

15 SEPT, 1997

Physics -- A bit more practice from Ch. 2

Conversions: Perform the following conversions

1 Angstrom = $1 \cdot 10^{-8}$ cm
1 mL = 1 cm^3

- (1) $43.6 \text{ mm} = \text{--- cm}$
(2) $6.2 \text{ L} = \text{--- cm}^3$
(3) $5.7 \text{ mm}^2 = \text{--- m}^2$
(4) $5.7 \text{ mm}^2 = \text{--- } \text{\AA}^2$
(5) $0.00905 \text{ m}^3 = \text{--- mm}^3$
(6) $4.01 \text{ km} = \text{--- cm}$
(7) $4.01 \text{ km} = \text{--- m}$
(8) $4.01 \text{ km} = \text{--- mm}$

Solving formulas for the indicated variable.

(9) $d = vt + \frac{1}{2} at^2$, for v

(10) $K = \frac{Mv^2}{2}$, for M

(11) $Q = Mc \Delta T$ time + is 1 variable
 $\leftarrow \Delta T$ means change in
1, for M

(12) $\frac{1}{F} = \frac{1}{d_1} + \frac{1}{d_2}$, for d_2
 $d_1 + d_2$ are
not the same
variable

Problems which are a bit more involved.

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1. From reading, we find the density of gold is 19.3 g/cm^3 . This means that 1 cubic centimeter of gold has a mass of 19.3 grams. If a gold bar is 2.5 cm wide, 0.50 cm thick, and 12 cm long, calculate the volume and then the mass of this gold bar.

2. The space shuttle orbits the Earth in about 90 minutes. The radius of Earth is 6370 km, and in a typical mission, the height of the shuttle above the Earth's surface, might be 220 km. Calculate the orbital velocity of the shuttle in km/hr. Convert your answer to m/s. If one mile = 1.61 km, convert your answer to miles per hour.

3. Back in the days of the Apollo lunar landing missions, it took an Apollo command module about 2 hours to orbit the moon. The command module orbited the moon in a "parking" orbit while the lunar excursion module (LEM) detached and landed on the moon. The diameter of the moon is about 3480 km. The command module orbited the moon at an altitude of about 100 km. Find the velocity of the command module, with respect to the moon, in km/hr. Convert your answer into units of m/s.

Bonus: I. Even though the moon is smaller than the earth, and therefore each orbit (trip around) was shorter for the command module than for the shuttle, the time to orbit the moon was longer (2 hours vs. 90 minutes), give a plausible reason why this might be so.

Bonus: II. The shuttle's orbital altitude as it orbits the Earth is always higher than the altitude quoted for the Apollo capsule going around the moon. Give a likely reason why this must be so.