**ACTIVITY: Building a water cycle**

**Activity idea**

In this activity, students observe the processes of evaporation and precipitation by creating a model that simulates the water cycle.

By the end of this activity, students should be able to:

* discuss how liquid water evaporates and changes into a gas
* discuss how evaporated water rises and circulates in the atmosphere
* discuss how evaporated water condenses when it cools, changes back into a liquid and becomes precipitation
* explain the role of the Sun in this process.

[Introduction/background notes](#Introduction)

[What you need](#need)

[What to do](#Do)

Student handout: [Observing the water cycle](#handout)

**Introduction/background**

We know rain falls from the sky and we know that water moves around the world in things like rivers and oceans, but how does the rain get into the atmosphere in the first place? The water cycle is driven by energy from the Sun. Liquid water is evaporated and changed into a gas. In this process, energy is absorbed. The gaseous vapour rises and circulates in the atmosphere, cools and changes back into a liquid. This process is called condensation and releases energy. Tiny droplets of water in the atmosphere accumulate to form clouds, which can return the water to the earth as precipitation.

In this activity, students create and observe a model that simulates the water cycle. A lamp represents the Sun and drives the process of evaporation. Students use ice to cool the ‘atmosphere’ and initiate the process of condensation.

**What you need**

* Aquarium or large Perspex box – the larger the aquarium/box, the more dramatic the effects
* 3 thermometers
* Large shallow bowl
* Permanent marker
* Paper towels
* Lamp with a 100 watt incandescent bulb
* Zip-lock sandwich bags
* Ice
* Water
* Food colouring
* Access to the article [Water and weather](https://www.sciencelearn.org.nz/resources/725-water-and-weather)
* Access to the interactive [Dynamic and complex: the global water cycle](https://www.sciencelearn.org.nz/image_maps/36-dynamic-and-complex-the-global-water-cycle)

**What to do**

1. Have students work together to construct the water cycle model:
* Spread out a layer of paper towels covering an area that is just slightly larger than the aquarium/box.
* Draw a line around the large bowl near the top (or use a glass measuring bowl). The line or measurement on the bowl will be used to judge any change in water level.
* Fill the bowl to the line with water that has had food colouring added to it.
* Carefully place the bowl at one end of the paper towels.
* Place the three thermometers onto the paper towels – one at each end and the third in the middle of the set-up.
* Turn the aquarium/box upside down and place it so it rests on the paper towels and covers all three thermometers and the bowl.
* Position the lamp so that it shines over the bowl of coloured water. This represents the Sun shining onto the Earth’s equator. The far end will represent one of the Earth’s poles.
* Leave the ‘Sun’ to shine overnight.
1. The next day, check the water level in the bowl. Has it changed?
2. Fill the sandwich bags with ice and cover the roof of the aquarium/box with them.
3. Hand out copies of the student handout [Observing the water cycle](#handout) and have students complete it.
4. Discuss the students’ findings and have them consider how important the Sun is in the process. What other factors play a role but are not displayed in the simulation? (The rate of evaporation depends on four main factors – water body size, heat energy, atmospheric pressure and air movement. Refer to the article [Water and weather](https://www.sciencelearn.org.nz/resources/725-water-and-weather) for a more detailed explanation.)

**Student handout: Observing the water cycle**

1. Check the model every 10 minutes and note where you see water.
* Is there any water movement in the model?
* What is the water level in the bowl like?
* Draw a diagram of what you see, noting where there is any water.
1. Look at the temperatures in the model.
* How do they change from each end and in the middle?
* Is there more water at one end?
* Is there a relationship between how much water you see and temperature?
1. Write an explanation of what you are seeing in terms of the water cycle. You should use words like ‘condensation’, ‘evaporation’ and ‘water vapour’. Read the article [Water and weather](https://www.sciencelearn.org.nz/resources/725-water-and-weather) and view the interactive [Dynamic and complex: the global water cycle](https://www.sciencelearn.org.nz/image_maps/36-dynamic-and-complex-the-global-water-cycle) for more information