Make Your Own Waterwheel Designing For a Sustainable Future

We're looking for ways to live sustainably on Earth, using energy that uses as few natural resources as possible. The power of a river travelling downstream is called renewable energy because the energy replaces itself and so, unlike oil or coal, we are not depleting nature. We are going to make a water wheel, test it to see if it works and then conduct some experiments to see how much energy we can create. Although this can be an indoor activity, it can get *very* exciting during the experiments and water can get *everywhere*, so you might want to do the experiments outside.



What You Will Need

A two-litre plastic bottle Scissors 2 corks I binder clip or a clothes peg String Assorted items to use for our experiments (no hamsters) A wooden skewer An exacto or craft knife

Step One—Making the Base

Cut a plastic bottle in two just a little bit above halfway and then cut two small circular holes in the bottle on either side. Sometimes it seems a bit tricky to cut into plastic but you can use an exacto or craft knife to make the first hole or just squeeze the bottle together and use scissors.



Did You Know?

The Water of Leith is a lovely greenspace in Edinburgh now but it used to be a working river with over 70 watermills along its course. It used the power of the water travelling downstream to turn a water wheel which then powered machinery which made many of the essential items that people needed in Edinburgh.



All of these water mills have now closed down but people are looking at the river again as a source of what we call *renewable energy,* energy created through a natural source that replaces itself. In 2020, a microhydro creating electricity from the river opened at Saughton Park.

Curricular Links to the Curriculum for Excellence

I can use exploration and imagination to solve design problems related to real-life situations. (EX 1-06a) I can understand how technologies help provide for our needs and wants and how they can affect the environment in which we live (TCH 1-07a)

I can make suggestions as to how individuals and organisations may use technologies to support sustainability and reduce the impact on our environment. (TCH 2-07a)

I can design and construct models and explain my solutions. (TCH 1-09a)

I can recognise basic properties and uses for a variety of materials and can discuss which ones are most suitable for a given task. (TCH 2-10a)

Step Two — Making the Wheel

Using the top half of the plastic bottle, cut six little rectangles of plastic that are about three cms by two cms, using scissors. Then, using a sharp knife, cut lines in the cork that are about 1/4 cms deep. Then insert the plastic strips into the cork. This may seem tricky at first but once you have one corner in they just slide in. These will be the paddles for your waterwheel. Make a hole in both ends of the cork using something hard and sharp like a knitting needle. Break the skewer in two and insert the halved skewer into one of the holes in the cork. You have your wheel!

Step Three—Putting it All Together

Make a hole in the end of the second cork and insert the other half of the skewer into it . Tightly tie string around this cork and at the end of the string tie a binder clip or a clothes peg. (The string should just touch the ground). Then place the water wheel inside the bottle, threading its skewer outwards through the hole. At the other end of the waterwheel cork insert the second skewer so they are connected.

You are now ready to begin experimenting! Before attaching objects to the binder clip, experiment with your technique.

Top tip: The waterwheel is more stable with some water in the bottom. Use a jug to pour the water over the top of the wheel to make it spin. What happens when you hold the jug higher, or lower? What happens when you direct the water to one side of the paddles or the other?

Experiments

When the wheel turns it creates energy. It creates enough energy to pick up some objects but not others. Choose 5-6 objects which you think it might pick up. These might include a penny, a pound coin, a bottle lid, a teaspoon, a rubber, a piece of lego, a small toy. You choose! Before you start, write down the object below and predict whether or not the wheel will be able to pick it up.

Object	Do you predict that the water wheel will be able to pick this up?	Did the water wheel pick this up?

How did you do? How could you modify the wheel to make it more efficient? This waterwheel is a *prototype,* a test model, and as a designer I am sure you will find ways to make it even better!



