Project Number: 2021-1-ES01-K220-SCH-000034434

PR2.A – TEACHING SOURCES

Title	Power from Water
Duration	1 session
Age Group	14 – 16 YO
Dimension of the advised group of students	*One group of 10-20 people*
Area	☐ *Area 1: Reading, writing and literature* ☐ *Area 2: Math* ☐ *Area 3: Second language learning* ☒ *Area 4: Sciences* ☐ *Area 5: Soft skills*
Specific objectives	- *To learn about hydropower* - *To discover forms of alternative energy* - *To conduct an experiment*
Needed Materials	- *2-liter plastic soda bottle* - *Ruler* - *Marker* - *Craft knife* - *Scissors* - *2 corks* - *1 wooden barbeque skewer* - *Sewing thread (16 inches)* - *Small objects to lift (small fishing sinker, an eraser)* - *Sink* - *Duct Tape* - *Large Funnel* - *Paper clips* If the training is organized **online** one communication platform will be necessary.
Software	- *One online communication platform, such us: Zoom, Google Meet, Webex, etc.* - *In person, no software is needed.*
Description	*Energy can be made, or generated, using solids, gas or liquids as its source of power. Energy can be generated to produce light, heat or the movement of objects. In this experiment, we explore how to get power from water, or hydropower, which can be used to pick up household objects.* *Hydropower is mechanical energy that is generated by using the motion of water caused by gravity. Hydropower is one of the oldest forms of energy and has been used by humans since 4000 BC! By learning how to make a water wheel with a handful of*

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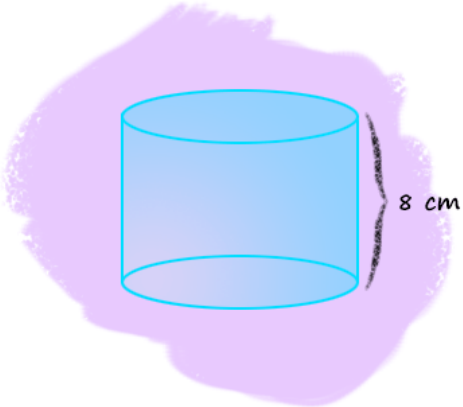
	household materials, we too can harness, or capture, different amounts of water to generate our own power. *Participants will conduct their own experiments and be the protagonists of the workshop. If doing an online training, materials are easy enough to find at home or could be provided by the organizers.*
Procedure on how to put in practice	***Duration:*** *90 minutes* ***No of participants:*** *10-20* ***Methods used:*** *experimentation* ***Competences developed:*** *research methodology, scientific awareness* ***Step-by-step description:*** 1. *Ask the group to name the forms of energy creation they know and their advantages and disadvantages. Discuss hydropower in detail and explain the experiment is focused on using power to lift an object.* 2. *The experiment is as follows:* a. *Using your marker and ruler, measure and mark a few dots 6 cm up from the bottom of the bottle. Connect your dots and cut off the bottom using the craft knife.* b. *Measure an 8cm section from the cut part of the bottle. Cut out this section so that you have a cylindrical section of plastic.*  c. *Cut four 2 cm-wide strips from the 8cm section with your scissors. Cut these strips in half so you are left with eight curved strips that measure 4 cm by 2 cm.*

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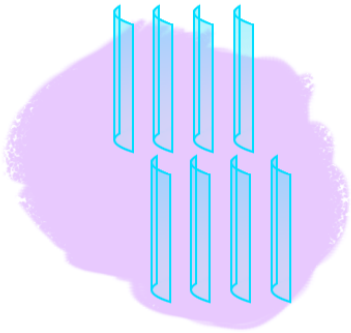
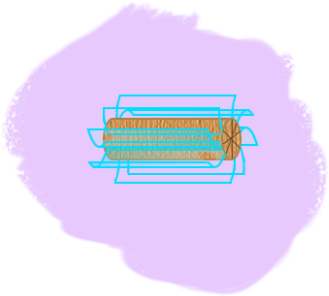
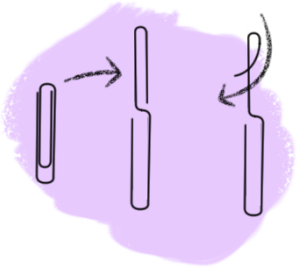


d. *Draw 8 evenly spaced lines lengthwise on the cork, and make slits along each line with your hobby knife. Making sure that the plastic pieces all curve in the same direction, slide each 4 cm by 2 cm plastic piece into its own slit. Why do you think it's important that the strips all curve in the same direction?*



e. *Unfold two paperclips and flex one end of each to create a small loop. These paperclips will act as supports for the water wheel's axle.*



f. *Affix your supports on opposite sides of your plastic funnel using your duct tape.*
g. *Cut the skewer in half and poke each half into one side of the wheel cork. Guide each end through a loop on your paper clip support. Make sure your paper clip's loops are loose enough to allow the wheel to turn freely.*

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	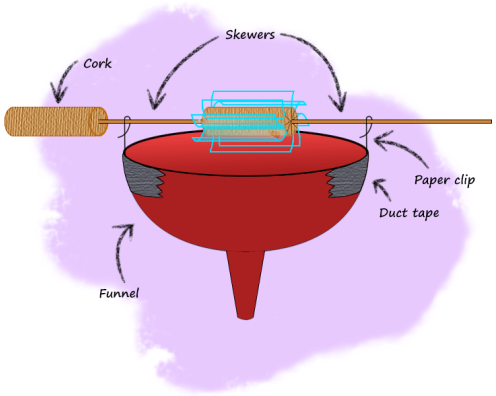 h. *Insert one of the skewers into the other cork and tie thread tightly around it. Tie the loose end of the thread to a weight or other small household object.* i. *Place your completed water wheel under a gentle stream of water in your sink. Slowly run water over the wheel so that the plastic pieces on the cork catch the falling water and turn it into mechanical energy.* ***Debriefing question:*** *Water has potential energy due to its position above the ground. The higher above the ground the water is, the more potential energy it has. Can you convert more of this potential energy into mechanical energy?*
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