

Acceleration



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

The goal of this section is to see what every kid knows about acceleration 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: Acceleration is a parameter responsible for the evolution of velocity. If you have no acceleration, your velocity will not change over time. The more acceleration you have, the more your velocity will increase over time.

2 The link between position, velocity and acceleration - 20min

Here is what you should tell the kids:

Let's imagine a car and a starting line. The distance between the car and the starting line is going to be called the **position** of the car. At the beginning, the car is at the starting line so its position is **zero**. The car is not moving so **its velocity is also zero**.

Now, if the car has a **constant velocity** what will happen with its position? (let the kids think for a while and discuss it with the whole class)

The car will start to move forward, **its position will increase at a steady rate**. What do we mean by steady rate? It means that if after one minute the position of the car is of 10 meters away from the starting line, after 2 minutes it will be of 20 meters, and so on.

When the car has some **acceleration**, the same happens with **velocity**. At the beginning the velocity of the car is of 0 km/hour, after, for example, one minute, it is of 10 km/hour and after two minutes it is of 20 km/hour.

To sum up, **a constant velocity makes position increase in a steady rate. A constant acceleration makes velocity increase in a steady rate.**

This part seems short but the concept can be hard to understand for the kids so it is ok to take a long time to explain it.

3 Racing board game - 20min - [Activity]

In this section the kids are going to have to draw how cars with different speeds and accelerations evolve in a track. Examples are given in the powerpoint. Different speeds and accelerations per steps are given to different cars and the kids must, with arrows, explain how cars get from one end to the other of the track. There are examples and corrections in the powerpoint. Kids can answer the questions in groups if you consider it useful.

4 Deducing the acceleration - 20min - [Activity]

Now kids have to think the other way around. In groups they are going to think of different situations for the cars (initial velocity and acceleration during the 'race') and draw the resulting trajectory of the car. Group by group, they are going to present the trajectories they have drawn but **without telling the initial velocity and acceleration to the rest of the class**. The rest of the groups are going to have to deduce them from the movement of the car.

You can, for example, transform this activity into a funny competition by giving points to the groups that give the right answers.

5 Acceleration and Force - 10min - G+T

Ask the kids to think about the relation between a force and acceleration. Actually, they are proportional. After telling them that, ask them what they think the proportionality coefficient can be (of course the word 'proportional' or 'proportionality coefficient' might be hard for them to understand so you will have to adapt the questions and explanations.)

Actually, that coefficient is **mass**: 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**.

6 Conversation topics

- Acceleration in nature, a tool for animals for hunting and surviving?
- What sports can you think in which acceleration is very important? Why?
- What would you prefer to have: Not much acceleration but a high maximum speed **or** a lot of acceleration but low maximum speed. Explain the reasons for making your choice.