

# Water-Wheel Activity

## OVERVIEW

Students will make paper pinwheels to model how 19th-Century communities used the Mississippi River to power factories and develop industry in Mississippi Mills.

## LEARNING OBJECTIVES

Students will use a hands-on model to explore how forces act on a water wheel to make it turn. They will learn how physical features of the land shaped the development of settlement and industry in the Mississippi Mills region.

## CURRICULUM CONNECTIONS

### - **Social Studies Grade 3:**

A1.2: Compare some of the roles of and challenges facing people in Canada around the beginning of the nineteenth century with those in the present day.

A2.5 Evaluate evidence and draw conclusions about some of the major challenges facing different groups and communities in Canada during this period, and measures taken to overcome these challenges.

A3.3 Identify some of the main factors that helped shape the development of settlements in Canada during this period, and describe how physical features of the land and the availability of goods and services can facilitate settlement and enhance community life.

B1.1 Describe some major connections between features of the natural environment of a region and the type of land use and/or the type of community that is established in that region.

B1.2 Describe some major connections between features of the natural environment and the type of employment that is available in a region, with reference to two or more municipal regions in Ontario.

### - **Science and Technology Curriculum: Understanding Matter and Energy: Grade 3**

2.2 investigate forces that cause an object to start moving, stop moving, or change direction.

2.3 conduct investigations to determine the effects of increasing or decreasing the amount of force applied to an object.

3.1 identify a force as a push or a pull that causes an object to move.

3.2 identify different kinds of forces (e.g., gravity – the force that pulls objects towards the earth).

### RESOURCES AND PREPARATION

Each pinwheel requires

- A square piece of paper (e.g. 12cm x 12cm)
- Scissors
- A pencil
- A thumbtack



### BACKGROUND/ DISCUSSION QUESTIONS

- **How did early settlers decide where to build communities?**

*Indigenous relations, arable land, access to water*

- **Why was water important to early settlers?**

*Drinking water, transportation, water for crops, power for industry*

Look at a map: most big cities developed on a body of water. Have students suggest cities around the country/world and identify the bodies of water near them.

*E.g. Ottawa: Ottawa River, Rideau River, Gatineau River*

*Toronto: Lake Ontario*

*Montreal: St. Lawrence River, Ottawa River*

Without cars, trains, or planes, water was crucial for transporting goods and people. In the mid- to late-19th Century, railways began to take over from rivers as the most important determinant of settlement. The railroad that passed through Brockville, Almonte, Carleton Place, Pakenham, Renfrew, and many other communities in the area was built in the 1850s and remained in operation into the 21<sup>st</sup> Century. However, even when water was no longer the primary means of transportation, the Mississippi River still provided an important power source for developing industry.

When Europeans first settled in Canada, most of the jobs were **primary sector** jobs that depended on natural resources – work like farming, trapping furs, logging timber, or fishing. Through the 19th Century, Canada went through the “Industrial Revolution,” and an increasing proportion of work was involved with manufacturing jobs (**secondary sector**). The Mississippi Mills region became an important industrial hub, particularly for the textile industry.

- **Why did people choose to build factories in Mississippi Mills?**

*Running machines* before electricity was a challenge that early settlers had to overcome. Water was not just important for transportation: the Mississippi River also powered all the factories built along it. Today, the Mississippi River Power Corp. uses the force of the water-power to generate electricity. In the mid-19th Century, factories had water wheels and turbines that harnessed the kinetic energy from the river’s current – in other words, the force of gravity pulling the water downhill – to power all their machines. This technology was vital for these settlers’ industrial development.

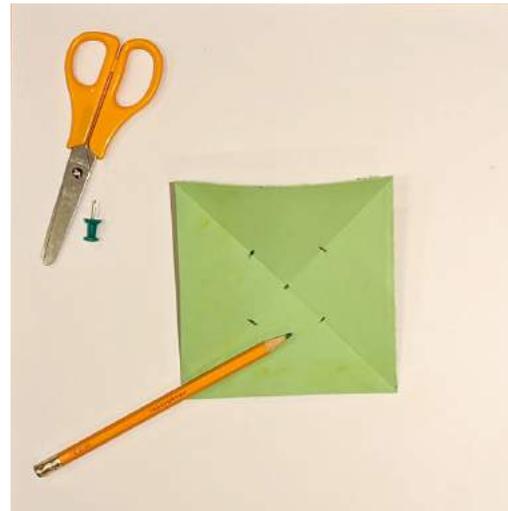
**Today, we’re going to build pinwheels to explore how air or water can turn a turbine.**

## How to Build a Pinwheel

Step 1: Begin with a square piece of paper. Fold it in half diagonally, matching opposite corners together. Unfold and repeat in the other direction.



Step 2: Using a pencil, mark a spot on each crease about  $\frac{1}{3}$  of the way from the centre.



Step 3: Using scissors, cut along each crease up to the mark you made in Step 2.



Step 4: Fold alternating corners to the centre and secure with a pin, so four corners are gathered together. Stick the pin holding all four corners into the pencil to secure it.



You're finished! Try to turn the wheel by blowing on it. (If the wheel seems stuck, try loosening the centre pin.) Now imagine that instead of your breath, the force of the river flowing through the wheel is making it rotate. That's how water wheels work!