Linear Motion Graphs

* Position graphs
  - positive slope ⇒ moving North
  - negative slope ⇒ moving South
  - steep slope ⇒ moving fast
  - shallow slope ⇒ moving slow
  - flat line ⇒ not moving

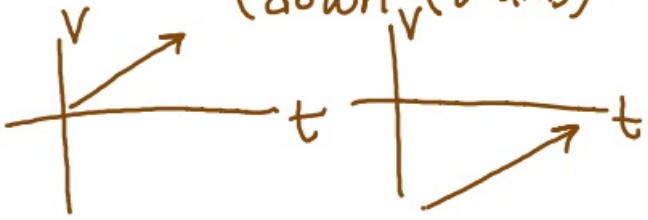
Slope equation: slope = velocity

$$V = \frac{\Delta X}{\Delta t}$$

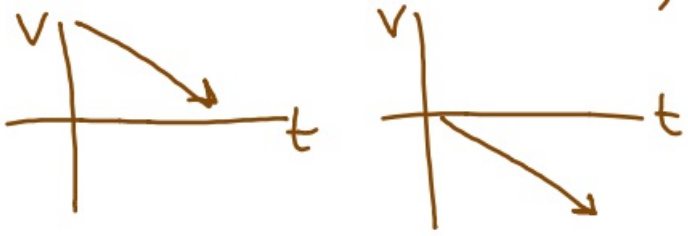
  - curved slope ⇒ speed is changing ⇒ there is acceleration

Velocity graphs

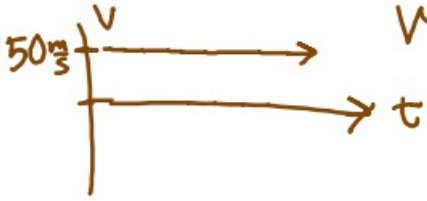
- positive slope ⇒
  - speeding up (above t-axis)
  - slowing down (below t-axis)



- negative slope
  - slowing down (above t-axis)
  - speeding up (below t-axis)



- Flat line ⇒ constant velocity



- touches t-axis ⇒ stop or turning point
- above t-axis ⇒ moving North
- below t-axis ⇒ moving South
- Slope formula: slope = acceleration

$$a = \frac{V_F - V_i}{\Delta t}$$

Is object accelerating?

yes ↙ ↘ no

$\Delta x = v_i \Delta t + \frac{1}{2} a \Delta t^2$

$v = \frac{\Delta x}{\Delta t}$

$\Delta x = \left(\frac{v_i + v_f}{2}\right) \Delta t$

$v_f^2 = v_i^2 + 2a\Delta x$

$a = \frac{v_f - v_i}{\Delta t}$

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* Special case
  free-fall $a = -9.8 \frac{m}{s^2}$
* If you drop object, final velocity $\neq 0$

Fall to the ground @ same time & hit the ground w/ same speed