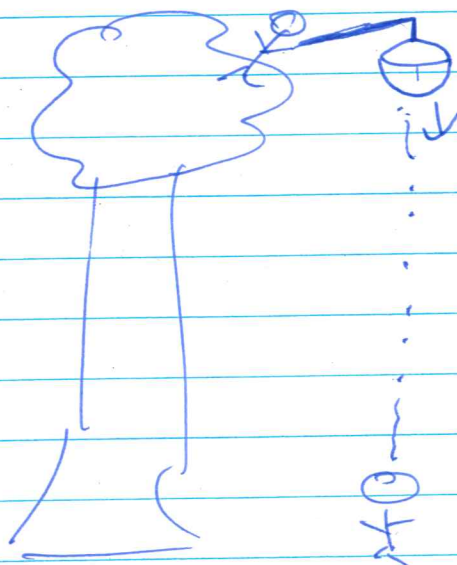


Nov. 27

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• Quiz Solutions
Posted today.

Example: An acorn hits you on the head at a speed of 3 m/s .



Your friend notices that it takes 5 seconds for the acorn to hit you.

How tall is the tree?
i.e. How far did the acorn travel.

Assume the acceleration is constant -9.8 m/s^2 .

We know the acceleration:

$$a(t) \equiv -9.8$$

$$\int a(t) dt = v(t) = -9.8t + C$$

Know: $v(5) = 3$
(at 5 sec . velocity is 3 m/s)

$$3 = -9.8 \cdot 5 + C$$

$$C = 3 + 9.8 \cdot 5$$

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$$So, v(t) = -9.8t + (3 + 9.8 \cdot 5)$$

$$s(t) = \int v(t) dt.$$

↑ displacement. ↑ velocity.

$$= -\frac{9.8t^2}{2} + (3 + 9.8 \cdot 5)t + C.$$

aside.

$$s(t) = \int -9.8t dt + \int (3 + 9.8 \cdot 5) dt$$

To find C? $s(0) = 0.$

$$0 = s(0) = -\frac{9.8 \cdot 0^2}{2} + (3 + 9.8 \cdot 5) \cdot 0 + C$$
$$\Rightarrow C = 0.$$

$$\Rightarrow s(t) = -\frac{9.8t^2}{2} + (3 + 9.8 \cdot 5)t$$

Want.

$$s(5) = -\frac{9.8 \cdot 5^2}{2} + (3 + 9.8 \cdot 5)5$$
$$= 137.5 \text{ m}$$