

TOY WORK SHEET

This work sheet proposes activities in which pupils analyze the functioning of some toys from the point of view of energy. In perspective, pupils will then be able to analyze other processes, may them be natural or technical.

The first two activities are suitable for pupils of **any age**, while the **other two activities** are suitable for **secondary school pupils**.

Attached to the work sheet you can find some examples for work sheets of two toys: **Dynamo Torch** and **Wind Mill Generator**.

These toys can be bought online, for example here:

<https://www.4m-ind.com/?s=dynamo&submit=Go>

<https://www.4m-ind.com/?s=windmill&submit=Go>

You can also have a look at their functioning here:

<https://www.youtube.com/watch?v=HggOuRIVyhM>

<https://www.youtube.com/watch?v=v5m2KDz0dkg>

<https://www.youtube.com/watch?v=HWHOjy3Zx74>



ACTIVITY 1

TOY CHOSEN:

HOW IS IT MADE?

Draw the components of the toy and how they fit together. Then build the toy.



FCHgo has received funding from the Fuel Cells and Hydrogen 2 Joint Undertaking (JU) under grant agreement No 826246

ACTIVITY 2

HOW DOES IT WORK

Draw the toy and add graphic symbols (arrows, lines, connectors, ...) to represent how it works dynamically. How does it work? How can you make it work in different ways? Write some notes with the results of different attempts. What can you do to make it work in the “best” or most efficient way?

ACTIVITY 3

DESCRIBE HOW THE TOY WORKS – THE STORY OF ENERGY

In this activity, you are going to tell how the toy works and what is the role of energy in its operations (the “story of the energy”).

Here is a list of energy carriers:

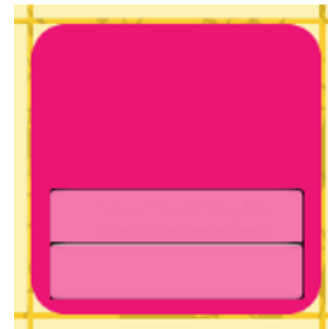
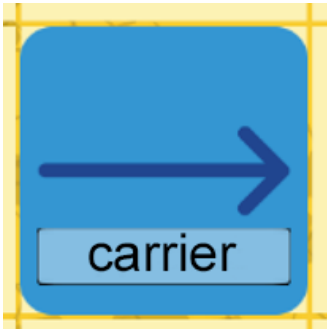
- Hot water
- Compressed water
- Water in motion
- Hot air
- Compressed air
- Air in motion
- Heat
- Food
- Fuel
- Hydrogen
- Electricity
- Light
- Motion
- Rotation
- Weight

Chose in this list the suitable carriers and put them in sequence corresponding to how the toy works. Name the couplers/exchangers, i.e. the “meeting places” where energy is exchanged between the carriers (where the first carrier “gives” energy to the second carrier). Tell the story of how the energy carriers interact and behave in the toy.

ACTIVITY 4

PROCESS DIAGRAM (ENERGY DIAGRAM)

Draw the process diagram, showing the carriers and the couplers/exchangers, and indicate power and energy currents.



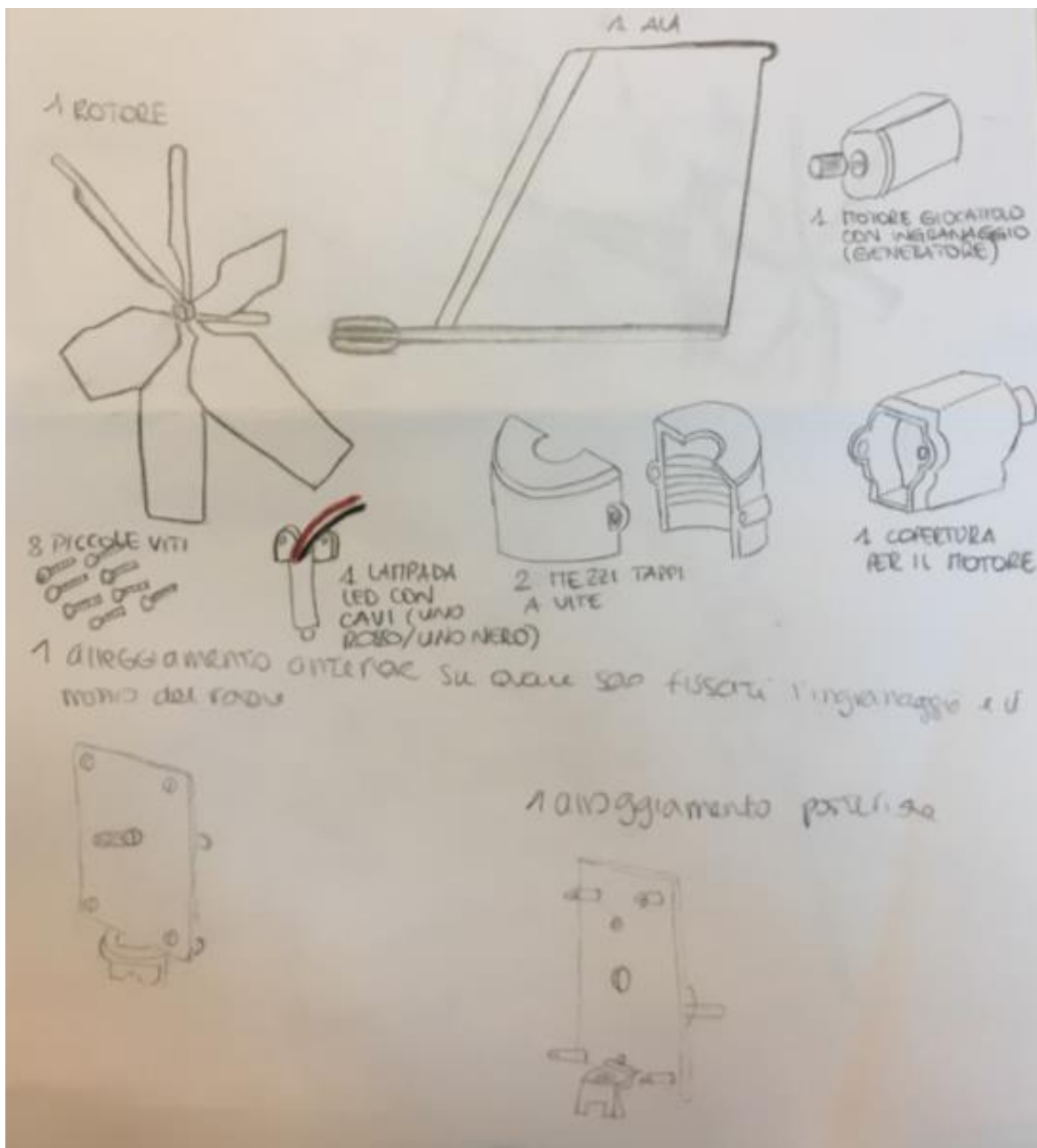
EXAMPLE

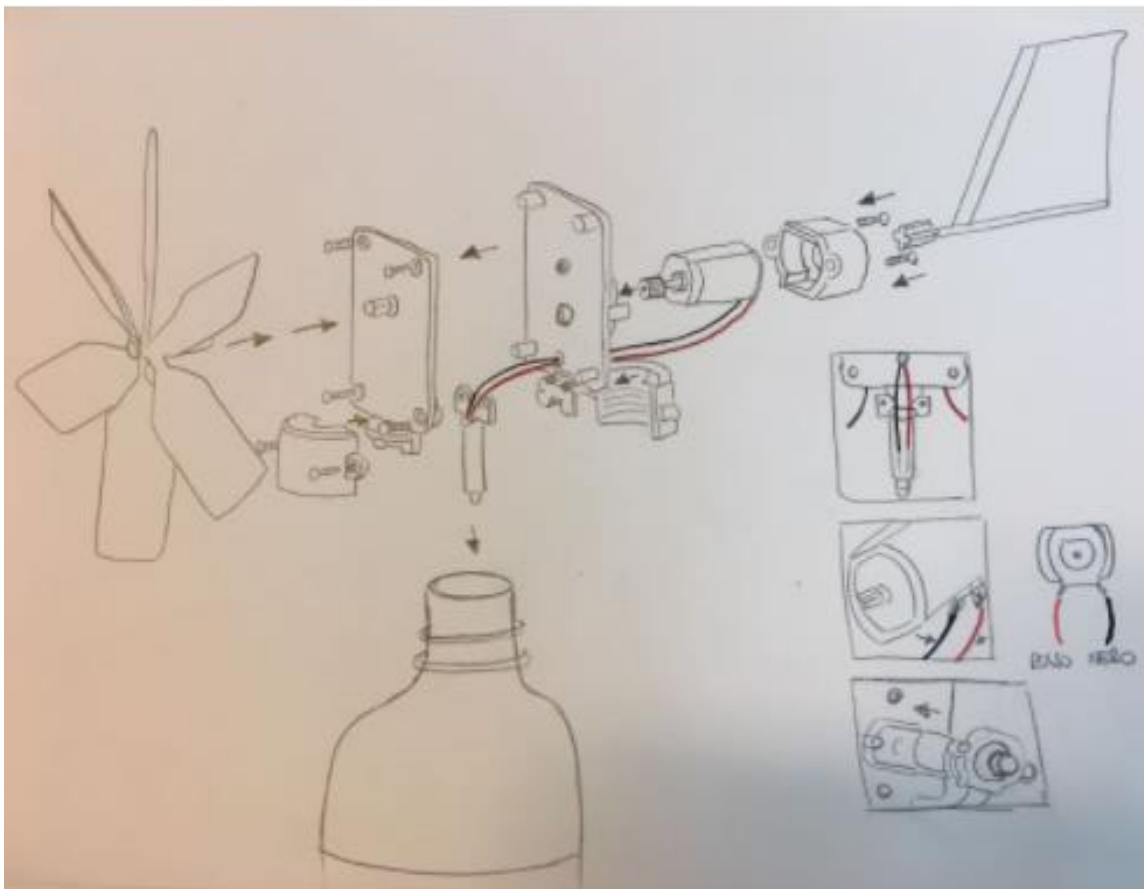
ACTIVITY 1

TOY CHOSEN: WIND MILL GENERATOR

HOW IS IT MADE?

Draw the components of the toy and how they fit together. Then build the toy.

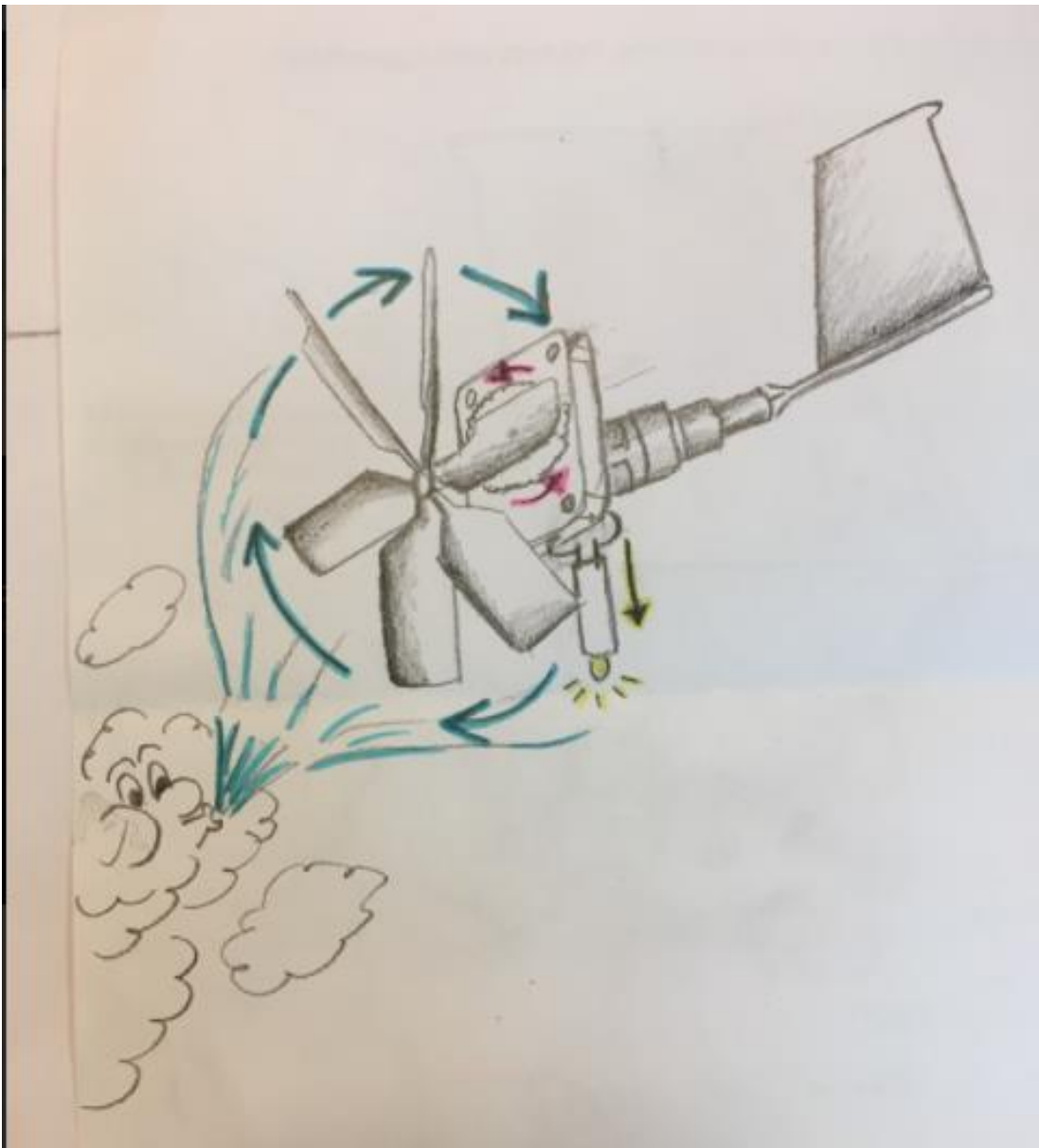




ACTIVITY 2

HOW DOES IT WORK

Draw the toy and add graphic symbols (arrows, lines, connectors, ...) to represent how it works dynamically. How does it work? How can you make it work in different ways? Write some notes with the results of different attempts. What can you do to make it work in the “best” or most efficient way?



The toy can work with a hairdryer, by selecting different air jet intensities, by putting it away from or near the wind turbines, by tilting the blades in relation to the direction of the jet. The toy works best if it is hit by the wind perpendicularly to the turbines; the faster the wind, the faster the wind turbines turn and the light bulb shines more intensely.

ACTIVITY 3

DESCRIBE HOW THE TOY WORKS – THE STORY OF ENERGY

In this activity, you are going to tell how the toy works and what is the role of energy in its operations (the “story of the energy”).

Here is a list of energy carriers:

- Hot water
- Compressed water
- Water in motion
- Hot air
- Compressed air
- Air in motion
- Heat
- Food
- Fuel
- Hydrogen
- Electricity
- Light
- Motion
- Rotation
- Weight

Chose in this list the suitable carriers and put them in sequence corresponding to how the toy works. Name the couplers/exchangers, i.e. the “meeting places” where energy is exchanged between the carriers (where the first carrier “gives” energy to the second carrier). Tell the story of how the energy carriers interact and behave in the toy.

*Carriers present: **air in motion, rotation, electricity, light.***

*The air in motion transfers the energy to the rotation through the wind **turbines.***

*The rotation transmits energy to the electricity through the **dynamo.***

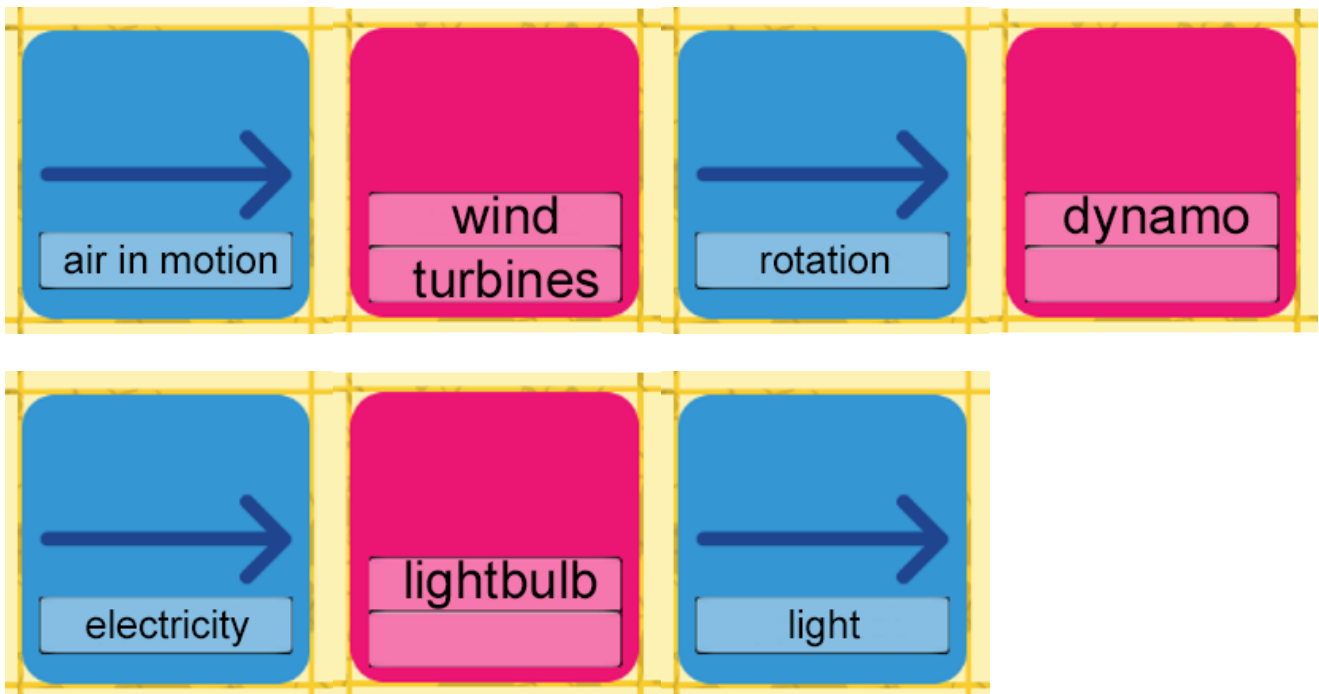
*The electricity transfers energy to the light through the **lightbulb.***

The air in motion hits the wind turbines, pushes them and makes them move. The turbines, through a series of gears and cogs, rotate the dynamo, thus it can generate electricity. The electricity flows through the electric cables and lights the lightbulb, which emits the light.

ACTIVITY 4

PROCESS DIAGRAM (ENERGY DIAGRAM)

Draw the process diagram, showing the carriers and the couplers/exchangers, and indicate power and energy currents.



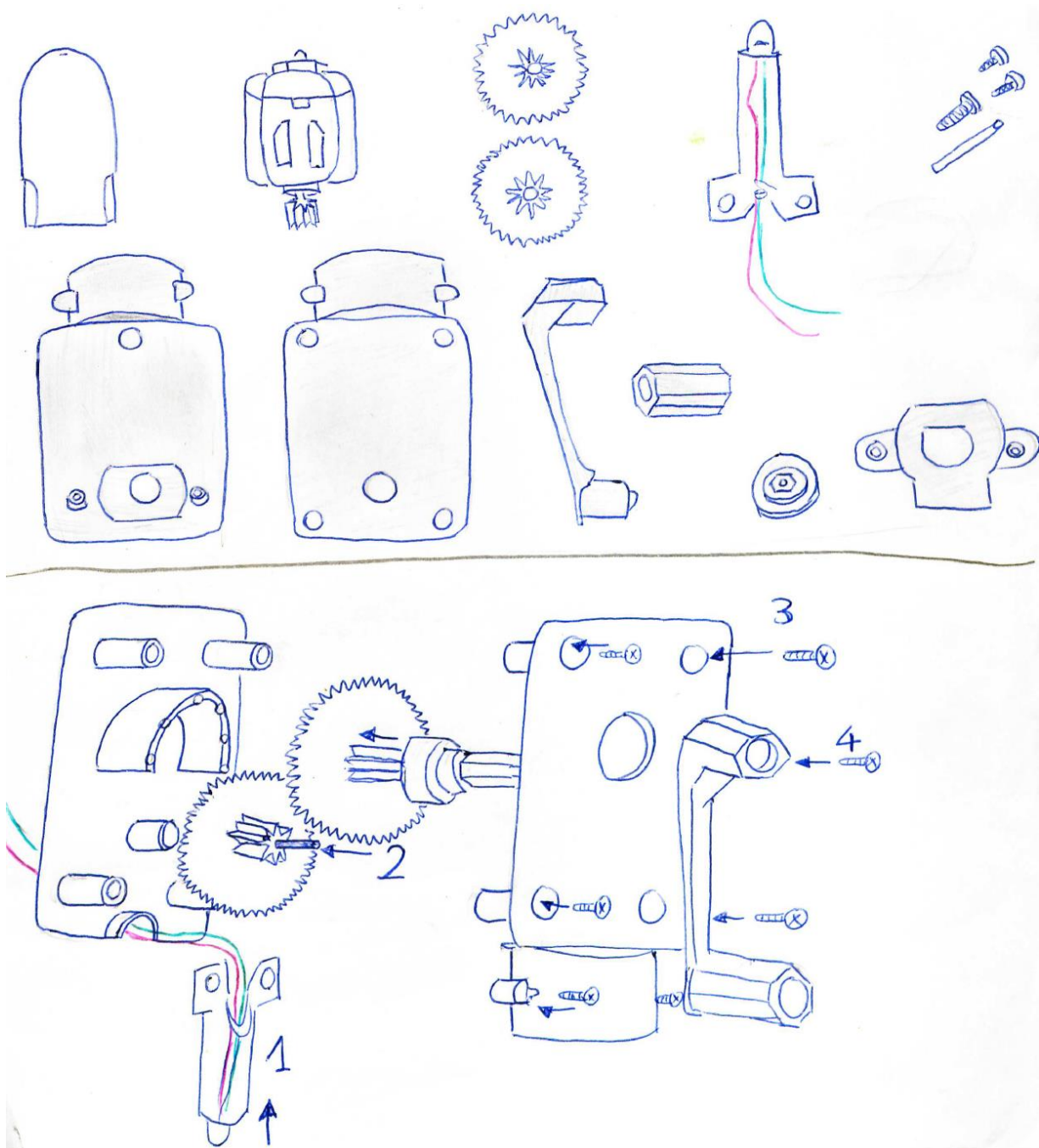
EXAMPLE

ACTIVITY 1

TOY CHOSEN: DYNAMO TORCH

HOW IS IT MADE?

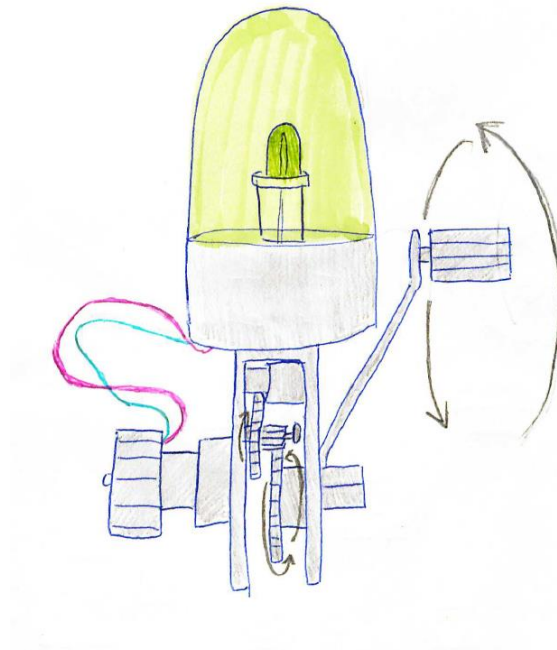
Draw the components of the toy and how they fit together. Then build the toy



ACTIVITY 2

HOW DOES IT WORK

Draw the toy and add graphic symbols (arrows, lines, connectors, ...) to represent how it works dynamically. How does it work? How can you make it work in different ways? Write some notes with the results of different attempts. What can you do to make it work in the “best” or most efficient way?



*The toy works by turning, more or less quickly, the crank with one hand.
The faster the crank is turned, the more light the toy produces.*

ACTIVITY 3

DESCRIBE HOW THE TOY WORKS – THE STORY OF ENERGY

In this activity, you are going to tell how the toy works and what is the role of energy in its operations (the “story of the energy”).

Here is a list of energy carriers:

- Hot water
- Compressed water
- Water in motion
- Hot air
- Compressed air
- Air in motion
- Heat
- Food
- Fuel
- Hydrogen
- Electricity
- Light
- Motion
- Rotation
- Weight

Chose in this list the suitable carriers and put them in sequence corresponding to how the toy works. Name the couplers/exchangers, i.e. the “meeting places” where energy is exchanged between the carriers (where the first carrier “gives” energy to the second carrier). Tell the story of how the energy carriers interact and behave in the toy.

*Carriers present: **food, rotation, electricity, light.***

*The food allows the hand to move and to rotate the **crank.***

*The rotation of the crank transfers energy to electricity through the **dynamo.***

*The electricity transfers energy to light through the **lightbulb.***

The hand acts on the crank and makes it rotate. The crank, through a series of gears and cogs, makes the dynamo rotate, so that it generates electricity. The electricity flows through the electric cables and lights the lightbulb, which emits the light.

ACTIVITY 4

PROCESS DIAGRAM (ENERGY DIAGRAM)

Draw the process diagram, showing the carriers and the couplers/exchangers, and indicate power and energy currents.

