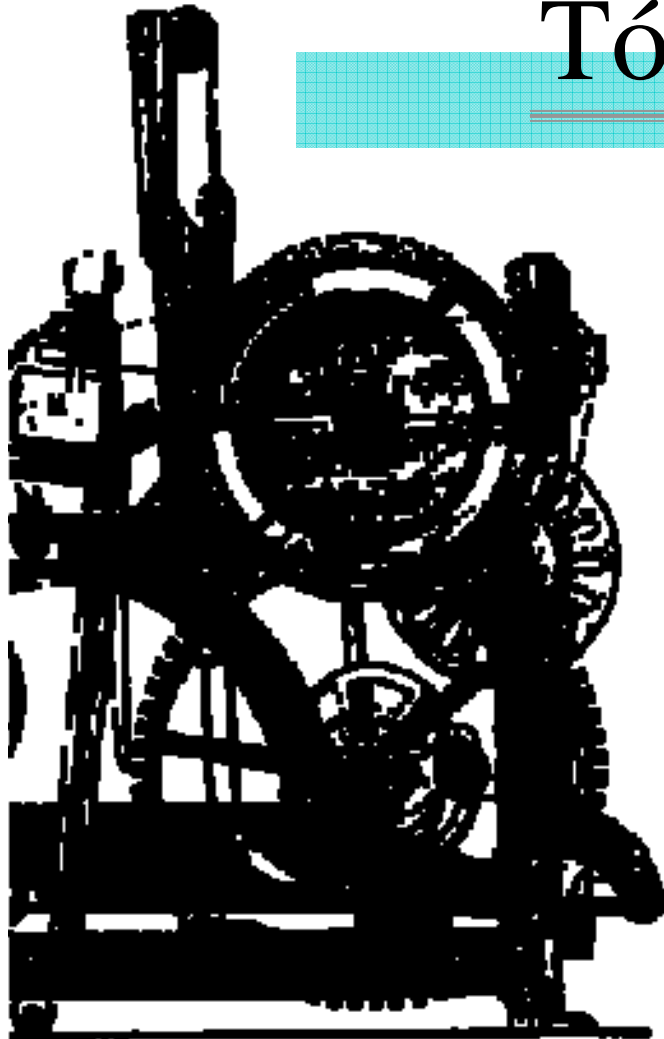


Tópicos da Física

Como Estão Relacionadas a Rapidez e a Velocidade?

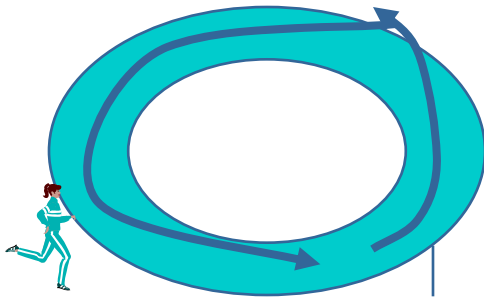




Rapidez e Velocidade

$$\text{Rapidez Média} = \frac{\text{distância total}}{\text{tempo}} \quad \text{Velocidade Média} = \frac{\text{deslocamento total}}{\text{tempo}}$$

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



$$\text{Tempo} = 1 \text{ min } 18 \text{ seg} \quad \frac{\text{Começo}}{\text{Final}} = 500 \text{ m}$$

$$\text{rapidez média} = \frac{500 \text{ m}}{78 \text{ s}} = 6.4 \frac{\text{m}}{\text{s}}$$

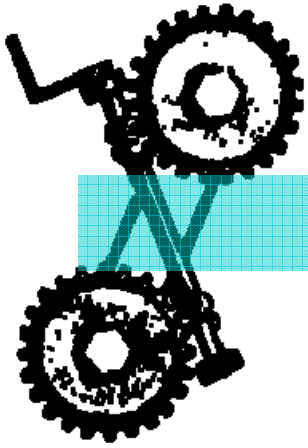
$$\text{velocidade média} = \frac{0 \text{ m}}{78 \text{ s}} = 0 \frac{\text{m}}{\text{s}}$$

É possível mover-se com rapidez constante mas não com velocidade constante?

Sim. (Movendo-se a 55 mph ao redor de uma esquina \Rightarrow mudando a direção = mudando a velocidade)

É possível mover-se com velocidade constante mas não com rapidez constante?

Não. (Uma mudança na rapidez causa uma mudança na velocidade.)



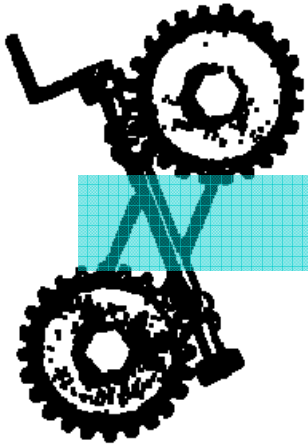
Aceleração

Aceleração média = $\frac{\text{mudança na velocidade}}{\text{tempo}}$

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

- Aceleração positiva significa aumentar a velocidade
- Aceleração negativa significa diminuir a velocidade

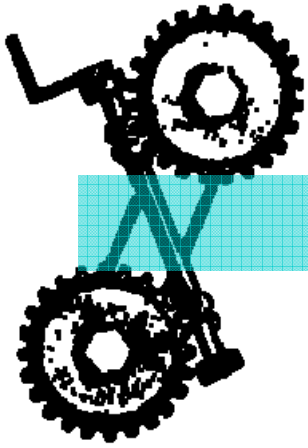
V_0	V_1	t	a
80 mph	80 mph	10 s	$0 \frac{m}{s^2}$
20 m/s	32 m/s	3 s	$4 \frac{m}{s^2}$
32 m/s	20 m/s	2 s	$-6 \frac{m}{s^2}$



Cinco Equações Importantes

Variável Que Falta

- 1 $\Delta s = v_{avg} \Delta t$ \longrightarrow a
- 2 $\Delta v = a \Delta t$ \longrightarrow Δs
- 3 $\Delta s = v_0 \Delta t + \frac{1}{2} a (\Delta t)^2$ \longrightarrow v
- 4 $\Delta s = v \Delta t - \frac{1}{2} a (\Delta t)^2$ \longrightarrow v_0
- 5 $v^2 = v_0^2 + 2a \Delta s$ \longrightarrow Δt



Derivação das Equações 3 & 4

$$\Delta s = v_{avg} \Delta t = \frac{1}{2} (v_0 + v) \Delta t$$

$$\Delta s = \frac{1}{2} v_0 \Delta t + \frac{1}{2} v \Delta t$$



$$\Delta s = \frac{1}{2} v_0 \Delta t + \frac{1}{2} v \Delta t$$

$$(-) \quad \frac{1}{2} a (\Delta t)^2 = -\frac{1}{2} v_0 \Delta t + \frac{1}{2} v \Delta t$$

$$\Delta s - \frac{1}{2} a (\Delta t)^2 = v_0 \Delta t$$

$$\Delta s = v_0 \Delta t + \frac{1}{2} a (\Delta t)^2$$

$$a = \frac{\Delta v}{\Delta t} = \frac{v - v_0}{\Delta t}$$

$$a \Delta t = v - v_0 \quad \frac{a \Delta t}{2} = \frac{v - v_0}{2}$$

$$\frac{1}{2} a \Delta t = \frac{1}{2} v - \frac{1}{2} v_0$$

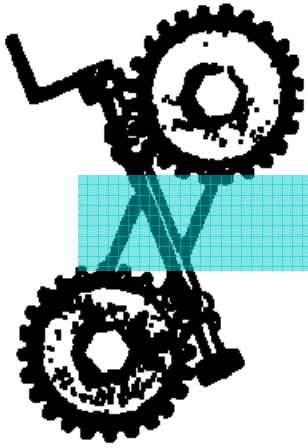
$$\Delta s = \frac{1}{2} v_0 \Delta t + \frac{1}{2} v \Delta t$$

$$(+)$$

$$\frac{1}{2} a (\Delta t)^2 = -\frac{1}{2} v_0 \Delta t + \frac{1}{2} v \Delta t$$

$$\Delta s + \frac{1}{2} a (\Delta t)^2 = v \Delta t$$

$$\Delta s = v \Delta t - \frac{1}{2} a (\Delta t)^2$$



Derivação da Equação 5

$$\Delta s = v_{avg} \Delta t = \frac{v + v_0}{2} \Delta t$$

$$\frac{2\Delta s}{v + v_0} = \Delta t$$

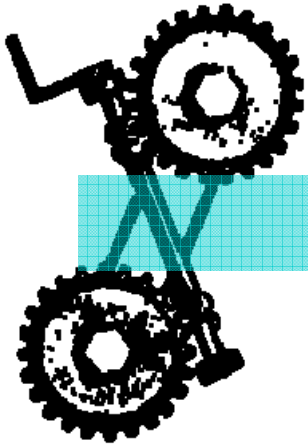
$$a\Delta t = \Delta v = v - v_0$$

$$\Delta t = \frac{v - v_0}{a}$$

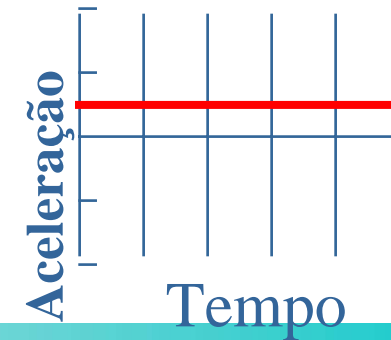
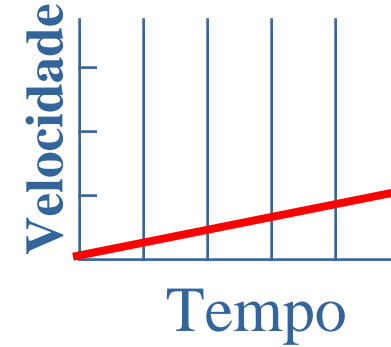
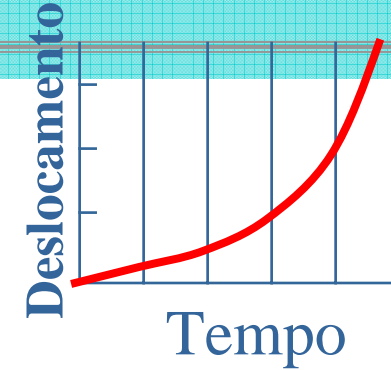
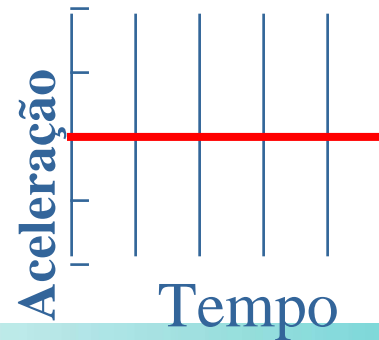
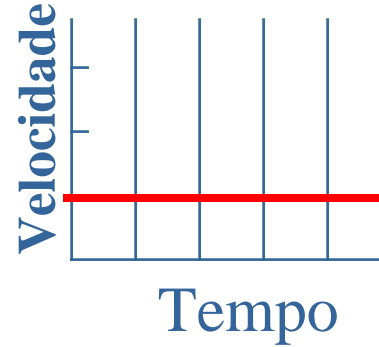
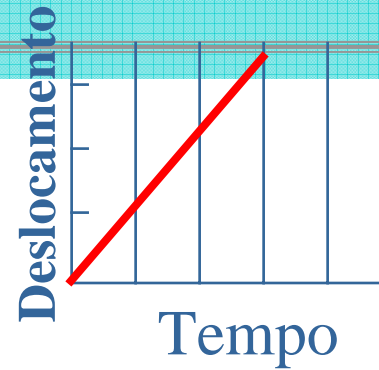
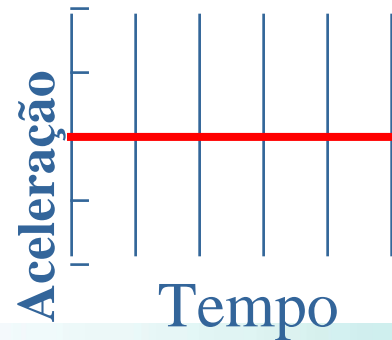
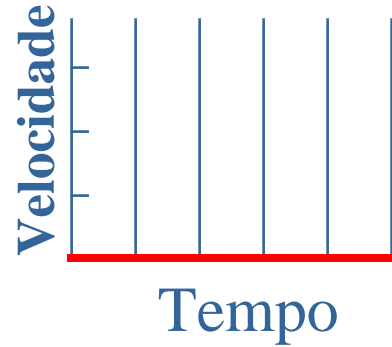
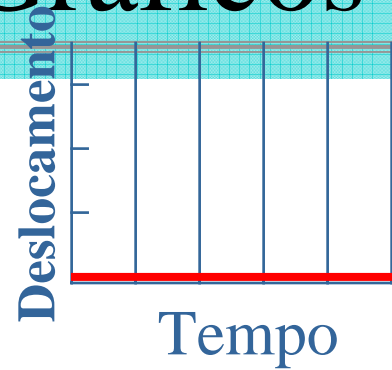
$$\frac{2\Delta s}{v + v_0} = \frac{v - v_0}{a}$$

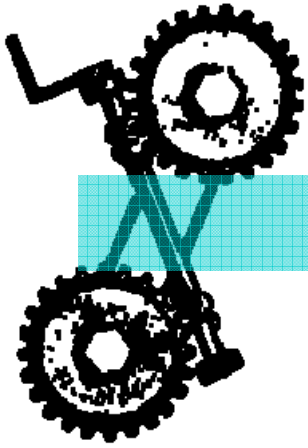
$$2a\Delta s = v^2 - v_0^2$$

$$v^2 = v_0^2 + 2a\Delta s$$

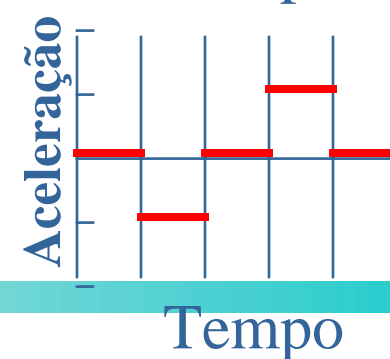
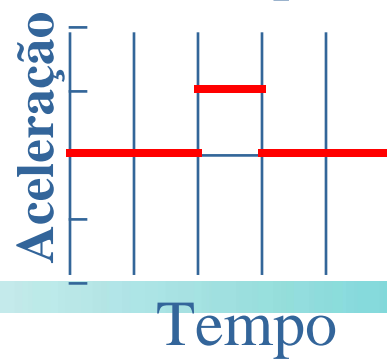
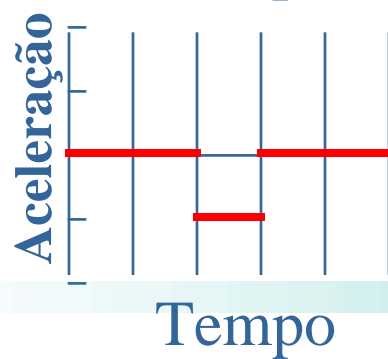
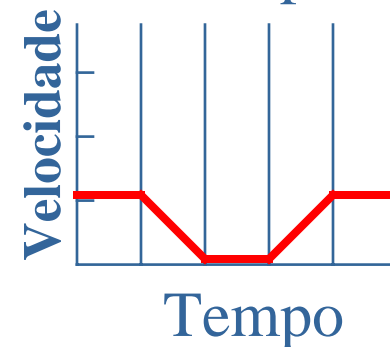
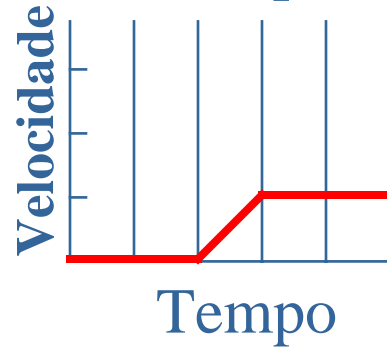
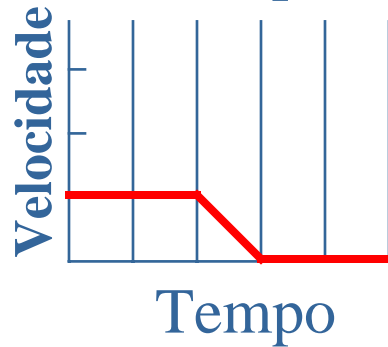
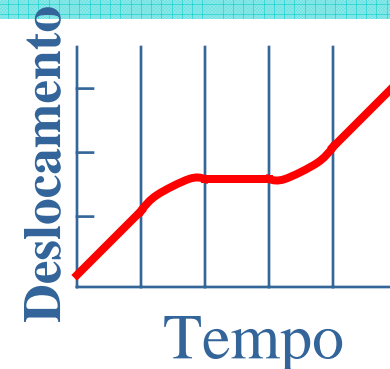
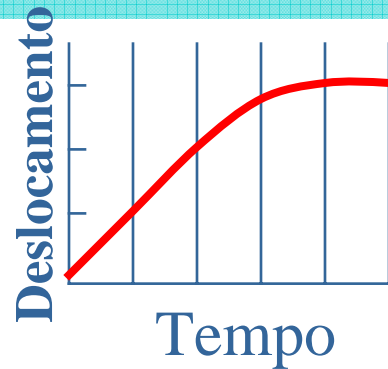


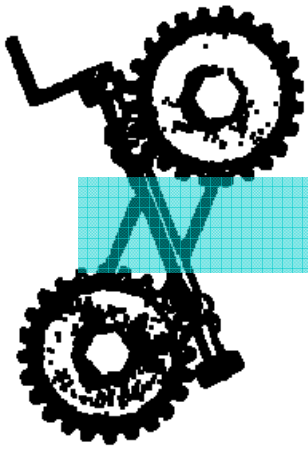
Gráficos



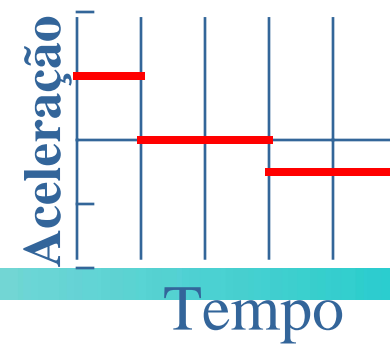
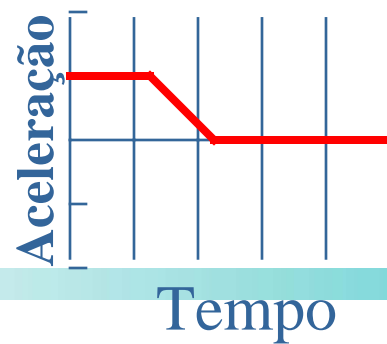
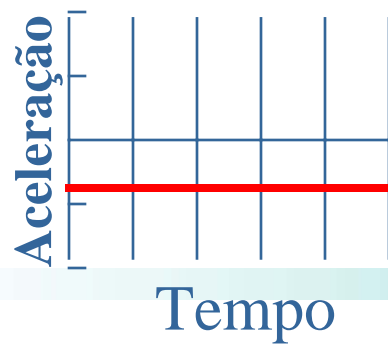
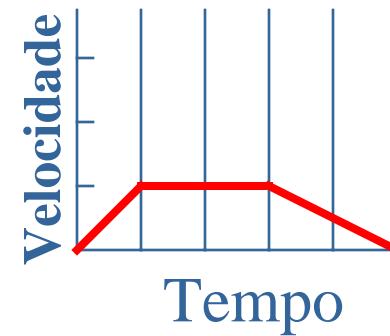
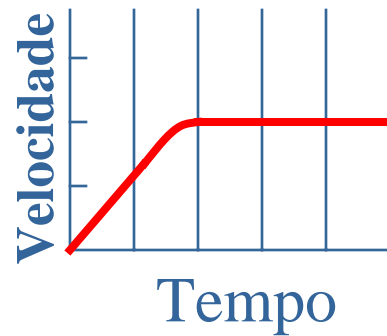
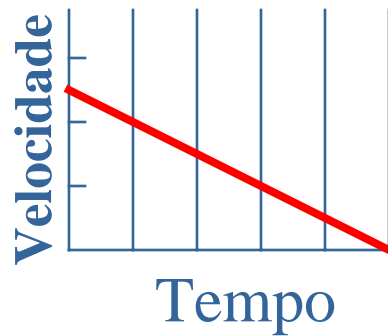
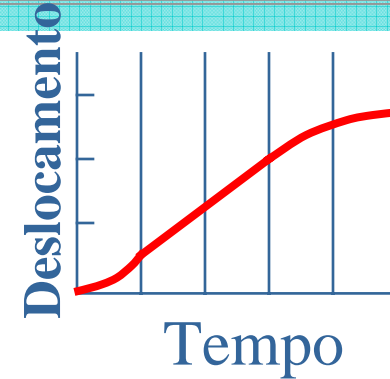
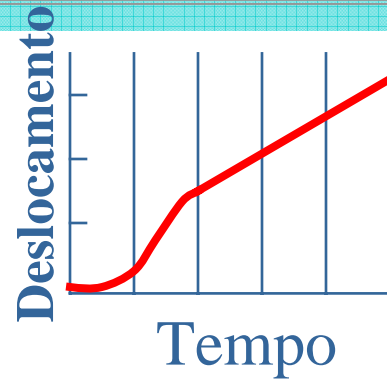
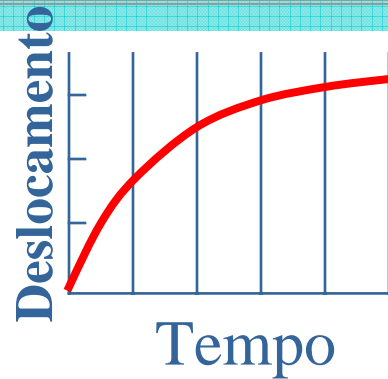


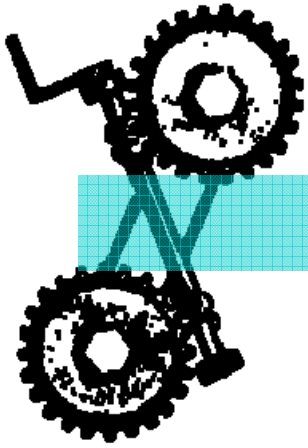
Gráficos



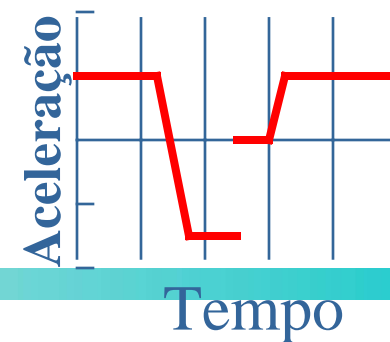
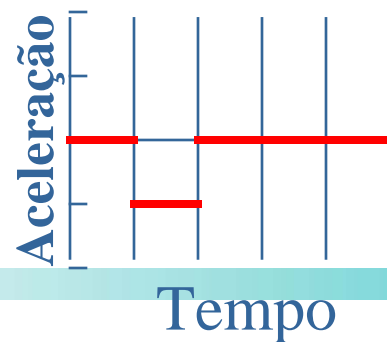
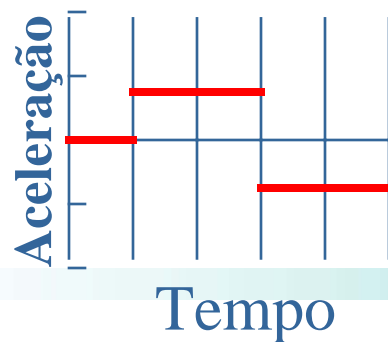
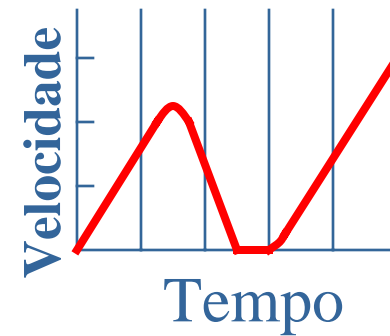
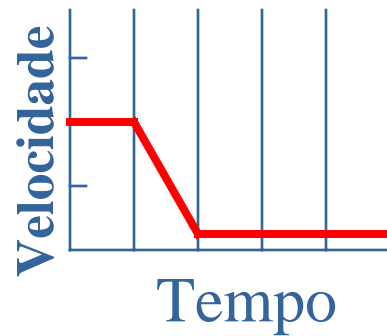
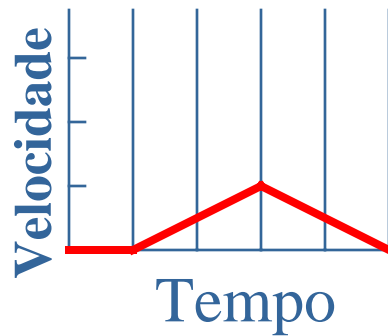
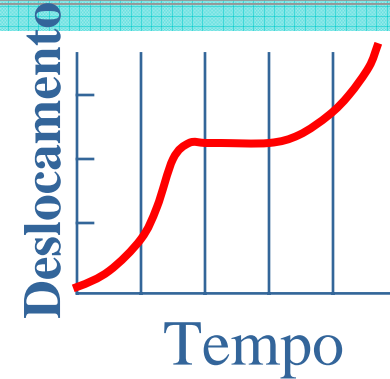
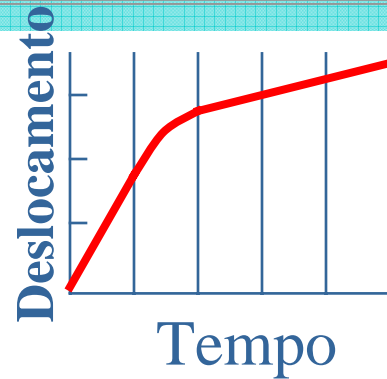
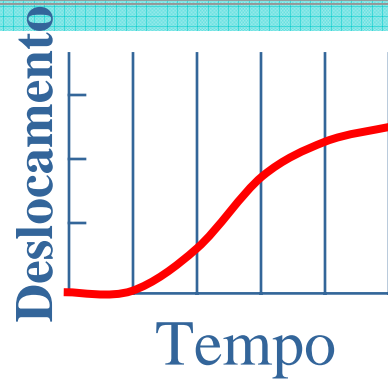


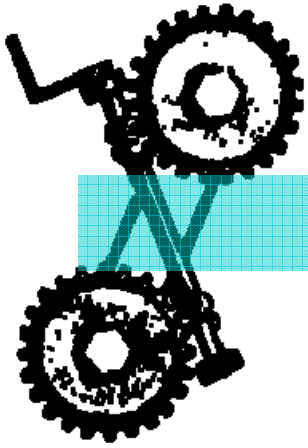
Gráficos





Gráficos





Movimento do Projétil

Começar a Demonstração
do Movimento do Projétil