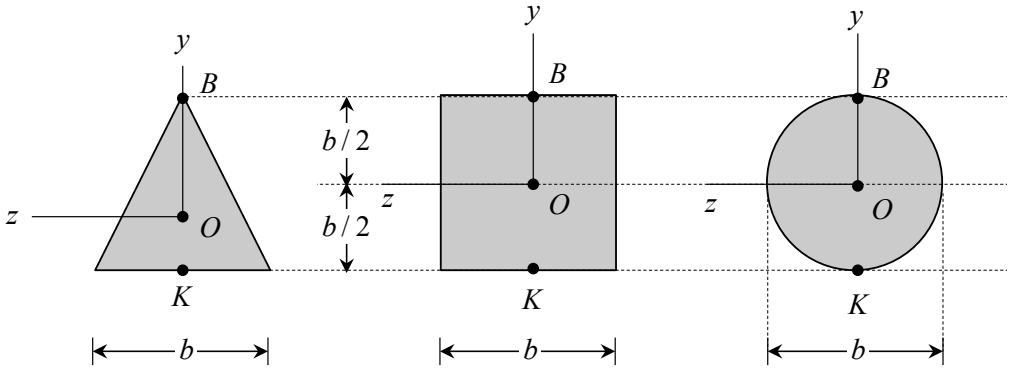
At a critical location along the length of a beam, the bending M on the cross-section of the beam is known. On each of the three beam cross-sections shown below, point O is the centroid, point B is the top-most point and point K is the bottom-most point on the cross-section. The beam is made of a material having a specific weight of ρ (N/m^3). The dimension b is in meters.

a) Determine the weight of the beam for each of the three cross-sections shown below. Leave these answers in terms of ρ and b. Rank order these weights from smallest to largest.

b) Determine the magnitude of the normal stress at points B and K for each cross-section. Leave these answers in terms of M and b. Rank order the maximum of these magnitudes for each point from smallest to largest.

c) Comment on the cost (weight) vs. maximum stress of these beam cross-sections.





beam cross section (1) ***beam cross section (2)*** ***beam cross section (3)***