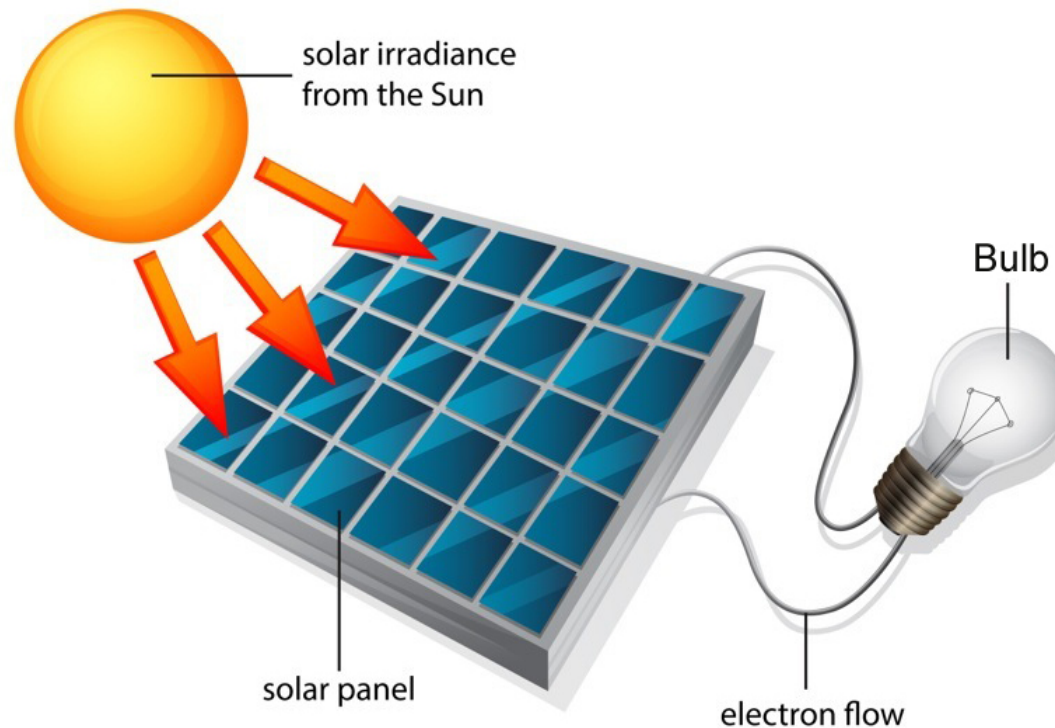


How can we make energy from the sun?

Solar energy is one of the cleanest and most dependable energy sources available to us. We can use solar energy to power our homes. Photovoltaic solar panels turn the sun's rays into electricity by exciting electrons in silicon cells using light photons from the sun.





Photovoltaic Cells:

<https://www.youtube.com/watch?v=yY6WkjNZy4g>

Solar Energy

There are two technologies commonly applied to use the sun's energy. Both of them involve panels on roofs, so it is easy to confuse them.

Solar photovoltaics (PV), also known as *solar electricity*, is a technology that converts sunlight directly into electricity.

Solar water heating (SWH), sometimes also referred to as *solar thermal*, is a technology that uses sunlight to produce hot water for showers, baths and hot taps.

Theoretically, it is of course possible to heat water using electricity produced from PV panels. However, from an environmental perspective, it is usually much better to use solar water heating panels and it is much cheaper to run.



Installing solar panels on a house:

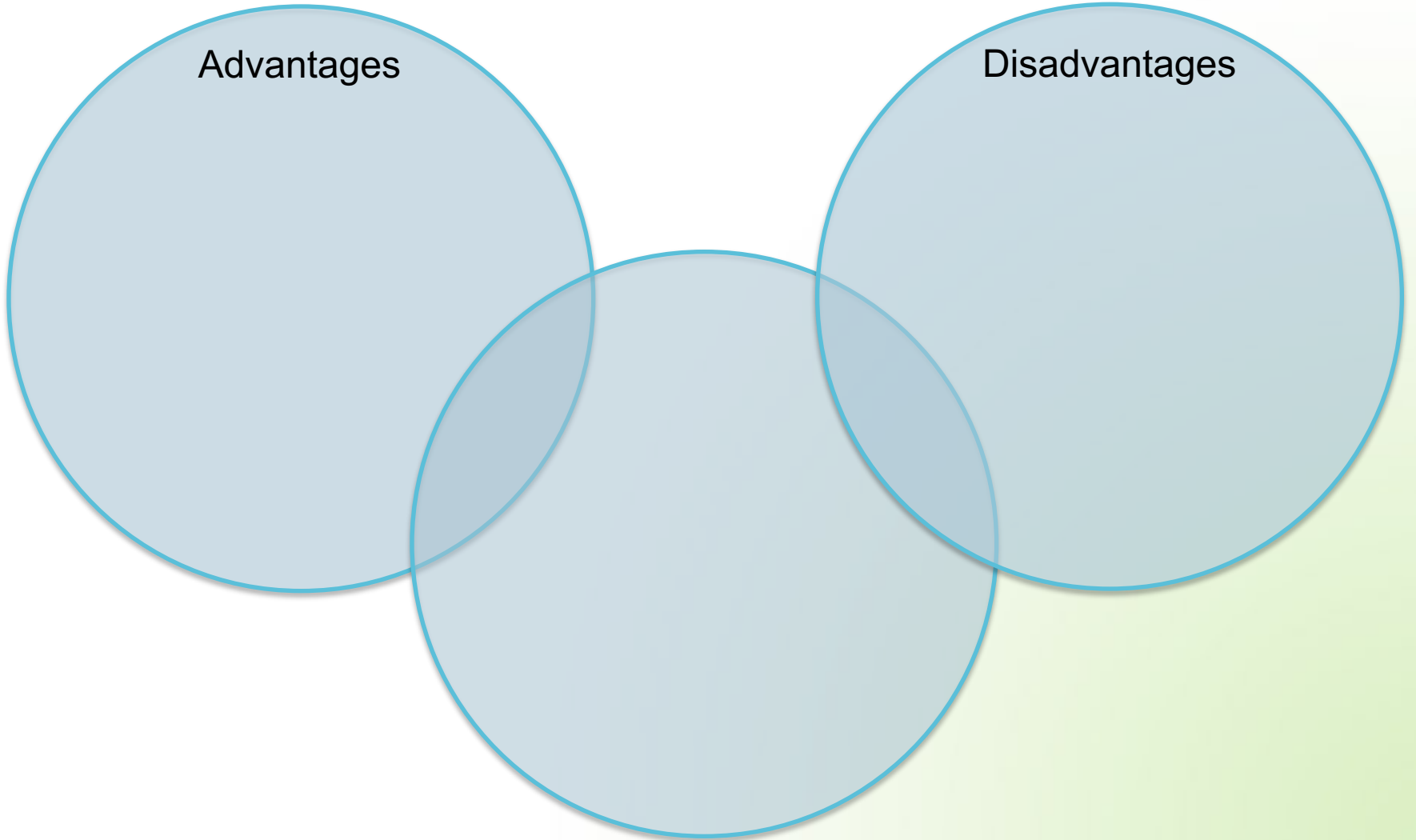
<https://www.youtube.com/watch?v=fIST7XScPDk>

The Sun

Discuss the advantages and disadvantages of the sun in pairs.
Place your points in the correct circle.

Advantages

Disadvantages



Seeing the light! (Research Activity)

As we have seen, solar panels can be placed onto buildings to generate electricity. The term for this is PHOTOVOLTAIC.



Study a solar calculator.



This system can be used to generate energy to charge batteries or it can be linked to the National Electricity Grid.

Seeing the light! (Research Activity)

Photovoltaic solar cells have to face south.

They must not be in shadow.

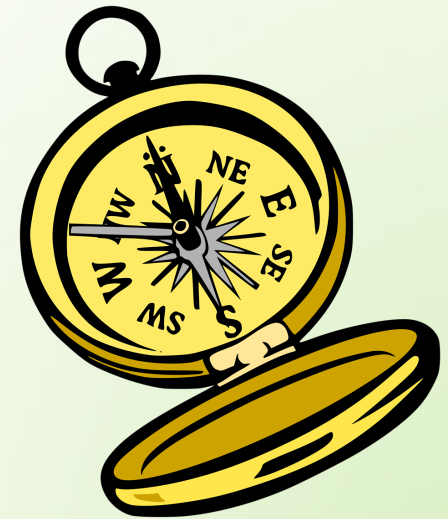
Why?

Use a compass to find the south from your home or school.

Would it be possible to put solar cells on your home or school?

Discuss.

Research and list the advantages of having solar cells to generate electricity.



Solar Energy

Solar cells are made of silicon.

There are two layers of silicon in each cell.

There are tiny electrons in the silicon.

When light shines onto the solar cells the electrons in the silicon generate electricity.

The electricity travels through the cells and along wires.

Each solar cell has a positive area and a negative area. You can use a solar cell as you would use a battery. Remember that you need bright light!

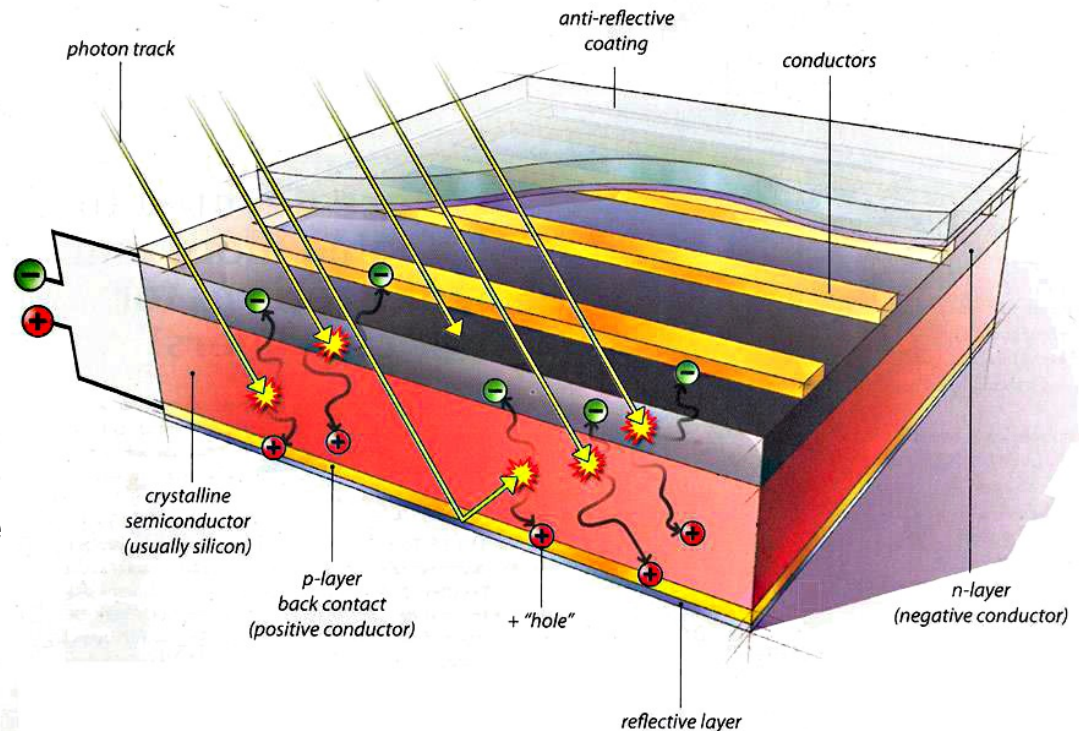


ILLUSTRATION BY KURT STRUVE

[SOURCE: SOLAR ENERGY INDUSTRIES ASSOCIATION](#)

Seeing the light!

Does the electricity generated in a solar cell depend on how bright the light is?

Discuss

How could you investigate this?

How could you create a fair experiment?

Which variables would you need to keep constant?

What would you measure?

How?

Seeing the light!

Experiment with a photovoltaic cell.

Attach the cell to a motor, fan or LED light.

Attach the cell to a voltmeter and measure the output.

Experiment through covering parts of the cell and record the results.

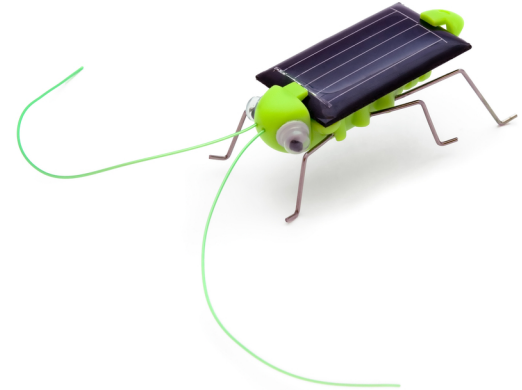


*Display your results
in a way that
everyone will
understand!*

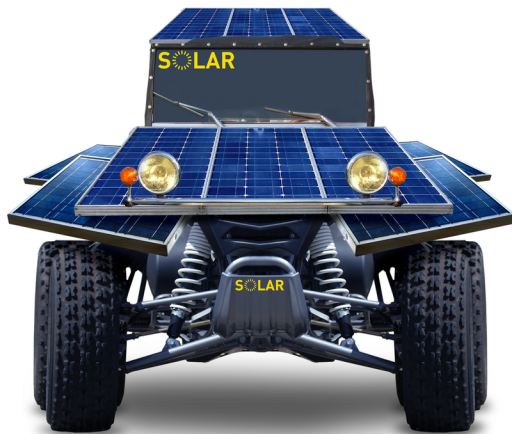
Using Solar Cells

Design and create a boat.

Design and create an animal with a moving part.



Using solar cells while designing and creating!

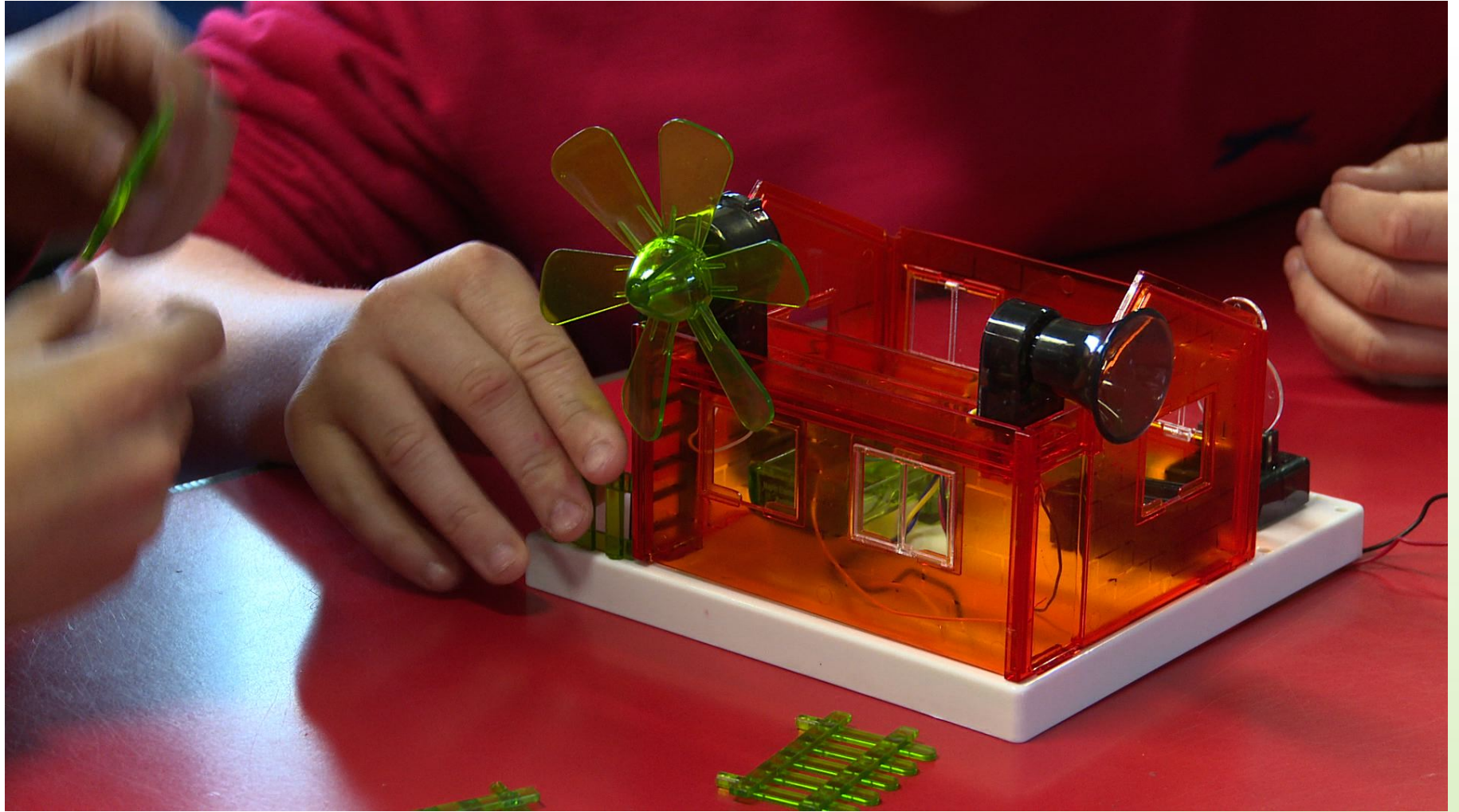


Design and create a car.

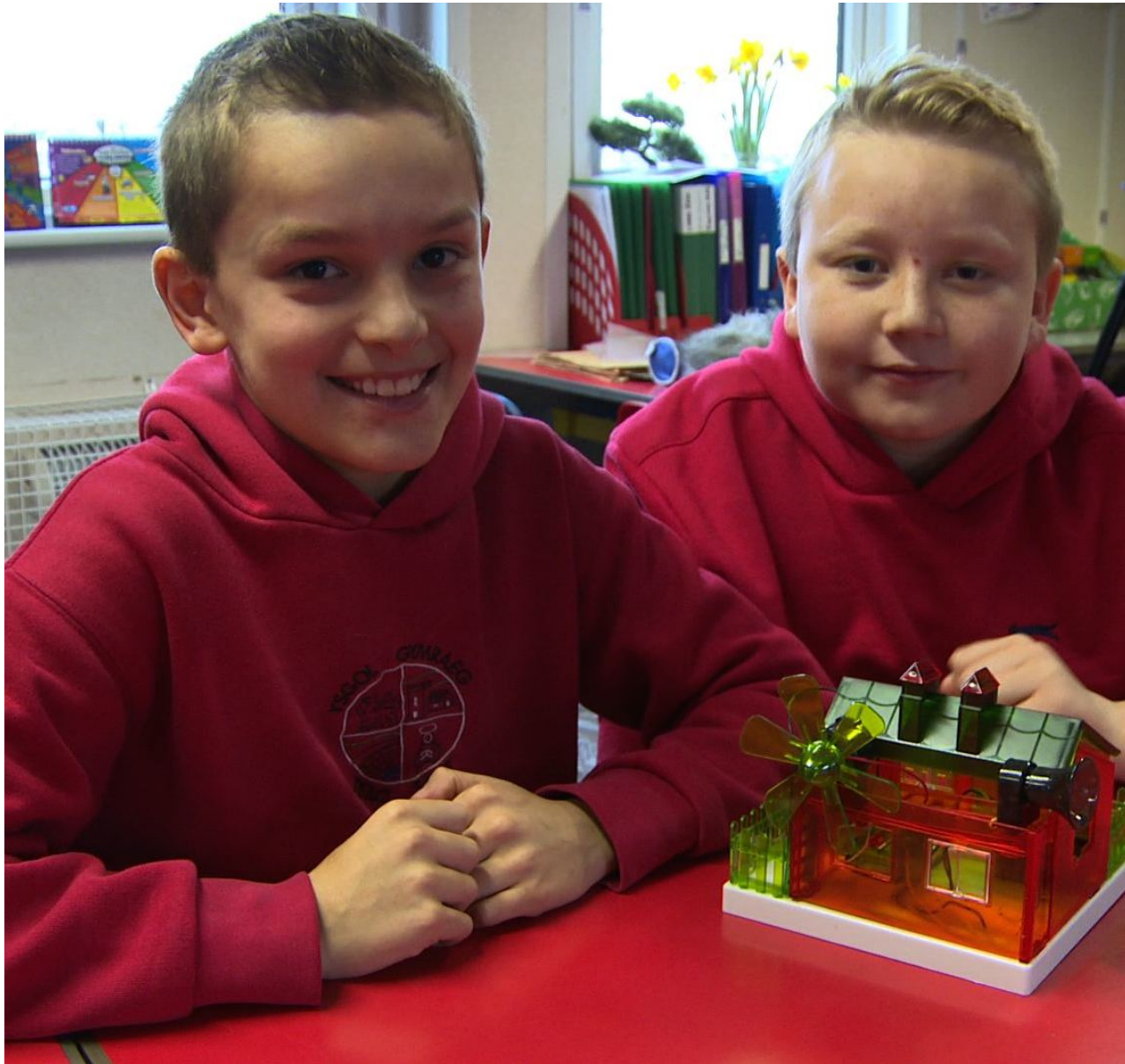
Design and create a flower that grows.



Experiments: <https://www.youtube.com/watch?v=smPng9yGVWQ>







Summer Sun!

Solar cells that generate electricity are called photovoltaic.

Electricity is measured in Watts.

1000 Watts are equal to 1 Kilowatt.

These cells can generate up to 13 Kilowatts of electricity.

A moment to ponder!

When would the cells produce most electricity?
When would the cells produce the least amount
of energy?

How much?

Electricity is measured in Watts
1000 Watts is equal to 1 Kilowatt
Complete the table.

Watt	Kilowatt
1000 w	1 Kw
	2 Kw
2 5000 w	
4000 w	
	5.5 Kw
8700 w	
	6 Kw
9000 w	
	9.5 Kw

Design and Create

Experiment with solar cells to see how you could use them in your Design and Technology work instead of batteries.

Use your solar cells to create light – greenhouse, torch, theatre lights, child's lamp, etc.

Use your solar cells with a gear system – a boat travelling through water, a racing car, a butterfly moving its wings, a flower growing, a toy moving etc.

Design and Create

Evaluate

- Describe your design.
- Describe how you used your solar cells.
- Are the solar cells very effective / effective / ineffective?
- Could you improve your product?
- How?

Solar Cells

Solar cells can be used to heat water.

The cells are placed on the roof of a building.

A pump is attached to the control switch.

You must also have a hot water tank or a water cylinder with a coil inside.