This print-out should have 9 questions. Multiple-choice questions may continue on the next column or page – find all choices before answering.

Serway CP 08 56

001 (part 1 of 2) 10.0 points

A 0.102 kg meter stick is supported at its 40 cm mark by a string attached to the ceiling. A 0.535 kg object hangs vertically from the 7.16 cm mark. A second mass is attached at another mark to keep it horizontal and in rotational and translational equilibrium.

If the tension in the string attached to the ceiling is 22.8 N, find the value of the second mass. The acceleration of gravity is 9.8 $\mathrm{m/s^2}$.

Correct answer: 1.68953 kg.

002 (part 2 of 2) 10.0 points

Find the mark at which the second mass is attached.

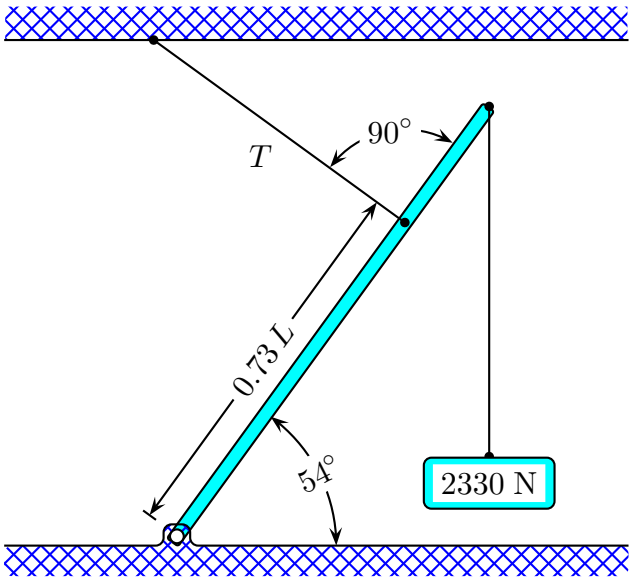
Correct answer: 49.7953 cm.

Boom and Cable

003 (part 1 of 3) 10.0 points

A 1420 N uniform boom is supported by a cable as shown. The boom is pivoted at the bottom, and a 2330 N object hangs from its end.

The boom has a length of 23 m and is at an angle of 54° above the horizontal. A support cable is attached to the boom at a distance of $0.73\,L$ from the foot of the boom and its tension is perpendicular to the boom.



Find the tension in the cable holding up the boom.

Correct answer: 2447.76 N.

004 (part 2 of 3) 10.0 points

Find the horizontal component of the reaction force on the boom by the floor.

Correct answer: 1980.28 N.

005 (part 3 of 3) 10.0 points

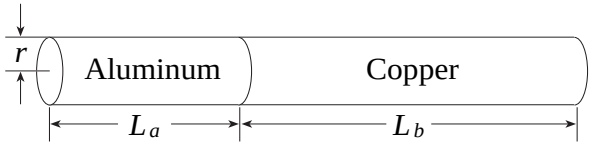
Find the vertical components of the reaction force on the boom by the floor.

Correct answer: 2311.24 N.

Elongation of a Rod

006 10.0 points

The radius of a rod is 0.182 cm, the length of aluminum part is 1.3 m and of the copper part is 2.46 m.



Determine the elongation of the rod if it is under a tension of 7380 N. Young's modulus for aluminum is 7×10^{10} Pa and for copper 1.1×10^{11} Pa.

Correct answer: 2.90308 cm.

Rising From the Depths

007 10.0 points

At the earth's surface, the pressure is 1.2546×10^{10} Pa lower than at a depth of $d = 369$ km .

If a cubic centimeter block of a metal were brought to the surface from this depth, what would be its new volume? The bulk modulus for this metal is 1.9×10^{11} N/m^2 and atmospheric pressure is 1.013×10^5 Pa .

Correct answer: 1.06603 cm^3.

Serway CP 09 02

008 (part 1 of 2) 10.0 points

If the shear stress in steel exceeds about 3.99×10^8 N/m^2 , the steel ruptures.

Find the shearing force necessary to shear a steel bolt 0.98 cm in diameter.

Correct answer: 30096.4 N.

009 (part 2 of 2) 10.0 points

Find the shearing force necessary to punch a hole 0.87 cm in diameter in a steel plate 0.603 cm thick.

Correct answer: 65759.6 N.