

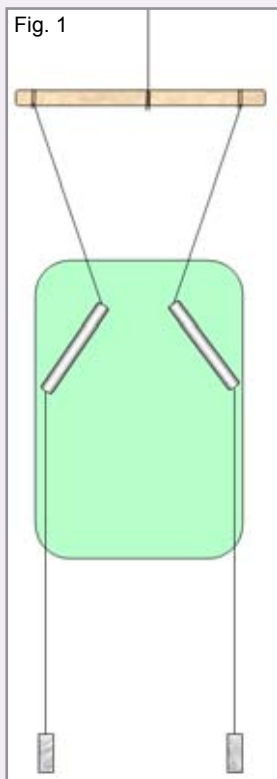
## Forces

# The climbing playing card

## An intriguing example of sliding friction

### You will need....

- ✓ a stiff card ~ playing card size
- ✓ a drinking straw
- ✓ adhesive tape
- ✓ a piece of wood (e.g. a lollipop stick)
- ✓ 2 washers or small weights
- ✓ 3 pieces of string; 2 × 1 m and 1 × 50 cm each



### Background:

Friction is a force between two surfaces that are in contact. It inhibits relative motion (sliding) of the surfaces. The size of the force depends on the nature of the materials involved and on the force with which they are pressed together. It generally does not vary with the area of contact.

There are three basic types of friction – static, sliding and rolling friction.

The Climbing Card is a neat demonstration of both static and sliding friction.

### Follow these steps:

1. Cut two 5 cm lengths from the straw and fix them to the card with adhesive tape as shown in the drawing; they should be arranged at an angle of 30° to 45° from the vertical (Fig. 1). Tie a washer or small weight to one end of each long string; thread the other ends through the straws and tie them to the ends of the piece of wood.
2. Use the short piece of string to tie the middle of the wood to a suspension point so that the wood can pivot easily.

### So what happened?

By pulling the strings alternately the card is made to climb upwards.

### What next?

1. Investigate what happens if the strings are held slightly apart from each other while at the same time pulling alternately.
2. What will happen if the strings are brought together while being pulled alternately?
3. At what angle should the straws be fixed to achieve the best effect?
4. Design a climbing animal figure.