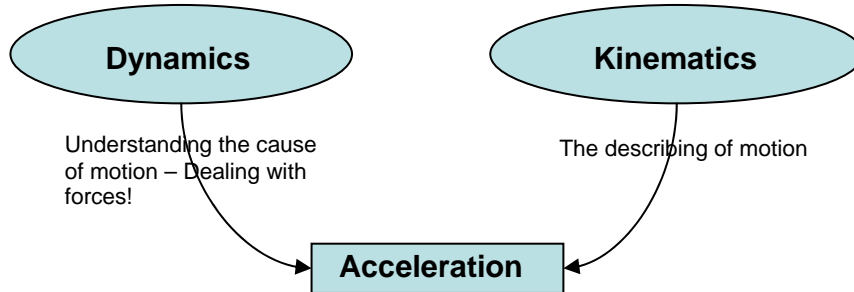


## Physics 151 Class Exercise: Kinematics & Dynamics

Use the diagram below to break the following problem into a kinematics and a dynamics part. Realize that acceleration relates the two parts and that mass only appear in the dynamics part.



1. A 68,000 N airplane is taking off. It starts from rests and reaches a velocity of 84 m/s at the end of the 880 m runway. What force is the airplane's thrusters supplying?

Dynamics	Kinematics		
$W = mg$ $m = \frac{W}{g} = \frac{68000N}{\left(9.81 \frac{m}{s^2}\right)} = 6.9 \times 10^3 kg$ $F = ma = \left(6.9 \times 10^3 kg\right) \left(4.0 \frac{m}{s^2}\right)$ $= 2.8 \times 10^4 N$	<p><b>Known:</b></p> $v_0 = 0$ $x = 880 \text{ m}$ $v = 84 \text{ m/s}$	<p><b>Solve:</b></p> $a = ?$	<p><b>NI:</b></p> $t$
	$v^2 = v_0^2 + 2ax$ $a = \frac{v^2}{2x} = \frac{\left(84 \frac{m}{s}\right)^2}{2(880m)} = 4.0 \frac{m}{s^2}$		