

SCIENCE, TECHNOLOGY, ENGINEERING AND MATHS

SOLAR SCIENTISTS

THESE ACTIVITIES FOLLOW ON FROM THE SOLAR SCIENTISTS WORKSHOP THAT YOU HAVE TAKEN PART IN AT DUMFRIES HOUSE STEM CENTRE. USING WHAT YOU LEARNED ABOUT THE SUN AND THE USE OF SOLAR PANELS TO GENERATE ELECTRICITY, YOU CAN EXPLORE OTHER WAYS OF USING THE SUN'S ENERGY.

ACTIVITY 1:

TRACK THE MOVEMENT OF THE SUN ACROSS THE SKY

1. You'll need to wait for a day sunny enough to cast a shadow. You'll also need some chalk, and an object that you can leave outside. It doesn't really matter what it is—it just needs to cast a shadow—but something tall and thin, like a stick, would work particularly well.
2. Place your shadow casting object in a sunny spot, and use the chalk to trace the shadow.
3. Come back to the object throughout the day, tracing the shadow every time. Once an hour or so should give good results.
4. Does the shadow's position change throughout the day? Why is this? What does it tell you about the position of the sun throughout the day? What about the length of the shadow?
5. As an extension, continue this experiment over subsequent days - do the shadows change? What about if you repeated the experiment in a few months time? You will need to take some good-quality photographs and measurements for this.

IF YOU REALLY ENJOY THE FIRST ACTIVITY, YOU CAN USE IT AS THE BASIS FOR BUILDING YOUR OWN SUNDIAL:
[HTTPS://
WWW.WIKIHOW.COM/MAKE-](https://www.wikihow.com/Make-)

ACTIVITY 2:

SOLAR THERMAL ENERGY

1. During the workshop, we explored harvesting the sun's light energy, in order to generate electrical energy. Now we are going to explore heat energy from the sun. You'll need two identical tin cans, one painted matt white and the other painted matt black. You'll also need two thermometers and some water.
2. Fill the two tin cans with the same volume of water. Make a note of the temperature of the water in the two tins—they should be the same.
3. Find a sunny spot and place your cans side-by-side. Come back periodically and measure the temperature of the water in the tin cans. Which can warms fastest? Which reaches the highest temperature?
4. The colour of the cans is crucial—white paint will reflect the sun's radiation, while black will absorb it. As an extension, experiment will cans of different colours.
5. To maximise the temperature your water reaches, there are a few things you can do: Build a little greenhouse for you cans using cling film and sticks. You used mirrors to reflect sunlight during the workshop—you can use mirrors here, or some tin foil placed to funnel sunlight to the cans.
6. Metal is an excellent conductor of heat—but what about other materials? Try a similar experiment using plastic containers, or wrap your tins in layers of different material.

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USEFUL RESOURCES

BUILD A SOLAR OVEN:

[HOMESCIENTOOLS.COM/ARTICLE/HOW-TO-BUILD-A-SOLAR-OVEN-PROJECT/](http://homesciencetools.com/article/how-to-build-a-solar-oven-project/)

THIS IS A NATURAL EXTENSION TO THE SECOND ACTIVITY - MAKE AN OVEN HOT ENOUGH TO COOK A FEW BASIC THINGS. S'MORES ARE A CLASSIC!

SOLAR POWER YOUR SCHOOL:

[SOLARFORSCHOOLS.CO.UK](http://solarforschools.co.uk)

TYPE YOUR POSTCODE INTO THE DESIGN AND ANALYSIS TOOLS ON THIS WEBSITE, AND YOU CAN PLACE THEORETICAL SOLAR PANELS ON THE ROOF OF YOUR SCHOOL! SEE IF YOU THINK YOU COULD POWER YOUR SCHOOL USING SOLAR PANELS

BUILD A PINHOLE CAMERA:

[SKYATNIGHTMAGAZINE.COM/ADVICE/SKILLS/HOW-TO-MAKE-A-PINHOLE-CAMERA/](http://skyatnightmagazine.com/advice/skills/how-to-make-a-pinhole-camera/)

CREATE A LONG-EXPOSURE PHOTOGRAPH OF THE SUN MOVING ACROSS THE SKY, BEST DONE OVER A PERIOD OF MONTHS.

