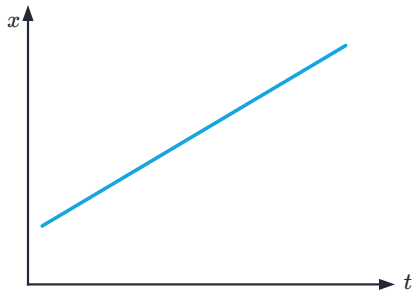
Achievable

AP PHYSICS 1 DUMP SHEET

Motion and force graphs

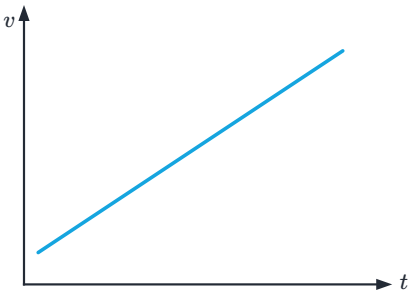
Position vs time



- Slope = velocity
- Positive slope → positive velocity
- Negative slope → negative velocity
- Horizontal line → object at rest
- Curve → accelerating

$$x = x_0 + vt$$

Velocity vs time



- Slope = acceleration
- Area under curve = displacement
- Horizontal line → constant velocity
- Slope up → positive acceleration
- Slope down → negative acceleration

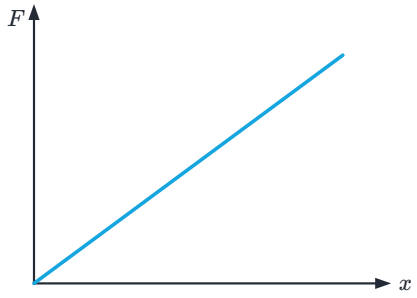
$$v = v_0 + at$$

Acceleration vs time

- Area under curve = change in velocity, Δv

$$\Delta v = \int a\,dt$$

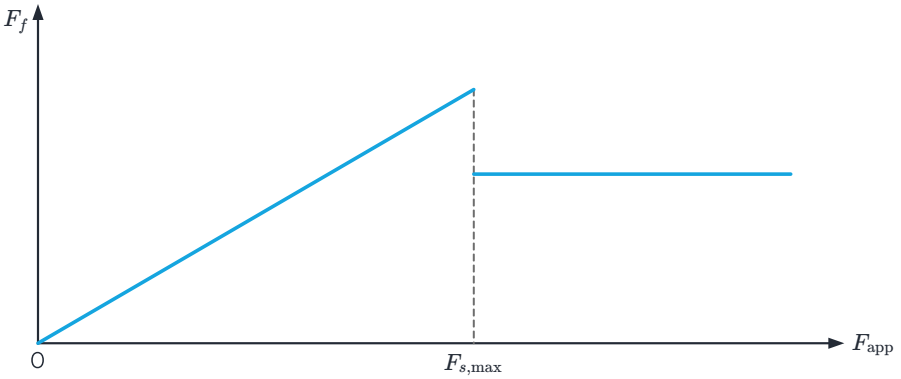
Spring force vs stretch



- $F = -kx$
- Slope = k (spring constant), for the force's size kx
- Area under curve = elastic potential energy

$$U_s = \tfrac{1}{2}kx^2$$

Friction force vs applied force



Static friction

- Friction matches applied force
- Increases up to $F_{s,\max}$
- Prevents motion

Kinetic friction

- Once sliding, friction is approximately constant, usually below $F_{s,\max}$
- $F_k = \mu_k N$