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*	Conversion of energy *components of electrical circuit*	Forces *push/pull, gravity, friction, air resistance*

It is not unusual to try to use gravity to do work. Let's face it, it's always there, and it isn't likely to run out in the near future. You use gravity to empty a wheelbarrow, and a tipper truck does just the same.

Mills were driven by water wheels, but what makes the mill stream flow? Gravity; and on a bigger scale we generate large quantities of electricity by using the fact that water flows downhill. We can say that, in counties that use hydro-electrical power generation, (Scotland for example), our television sets might be gravity powered!

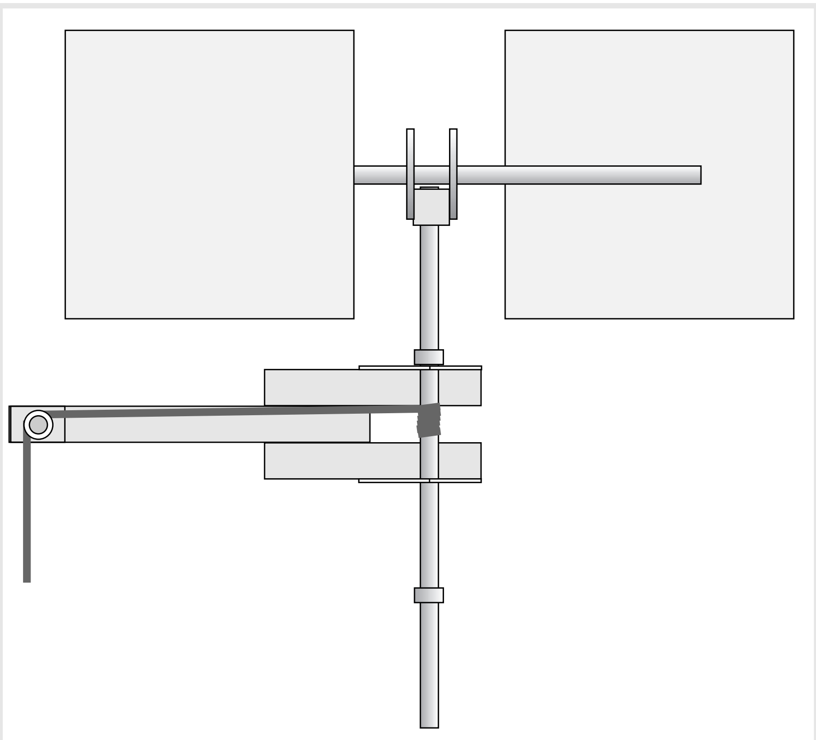
Of course, one problem of things falling down is that they have to be lifted back up again. Some power stations use electricity to pump water up a mountain and then use the water falling back down to make electricity! This comes about because it is difficult to store electricity. You have to generate electricity WHEN it's needed. If you have spare capacity, you can use this to raise the water, and you can store the water at the top of the hill. When demand for electricity is great, you can let the water fall.
The question is, "How does all the other water get to the top of the hills so that rivers can flow down?"

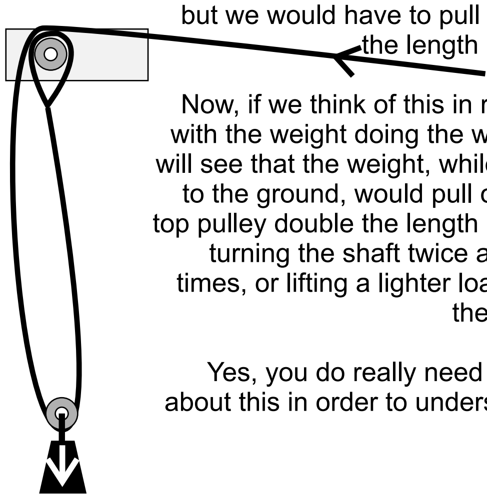
Can you think of any other uses of gravity as a primary source of energy?
Before satisfactory metal springs were developed, clocks were driven by 'gravity motors' similar to the ones we have made. Someone had to wind a weight up the clock tower so that, when it fell down, it would drive the clockwork. This is the system used by grandfather clocks and some old wall clocks. The weights are usually narrow metal cylinders, and they hang on chains. You may have seen some.

The challenge is to build a clock! Well, a timer anyway. A way of measuring time. If we have a weight that takes, say, 60 seconds to reach the floor, then we should be able to devise a scale of seconds against which the weight falls. That sounds easy. The real problem is to make the fall as slow as possible. This will give us a greater range of time with which to work . How can we make the weight fall slowly? We have used air resistance already so that's a start.
We could start the weight at a higher position - near the ceiling perhaps. Out of a window? The trouble with this approach is being able to read the scale.

How about a timer which, when set to measure, say 100 seconds, sounds a buzzer when the time has passed? Once the machine is built you could use air brakes to adjust or fine tune the timer.

If you stood your machine on a table and let go the weight, the whole thing would fall off the table (gravity again!) If we are likely to have a thread passing over a pulley higher than the machine, then the machine will fly into the air when the weight is released. You will need to design some form of stand or clamp to prevent this happening.





It could be useful to investigate the behaviour of pulleys. When we set up a block and tackle to help us lift a heavy load, we might find that we have a system like this. The weight will appear to be only half as heavy, but we would have to pull in twice the length of rope.

Now, if we think of this in reverse, with the weight doing the work, we will see that the weight, while falling to the ground, would pull over the top pulley double the length of rope, turning the shaft twice as many times, or lifting a lighter load twice the height.

Yes, you do really need to think about this in order to understand it!