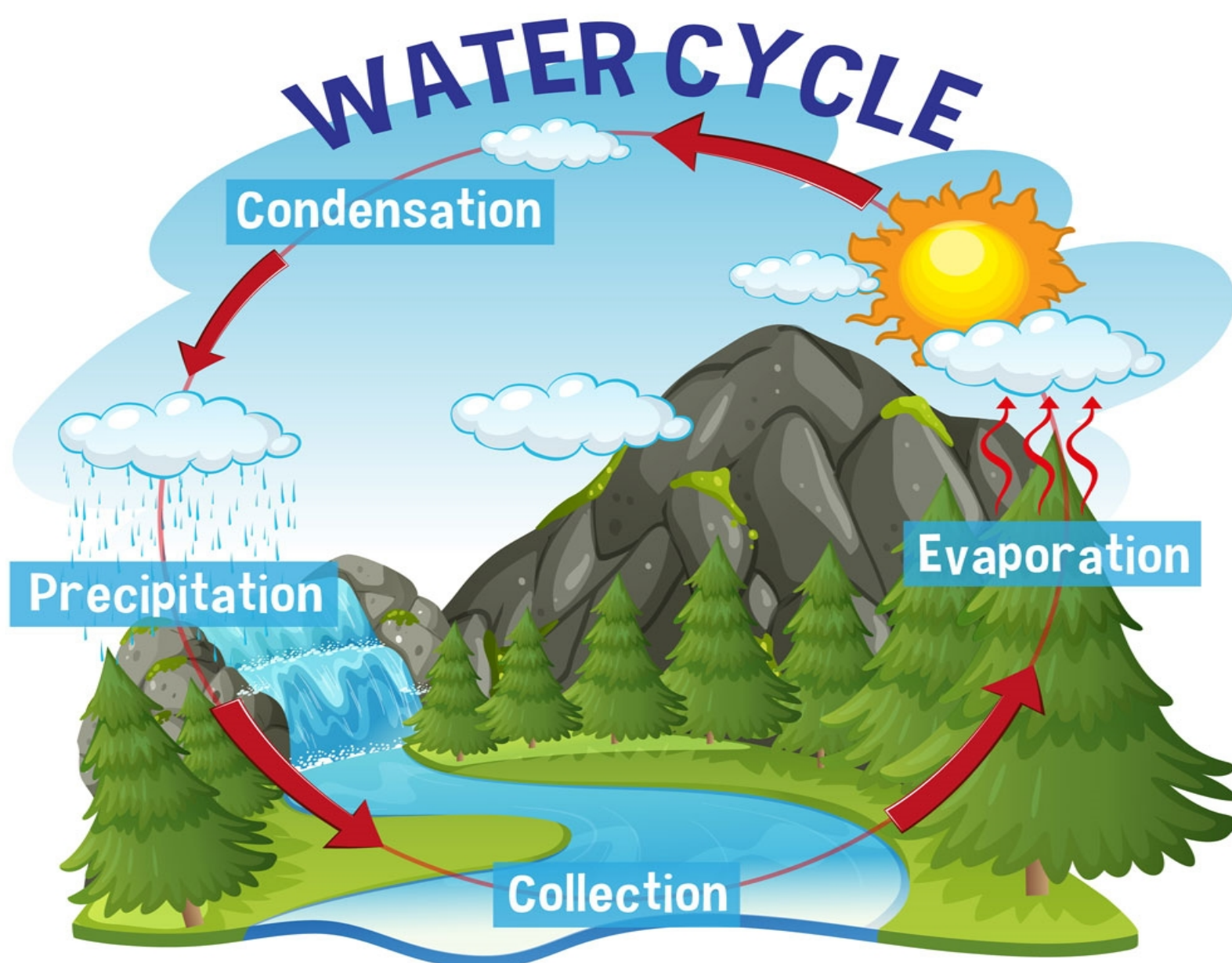


Water as power



Our main sources of energy today are fossil fuels. They formed millions of years ago from dead plants and animals. There are three main types of fossil fuels: coal, oil, and natural gas. All fossil fuels are non-renewable resources. It took millions of years to form fossil fuels and we are currently using it up faster than it is being made. To remove fossil fuel energy from Earth, companies have to drill, mine or frack (break) the Earth. Next, they have to refine (make ready) the energy so that we can use it in our cars, homes and more. A challenge to using non-renewable energy sources is that they can cause pollution of our land, air, and water. Burning fossil fuels throughout the world releases millions of tons of carbon dioxide (CO_2) into the air and this causes global warming.

Renewable energy comes from natural resources that can be more easily replenished. Water, which we will never run out of, is a renewable source of energy. Hydroelectric power stations use the kinetic (movement) energy of the water to drive electric generators creating electricity. It is considered a renewable energy source because the water cycle is constantly renewed by the sun.





Context

Hydropower accounts for 6.7% worldwide production. Using the power of water dates back thousands of years. Water wheels were used during the Middle Ages as the main source for driving large machines. A waterwheel spins as a stream of water, which is being pulled down by gravity, hits its blades. The water wheel converts energy from falling water into power that can be used to do work. It is a clean form of energy which means it is good for the environment.

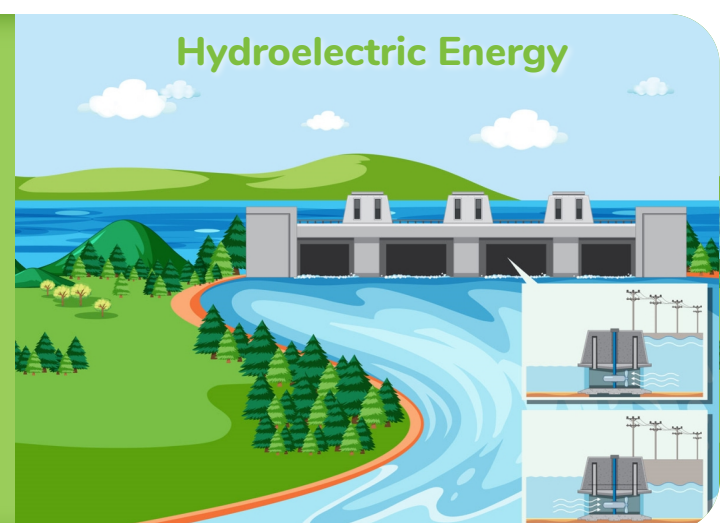


Have you ever thought...

Where can you find hydroelectric power?

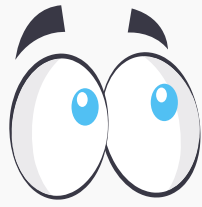
How is it made into electricity?

What are the advantages of using hydroelectric power?





Take a look



Turn a tap on, increasing the speed slowly and feel the power of the flow.

Make sure you have checked with an adult to do this!



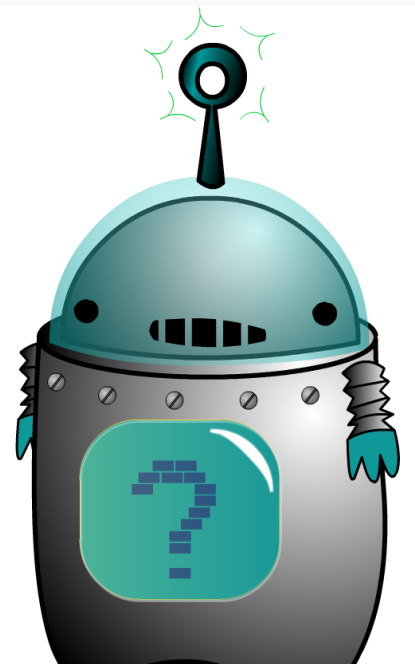
Investigate...

Find out about **water energy** and waterwheels

What are the different types of waterpower?

How do waterwheels work?

Can the wheel be in different positions?



Explore

Design a waterwheel

Hint: The water wheel has many paddles, and it is connected to the main centre shaft. The wheel is assembled to rotate freely in its central axle. The water forces the blade forward and then the blade moves in a forward direction. At that time the next blade comes in the position of the previous moved blade and this process continues until the water flow stops. This continuous motion of blades produces a continuous rotational motion of the water wheel.

What will be the shape of the paddles/blades?

Why are the wheels circular?

Where is the energy created?





Challenge

Build your invention from your design

How is the water moving?

How much water is needed to power it?

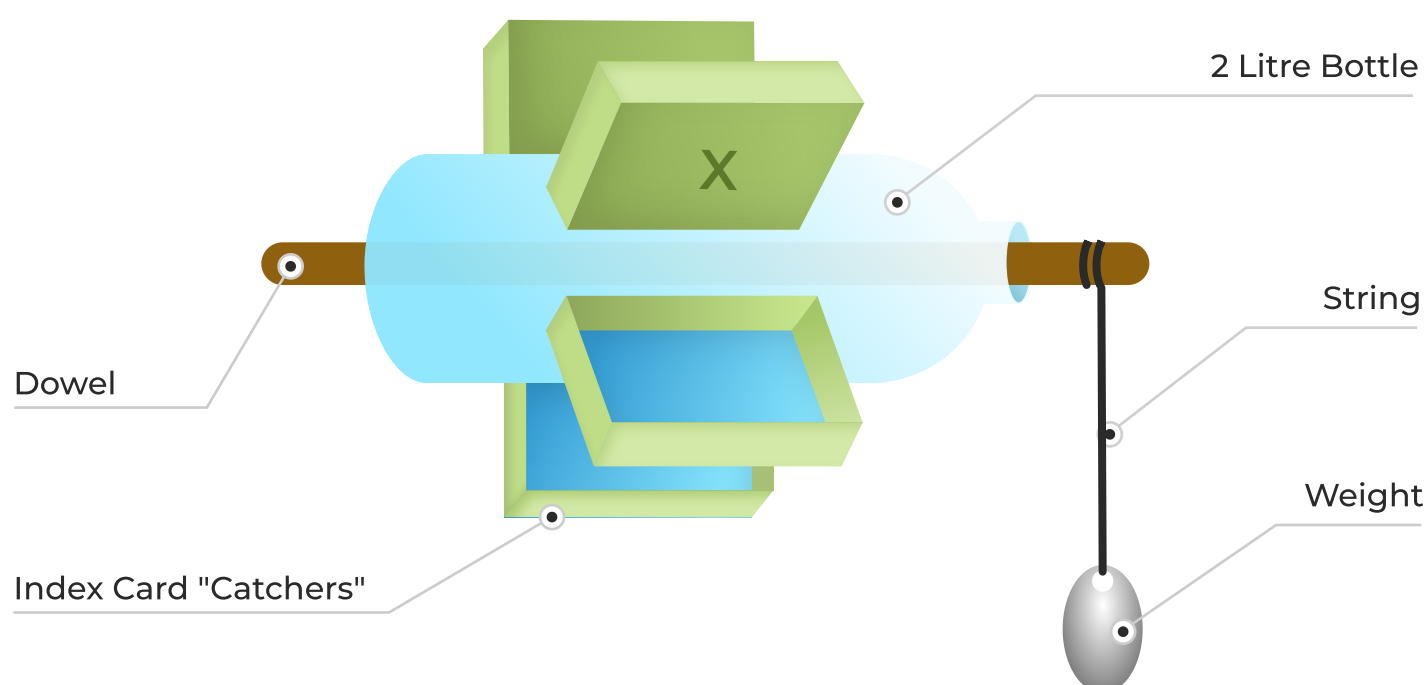
Does it make a difference having more or less paddles?

Does the shape of the paddle make a difference?

Does the size of the paddle affect the speed?



Pour a fixed amount of water over the waterwheel and count the number of turns it makes. Time this test by using a stopwatch to record the elapsed time (that is time taken from the when the waterwheel started to move to when it stopped). Repeat this until there is a consistent measurement for the rate at which the waterwheel spins. Record your data.



How might the rate of rotation be found?

(Hint: To determine the rate of rotation, divide the number of turns by the elapsed time).

Add a string to the axle of the waterwheel. As the waterwheel rotates the string rolls up around the neck of the bottle. Try tying a weight to the end of the string. What happens?





Did you know?

The roar from Victoria Falls in Zimbabwe is so loud that it can be heard from 25 miles (40 kilometres) away!



The mathematics

The students through investigation and exploration will be problem solving, conjecturing and applying mathematical thinking. Knowledge and application of measures concepts will be deepened.

