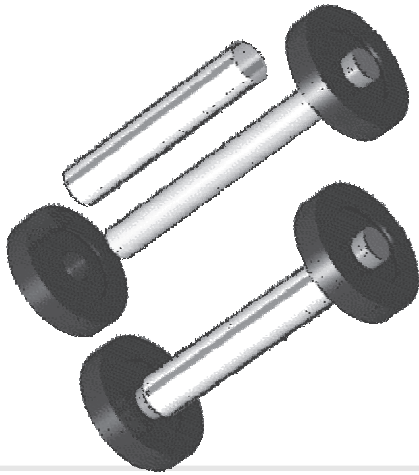


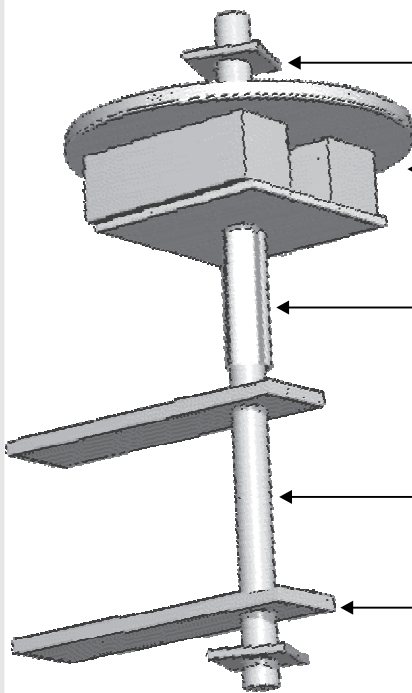
### EARLY YEARS AXLE UNIT



This is a very simple basic 'wheels & axles' unit that is ideal for the very young. They can be built by the children or the units may be assembled in advance. This may be preferable for nursery children. The children can tape two units to a small box and have an almost instant 'vehicle'.

The unit consists of two rubber tap washers pushed onto a length of dowel or paper stick. If only this were done then the wheels would not rotate when the axle was fastened to a box etc. So a length of jumbo sized straw, paper or plastic, is put on the dowel between the washers. The washers must not be pushed so close together that they grip the straw. The straw is fastened to the vehicle, allowing only the wheels and the axle to rotate freely. This works with card discs equally as well as with rubber washers, as long as there is no great weight resting on the axles.

### THE BASIC AXLE UNIT



**STOPPER** - Something to stop the wheel falling off (without preventing it from rotating). Shown here is a card washer. A 1½cm square (*approx.*) in which there is a hole punched using a heavy duty punch, (*which is less than 5mm diameter*). Once you are satisfied, a tiny dot of glue on the outside of the washer will keep it in place.

**WHEEL** - An economical single disc version (*see opposite*). The holes in the discs are a tight fit on a 5mm diameter axle. Enlarge the hole a little with the pointed end of a pencil until the wheel turns freely.

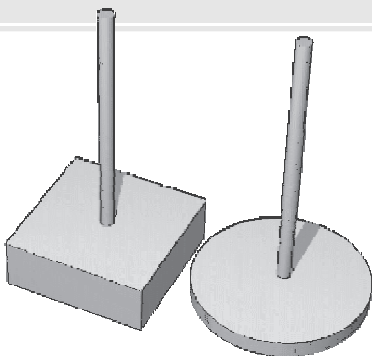
**SPACER** - You will want to prevent the wheel rubbing against the frame - or you may want to keep wheels at the end of an axle that is a lot longer than the width of the frame. Here a piece of jumbo sized plastic straw is used, a length of jumbo artstraw would also be OK.

*Note that a jumbo straw will pass through a 6mm hole. If you want to prevent that happening a card washer, as shown above, placed between the straw and the hole will do the job.*

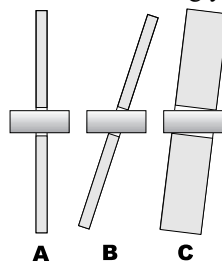
**AXLE** - Usually 5mm diameter dowel. (Dowel is the name given to round section strips of wood). Paper sticks are available, also 5mm diameter, which work well, though they do bend easily.

**AXLE MOUNT** - Fixed part of the frame. They may or may not allow the axle to rotate. If the wheels are to turn independently then it is probably better to fix the axle firmly to the frame.

### THE WHEEL JIG



Card discs are either 1mm or 2mm thick. This is not thick enough for them to be used singly as independently rotating wheels.



In the diagram on the left the same narrow gap is present between each 'wheel' and axle.

**A** is in the straight unloaded position.

**B** is the same wheel at the maximum tilt allowed by the gap.

**C** is identical except for the increased thickness of the 'wheel'. Notice how this has reduced the angle.

We can build thicker wheels by using two discs with some form of spacer between. Some ways are shown on the opposite page. Lining up the holes can be tricky unless you have some sort of jig. A simple jig can be made from a small wooden block and a length of 5mm dia. dowel, as shown here. It is important that the hole is drilled perpendicular to the surface of the wood. One way to achieve this is to use an mdf disc in place of the block. These come pre-drilled. The problem is that they come in packs of a hundred!