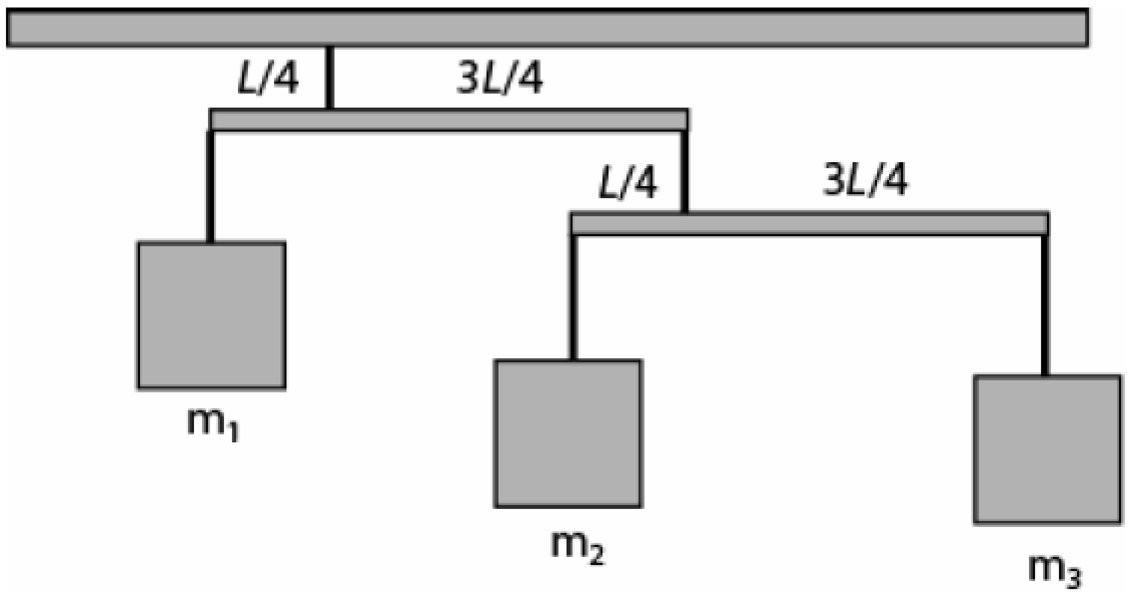
Questions

Chapter 12
Equilibrium and Elasticity

12-4 Some Example of Static Equilibrium
F-062

Fig. 1 shows a three boxes of masses m_1, m_2 and m_3 hanging from a ceiling. The crossbars are horizontal and have negligible mass and same length L. If m_3 = 1.0 kg, then m_1 is equal to:

A) 2.0 kg
B) 8.0 kg
C) 12 kg
D) 4.0 kg
E) 10 kg

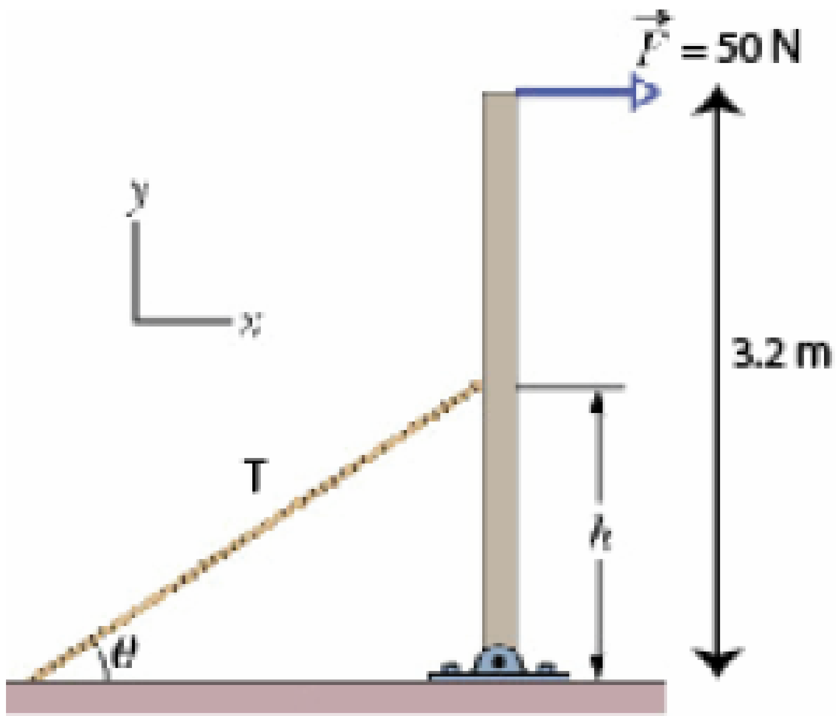


Answer C

12-4 Some Example of Static Equilibrium
F-062

Fig. 2 shows a uniform beam with a weight of 60.0 N and length of 3.20 m is hinged at its lower end and a horizontal force F of magnitude 50.0 N acts at its upper end. The beam is held vertical by a cable that makes an angle θ = 30.0° with the ground and is attached to the beam at a height h = 1.60 m. The tension (T) in the cable is:

A) 160 N
B) 115 N
C) 46 N
D) 80N
E) 35 N

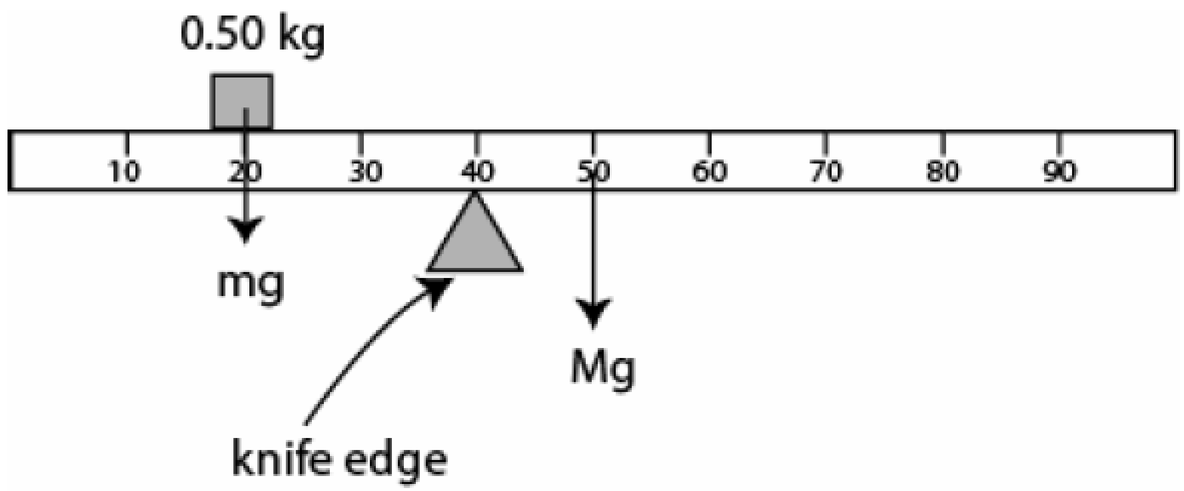


Answer B

12-4 Some Example of Static Equilibrium
F-061

A uniform meter stick of mass M is balanced on a knife edge at the 40 cm mark by hanging a 0.50 kg mass at the 20 cm mark (see Fig. 8). Find M.

A)3.0 kg
B) 2.0 kg
C) 0.5 kg
D) 2.5 kg
E) 1.0 kg



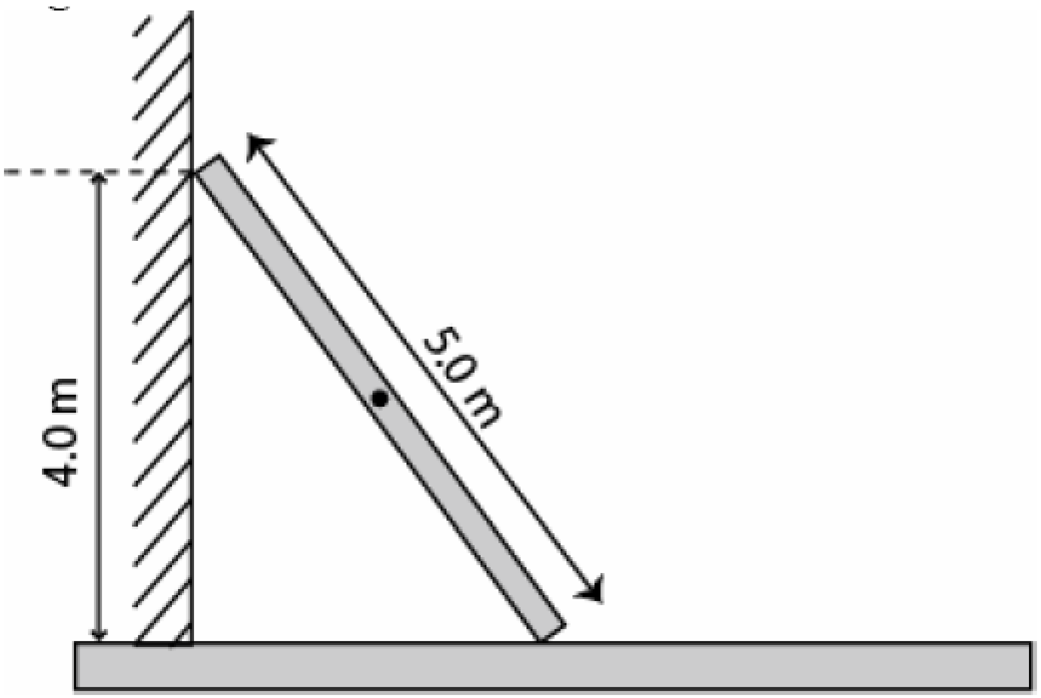
Answer E

12-4 Some Example of Static Equilibrium

F-061

A 5.0 m long uniform ladder (with mass m = 12.0 kg) leans against a wall at a point 4.0 m above a horizontal floor as shown in Fig 9. Assuming the wall is frictionless (but the floor is not), determine the normal force exerted on the ladder by the wall.

A) 44 N
B) 59 N
C) 120 N
D) 160 N
E) 89 N



Answer A

12-4 Some Example of Static Equilibrium
F-042

A simple pendulum of mass m=20 kg and length L is pulled back and held with a horizontal force of 100 N (see Fig 1). The tension in the string at this equilibrium position is:

A) 120 N
B) 60 N
C) 220 N
D) 190 N
E) 260 N

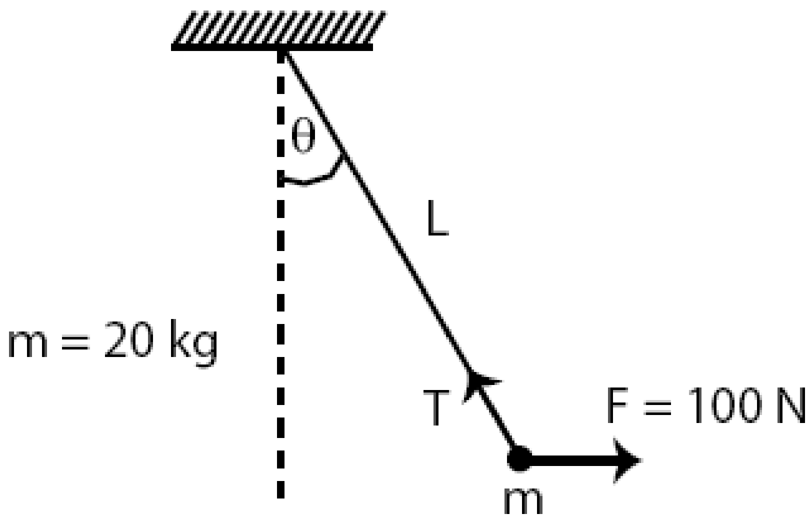


Figure 1

Answer C

12-4 Some Example of Static Equilibrium
F-042

A uniform rod AB is 1.2 m long and weighs 16 N. It is suspended by strings AC and BD as shown in Fig 2. A block P weighing 96 N is attached at point E, 0.30 m from A. The tension in the string BD is:

A) 48 N
B) 24 N
C) 64 N
D) 32 N
E) 112 N

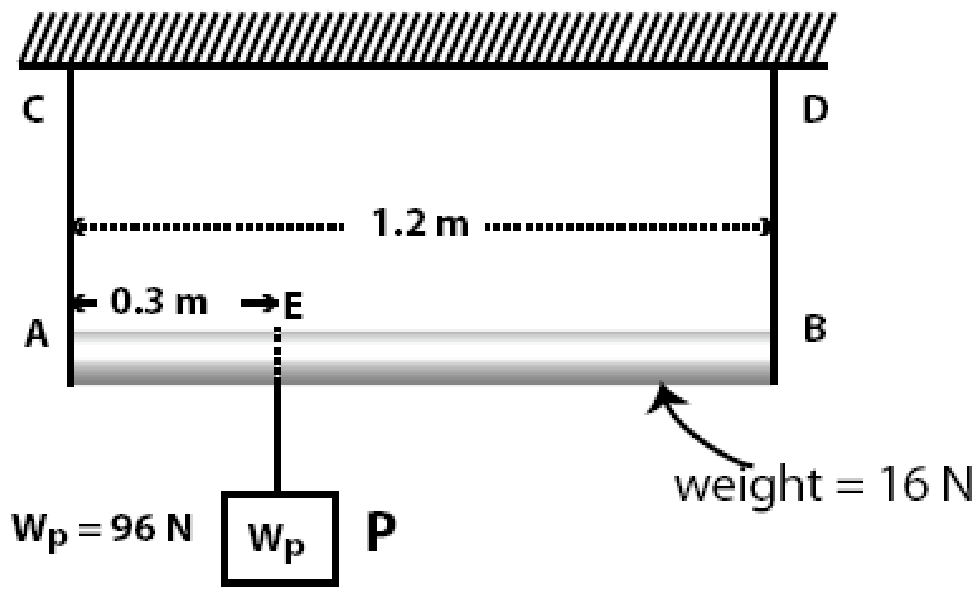


Figure 2

Answer D

12-4 Some Example of Static Equilibrium
F-041

A 20 kg uniform ladder is leaning against a frictionless wall and makes an angle of 60 degrees with the horizontal. The ladder being at rest find the magnitude of the frictional force exerted on the ladder by the floor ?

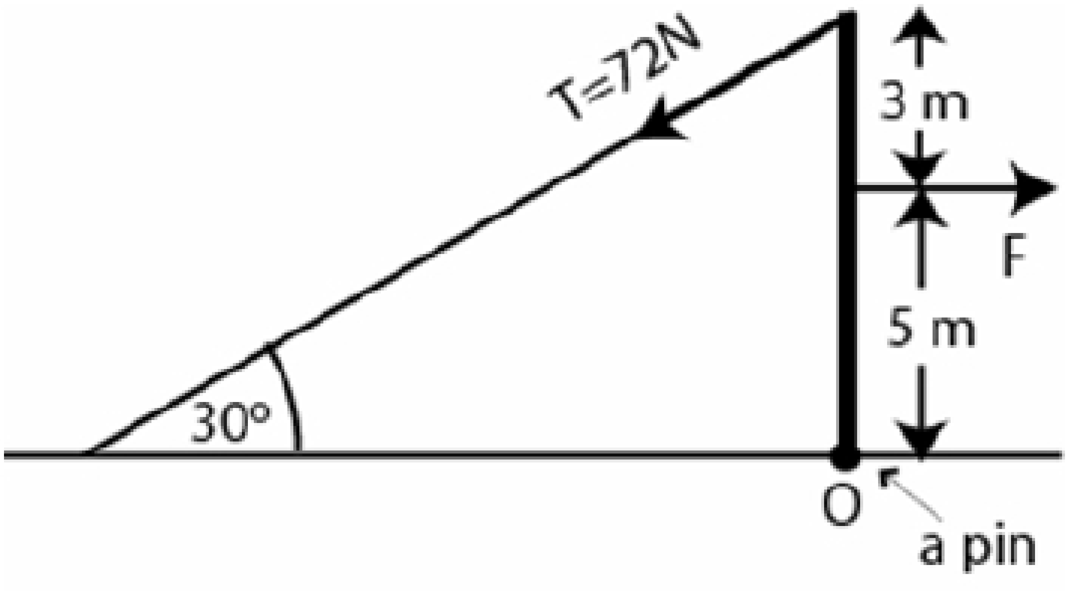
A) 57 N
B) 70 N
C) 39 N
D) 25 N
E) 10 N

Answer A

12-4 Some Example of Static Equilibrium
F-041

A uniform beam is held in a vertical position by a pin at its lower end and a cable at its upper end (see Fig 4). The tension in the cable is 72 N. Find the horizontal force F acting on this beam.

A) 0 N
B) 200 N
C) 390 N
D) 900 N
E) 100 N



Answer E

12-4 Some Example of Static Equilibrium

F-032

Fig 9 shows a stationary 50 N uniform rod (AB), 1.2 m long, held against a wall by a rope (AC) and friction between the rod and the wall. Find the force (T) exerted on the rod by the rope.

A) 87 N
B) 25 N
C) 100 N
D) 50 N
E) 29 N

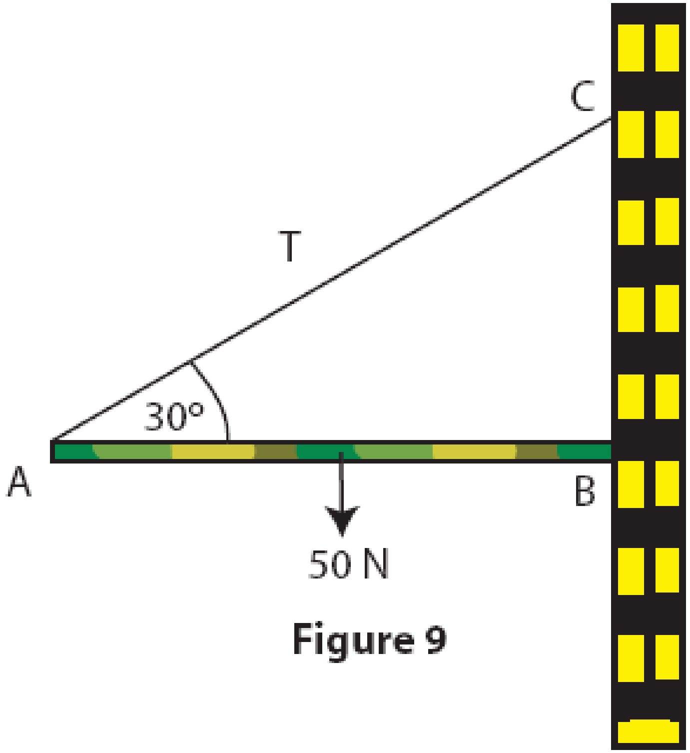


Figure 9

Answer D

12-4 Some Example of Static Equilibrium
F-032

A 240 N weight is hung from two ropes AB and BC as shown in Fig 3. The tension in the horizontal rope AB is:

A) 0 N
B) 416 N
C) 656 N
D) 480 N
E) 176 N

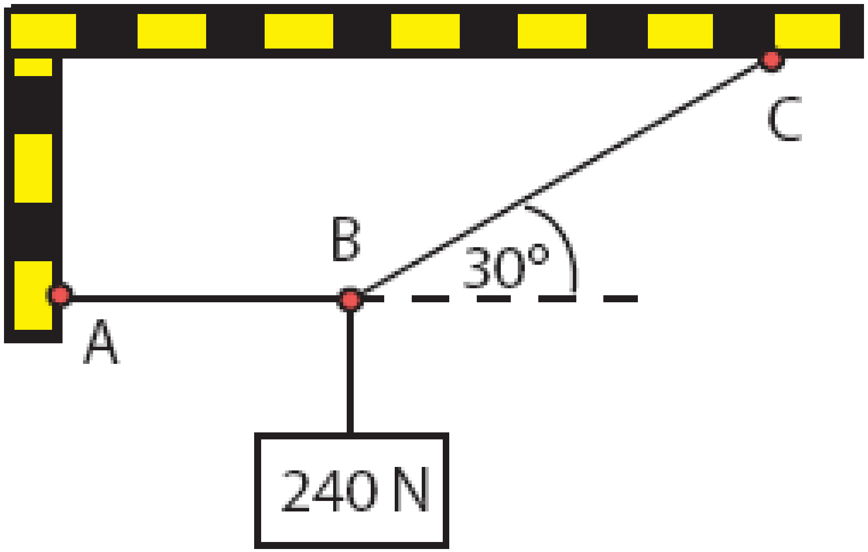


Figure 3

Answer B

12-6 Elasticity
F-062

A solid copper sphere has a diameter of 85.5 cm. How much stress must be applied to the sphere to reduce its diameter to 85.0 cm? The bulk modulus of copper is 1.4×10^{11} N/m^2

A) 2.4×10^9 N/m^2
B) 1.5×10^{10} N/m^2
C) 7.0×10^{10} N/m^2
D) 9.5×10^9 N/m^2
E) 2.8×10^{11} N/m^2

Answer A

F-061

The volume of a solid Aluminum sphere at the sea level is V = 1.0 m^3. This sphere is placed at a depth of about 700 m in the sea where the absolute pressure is p = 7.0 x 10^6 N/m^2. The change in the volume of the sphere is: (the bulk modulus of Aluminum, B = 70 x10^9 N/m^2).

A) 4.0 x 10^{-4} m^3
B) 2.0 x 10^{-4} m^3
C) 3.0 x 10^{-4} m^3
D) 1.0 x 10^{-4} m^3
E) 5.0 x 10^{-4} m^3

Answer D

12-6 Elasticity
F-042

A horizontal aluminum rod (shear modulus = $2.5\text{x}10^{10}$ N/m^2) projects L=5.0 cm from the wall (see Fig 6). The cross sectional area of the rod A $=1.0\text{x}10^{-5}$ m^2. A shearing force of 500 N is applied at the end of the rod. Find the vertical deflection delta(x) of the end of the rod.

A) $2.0\ \text{x}10^{-4}$ m
B) $1.0\ \text{x}10^{-4}$ m
C) $3.0\ \text{x}10^{-4}$ m
D) $4.0\ \text{x}10^{-4}$ m
E) $5.0\ \text{x}10^{-4}$ m

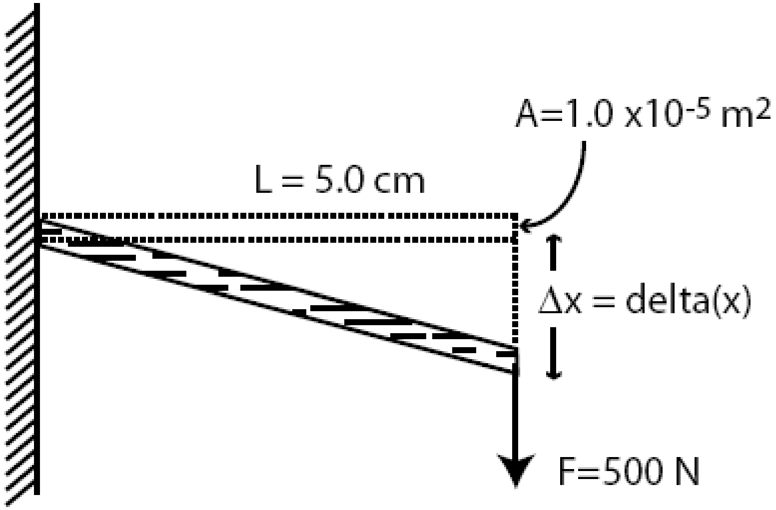


Figure 6

Answer B

12-6 Elasticity
F-041

A certain wire stretches 1.0 cm when a force F is applied to it. The same force is applied to a second wire of the same material but with twice the diameter and twice the length. The second wire stretches:

A) 1.0 cm
B) 0.25 cm
C) 0.50 cm
D) 2.0 cm
E) 4.0 cm

Answer C