ES	TECHNOLOGY	Knowledge & understanding	Needs	Resources	Processes
	TECHNOLOGY	Skills in designing & making	Preparing	Carrying out	Reviewing
	SCIENCE	K & U - Energy and forces	Properties of energy *simple battery-operated circuits* *parallel circuits*	Conversion of energy *components of electrical circuit* *light, sound*	Forces *push/pull*
	SCIENCE	K & U - Earth & space	Materials from Earth	Changing materials	

If we are looking at solid objects (beads for example) through our kaleidoscope, we will need to make sure that the objects are well lit. We would probably carry the kaleidoscope to a well illuminated spot under a lamp or near a window.
If we have made a disc kaleidoscope, like the one opposite, we will need the light to pass through the discs. The same would apply whenever we were using translucent material to obtain a special effect.

To allow light to pass through the discs we need to point the device at a light source. We might point it at a window or towards a lamp.
Of course, to see the amazing range of changing patterns we need to be able to move the objects or discs as well. The traditional kaleidoscope has lots of tiny glass or plastic fragments housed on a thin rotating container, and gravity moves these pieces when the toy is turned.
If we wanted to create patterns by some means that prevented us from lifting the kaleidoscope we would have to provide a light source below the pattern maker. For example, we may wish to float small objects on a liquid like water or maybe something more viscous, (thicker), like oil or glycerine.

STAGE ONE

The design challenge it to design a kaleidoscope with built in illumination. This will mean using electricity. You will need a fairly bright light, so you may have to investigate halogen bulbs.
As you will be using batteries to provide light you may as well use some of that available power to create movement.
Rotating - rocking - shaking - ?
You may prefer a slowly changing pattern rather than a spinning blur, so if you are turning the viewed object, you will want it to turn very slowly. So how could you achieve slow rotation using an electric motor?
Gears? *(Check out worms!)* - Pulleys ? - Hmm... viscous liquid was mentioned above - maybe that could provide an answer. *(Look at the Treacle Drive below - it might give you some ideas.)*

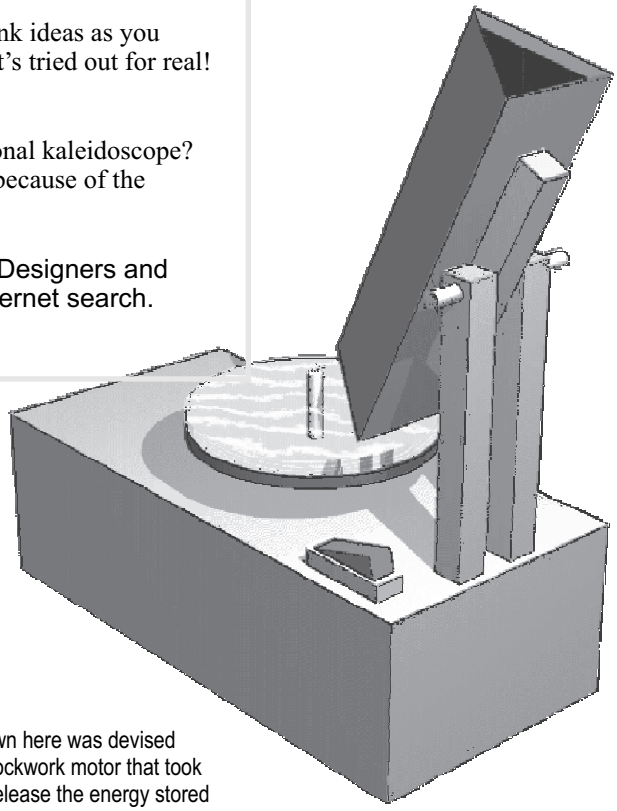
STAGE TWO

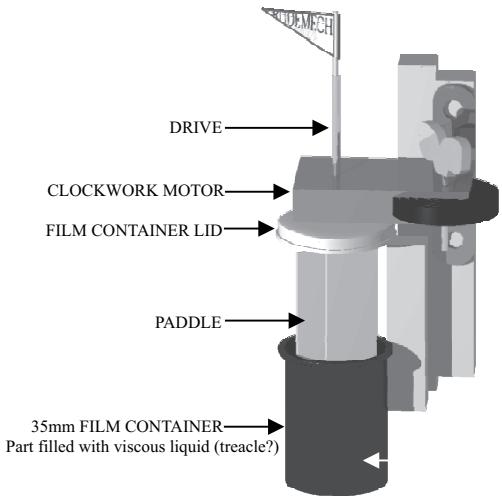
Design and build your electric kaleidoscope. Be prepared to rethink ideas as you proceed. A 'good' idea on paper may not be so successful when it's tried out for real!

STAGE THREE

So, how well does it work? How does it compare with the traditional kaleidoscope? It probably won't be as convenient to use, so does it score better because of the fantastic patterns it creates?

Kaleidoscopes are taken much more seriously in the USA. Designers and craftsmen make the most amazing kaleidoscope. Try an Internet search.





CLOCKWORK TREACLE DRIVE

The 'treacle motor' shown here was devised to slow down a small clockwork motor that took only a few seconds to release the energy stored in the spring. Turning the paddle in the treacle extended the running time to over one hour!
This wouldn't work the same way with an electric motor. An electric motor NEEDS to run fairly fast, so you would have to combine any viscous brake with a geared system that allowed the motor to run at a respectable speed. (Look up the word 'torque'.)
Of course a Gravity Motor (see project) could perhaps run for <u>days</u> with a viscous brake applied. Now there's an idea. . . . . .