9. Ball is launched at velocity V_1 and travelled distance $d_1 = 2.2 - 0.27 = 1.93$ m

Desired distance $d_2 = 2.2$ m

Since there is no horizontal acceleration, launch velocity is proportional to distance travelled. Therefore, to find desired launch velocity V_2, solve $\frac{V_1}{1.93} = \frac{V_2}{2.2}$ for V_2

$V_2 = 1.1399 V_1$

Use potential energy of spring to find desired compression

$\frac{1}{2} k x_1^2 = \frac{1}{2} m v_1^2$

$k x_1^2 = m v_1^2$ solve for k

$k = \frac{m v_1^2}{x_1^2}$

$\frac{1}{2} k x_2^2 = \frac{1}{2} m v_2^2$

$k x_2^2 = m v_2^2$

$\frac{m v_1^2 x_2^2}{x_1^2} = m v_2^2$ Solve for x_2

$x_2^2 = \frac{v_2^2 x_1^2}{v_1^2}$

$x_2 = \frac{v_2 x_1}{v_1}$ Plug in V_2, X_1

$x_2 = \frac{1.1399 x_1 (0.011)}{x_1}$

$= 0.012539 \text{ m} = 1.2539 \text{ cm}$

Rhoda should compress the spring 1.2539 cm.