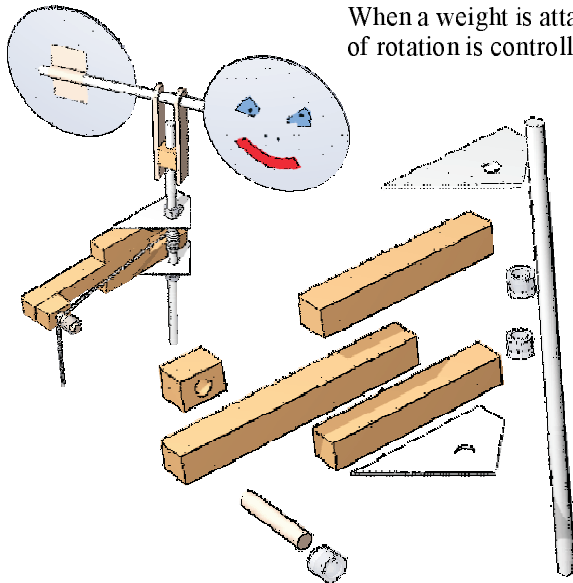


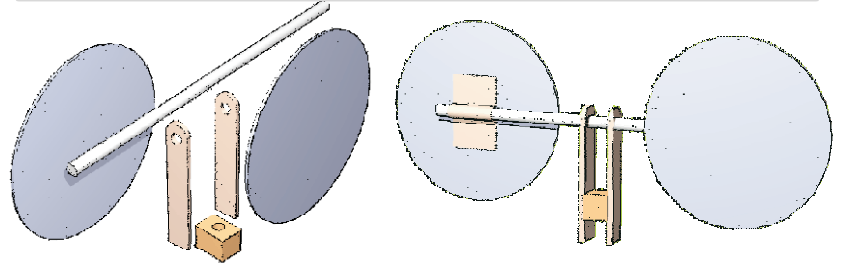
GRAVITY MOTOR WITH AIRBRAKE

When a weight is attached to the thread and allowed to fall the shaft of the motor rotates. The speed of rotation is controlled by the adjustable, (and detachable), airbrake.

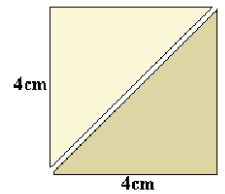


CUTTING LIST

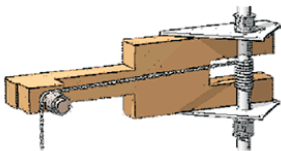
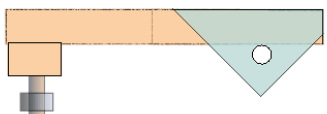
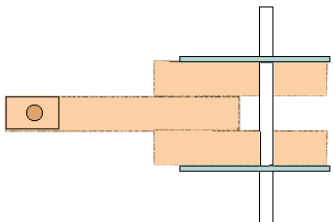
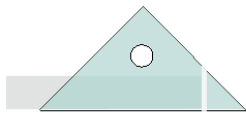
Softwood - 1cm square, 2 x 6cm and 1 x 8cm
 + 2 short lengths, approx 2cm, for drilling
 Paper sticks (or wooden dowel) - 5mm diameter, 2 x 15cm and 1 x 2½cm
 Stiff card - strong thread (about 2m) - 3 short pieces of PVC tubing
 Wooden lolly stick



- Saw 3 pieces of wood, 2 at 6cm long and the other 8cm. [for classroom economy you can use one third of a length of wood, i.e. a third of 59cm, and this will give you the 2 x 6cm pieces and a slightly shorter centre piece.
- Glue together, as shown, with about 3cm overlap.
- Glue a drilled [5mm hole] block to the end of the centre piece. [If you wish you could drill the hole in the centre piece directly thus avoiding the block altogether].
- Cut 2 card triangles, [as shown], by diagonally halving a 4cm square. Punch the holes with a 6mm punch. If you have a smaller punch then enlarge the holes with the point of a pencil.
- Glue the triangles in place, using a paper stick of dowel to ensure the hole are in line.
- Fit the short dowel 'pulley' and the shaft and secure with plastic 'stoppers'.
- The AIRBRAKE body is made up of a drilled block [as above] and 2 halves of a lolly stick. Punch or drill 5mm holes near the ends - but not too near or the stick will split. A heavy duty hole punch does this job best.
- Glue the piece together with a paper rod or dowel in place [but don't glue the dowel/stick]
- LEAVE TO SET for a reasonable length of time - say 15 minutes minimum.
- Cut 2 identical shapes from card and glue to horizontal 'stick'.
- When all is set push the shaft of the motor through the hole in the block



card bearing: stiff card based on 4cm square [as shown] - end is trimmed after fitting



THREAD

The simplest way to fit the thread is shown opposite. The thread can be secured with a tight knot or a small piece of sticky tape - or, best of all, both!

A weight attached to the thread exerts a downward force but this is modified by the 'pulley' which changes this force to a horizontal one. As the thread unwinds it creates a rotational force in the shaft, so turning the airbrake.

The airbrake will slow down this process when the card 'sails' are set vertically. Turn them to horizontal and the airbrake will effectively be 'switched off'.

The set up shown is fairly simple - but it could be simpler! Driving a horizontal shaft using a weight and a length of cord is straightforward [think about it!]

The limitation of the distance the weight has to fall can be overcome in various ways. The thread could go out of the window - the thread could be taken over a pulley attached to something like the curtain rail, etc. The diagram shown on the illustrates another approach. With the end of the thread attached to the dowel pulley and a paper clip hanging on a loop of thread acting as another pulley, the weight falling, say, ONE metre has to unwind TWO metres of thread! ... but it will take twice the weight to do the same amount of work. If the thread is wound around a thicker shaft, or a drum attached to the shaft, the weight will exert a greater turning force [torque] but will unwind the thread quicker. Lot's of experimental opportunities!

