#### Renewable Energy – Module 1

Learn about renewable energy

Find out how to assemble a solar panel

Learn how to orientate it relative to the sun

Use it to power a pedestal fan



## **Pedestal Fan**



#### What do we use energy for?



#### Where does our energy come from?

- Fossil fuels (mostly)
- Nuclear energy
- Renewable energy (e.g. hydroelectric, wind & solar)





## **Fossil Fuels and Climate Change**

- Fossils fuels include oil, coal and natural gas.
- Most of our energy at present comes from burning fossil fuels.
- This produces 'greenhouse gases' which cause climate change.



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## Renewable Energy





- We need to reduce our carbon emissions
- We must reduce our dependency on fossil fuels
- One of the ways we can help is to use renewable energy which does not produce greenhouse gases
- Renewable energy comes from sources that do not get used up



## Make a fan powered by solar energy





## **STEM Learning Objectives**

- Science: Electricity (compare and give reasons for variations in how components function) and Light (recognise how shadows are formed).
- Technology engage in an iterative process of designing and making
- Engineering optimise the performance of equipment
- Maths draw and measure angles using a protractor



## Work Safely

# Look at the tools and equipment. Can you spot any potential hazards?



Can you think of ways to reduce the risks?



## **Collect your materials**

## You will need:

- A solar renewable energy kit.
- A sheet of polystyrene foam.





## Assemble your tools

#### You will need:

- A ruler
- A pencil
- A felt tip pen
- A protractor
- A pair of scissors
- A cool melt glue gun
- A bowl
- A sheet of card





## Prepare the solar cells

- 1. Open the solar renewable energy kit.
- 2. Remove the 8 solar cells from the mounting plate.
- 3. Unscrew all the nuts and washers.
- 4. Remove the metal connecting strips.
- 5. Place the nuts, washers and strips in the bowl so you <u>don't lose them.</u>





## Assemble the solar cell

- Lay out the solar cells in the order shown.
- 2. Plus (+) and minus (-) signs are moulded into the back of each cell.
- 3. Turn the mounting plate over and slide the small holes onto the studs.







## **Connect up the solar panel**

- 1. Fit the metal connecting strips.
- 2. Place the contacts from the solar motor onto the two studs shown.
- 3. Slide a washer onto each stud.
- 4. Spin a nut onto each stud with your fingers.
- 5. Nip up the nuts with the plastic spanner provided.
- 6. Make sure all the nuts are screwed on before you lift up the panel.





#### Make sure the fan works

- 1. Fit the propeller onto the motor shaft. Hold the solar panel facing the sun and check the propeller spins.
- 2. Feel whether the air is blowing away from the motor.
- 3. If it isn't then swap over the motor connectors on the solar panel this will make the motor turn the other way.
- 4. Hold the solar panel at varying angles to the sun and try to work out whether this affects how hard the fan blows.





# Work out at what angle to mount the solar panel.

- 1. The panel needs to be mounted at right angles to the sun's rays to maximise power output.
- 2. Take a sheet of card and hold vertically on a flat table in the sun.
- 3. Hold the pencil vertically as shown and mark the point on the card.
- 4. Mark on the card where the shadow meets the table.
- 5. Draw a line between the two marks.
- 6. Draw another line at right angles to this.
- 7. Measure the angle of the second line from horizontal.





#### Make a stand for the solar panel

- 1. Design and make a stand for the solar panel.
- 2. The panel needs to be mounted at the angle you measured in step 8.
- You need to be able to take the panel on and off the stand.







## Assemble the stand for the fan

- 1. Push the end of the upright down into the slot in the base.
- Twist it clockwise through 90°.
- 3. Take the propeller off the motor shaft.
- 4. Loosen the screw on the upright and push the motor in.
- 5. Nip up the screw and refit the propeller.





#### Fit your lamp and re-make the circuit

- 1. Work out a position inside your house to fit your bulb holder.
- 2. Glue it in position.
- 3. Work out where to attach your battery and glue it on.
- 4. Re-connect the wires.
- 5. Try out the light, then switch off.
- 6. Tidy the wires and tape them to the inside of the house.





## Try out your pedestal fan





## What did you learn?

- Where does most of our energy come from?
- What is the problem with this?
- Name some sources of renewable energy.
- How does the orientation of the solar panel affect the fan performance?
- How are shadows formed?
- How does a solar powered electric fan work?



