

IB Physics HL Notes

Kinematics

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Free fall 2-object Problem

Rock	Coin
$a = -10$	$a = -10$
$t_1 = t$	$t_2 = t - 1$
$u = 0$	$u = -20$

$$s_1 = \frac{1}{2}(-10)t^2 = -5t^2$$

$$s_2 = -20(t-1) + \frac{1}{2}(-10)(t-1)^2$$

$$= -20t + 20 - 5(t^2 - 2t + 1)$$

$$= ~~10t^2~~ - 5t^2 - 10t + 15$$

$$t = 1 \text{ or } t = -3, \text{ but } t \geq 0$$

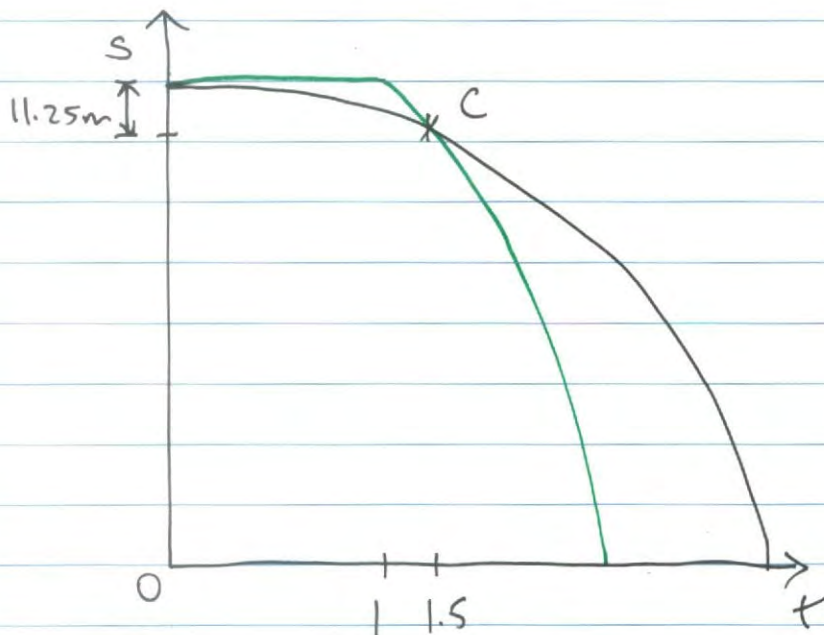
$$\text{so } t =$$

$$\text{so } -5t^2 = -5t^2 - 10t + 15$$

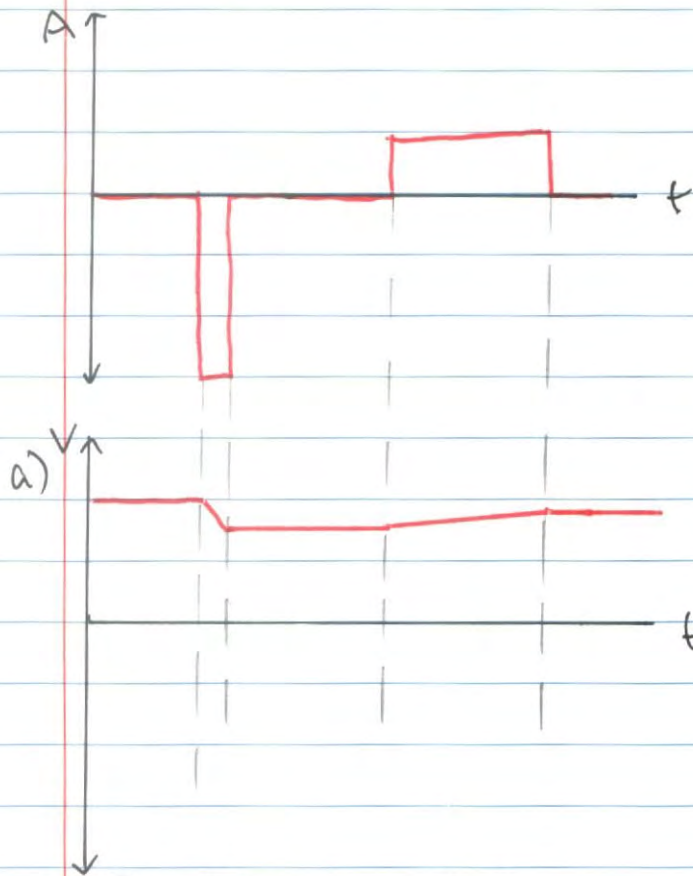
$$t = 1.5 \text{ s} //$$

$$s_1 = -5(1.5)^2 = -11.25 \text{ m} //$$

$$v = ~~10~~ -20 + (-10)(1.5-1)$$
$$= -25 \text{ ms}^{-1} //$$



PPQ #2 - Kinematic Graph:



PPQ #47 - 2 object