Answer on Question #48308 – Physics – Mechanics | Kinematics | Dynamics

A monkey in a perch 20m high in a tree drops a coconut above the head if a zoo keeper as he runs with a speed 1.5m/s beneath the tree. How far behind him in meters does the coconut hit the ground?
a) 2.25
b) 3.06
c) 2.02
d) 3.03

Solution:
Time the coconut should be dropped by the monkey before zoo keeper will run beneath the tree = time for the cocunut to hit the ground:
Equation of motion for the coconut along the Y-axis:

$$y: h = \frac{gt^2}{2}$$

$$t = \sqrt{\frac{2h}{g}} = \sqrt{\frac{2 \cdot 20m}{9.8\frac{m}{s^2}}} = 2.02s$$

Therefore, it takes 2.02 seconds for the cocunut to hit the ground (and two seconds for the zookeeper to run, because these actions are happening simultaneously), hence, the monkey should drop the coconut 2.02 seconds before zoo keeper will run beneath the tree.

Answer: c) 2.02s