

ESP Kouba

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Worksheet 10 1/2

Solutions

1.) Let $s(t)$ be height above ground at time t . Then $s(0) = 64$ ft. and

$$s'(0) = 0 \text{ ft./sec.} \quad ;$$

$$s''(t) = -32 \text{ ft./sec.}^2 \rightarrow$$

$$s'(t) = -32t + c \quad (\text{and } s'(0) = 0) \rightarrow$$

$$\boxed{s'(t) = -32t} \rightarrow$$

$$s(t) = -16t^2 + c \quad (\text{and } s(0) = 64) \rightarrow$$

$$\boxed{s(t) = -16t^2 + 64}$$



a.) strike ground: $s'(t) = 0 \rightarrow$

$$-16t^2 + 64 = 0 \rightarrow t^2 = 4 \rightarrow \boxed{t = 2 \text{ sec.}}$$

b.) $s'(2) = -64$ ft./sec.

$$= -64 \frac{\text{ft.}}{\text{sec.}} \cdot \frac{1 \text{ mi.}}{5280 \text{ ft.}} \cdot \frac{3600 \text{ sec.}}{1 \text{ hr.}} \approx -43.6 \text{ mph}$$

2.) Let $s(t)$ be height above ground at time t . Then $s(0) = 64$ ft. and

$$s'(0) = 48 \text{ ft./sec.} \quad ;$$

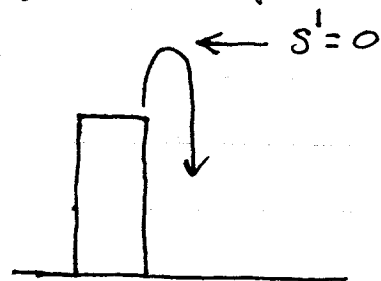
$$s''(t) = -32 \text{ ft./sec.}^2 \rightarrow$$

$$s'(t) = -32t + c \quad (\text{and } s'(0) = 48) \rightarrow$$

$$\rightarrow \boxed{s'(t) = -32t + 48} \rightarrow$$

$$s(t) = -16t^2 + 48t + c \quad (\text{and } s(0) = 64) \rightarrow$$

$$\boxed{s(t) = -16t^2 + 48t + 64}$$



a.) highest point: $s'(t) = 0 \rightarrow$

$$-32t + 48 = 0 \rightarrow \boxed{t = 3/2 \text{ sec.}}$$

b.) $s(3/2) = -36 + 72 + 64 = \boxed{100 \text{ ft.}}$