Chapters/ Sections will be Covered

Book: Fundamentals of Physics by David Halliday, Jearl Walker, and Robert Resnick

Chapter Title: Equilibrium and Elasticity

Sections: Equilibrium
The Requirements of Equilibrium
The Center of Gravity
Elasticity
Tension and Compression
Shearing
Hydraulic Stress

Sample Quiz Question

In underwater applications where an object experiences stress on all sides causing deformation of volume, which modulus should be applied?
a) Shear modulus
b) Tension modulus
c) Elastic modulus
d) Bulk modulus

A force works across the plane of an object which is at static equilibrium condition, what is the appropriate modulus to use?
a) Elastic modulus
b) Bulk modulus
c) Shear modulus
d) Young modulus

Sample Quiz Question

An object does not have translational and rotational motion. What is the best condition to apply for calculating forces acting on it?
a) Static equilibrium condition
b) Unstable equilibrium condition
c) Newton's 2nd law of translational motion
d) Newton's 2nd law of rotational motion

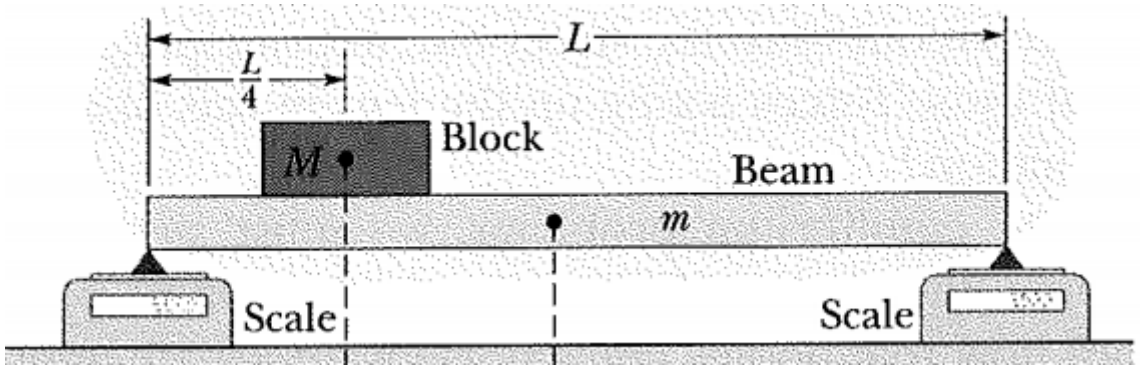
Compressive stress is continuously applied in a uniaxial direction on an object that breaks the object at the end. What is the name of the stress of this event?
a) Tensile stress
b) Yield stress
c) Ultimate stress
d) Strain

Class Activity: Math Problem #1

Fundamentals of Physics 10th Edition-Halliday, Resnick, Walker

Sample Problem 12.01 Balancing a horizontal beam

In Fig. 12-5*a*, a uniform beam, of length L and mass $m = 1.8$ kg, is at rest on two scales. A uniform block, with mass $M = 2.7$ kg, is at rest on the beam, with its center a distance $L/4$ from the beam's left end. What do the scales read?



Class Activity: Math Problem #2

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Sample Problem 12.05: Stress and strain of elongated rod

One end of a steel rod of radius $R = 9.5$ mm and length $L = 81$ cm is held in a vise. A force of magnitude $F = 62$ kN is then applied perpendicularly to the end face (uniformly across the area) at the other end, pulling directly away from the vise. What are the stress on the rod and the elongation ΔL and strain of the rod?

Probable Final Questions: Lecture 18

Establish the necessary physical conditions under which an object can maintain static equilibrium.

Explain the similarity by comparing their definitions when the center of gravity is in the same place as the center of mass.

Identify the various types of deformation a rigid body can experience. Provide a brief description and an appropriate diagram for each.