

## Teacher guide: The Physics of Racing Cars

The following steps help executing the activities in an easy way:

### Activity 1:

1. Student's works in groups of 2-3.
2. Each group needs:
3. About 4 sheets (e.g. A4 sheets)
4. 4 straws.

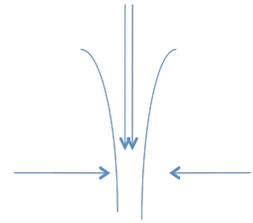


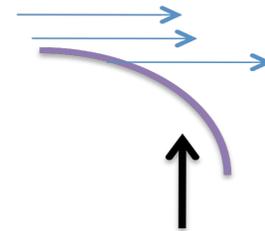
Figure 1

Bend 2- sheets at about 1-cm from one end, just enough to rap around the straw.  
Two Straws are used to hang two sheets and hold them next to each other. (Fig. 1)

- One student holds both straws about 3 cm from each other, hang both sheet from straws.
- The other student uses one straw to blow in between the sheets.
- Students will observe that both sheets collapse towards each other.
- Question: Why the sheets collapse towards each others?

### Activity 2:

- Each student holds on sheet from both sides, bending it over as in figure2.
- The students is then is then asked to blow above the paper (Fig. 2).



The paper will be lifted upwards.

Figure 2.

### Activity 3

Students are asked to make airplane by folding one of the sheets. There are many methods in which students can do that. It is let up to the student to fold the airplane in any way he knows. The main idea here is to ask the students to test different methods to change the shape of the wings, and find out which shape gives better flying airplane.

### Activity 4:

You need : a card board, protractor and a wooden block (~5X10X20 cm<sup>3</sup>)

Students are asked to do the following experiment:

1. Arrange the block and the cardboard as in figure 3.

2. Gradually tilt the board until the block is about to tip over at angle say  $\theta_1$ .
3. Measure the inclination angle  $\theta_1$ . Make a record.
4. Now arrange the block and the cardboard as in figure 4.
5. Gradually tilt the board until the block is about to tip over at angle say  $\theta_2$ .
6. Measure the inclination angle  $\theta_2$ . Make a record.

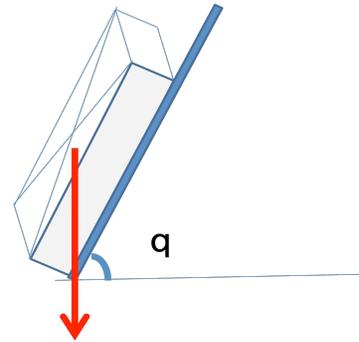


Figure 3

Students are asked to compare both angles. Why  $\theta_2$  is bigger than  $\theta_1$ ?  
Now back to the car and the bus; Discussion about the location of center of mass for both cases. Why do think race cars are made such that they are designed to have as low height as possible.

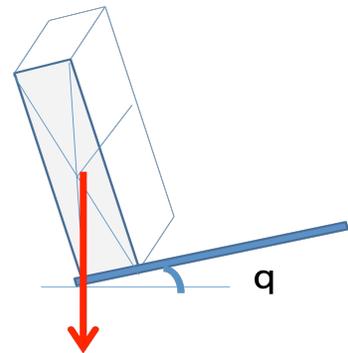


Figure. 4