

## WEEK 4B: Introducing Newton's Laws

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### 1 More Rocket Science

A rocket is being launched to put a satellite in orbit. Air resistance is not negligible.

- (a) Draw the force diagram for the rocket
- (b) Is the rocket an inertial reference frame?
- (c) Write down Newton's 2nd law for the rocket during lift-off.

### 2 Block on Ice

A block is moving along on ice at  $v_0 = 5 \text{ m/s}$ . I come along and exert a force of  $5 \text{ N}$  at an angle of  $\theta = 30^\circ$  on the block for 5 seconds. Find the speed of the block after 5 seconds.

### 3 Elevators

You are at the bottom floor of Orbach Library. You have sore legs so you decide to take the elevator up to the top floor.

- (a) Draw the force diagram for the elevator.
- (b) Sketch an acceleration vs time graph.
- (c) Sketch a velocity vs time graph.