



The long answer

(for math/physics lovers):

When you place the ball on the ramp, you give it *potential energy*:

Potential Energy = mgh
(mass x acceleration due to gravity x height)

The height of the ball is directly proportional to its position on the ramp.

When the rolling ball reaches the bottom of the ramp, the potential energy has been converted to *kinetic energy*:

Kinetic Energy = $\frac{1}{2}mv^2$
(half the mass x velocity squared)

Since energy is conserved, the potential energy at the top of the ramp must equal the kinetic energy at the bottom:

$$\text{Energy} = mgh = \frac{1}{2}mv^2$$

Solving for *velocity* v , we get:

$$v^2 = 2gh \quad \text{so } v \text{ is proportional to } \sqrt{h}$$

Once they leave the ramp, all the balls have the same flight time. So the distance each ball travels depends only on the velocity, which in turn depends on the square root of the height.

The long answer

This method of calculation can be explained by anonymous and quick algebra