

Two-Dimensional Motion and Vectors, Practice D

$$\begin{aligned}
 1. \Delta y &= -0.70 \text{ m} & \Delta t &= \sqrt{\frac{2\Delta y}{a_y}} = \frac{\Delta x}{v_x} \\
 \Delta x &= 0.25 \text{ m} & & \\
 a_y &= -g = -9.81 \text{ m/s}^2 & v_x &= \sqrt{\frac{a_y}{2\Delta y}} \Delta x = \sqrt{\frac{-9.81 \text{ m/s}^2}{(2)(-0.70 \text{ m})}} (0.25 \text{ m}) = \boxed{0.66 \text{ m/s}}
 \end{aligned}$$

$$\begin{aligned}
 2. \Delta y &= -1.0 \text{ m} & \Delta t &= \sqrt{\frac{2\Delta y}{a_y}} = \frac{\Delta x}{v_x} \\
 \Delta x &= 2.2 \text{ m} & & \\
 a_y &= -g = -9.81 \text{ m/s}^2 & v_x &= \sqrt{\frac{a_y}{2\Delta y}} \Delta x = \sqrt{\frac{-9.81 \text{ m/s}^2}{(2)(-1.0 \text{ m})}} (2.2 \text{ m}) = \boxed{4.9 \text{ m/s}}
 \end{aligned}$$

*Givens**Solutions*

$$\begin{aligned}
 3. \Delta y &= -5.4 \text{ m} & \Delta t &= \sqrt{\frac{2\Delta y}{a_y}} = \frac{\Delta x}{v_x} \\
 \Delta x &= 8.0 \text{ m} & & \\
 a_y &= -g = -9.81 \text{ m/s}^2 & v_x &= \sqrt{\frac{a_y}{2\Delta y}} \Delta x = \sqrt{\frac{-9.81 \text{ m/s}^2}{(2)(-5.4 \text{ m})}} (8.0 \text{ m}) = \boxed{7.6 \text{ m/s}}
 \end{aligned}$$

$$\begin{aligned}
 4. v_x &= 7.6 \text{ m/s} & \Delta t &= \sqrt{\frac{2\Delta y}{a_y}} = \frac{\Delta x}{v_x} \\
 \Delta y &= -2.7 \text{ m} & & \\
 a_y &= -g = -9.81 \text{ m/s}^2 & \Delta x &= \sqrt{\frac{2\Delta y}{a_y}} v_x = \sqrt{\frac{(2)(-2.7 \text{ m})}{-9.81 \text{ m/s}^2}} (7.6 \text{ m/s}) = \boxed{5.6 \text{ m}}
 \end{aligned}$$