1. Question Details SerCP9 8.P.062. [1589051]

A student sits on a rotating stool holding two 2.1-kg objects. When his arms are extended horizontally, the objects are 1.0 m from the axis of rotation and he rotates with an angular speed of 0.75 rad/s. The moment of inertia of the student plus stool is 3.0 kg · m^2 and is assumed to be constant. The student then pulls in the objects horizontally to 0.27 m from the rotation axis.

(a) Find the new angular speed of the student.

[ ] rad/s

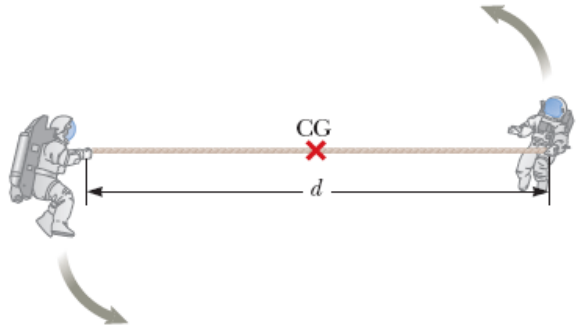
(b) Find the kinetic energy of the student before and after the objects are pulled in.

before [ ] J

after [ ] J

2. Question Details SerCP9 8.P.072. [1594372]

Two astronauts, each having a mass of 90.5 kg, are connected by a 10.0-m rope of negligible mass. They are isolated in space, moving in circles around the point halfway between them at a speed of 4.70 m/s. Treating the astronauts as particles, calculate each of the following.



(a) the magnitude of the angular momentum of the system

[ ] kg · m^2/s

(b) the rotational energy of the system

[ ] kJ

By pulling on the rope, the astronauts shorten the distance between them to 5.00 m.

(c) What is the new angular momentum of the system?

[ ] kg · m^2/s

(d) What are their new speeds?

[ ] m/s

(e) What is the new rotational energy of the system?

[ ] kJ

(f) How much work is done by the astronauts in shortening the rope?

[ ] kJ

3. Question Details SerCP9 9.P.006.soln. [1589119]

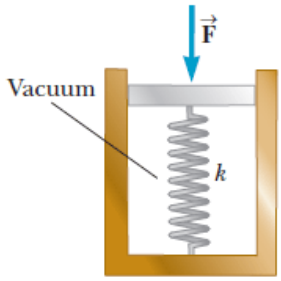
The four tires of an automobile are inflated to a gauge pressure of 1.9×10^5 Pa. Each tire has an area of 0.021 m^2 in contact with the ground. Determine the weight of the automobile.

[ ] N

4. Question Details SerCP9 9.P.020. [1594395]

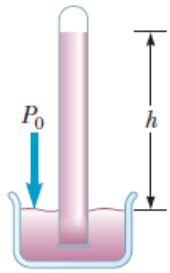
The spring of the pressure gauge shown in the figure below has a force constant of 1,320 N/m, and the piston has a radius of 1.27 cm. As the gauge is lowered into water, what change in depth causes the piston to move in by 0.750 cm?

[ ] m



5. Question Details SerCP9 9.P.026. [1594371]

Blaise Pascal duplicated Torricelli's barometer using a red Bordeaux wine, of density 984 kg/m^3, as the working liquid (figure below).



(a) What was the height h of the wine column for normal atmospheric pressure?

[ ] m

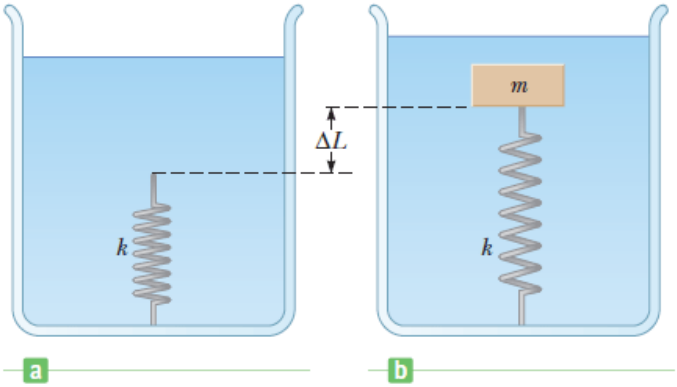
(b) Would you expect the vacuum above the column to be as good as for mercury?

- ○ Yes
- ○ No

6. Question Details SerCP9 9.P.040. [1594464]

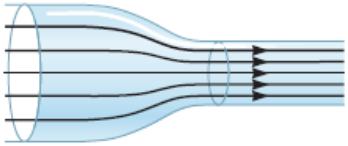
A light spring of force constant k = 166 N/m rests vertically on the bottom of a large beaker of water (Figure a). A 4.40-kg block of wood (density = 650 kg/m^3) is connected to the spring, and the block-spring system is allowed to come to static equilibrium (Figure b). What is the elongation ΔL of the spring?

[ ] cm



7. Question Details SerCP9 9.P.046.WI. [1636938]

A liquid (ρ = 1.65 g/cm^3) flows through a horizontal pipe of varying cross section as in the figure below. In the first section, the cross-sectional area is 10.0 cm^2, the flow speed is 255 cm/s, and the pressure is 1.20 × 10^5 Pa. In the second section, the cross-sectional area is 4.50 cm^2.



(a) Calculate the smaller section's flow speed.

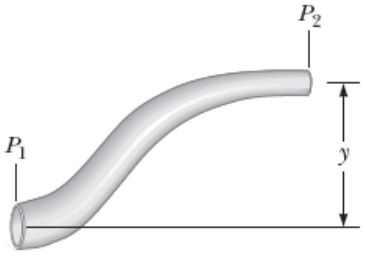
[ ] m/s

(b) Calculate the smaller section's pressure.

[ ] Pa

8. Question Details SerCP9 9.P.052. [1636948]

Water moves through a constricted pipe in steady, ideal flow. At the lower point shown in the figure below, the pressure is 1.85×10^5 Pa and the pipe radius is 2.50 cm. At the higher point located at y = 2.50 m, the pressure is 1.23×10^5 Pa and the pipe radius is 1.30 cm.



(a) Find the speed of flow in the lower section.
[ ] m/s

(b) Find the speed of flow in the upper section.
[ ] m/s

(c) Find the volume flow rate through the pipe.
[ ] m^3/s

9. Question Details SerCP9 9.P.054. [1588926]

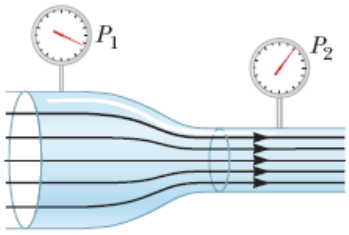
A large storage tank, open to the atmosphere at the top and filled with water, develops a small hole in its side at a point 14.3 m below the water level. The rate of flow from the leak is 2.10×10^{-3} m^3/min.

(a) Determine the speed at which the water leaves the hole.
[ ] m/s

(b) Determine the diameter of the hole.
[ ] mm

10. Question Details SerCP9 9.P.058. [2354908]

The Venturi tube shown in the figure below may be used as a fluid flowmeter. Suppose the device is used at a service station to measure the flow rate of gasoline ($\rho = 7.00 \times 10^2$ kg/m^3) through a hose having an outlet radius of 1.09 cm. The difference in pressure is measured to be $P_1 - P_2$ = 1.80 kPa and the radius of the inlet tube to the meter is 2.18 cm.



(a) Find the speed of the gasoline as it leaves the hose.
[ ] m/s

(b) Find the fluid flow rate in cubic meters per second.
[ ] m^3/s

Assignment Details

Name (AID): **HW #9 - Due Monday Nov. 18, 2013**
Submissions Allowed: **5**

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Before due date