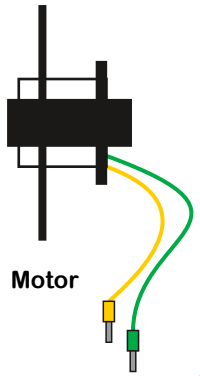
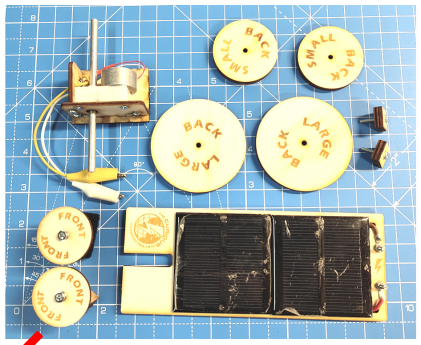
Aim

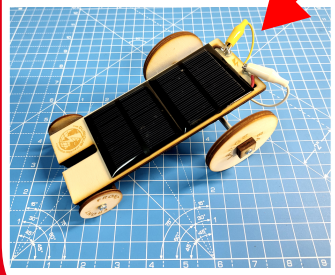
Help understand solar power, solar cells, energy conversion and basic electronics.

Objectives

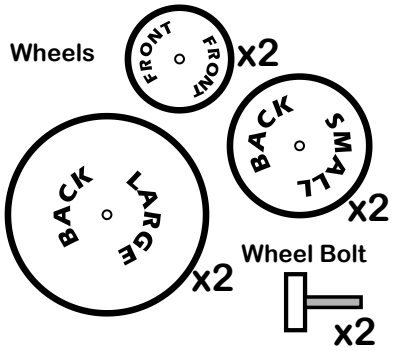
Build a kit car.
Investigate different methods of assembly.
Try different wheel configurations.
Build a basic electronic circuit.
Investigate solar power.
Make the car travel a specified distance as quickly as possible.

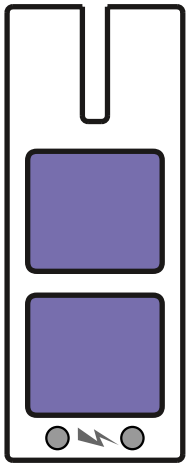




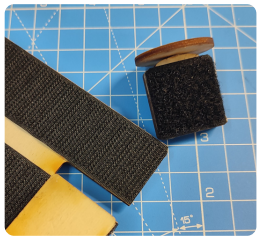


Kit Contents



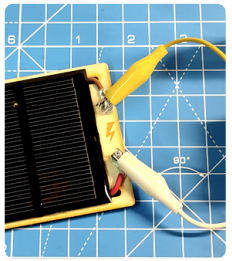


Front wheels and motor connect to solar base using hook & loop tape.



Wheels fit onto the motor axle then are held in place using the wheel bolts.
Turn the square head with your hands.

Clip the wires from the motor to the connections on the solar base.

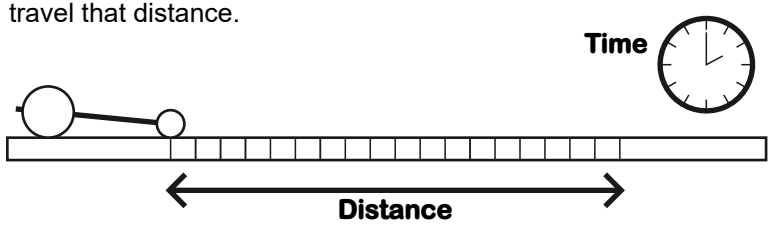


Activity Ideas

How do solar cells produce electricity?
Where have you have seen solar cells before?
How is energy transferred?
(Light energy –> Electrical energy -> Mechanical energy)
How do we measure speed?
(Distance over time, link to maths)
Which wheel size goes faster?
(Larger wheels go further per revolution)
What gradient can the car climb?
(This will be a measure of its power)
Will the car go in reverse?
(Turn motor round or swap terminals)

Speed & Distance

Speed is the **distance** travelled within a certain **time**.If the car travels 1 metre in 1 second then the car is travelling at 1 metre per second.You can test this by measuring the length of your racecourse.You can then time the car using a stopwatch.The **speed** of the car is the **distance divided by the time** taken to travel that distance.



Each car is raced along the racecourse. The times taken is measured.You should take several measurements to see how this varies.
Try to calculate an average of the times.

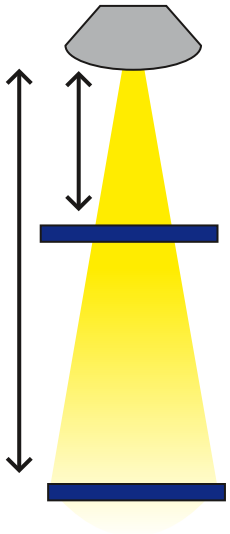
Problems?

Are the wheels aligned correctly?
Problems with friction:
Are wires in the way?
Are wheels sticking or rubbing?
Are the back wheels tightened correctly?
Is there enough light hitting the solar panels?
Are the wheels aligned correctly?
Is the race surface flat and level?

Kit developed by:
The Curious Electric Company
We hope you enjoy your kit.
Comments or suggestions?
www.curiouselectric.co.uk
hello@curiouselectric.co.uk

Please re-use or re-cycle or return to us

Solar Power

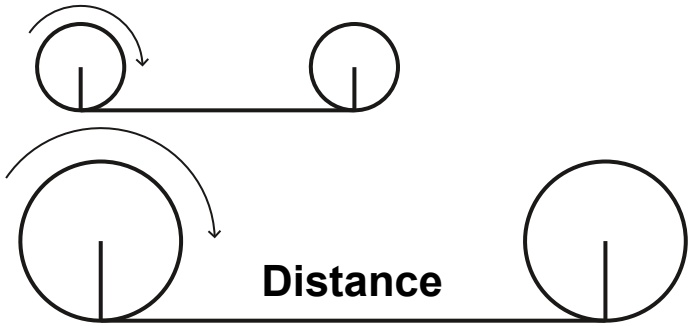


These cars use solar panels to convert light into electricity. The electricity is then converted into mechanical motion through the motor.
You can test this using a bright light. Hold the light far away from the solar panels and see how fast the motor spins (if at all).
Gradually move the light closer to the solar panels and watch the motor. It should start to spin and then get quicker as the light is moved closer. This can also be tested outdoors, using your hands to shade the panels and then gradually letting through more light.

These cars use two solar panels. More area to catch the light means more power available. You can test this by covering on of the solar panels.

Wheels & speed

There are a two different sized back wheels - large and small. These will affect the speed of the car.
Larger wheels go further for each rotation, so a car with larger wheels should go faster.
This can be tested by rolling each wheel one revolution along the ground and marking how far they have gone.



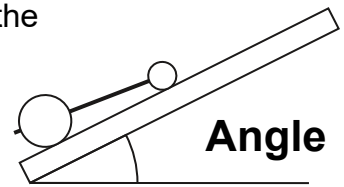
This only matters for the motorised wheels - the other wheels do not affect the speed.

Friction & Grip

A wheel with better grip will ensure the power is transferred to moving forwards. The grip of a wheel depends upon the surface of the road it is on and the surface of the wheel.

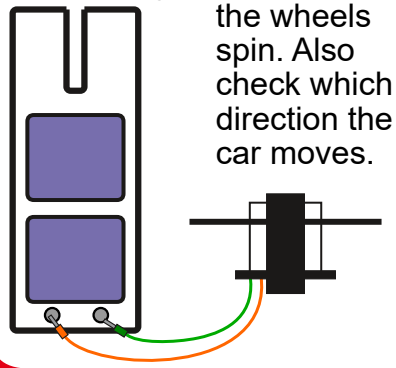
You can test this by making the cars go up-hill on different surfaces. Surfaces with better grip will be able to go up a higher gradient. Try different surfaces from paper sheets to wooden table to sheets of sandpaper.
Better grip means the car can drive up a steeper angle of hill.

This is one reason why wheels have rubber tyres, to ensure that the wheel has a good grip to the road surface.



Direction

The direction of the motor depends upon how it is connected to the solar panels.
Test this by swapping the crocodile clips around and seeing which direction the wheels spin. Also check which direction the car moves.



Weight

The weight of the car affects how fast it will go.
It will affect the acceleration of the car, hence it will take longer to get up to the same speed.

This can be tested by adding weights to the top of the car (being careful not to block the solar panels) and then timing how long it takes to go a measured distance.
Try again with different weights.