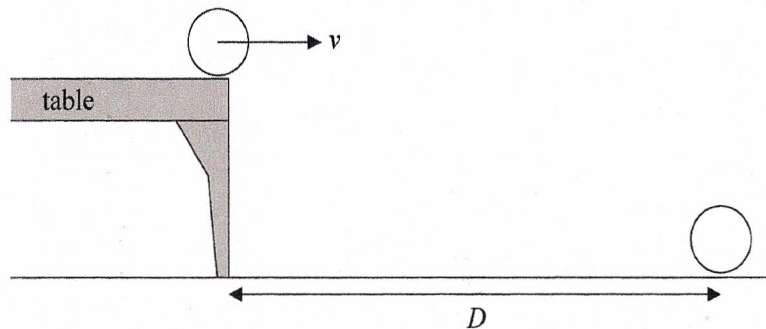


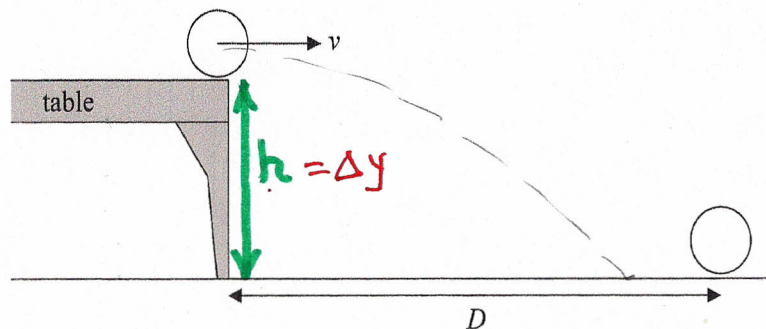
Warm up

- A ball rolls off a horizontal table with **velocity v** . It lands on the ground a **time T** later at a **distance D** from the foot of the table as shown in the diagram below. Air resistance is negligible.
- Demonstrate the formulas for **Range(D)**, and the **hang time (T)**, assuming that you know the **initial velocity(v)** and the **height** of the table.



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$$\begin{array}{c} v \\ h \\ \hline T = ? \\ D = R = \Delta x = ? \end{array}$$

Vertical Direction

$$\Delta y = h = \frac{1}{2}gt^2$$

$$t = \sqrt{\frac{2\Delta y}{g}} = \sqrt{\frac{2h}{g}}$$

$$T = t = \sqrt{\frac{2h}{g}}$$

Horizontal Direction

$$D = R = \Delta x$$

$$D = v \cdot t$$

$$D = v \cdot \sqrt{\frac{2h}{g}}$$