國立臺灣海洋大學資工系 1A 普通物理 98(1)作業 2 解答 (980928,1005)

此資料專為教學用請勿流傳-楊志信

Ex*.1-1, *Prob*.2-71** (HRW,8e) ***Sol.

We denote the required time as t, assuming the light turns green when the clock reads *zero*. By this time, the distances traveled by the two vehicles must be the same.

(**a**) Denoting the acceleration of the automobile as a and the (constant) speed of the truck as v then

$$\Delta x = \tfrac{1}{2} a t^2 |_{car} = v t |_{truck},$$

which leads to

$$t = \frac{2v}{a} = \frac{2(9.5)}{2.2} = 8.63 \approx 8.6 \text{ (s)}.$$

Therefore, $\Delta x = v t = (9.5)(8.63) = 81.9 \approx 82$ (m).

(**b**) The speed of the car at that moment is

$$v|_{car} = a t = (2.2)(8.63) = 18.9 \approx 19 \text{ (m/s)}.$$

Ex*.2-2, *Prob*.2-88** (HRW,8e) ***Sol.

We adopt the convention frequently used in the text: that "*up*" is the positive y direction. (**a**) At the highest point in the trajectory $v = 0$. Thus, with $t = 1.60$ s, the equation $v = v_0 - gt$ yields $v_0 = 15.7$ m/s.

(**b**) One equation that is *not* dependent on our result from part (a) is $y - y_0 = v_0 t - \tfrac{1}{2} g t^2$; this readily gives $y_{max} - y_0 = 12.5\,\text{m}$ for the *highest* ("max") point measured *relative to* where it started (the top of the building).

(**c**) Now we use our result from part (a) and plug into $y - y_0 = v_0 t - \tfrac{1}{2} g t^2$ with $t = 6.00\,\text{s}$ and $y = 0$ (the ground level). Thus, we have

$$0 - y_0 = (15.68\,\text{m/s})(6.00\,\text{s}) - \tfrac{1}{2}(9.80\,\text{m/s}^2)(6.00\,\text{s})^2.$$

Therefore, y_0 (the height of the building) is equal to 82.3 m.