HW9 - due 6 pm Day 20 (Fri. Aug. 22) (6127676)

Question 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18

1. Question Details OSColPhys1 11.2.004. [2153033]

A straightforward method of finding the density of an object is to measure its mass and then measure its volume by submerging it in a graduated cylinder. What is the density of a 200 g rock that displaces 77.0 cm^3 of water? (Note that the accuracy and practical applications of this technique are more limited than a variety of others that are based on Archimedes' principle.)

[ ] 2.6 g/cm^3

2. Question Details OSColPhys1 11.P.004.WA. [2707313]

Since neutron stars consist totally of neutrons, they are extremely massive and have a density that is hard to imagine. A typical radius and mass for a neutron star are 1.55×10^3 m and 3.50×10^{28} kg respectively.

(a) Determine the density of a neutron star.

[ ] 2.24e+18 kg/m^3

(b) Determine the weight (in pounds) of a penny (V = 360 mm^3) if it were made from this material. (Assume 1 lb = 4.448 N.)

[ ] 1.78e+12 lb

Supporting Materials

Physical Constants

3. Question Details OSColPhys1 11.P.005.WA. [2707273]

Alloys of gold are rated in karats, a dimensionless unit that is used to indicate the proportion of gold by weight in a gold-containing alloy. If an alloy is one part in twenty-four pure gold, then it is classified as one karat gold. The density of gold is 19.3×10^3 kg/m^3. Determine the volume of gold in a 18.0 karat gold necklace that has a weight of 1.43 N.

[ ] 5.67e-06 m^3

Supporting Materials

Physical Constants

4. Question Details OSColPhys1 11.3.011. [2153568]

As a woman walks, her entire weight is momentarily placed on one heel of her high-heeled shoes. Calculate the pressure exerted on the floor by the heel if it has an area of 1.60 cm^2 and the woman's mass is 52.0 kg. Express the force in N/m^2 and lb/in^2. (In the early days of commercial flight, women were not allowed to wear high-heeled shoes because aircraft floors were too thin to resist such large pressures.)

[ ] 3.19e+06 N/m^2

[ ] 462 lb/in^2

5. Question Details OSColPhys1 11.3.012. [2153097]

The pressure exerted by a phonograph needle on a record is surprisingly large. If the equivalent of 1.30 g of mass is supported by a needle the tip of which is a circle 0.180 mm in radius, what pressure is exerted on the record in N/m^2?

[ ] 1.25e+05 N/m^2

6. Question Details OSColPhys1 11.P.008.WA. [2707298]

A 4.5-kg, three legged stool supports a 74-kg person. If each leg of the stool has a cross-sectional diameter of 1.4 cm and the weight of the person is evenly distributed, determine the pressure exerted on the floor by each leg.

[ ] 1.67e+06 Pa

Supporting Materials

Physical Constants

7. Question Details OSColPhys1 11.P.009.WA. [2707288]

Determine the actual pressure inside an inflated football if it has a gauge pressure of 9.2 lb/in^2.

[ ] 23.9 lb/in^2

Supporting Materials

Physical Constants

8. Question Details OSColPhys1 11.P.010.WA. [2707261]

You inflate the tires of your car to a gauge pressure of 44.0 lb/in^2. If your car has a mass of 1725 kg and is supported equally by its four tires, determine the following.

(a) Contact area between each tire and the road

[ ] 0.0139 m^2

(b) Will the contact area increase, decrease, or stay the same when the gauge pressure is increased?

- ○ increase
- ○ decrease
- ○ stay the same

(c) Gauge pressure required to give each tire a contact area of 114 cm^2

[ ] 53.8 lb/in^2

Supporting Materials

Physical Constants

9. Question Details OSColPhys1 11.5.025. [2153532]

What force must be exerted on the master cylinder of a hydraulic lift to support the weight of a 2200 kg car (a big car) resting on the slave cylinder? The master cylinder has a 2.00 cm diameter, while the slave's is 24.0 cm.

[ ] 150 N

10. Question Details OSColPhys1 11.P.020.WA. [2707450]

The weight of a hydraulic barber's chair with a client is 2250 N. When the barber steps on the input piston with a force of 46 N, the output plunger of a hydraulic system begins to lift the chair. Determine the ratio of the radius of the output plunger to the radius of the input piston.

$\frac{r_{plunger}}{r_{piston}}$ = [ ] 6.99

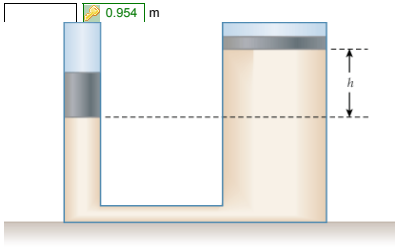
Supporting Materials

Physical Constants

11. Question Details OSColPhys1 11.P.011.WA. [2707326]

As shown in the figure below, a hydraulic system has two pistons of different diameter and uses a liquid of density ρ = 850 kg/m^3. The smaller piston has a diameter of 4.5 cm and a mass of 1.6 kg and the larger piston a diameter of 14 cm and a mass of 3.0 kg. Determine *h*, the height difference between the two pistons.

[ ] 0.954 m



Supporting Materials

Physical Constants

12. Question Details OSColPhys1 11.P.012.WA. [2707352]

The pressure at the bottom of a cylindrical container with a cross-sectional area of 48.0 cm^2 and holding a fluid of density 740 kg/m^3 is 115 kPa.

(a) Determine the depth of the fluid.

[ ] 1.89 m

(b) Determine the pressure at the bottom of the container if an additional 2.40 × 10^{-3} m^3 of this fluid is added to the container. (Give your answer to at least 3 significant figures.)

[ ] 119 kPa

Supporting Materials

Physical Constants

13. Question Details OSColPhys1 11.P.016.WA. [2707327]

Mercury is added to a cylindrical container to a depth *d* and then the rest of the cylinder is filled with water. If the cylinder is 0.6 m tall and the pressure at the bottom is 1.1 atmospheres, determine the depth of the *mercury*. (Assume the density of mercury to be 1.36 × 10^4 mg/m^3.)

[ ] 0.0344 m

Supporting Materials

Physical Constants

14. Question Details OSColPhys1 11.7.039. [2153235]

If your body has a density of 990 kg/m^3, what fraction of you will be submerged when floating quietly in the following liquids?

(a) fresh water

[ ] 99 %

(b) the Great Salt Lake, which has a density of 1030 kg/m^3

[ ] 96.1 %

15. Question Details OSColPhys1 11.P.027.WA. [2707277]

A wood block with a volume of 6.80 × 10^{-4} m^3 is floating in water. When a small steel object of mass *m* = 0.380 kg is placed on top of the block, the system is in equilibrium, and the top of the block is at the level of the water.

(a) Determine the density of the wood.

[ ] 441 kg/m^3

(b) What happens to the block if the steel object is replaced by another steel object with half the mass?

- The block rises.
- The block sinks.
- The block stays at the same position.

(c) What happens to the block if the steel object is replaced by yet another steel object with twice the mass?

- The block rises.
- The block sinks.
- The block stays at the same position.

Supporting Materials

Physical Constants

16. Question Details OSColPhys1 11.P.028.WA. [2707401]

When a solid object is completely submerged in ethyl alcohol, its apparent weight is 20.4 N and when completely submerged in water, its apparent weight is 14.0 N. Determine the volume of the object. Use 790 kg/m^3 as the density of the ethyl alcohol and 1000 kg/m^3 as the density of water.

0.00311 m^3

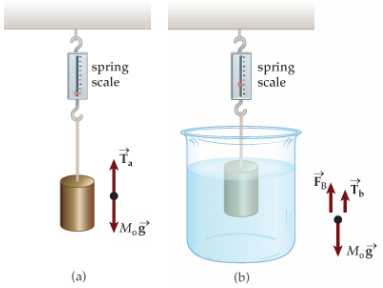
Supporting Materials

Physical Constants

17. Question Details OSColPhys1 11.P.030.WA. [2707269]

When an object is suspended from a spring balance (figure (a)) the reading is 9.40 N. When the suspended object is submerged in water (figure (b)) the reading is 4.50 N. Determine the density of the object.

1920 kg/m^3



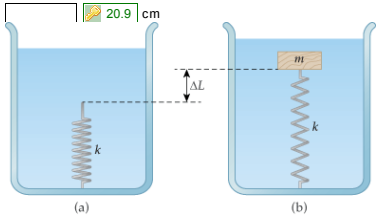
Supporting Materials

Physical Constants

18. Question Details OSColPhys1 11.P.031.WA. [2707406]

A spring with a force constant k = 135 N/m is attached to the bottom of a large beaker which is then filled with water (figure (a)). A block of pine wood with a mass of 4.90 kg and a density of 630 kg/m^3 is connected to the spring and the block-spring system comes to equilibrium as shown in figure (b). Determine the elongation ΔL of the spring.

20.9 cm



Supporting Materials

Physical Constants

Assignment Details

Name (AID): **HW9 - due 6 pm Day 20 (Fri. Aug. 22) (6127676)**
Submissions Allowed: **5**
Category: **Homework**
Code:
Locked: **No**
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