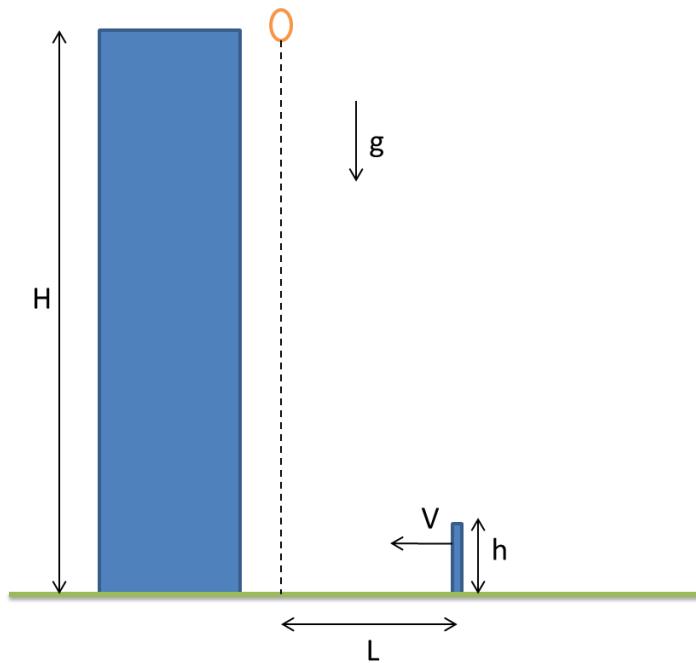


Answer on Question #45347, Physics, Mechanics | Kinematics | Dynamics

You are on top of a physics building, 46.0 m above the ground (see figure). Your physics teacher, who is 1.8 m tall, is walking alongside the building at a constant speed of 1.2 m/s. If you wish to drop an egg on your teacher's head, what distance should the teacher be with respect to the target point when you release the egg? Assume that the egg is in free fall.

Solution.



Kinematics equations of motions:

Egg:

$$-h = \frac{gt^2}{2}$$

Teacher:

$$L = Vt$$

Where t is a time of the egg's flight. So:

$$t = \sqrt{\frac{2(H-h)}{g}}$$

$$L = Vt = V \sqrt{\frac{2(H-h)}{g}}$$

Numerically:

$$L = 1.2 \frac{m}{s} \cdot \sqrt{\frac{2 \cdot (46m - 1.8m)}{9.8 \frac{m}{s^2}}} \approx 3.6 \text{ m}$$

Answer: 3.6 m