

26/10/21

PG: Derivation.

Activité introductive.

$$1) z(10) = 5 \times 10^2 = 5 \times 100 = 500 \text{ m.}$$

$$2) v_1 = \frac{d}{\Delta t} = \frac{z(10) - z(0)}{10 - 0} = \frac{500}{10} = 50 \text{ m} \cdot \text{s}^{-1}.$$

$$3) z(20) - z(15) = 5 \times 20^2 - 5 \times 15^2 = 2000 - 1125 = 875 \text{ m.}$$

$$4) v_2 = \frac{z(20) - z(15)}{20 - 15} = \frac{875}{5} = 175 \text{ m} \cdot \text{s}^{-1}.$$

$$5) v = \frac{d}{\Delta t} = \frac{z(1) - z(0,5)}{1 - 0,5} = \frac{5 - 5 \times 0,5^2}{0,5} = \frac{5 - 1,25}{0,5} = \frac{3,75}{0,5} = 7,5 \text{ m} \cdot \text{s}^{-1}.$$

$$6) v = \frac{d}{\Delta t} = \frac{z(1) - z(0,8)}{1 - 0,8} = \frac{5 - 5 \times 0,8^2}{0,2} = 9 \text{ m} \cdot \text{s}^{-1}.$$

$$v = \frac{z(1) - z(0,99)}{1 - 0,99} = \frac{5 - 5 \times 0,99^2}{0,01} = 9,95 \text{ m} \cdot \text{s}^{-1}.$$

Vitesse instantanée à $t = 1 \text{ s}$.

$$v(1) = \lim_{t \rightarrow 1} \frac{z(1) - z(t)}{1 - t} = \lim_{t \rightarrow 1} \frac{5 - 5t^2}{1 - t} = \lim_{t \rightarrow 1} \frac{5(1 - t^2)}{1 - t}$$

$$= \lim_{t \rightarrow 1} \frac{5(\cancel{1-t})(1+t)}{(\cancel{1-t})} = \lim_{t \rightarrow 1} 5(1+t) = 10 \text{ m} \cdot \text{s}^{-1}.$$