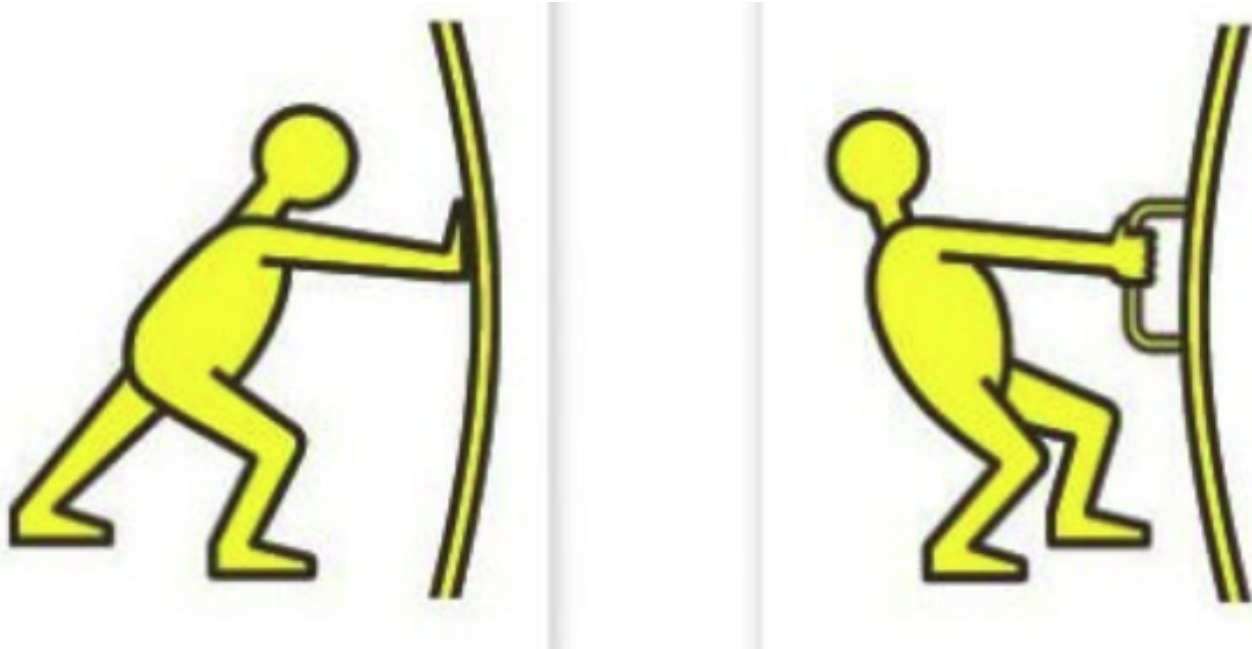


Force



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1 'How would you define Force?' - 5min

The goal of this section is to see what every kid knows about force and to allow them to get progressively into the subject by thinking about it by themselves. At the end of these five minutes, the following explanation should be given to the whole group so that they have a good idea about what the activities are going to be related with: A force can be anything that modifies the speed, acceleration or shape of an object. For example, if one throws a ball, he or she is modifying its acceleration and speed. If one breaks an object, he or she is modifying its shape.

2 A historic point of view - 10min

The first to realize that acceleration and force are linked was Isaac Newton, a british that had studied in one of the oldest universities in the world, Cambridge. Not only he realized such a link but also that it depended on the mass of the object in the following way: If some object is heavy and some force is applied on it, it accelerates **a bit**. On the contrary, if the object is light, if the same force is applied on it, it accelerates **a lot**. That was in 1687 !

In that year, Isaac Newton published three laws about force. These laws are now known as the three principles of Newton and that is what we are going to talk about today.

3 1st principle - 15min

The first principle states that **a body that has no force being applied on it is either steady or moving at a constant speed.**

The activity related to this principle is quite simple. Kids only have to look at objects that are not moving, that means that no force is being applied on them. But wait, **what about the force of gravity? Why are objects steady if the force of gravity is affecting them?** Let the kids think about that.

Actually, if all the forces compensate each other, **it is as if there was no force being applied on the object.** Tell the kids to think about objects in these situations. It can be an object lying on a table or on the floor, since the table or the floor are keeping the object from falling by applying a force to it.

4 2nd principle - 15min - [Activity]

The second principle states that the more force is applied to an object, the more it accelerates. At the same time, the more heavy is the object, the more force you need to accelerate it.

It is quite easy to imagine an activity related with this principle. Get a series of balls of different weights (tennis, basketball, football, etc...). The activity has to take place outside. The goal is to compare how far balls get when thrown with different forces. Every kid should throw

the different balls **with all their possible effort** from a given point and mark down which one went the further away, the second one, and so on. This way kids will see the influence of **different masses (or weights)**. Now every kid should try to reach a certain point with every ball and mark down with which ball he needed to do the biggest effort, the second one, and so on. This will allow them to see the link between **force** and acceleration.

5 3rd principle - 15min - [Activity]

The third principle states that when someone applies a force to a given object, it also feels **exactly the same force** from the object.

The activity here is quite simple, kids should group in pairs and every one of them should sit on the floor, crossing their legs and, very important, **being back to back** with its partner. Then kids should relax, without making any effort to keep their back straight. Ask them to think about how this is related to this third principle.

The explanation is very simple, in a pair sitting back to back, both of the kids apply a force on the other which is the force of letting their weight lie without making an effort to keep it from going down/backwards. At the same time, every kid **feels** the exact same force from the other kid, which is what it makes them not fall down.

Another way to see this principle is to think about what happens if we strike any object. **It hurts!** This is because the object is also applying a force on us, **it is as if the object was also striking us!**

6 Conversation topics

- Now that you know what a force is, what do you think about Star Wars and 'the Force'?
- We have talked about Isaac Newton, do you know of any other famous scientists?
- How would you define the concept of being strong? Some people use as a criterion the number of times an animal can lift its own weight, do you find it accurate? Use what you just learned.