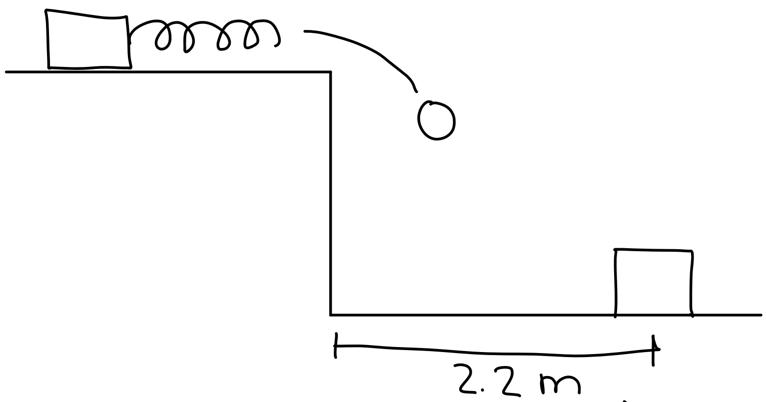

work (not answer)

$$\frac{1}{2}mv_i^2 + \frac{1}{2}kx_i^2 + mgh_i = \frac{1}{2}mv_f^2 + \frac{1}{2}kx_f^2 + mgh_2$$

$v_1 = 0$
$x_i = ?$
$h_i = ?$
$h_2 = 0$
$v_2 = ?$
$x_f = 0$

$$\frac{1}{2}kx_i + mgh_i = \frac{1}{2}mv_f^2$$

$$x_i = \frac{\frac{1}{2}mv_f^2 - mgh_i}{\frac{1}{2}k}$$

Bobby: $x_i = -0.0011\,m$
$\Delta x = 1.93\,m$

$v_1 = 0$
$v_f = ?$
$\Delta x = 2.20$
$\Delta y = ?$
$a = -10\,m/s^2$

$$0.0011 = \frac{\frac{1}{2}mv_f^2 - mgh_i}{\frac{1}{2}k}$$

$$0.022 = \frac{mv_f^2 - mgh_i}{\frac{1}{2}k}$$

$$\frac{1}{2}kx^2 = 1.93$$

$$\frac{1}{2}k(0.0011) = 1.93$$

$$k = 3509\ N/m$$

$$PE_i = \frac{1}{2}kx^2 = \frac{1}{2}(3509)(0.0011)^2$$
$$= 0.0021\ J$$

$$KE_i = PE_i = 0.0021\ J$$

$KE_f = KE_i + mgh$

$\frac{1}{2} m v_i^2 = KE_i$

$\frac{1}{2} m v_1^2 = 0.0021$

Answer

vertical component of launch is zero

$X = V_i t$

$h = \frac{1}{2} g t^2$

$X = V_1 \sqrt{\frac{2h}{g}}$

d_1 = initial distance of Bobby's shot

$d = 2.20$ which is the distance Rhonda wants to hit

$\frac{V_{iR}}{V_{iB}} = \frac{d}{d_1}$

$V_{iR} = \frac{d}{d_1} V_{iB}$

$PE = \frac{1}{2} K X^2$ elastic PE

$KE = \frac{1}{2} m v_i^2$

proportional to compressed spring of Bobby

$\frac{1}{2} m v_1^2 = \frac{1}{2} K X^2$

$X_{1R} = \frac{d}{d_1} X_{1B} = \left(\frac{2.20}{1.93}\right)(0.0011) = 0.0125 \text{ m}$

Rhonda should compress the spring 0.0125 m