

Section 7 & 9
Quiz (1)-Ch(1)

Key

Phys 101 (Term 263)-(F. Enaya)

** Show your steps clearly for full credit!! **

Q1. The acceleration { a } of an object moving along x-axis is given by: $a = x^n v^p m^q$

where { x } is the distance, { v } is the speed and { m } is the mass of the object. Find the values of { n }, { p } and { q } so that the above equation is dimensionally correct.

Using basic Units (L, T and M) : $a = x^n v^p m^q \Rightarrow (L/T^2) = L^n \cdot (L/T)^p \cdot M^q$

$$\Rightarrow L^1 \cdot T^{-2} = L^{(n+p)} \cdot T^{-p} \cdot M^q \Rightarrow$$

$n + p = 1$, and $-p = -2 \Rightarrow (p = 2) \ \& \ (n = -1)$, where there is no (M) in the left side $\Rightarrow (q = 0)$

Q2. An astronomical unit (AU), is the average distance of the earth from the sun, approximately 1.49×10^8 km. The speed of the light is about 3×10^8 m/s. Express the speed of light in terms of astronomical units per hour.

$$3 \times 10^8 \frac{\text{m}}{\text{s}} \times \frac{1 \text{ km}}{1000 \text{ m}} \times \frac{1 \text{ Au}}{1.49 \times 10^8 \text{ km}} \times \frac{3600 \text{ s}}{1 \text{ h}} = 7.25 \frac{\text{Au}}{\text{h}}$$