You buy a plastic dart gun. and being a clever physics student you decide to do a quick calculation to find its maximum horizontal range. You shoot the gun straight up, and it takes 5.6 seconds for the dart to land back at the barrel.
What is the maximum horizontal range of your gun?

When we shoot the gun straight up, we can find the speed of dart when it leaves the gun:

$$v_0 = g\frac{t}{2}$$

Where t – is a time of a dart's flight.
The horizontal range of an object shouted at angle:

$$S_x = \frac{v_0{}^2 \sin(2\alpha)}{g}$$

And the maximum range at $45°$:

$$S_{xmax} = \frac{v_0{}^2}{g} = \frac{\left(g\frac{t}{2}\right)^2}{g} = \frac{gt^2}{4}$$

$$S_{xmax} = \frac{9.81\frac{m}{s^2} \cdot (5.6s)^2}{4} \approx 77m$$

Answer: $S_{xmax} \approx 77m$