Electricity Lesson 1 | Lesson Outline

Learning Lab®

Learning intention:
To explore how gears work to transform slow rotation of turbine blades into fast rotation that allows a generator to generate electricity, and to understand that engineering skills are important for careers in electricity generation.

Resources **Electricity 1 -** Introductory Video **6min 45sec** **Electricity 1 -** Instruction Slides **Electricity 1 -** Template **Worksheet 1a -** Turbines and Gears **Worksheet 1b -** Turbines and Gears Extension **Answers** - Worksheet 1a & 1b **Per group/pupil** Corrugated cardboard, scissors, glue stick, Blu tack/plasticine, pencil, 4 split pins, paper	
Hook into the lesson	Play **Electricity 1 – Introductory Video.** The video introduces the topic of renewable energy, before focusing on electricity generation. In particular, wind turbines are used as an example of how engineering skills are needed in the renewables industry. The video asks the following questions, giving opportunity to pause and discuss (or pupils could write individual answers): • **How important are electricity, transport and heat to you and everyone else?** 1 min 58 secs • **What do you know about renewable electricity and how it can be generated?** 3 min 35 secs.
Activity	Pupils will create cardboard gears, following instructions in **Electricity 1 – Instruction Slides**. This activity can be run in the following ways: • As a group activity, with a recommended group size of 4. Give each group 2 of the **Electricity 1 - Template** sheets. Each pupil creates one gear and works with their group to investigate the different gears. • As an individual activity. Give each pupil 2 of the **Electricity 1 - Template** sheets. Each pupil makes a full set of gears and investigates independently. This will extend the duration of the activity. Give pupils **Worksheet 1a – Turbines and Gears**. Pupils will explore the cardboard gears that they have made. They will investigate the speed at which different sized gears can rotate when used together.
Extension	Give pupils **Worksheet 1b – Turbines and Gears Extension**. Pupils will further explore the cardboard gears, investigating the mathematical relationship between the size of gears rotating together.
Plenary	Lead a class discussion on the following questions, related to gears, engineering and the skills needed for engineering careers. **Q: What skills did you need to carry out the gears investigation?** A: Problem solving, team work, communication, maths, construction **Q: What are some other uses for gears in everyday life?** A: Clocks and watches, bikes, cars, tin openers, drills **Q: Why are gears needed in wind turbines?** A: They are needed to take the slow spin of the wind turbine blades and transform it into the fast spin needed to generate electricity in a generator. **Q: Engineering skills are needed to make and build objects and buildings that we use every day. Look closely at the tables and chairs around you. What skills did people need to make them? Think of a time recently that you used engineering skills to make or fix something. Share what you did with the people around you.**