

# ELEVATOR SYSTEMS

## **APPLYING NEWTON'S LAWS OF MOTION**

PowerPoint Presentation By: Jay Gregorio, AHS

# Objectives

- identify the forces acting on the elevator systems;
- use vector arrows to represent magnitude and direction of the forces acting on the system;
- differentiate true weight from apparent weight;
- find the magnitude of the net force and acceleration in elevator systems;

# Differentiate “true weight” from “apparent weight”.

- **True weight** - “actual weight”.
- **Apparent weight** - force experienced by an object as a result of all the forces acting on the object, giving it an acceleration.



# CASE 1: No Acceleration

What are the possible conditions?

- at rest
- moving at a constant velocity

Therefore,

$$\mathbf{F}_{\text{net}} = 0$$



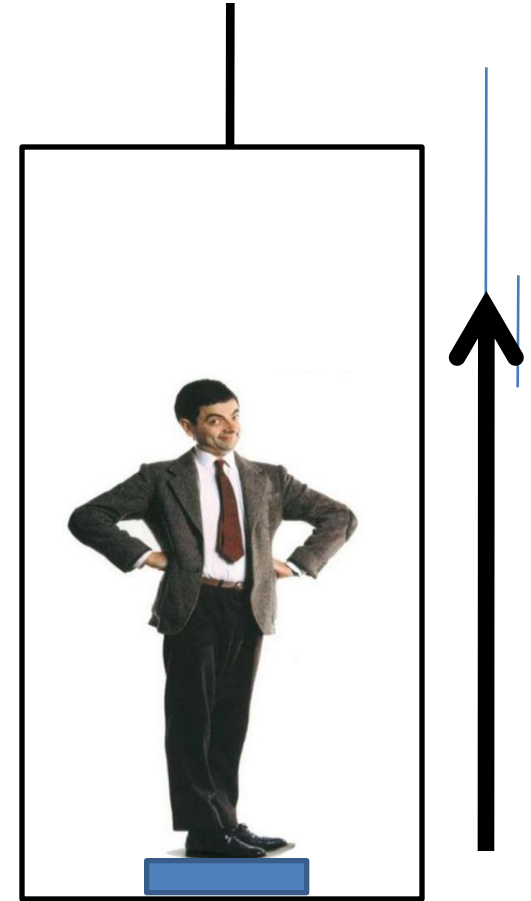
# CASE 2: Going Up, Speeding Up

Compare the true weight from  
apparent weight.  $F_N > F_g$

Determine whether Mr. Bean feels  
heavier or lighter. (**heavier**)

What is the apparent weight?

$$F_N = m(g + a)$$

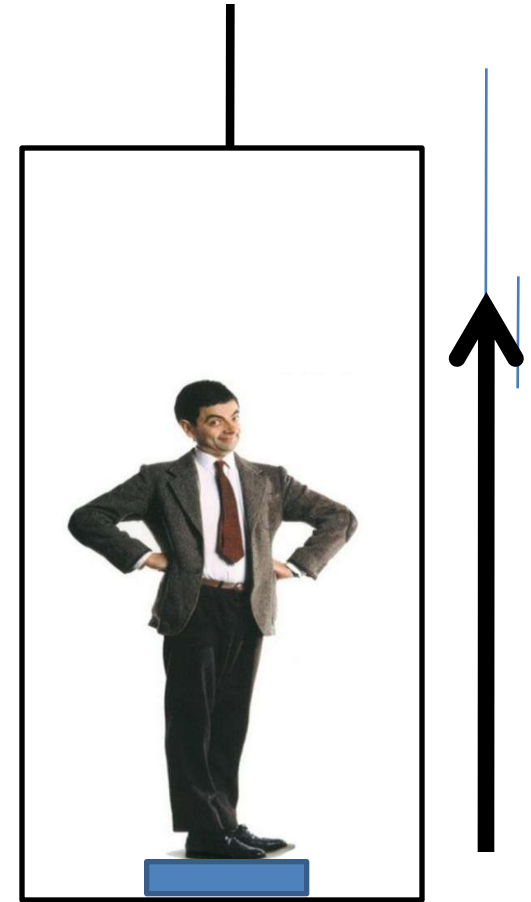


# CASE 3: Going Up, Slowing Down

Compare the true weight from  
apparent weight.  $F_N < F_g$

Determine whether Mr. Bean feels  
heavier or lighter. (**lighter**)

What is the apparent weight?  
 $F_N = m(g - a)$



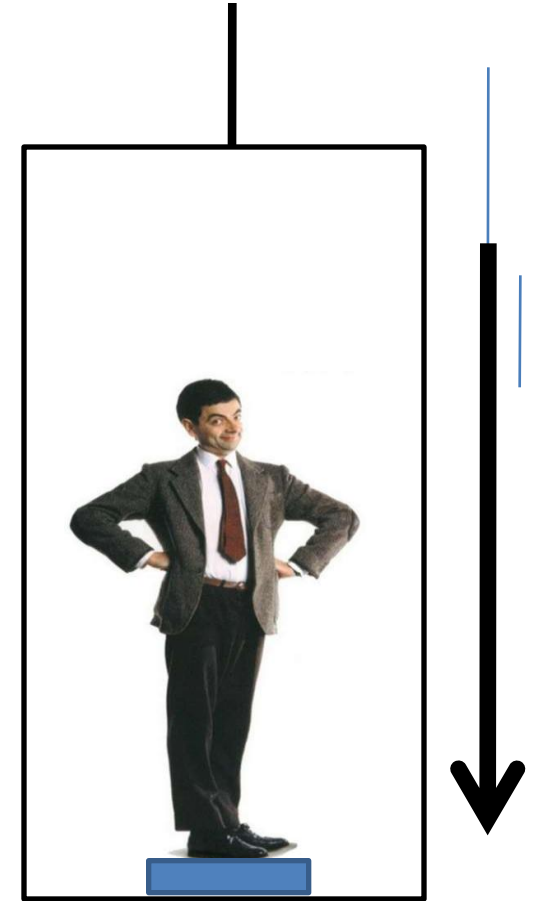
# CASE 4: Going Down, Speeding Up

Compare the true weight from  
apparent weight.  $F_N < F_g$

Determine whether Mr. Bean feels  
heavier or lighter. (**lighter**)

What is the apparent weight?

$$F_N = m(g - a)$$

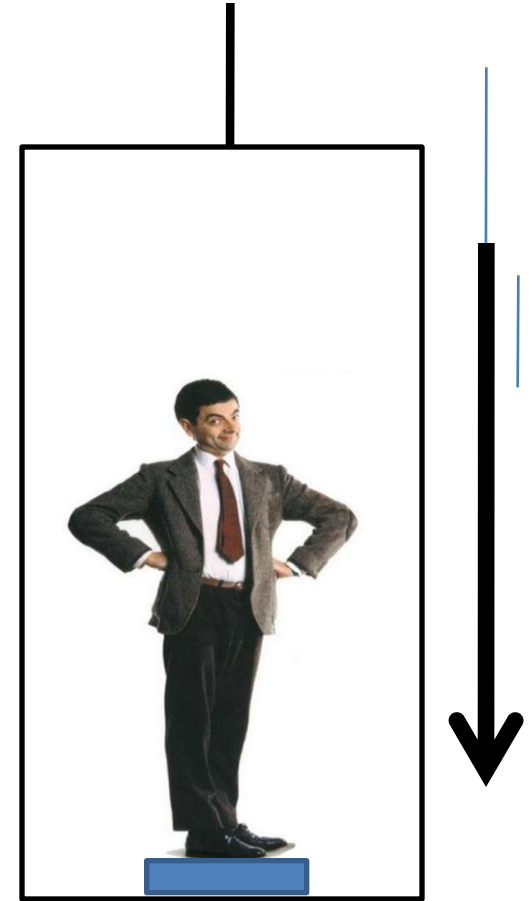


# CASE 5: Going Down, Slowing Down

Compare the true weight from  
apparent weight.  $F_N > F_g$

Determine whether Mr. Bean feels  
heavier or lighter. (**heavier**)

What is the apparent weight?  
 $F_N = m(g + a)$



# CASE 6: When the cable breaks..

Compare the true weight from apparent weight. **The only force acting on the body is  $F_g$  (true weight).**

What is the apparent weight?

$$F_N = 0$$

