Answer on Question #70571-Physics-Other

I've tried using the Vf=Vi+at formula or have been trying to find the velocity but this just throws me off. Can someone please help me?

Solution

You need to use the formulas for projectile motion.

A. What was the greatest height above the ground reached by the ball?

The maximum height is

$$h = \frac{v_0^2 \sin^2 \theta}{2g}$$

v_0 is initial speed, g is the acceleration due to the gravity, θ is the angle between the initial velocity vector and horizontal axis.

B. What were the vertical and horizontal components of its velocity when it was struck?

The vertical component of its velocity:

$$v_{y0} = v_0 \sin \theta$$

The horizontal component of its velocity:

$$v_{x0} = v_0 \cos \theta$$

C. What was the speed of the ball when it was caught?

It depends on the time in the air (when it was caught).

$$v(t) = \sqrt{v_x^2 + v_y^2}$$

$$v_x = v_{x0} = v_0 \cos \theta$$

$$v_y = v_{y0} - gt = v_0 \sin \theta - gt.$$

D. At what angle with the horizontal did the ball leave the bat?

From the formula

$$h = \frac{v_0^2 \sin^2 \theta}{2g}$$

we have:

$$\sin \theta = \sqrt{\frac{2gh}{v_0^2}}$$

$$\theta = \sin^{-1}\left(\sqrt{\frac{2gh}{v_0^2}}\right).$$