Day 4: Smart use of electricity, heat, water and energy

Attachment 4.1: Sensory game

Everyone sitting/ standing in a circle.

Every person blindly gets an object (hands on their back) and has to identifiy it merely by touching without looking at it.

Name the object.

Does this object have something to do with energy or not?

Put it in the middle (two spaces: „Energy" – „No Energy")

When all objects are presented, the group discusses, if everything was sorted correctly.

Solution: If we see energy in a bigger context, all objects have something to do with energy!

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Attachment 4.2: Electric quiz

Electric quiz (see file folder)

Attachment 4.3: Boil water using different methods

Put the lid on!

Whenever something is heated in the kitchen, CO_2 is produced. But we can cook in a clever way, so that less CO_2 is produced.
At this station, you have the task of bringing 1/4 litre of water to the boil. We will compare 3 different options:

Electric kettle, induction hob and gas cooker.

Electricity consumption is measured in kWh using a power meter. The gas consumption of the gas cooker is weighed and then converted into kWh.

One watt hour (Wh) corresponds to the energy consumed by an appliance with an output of one watt in one hour. A kilowatt hour (kWh) is 1000 times a watt hour. It is mainly used to calculate electricity costs, but also heating costs.
Task
Bring 1/4 litre of water to the boil. We will compare 3 different options:

For induction hob and electric kettle:
Fill the pot with 250 ml of cold water and place it on the hob and pour 250 ml of cold water into the kettle
Put the lid on!
Set the power meter to zero: press both buttons simultaneously
Switch on the hob and the kettle.
As soon as the water boils, switch off the appliances and enter the measurement results in the table.

For the gas cooker:
Pour 250 ml of cold water into the pot.
Weigh the gas cooker and enter the value in the table.
Light the cooker, place the pot on top and wait until the water boils. Switch off the appliance.
Weigh the gas cooker again. The difference to the initial value is the amount of gas used.
Enter it in the table.
Now you have to convert the weight of the gas consumed into kWh:
1 gr. of gas corresponds to 0.013 kWh

Now calculate the amount of CO_2 produced by the different methods of heating water.

The production of 1 kWh of conventionally produced electricity generates
approx. 600 grams of CO_2.
When using gas to heat the water, 1 kWh of gas corresponds to
approx. 240 grams of CO_2.

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Measurements:

	Electric kettle	induction hob	gas cooker
kWh			
	1 kWh = 600 gr. CO_2		1 kWh = 240gr. CO_2
CO_2			

	gas cooker
Initial weight	
Final weight	
Difference	
1 gr. gas = 0.013 kWh kWh	kWh

What is the most favourable way to heat water to reduce CO_2 emissions?

.....

What other tips can you think of for heating water efficiently?

1. .....

2. .....

3. .....

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Attachment 4.4: Compare surfaces

Thermal conduction: plate experiment

Task 1

Put your hand flat on the 5 different plates for a **short time** and feel the temperature.
Line the plates up in a row from warm (1) to cold (5).

1. ..... 2. ..... 3. .....

4. ..... 5. .....

Task 2

Now use the thermometer to measure the surface temperature of the plates.

1. .....- .....°C

2. .....- .....°C

3. .....- .....°C

4. .....- .....°C

5. .....- .....°C

Is there a difference between what you felt and what you measured?
O yes O no

Can you guess why you observed that?

Tick the correct statement:

O The thermometer is broken.
O The plate that feels warm conducts („pulls") the heat out of the hand.
O The plate that feels cold conducts („pulls") the heat energy out of your hand. This makes the plate warmer and the hand colder. The plate feels warmer after a while.

Solution:

The plate that feels cold conducts („pulls") the heat energy out of your hand. This makes the plate warmer and the hand colder. The plate feels warmer after a while.

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Attachment 4.5: water volcano

Using the heat of the sun
- movement in a glass of water

1. Fill the large plastic container with cold water from the tap.
2. Add 2 drops of red ink to the small glass. Then top up with hot water
3. Place the lid loosely on the small jar and carefully place it in the large, water-filled container. Remove the lid from the small jar under water.
4. Observe what happens. Describe it and think about why this is happening.

Empty the jars again for the next group!

Attachment 4.6: Consumption of tap water

In Germany, each person uses almost 120 litres of tap water every day. That's almost enough to fill a bathtub. Of course, we don't drink all of it - nobody does. But what do we use it for?

Task 1
There are 7 blue columns on the table, which are supposed to be water columns. Next to them are cards with pictures and texts. They show what we use the water from the tap for.

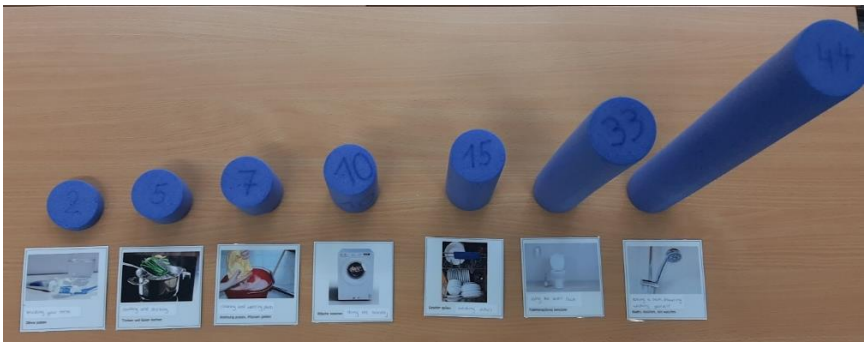
1 Put the water columns in the right order, from 2 to 44 litres.

2 Place the cards with the pictures and texts next to the water columns:

What do we use how much water for each day?

When you have finished, check that you have placed the cards correctly.

3. write the correct number of litres for each activity in the table.



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activity	*litres*	*activity*	*litres*
 Brushing your teeth		 Doing the laundry	
 Cooking and drinking		 Using the toilet flush	
activity	*litres*	*activity*	*litres*
 Cleaning and watering plants		 Taking a bath, showering, washing yourself	

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Washing dishes

Task 2

Is something missing? If you can think of other things you do with water, write them in the blank spaces. Draw a picture and write the activity next to it.

Solution

Liter	activity
2	Brushing your teeth
5	Cooking and drinking
7	Cleaning and watering plants
10	Washing dishes
15	Doing the laundry
33	Using the toilet flush
44	Taking a bath, showering, washing yourself

Attachment 4.7: Information signs