

Document 1: Glossary.

**Forces measured in Newton. It's a vector quantity**

Gravitational force or gravity or (on Earth) Weight.

Frictional force or friction

Air resistance or drag.

Buoyant force or upthrust.

The force from A on B.

To act, to push, to pull

upwards  $\uparrow$ , downwards  $\downarrow$ , forwards  $\rightarrow$ , backwards  $\leftarrow$ , towards something.

the upward force (upwards: adverb, upward adjective)

**Accelerated or uniform motion**

Linear motion is movement in a straight line

Uniform speed (velocity): the speed of the object is constant

Circular motion: the trajectory is a circle.

Inertia is the tendency of an object to resist a change of velocity.

**The principle of Inertia or Newton's first Law of motion:**

If the forces on a mass are balanced (no resultant force), then:

- If it is at rest, it stays at rest.
- If it is moving, it keeps on moving at a constant speed in a straight line.

**Newton's second Law of motion:** If the forces on a mass are not balanced (a resultant force), then the velocity changes in the direction of the resultant force, there is an acceleration:  $\vec{a} = \frac{\vec{F}}{m}$

Document 2: Riddles.

Could the convict escape this way?



Could he lift the ball more easily in a prison on the Moon?

Could he jump higher in a prison on the Moon?



Your inertia can kill you!



## ACTIVITIES:

1) **Warm up:** Describe photos and speak about motion and forces (1 minute to prepare).

Choose: “easy-peasy” or “challenging”

2) **Riddles:** (challenging: by pairs)

Use your scientific knowledge to explain each visual in the document 2.

3) **Video study** (easy-peasy: by group of four)

Each group watch a video about forces. They speak together about the video. What have you understood? How can you explain the video to the other students?

You are in the Group A: use the video drag.avi

You are in the Group B: use the video friction.avi

You are in the Group C: use the video freefall.avi

You are in the Group D: use the video weightlessness.avi

<b>video drag.avi</b>  What causes air resistance?  How can we decrease air resistance?  How do they study air resistance in the video?	<b>video friction.avi</b>  What is the name of the sport they study?  What type of shoes do they wear? Why?  Why do they use water drops?  Why do they use brooms?
<b>video freefall.avi</b>  Does the moon have gravity?  Can we do this experiment on Earth? Why?  Describe the experiment they carry out on Earth.  Why have they used the same container (recipient)?	<b>video weightlessness.avi</b>  When you fall do you still have weight?  How do they obtain zero gravity?  What are their movement in the Earth's frame?  How can you explain weightlessness?

3) **Feedback:** Students present an explanation of the riddles.

## PERSONAL WORDS:

