Example 1

A hunter aims directly at a target (on the same level) 65.0 m away. Note that the gravitational acceleration on the Earth is \( g = 9.80 \text{ m/s}^2 \).

(a) (10 pts) If the bullet leaves the gun at a speed of 145 m/s, by how much will it miss the target?

(b) (15 pts) At what angle should the gun be aimed so the target will be hit?

Example 1 (a) - Cont’d

Step 1: **Draw** a diagram (or picture) of the situation, with coordinate axes.

Step 2: **Think** about which principle(s) of physics apply in this problem. (⇒ kinematic eqs.)

Step 3: **Write** down kinematic equations.

Step 4: **Solve** them.

Example 1 (b)

Step 1: **Draw** a diagram (or picture) of the situation, with coordinate axes.

Step 2: **Think** about which principle(s) of physics apply in this problem. (⇒ kinematic eqs.)

Step 3: **Write** down kinematic equations.

Step 4: **Solve** them.
Example 1 - Summary

(a) $d = 0.985 \text{ m}$

(b) $\theta = 0.5 \cdot \sin^{-1}(9.80 \cdot 65.0 \cdot 145^2) = 0.868^\circ$

Note that the following is a wrong approach for part (b):

$$\theta = \tan^{-1}(0.985/65.0) = 0.868^\circ$$

even though the answer numerically agrees with the correct one. Below is an exercise of two approaches by changing the magnitude of the velocity ($v_0$), but using the same distance ($d$) of 65.0 m, where you see a larger discrepancy as $v_0$ decreases.