

### 3.6: Breathing and respiration

Respiration is a complex chemical process by which living things transfer energy derived from their food (chemical-potential energy, \*12.2) for activities such as growth and movement. Breathing is the activity of animals which enables them to take oxygen into their bodies. Breathing involves an *exchange* of gases: oxygen needed for respiration is taken in, while carbon dioxide, the main waste product, is removed from the body and breathed out.

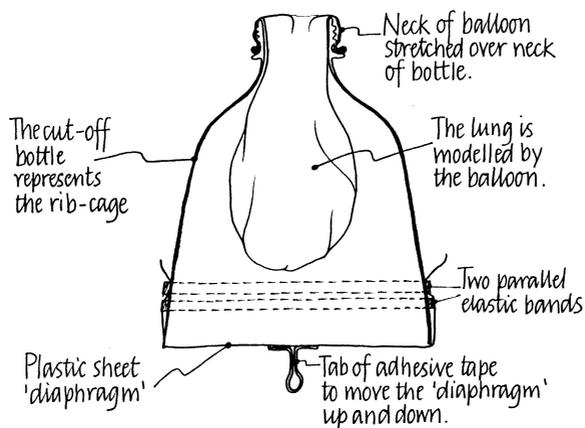
Humans and other mammals (\*5.1) breathe using two lungs which are complex air-sacs in the chest (see Activity 3.1.2), supplied with air by the wind-pipe which runs down the neck in front of the spine and the gullet. When investigating our own breathing it is important to realize at the outset that the lungs cannot move themselves: air can be made to flow in and out of them only by changing the shape and volume of the chest. This can be shown in a simple way by making a model of the chest, lungs and diaphragm, which is also a useful introduction to an investigation of one of our two ways of breathing.

#### Activity 3.6.1

##### Modelling the chest and breathing

*Equipment and materials:* 2-litre transparent plastic bottle; thin polythene sheet (e.g. cut from plastic bag); round balloon; two elastic bands; adhesive tape about 2cm wide; craft knife; scissors.

- Make a model of the chest as shown in Fig. 3.6. In this model the balloon represents the lungs, the bottle the chest and the polythene sheet, the diaphragm.



The 'diaphragm' is held in place over the lower elastic band and under the upper one. This forms an air-tight seal.

Figure 3.6 Modelling the thorax

- Hold the bottle neck and the tab in the middle of the 'diaphragm'; push the tab up and down, watching what happens to the 'lung'.