



Learning about electricity

Kilowatt Hours Maths

Learning objectives:

Children will know that some appliances use more electricity than others
Some children in UKS2 will calculate the number of kilowatt hours of electricity that appliances use

Start learners off

See if it is possible (and safe) to gain access to the school's electricity meter. If the children cannot see it for themselves, you might be able to ask the caretaker if it is possible to take a photograph to show them. This is a great opportunity to revise work on reading dials. The reading shows us how much electricity the school is using in kilowatt hours.

Show the label from an electrical appliance. Every electrical appliance has a power rating that tells you how much electricity it needs to work. This is usually given in Watts (W) or kilowatts (kW). $1000\text{ W} = 1\text{ kW}$.

Which electrical items do the children think use the most electricity? Investigate some of the appliances that you have in the classroom (you could look for the labels together, or you may like

Move learners on

Give children a set of pictures or words for electrical appliances (you can use this table to start you off). Ask them to sort the appliances to show which they think use the most electricity.

Appliance	Average power rating (Watts)
Fridge freezer	200 - 400
Games Console	45 - 190
Electric shower	7000 - 10,500
Laptop	20 - 65
Kettle	3000
Smart phone (charge)	2.5 - 5
Iron	1000 - 1800
Tumble dryer	2000 - 3000
Hair dryer	2000

Either research the amount, look on labels of real products, or provide the answers. Was anyone surprised?

Point out that some appliances, such as fridge freezers, use less electricity, but are on all the time. A hair dryer uses a lot, but is not running all day.

Which appliances use most power in your classroom?

Challenge learners further

Calculating how much it costs to use different appliances:

To find out the rate that you are paying for each unit of electricity, you'll need to look on a bill from your home or school utilities supplier. One unit of electricity is equal to 1000 Watts of power used for 1 hour. This is called 1 Kilowatt hour, or 1kW/h. To find out how much an appliance costs to run per hour do the following:

- 1) Find out the cost you are paying per unit
- 2) Look at the label on the appliance you are using to find its power consumption in Watts. This might be on a label or sticker somewhere on the appliance. Look for its power consumption in Watts or kW (thousands of watts). This is how many Watts the appliance uses. An appliance with a power consumption of 1kW would use 1kW/h (1 kilowatt hour, or unit of electricity) every sixty minutes.
- 3) Work out the amount the appliance costs to run each hour:

Cost = unit cost in pence x power consumption in kilowatts.

To find out how much it costs to run over a week, multiply that by how many hours the device is used in a week. For a year, multiply the weekly amount by 52.

Example:

How much would it cost to light a 100 watt bulb per hour if one unit of electricity costs 17.2p?

To change watts to kilowatts divide by 1000

$$100/1000 = 0.1$$

$$17.2p \times 0.1 = 1.72p \text{ per hour to run.}$$

If the light bulb is on for 4 hours every evening, how much will it cost a week?

$$1.72 \times 4 \text{ hours} = 6.88$$

$$\times 7 \text{ days} = 48.16 = 48p \text{ a week to the nearest penny.}$$

How much is this a year?

$$48.16 \times 52 \text{ weeks} = 2504.32p = \text{£}25.04 \text{ to the nearest penny.}$$

Calculate your school energy use

Use information from your school energy bills to find out how much electricity you used over different time periods. You may even be able to access your school electricity meter so you can take readings and find out how many kWh the school is using in a day.

Compare the number of kWh used in a quarter (or a day) in the summer, with the amount used in the winter - why do you think there is a difference?

It may be possible to get an energy monitor for use in your school or classroom. By looking at it, the children can see right away what impact is had on energy consumption by turning lights off and turning appliances off at the plug, rather than leaving them on stand-by.

At the end of this activity:

All children will know that some electrical appliances use more electricity to power them than others.

Most children will be able to list some appliances in terms of the amount of electricity that they need to power them. They will be able to say that electricity usage is measured in kilowatt hours.

Some children will be able to calculate the amount of electricity used by different appliances over a set time period.