

Examples

28. A ball with an initial velocity of 8.00 m/s rolls up a hill without slipping. Treating the ball as a spherical shell, calculate the vertical height it reaches. (b) Repeat the calculation for the same ball if it slides up the hill without rolling.

The same ball rolls on a table of height 1.00 m with 2.00 m/s velocity and down a smooth ramp to the floor below without slipping. What is the ball's velocity when it reaches the floor? Neglect loss due to friction.

Examples

40. Three children are riding on the edge of a merry-go-round that is 100 kg, has a 1.60-m radius, and is spinning at 20.0 rpm. The children have masses of 22.0, 28.0, and 33.0 kg. If the child who has a mass of 28.0 moves to the center of the merry-go-round, what is the new angular velocity in rpm?

The empty merry-go-round from above is spinning clockwise at 10.0 rpm when a child of 28.0 kg mass runs with a velocity of 5.00 m/s along a line tangent to the edge of the merry-go-round and jumps onto the merry-go-round in the clockwise direction. The child remains on the edge. What is the new angular velocity? Neglect loss due to friction.

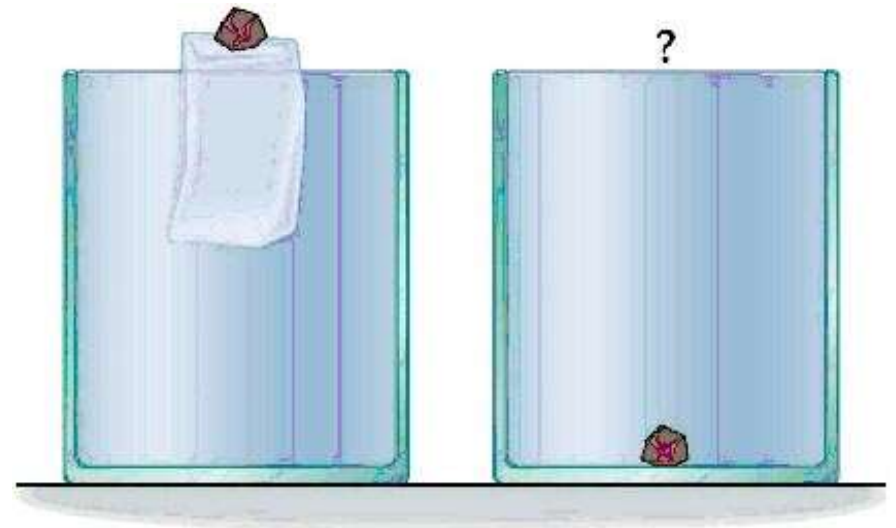
Problems On Static Fluid

43. In an immersion measurement of a woman's density, she is found to have a mass of 62.0 kg in air and an apparent mass of 0.0850 kg when completely submerged with lungs empty. (a) What mass of water does she displace? (b) What is her volume? (c) Calculate her density. (d) If her lung capacity is 1.75 L, is she able to float without treading water with her lungs filled with air?

If she holds on to a ball of 0.500 kg in her hand during the measurement, and together submerged they have an apparent mass of 0.0200 kg. What is the density of the ball?

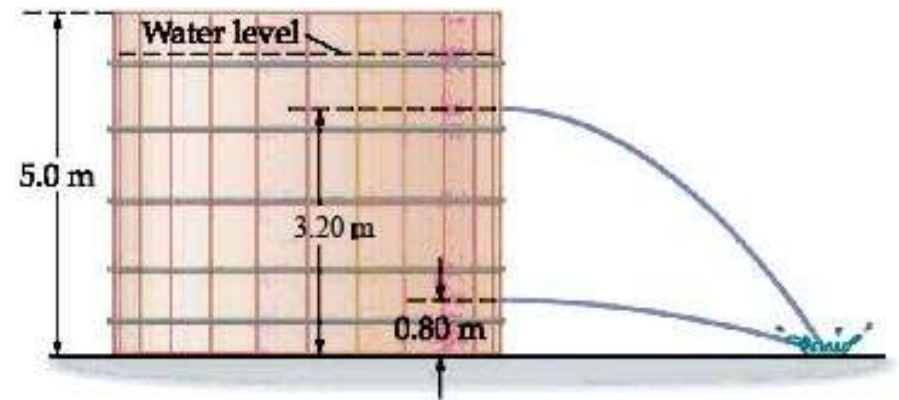
Problems On Static Fluid

A 300-g chunk of ice (of density 0.900 g/cm^3) is placed in a water bucket. A 20.0-g rock, with a volume of 2.00 cm^3 , is placed on top of the ice before water is filled to the top. When the ice melts and the rock drops to the bottom of the bucket, how much water spills out or needs to be added to maintain full level? Ignore the possible dependence of the densities of ice and water on temperature.



Example Problems

The water tank is open to the atmosphere and has two holes in it, one 0.80 m and one 3.20 m above the floor on which the tank rests. If the two streams of water strike the floor in the same place, what is the depth of water in the tank?



Examples

•22. If a large housefly 3.0 m away from you makes a noise of 40.0 dB, what is the noise level of 1000 flies at that distance, assuming interference has a negligible effect?

Five loudspeakers are at the same distance from you and are broadcasting with the same sound intensity when you hear an intensity level of 60 dB. Neglect any interference effect. Four loudspeakers suddenly go silent, what is the sound intensity level you hear from the remaining speaker?

Example Problems

36. Two eagles fly directly toward one another, the first at 15.0 m/s and the second at 20.0 m/s. Both screech, the first one emitting a frequency of 3200 Hz and the second one emitting a frequency of 3800 Hz. What frequencies do they receive if the speed of sound is 330 m/s?

An eagle is chasing another eagle along a straight line in air. The chaser, with a velocity of 35.0 m/s, screeches with a frequency of 3800 Hz. What frequencies does the eagle in front, with a velocity of 20.0 m/s, hear if the speed of sound is 330 m/s?

Examples

14. A sandwich board advertising sign is constructed as shown. The sign's mass is 8.00 kg. (a) Calculate the tension in the chain assuming no friction between the legs and the sidewalk. (b) What force is exerted by each side on the hinge?

A sandwich board advertising sign is constructed as shown. The sign's mass is 8.00 kg. Even though the chain is broken and the hinge is frictionless, the board is able to stand without collapsing. What is the minimum coefficient of static friction between the sign and the sidewalk?

