

PHYSICS 1030

Homework #1

(Due Sept. 7, 2010)

1. (Serway 1-2) The standard kilogram is a platinum-iridium cylinder 39.0 mm in height and 39.0 mm in diameter. What is the density of the material?
2. (Serway 1-3) A major motor company displays a die-cast model of its first automobile, made from 9.35 kg of iron. To celebrate its hundredth year in business, a worker will recast the model in gold from the original dies. What mass of gold is needed to make the new model?
3. (Serway 1-7) Which of the following equations are dimensionally correct?
 - (a) $v_f = v_i + ax$
 - (b) $y = (2 \text{ m}) \cos(kx)$, where $k = 2 \text{ m}^{-1}$.
4. (Serway 1-14) Assume that it takes 7.00 minutes to fill a 30.0-gal gasoline tank.
 - (a) Calculate the rate at which the tank is filled in gallons per second.
 - (b) Calculate the rate at which the tank is filled in cubic meters per second.
 - (c) Determine the time interval, in hours, required to fill a 1-m^3 volume at the same rate. (1 U.S. gal = 231 in.³)
5. (Serway 1-18) A pyramid has a height of 481 ft and its base covers an area of 13.0 acres (Fig. P1.18 in text). If the volume of a pyramid is given by the expression $V = \frac{1}{3}Bh$, where B is the area of the base and h is the height, find the volume of this pyramid in cubic meters. (1 acre = 43 560 ft².)
6. (Serway 1-19) The pyramid described in Problem 5 (Serway 1-18) contains approximately 2 million stone blocks that average 2.50 (short) tons each. Find the weight of this pyramid in pounds.
7. (“Back of the envelope” problem) If the iron in the Earth’s core were made into a wire as long as the radius of the visible universe, what would be the diameter of the wire?