

Tutorial week 2.

21. Stone throw problem.

- GS
- Const accⁿ eqns.
 - Take down as positive \downarrow +ve
 - Work to 1st.

Plan (1) Drop \rightarrow depth of well.

- (2) Launch speed when you throw stone
- (3) Calc max height of a stone thrown upwards

Exec (1) $s = \underline{u}t + \frac{1}{2}at^2 \rightarrow s \sim 80\text{m}$

(2) $(s) = \underline{u}t + \frac{1}{2}at^2 \rightarrow \cancel{80\text{m}} u \sim 11\text{m/s}$

(3) $\frac{v^2}{\parallel_0} = u^2 + \frac{2as}{\parallel \sim 11\text{m/s}}$ $\rightarrow s \sim -7\text{m}$

So, don't accept the challenge.

Q2 Flea jump

GS Const accⁿ eqn's (1D)
Flea jumps vertically $\uparrow +ve$
 $\sim 1 sf.$

Plan (1) Launch speed of flea $\rightarrow v^2 = \underbrace{u^2}_{\substack{\uparrow \\ \text{at } s}} + \underline{2as}$
(2) Same eqn (v, u, a, s values diff.)
 $\div 10$ to get ans. in 'units of g '.

Exec (1) $v^2 = u^2 + 2as \rightarrow u^2 = \sqrt{6} \text{ ms}^{-1}$

(2) (5) $v = \sqrt{6} \text{ ms}^{-1}$ $a?$
 $u = 0$

$s = \sim 1 \text{ mm}$ $v^2 = u^2 + 2as$

$a \sim 300g !!$

Q3 Parachute

$$\begin{array}{l} a) \quad \left. \begin{array}{l} b = \text{length} \\ c = \text{speed} \\ k = \text{time} \end{array} \right\} \text{const.} \end{array}$$

$$b) \quad \frac{dy}{dt} = 0 - c - ck \frac{-1}{k} e^{-t/k}$$

$$= -c + c e^{-t/k}$$

$$= -c \left(1 - \underbrace{e^{-t/k}} \right)$$

$$c) \quad \text{Long time } e^{-t/k} \rightarrow 0$$

~~is~~ ~~is~~ c is term velocity or max speed attained.

$$d) \quad a = \frac{dv}{dt} = 0 - \frac{c}{k} \underbrace{e^{-t/k}}$$

$$e) \quad \text{As } t \uparrow \quad \underline{a \rightarrow 0}.$$