Answer on Question#51959 - Physics - Other

A monkey in a perch 20m high in a tree drops a coconut above the head of a zoo keeper as he runs with a speed $v = 1.5\text{m/s}$ beneath the tree. How far behind him in metres does the coconut hit the ground?

Solution:

The time needed for coconut to fall from the perch is

$$t = \sqrt{\frac{2h}{g}},$$

where $h = 20\text{m}$ – is the height of the perch, $g = 10\frac{\text{m}}{\text{s}^2}$ – is the acceleration of free fall. So

$$t = \sqrt{\frac{2h}{g}} = \sqrt{\frac{2 \cdot 20\text{m}}{10\frac{\text{m}}{\text{s}^2}}} = 2\text{s}$$

The zoo keeper manages to run distance

$$S = v \cdot t = 1.5\frac{\text{m}}{\text{s}} \cdot 2\text{s} = 3\text{m}$$

while the coconut is falling from the perch. So the coconut will fall 3m behind the zoo keeper.

Answer: 3m.