Source: KBe2020math401flo2

- Galileo's Inclined Plane
  - rolling a ball down the ramp
  - picture shows where the ball after each moment.
  - snapshots taken at constant rate
  - We can figure out the instantaneous speed
  - Equ is $y = 32x^2$
  - Derivative is $y = 32(x+d)^2 - 32x^2$
- "Instantaneous speed as a function"

$$\begin{aligned} y &= \frac{a(x+h)^2 - ax^2}{h} \\ &= \frac{a(x^2+h^2+2xh) - ax^2}{h} \\ &= \frac{ax^2 + ah^2 + 2axh - ax^2}{h} \\ &= \frac{\cancel{ax^2} + axh^2 + 2ah\cancel{-ax^2}}{h} \\ &= \frac{ah\cancel{h} + 2ax\cancel{h}}{\cancel{h}} \\ &= \cancel{ah}^{0} + 2ax \end{aligned}$$
