

1 0 5 . 6 4 1

R a i n b o w - U - L i g h t

Parts list:

2 x LED –Rainbow	5mm
1 x Acrylic sheet	3 x 30 x 160mm
1 x Plastic rod	11dia x 200mm
1 x Wire red	500mm
1 x Wire black	500mm
2 x connectors	



Necessary tools and equipment:

Fine glass paper
Side cutters
Fretsaw with medium blade
Hot glue gun and two component glue
Craft knife
Drills 5dia

Safety Note

The LEDs can be tested by holding them across the terminals of a 4.5 volt battery. However you must be sure to have the correct polarity.

The longer leg of the LED is the plus + pole and connects to the battery plus

The shorter leg of the LED is the minus – pole and connects to the battery minus

Connecting the LED the wrong way around will destroy the component .

Please Note

The OPITEC range of projects is not intended as play toys for young children. They are teaching aids for young people learning the skills of Craft, Design and Technology. These projects should only be undertaken and tested with the guidance of a fully qualified adult. The finished projects are not suitable to give to children under 3 years old. Some parts can be swallowed. Danger of suffocation!

1. Product information

Light Emitting Diodes in comparison to normal light bulbs produce light without heat.

In a normal bulb there is Wolfram element wire that is heated until it glows- whereas the LED will stay cold. The Led functions due to the electrons flowing through a special crystal which in turn causes it to vibrate and send out light.

LEDs convert more electricity into light as normal bulbs and are therefore much more energy saving and have a very long life. They will in future gradually overtake most of the other forms of illumination of this type.

2. Instructions

2.1. Cutting and drilling the acrylic sheet



Photo 1

2.1.1 Sawing the acrylic sheet

Firstly saw the acrylic sheet to 9cm long (see pattern on the last page) Photo 1



Photo 2

2.1.2 Now drill the 2 x 5mm diameter holes in the acrylic sheet .

The easiest way to drill the hole is use the patterns on the last page. When drilling use a middle speed and do not exert pressure on the drill otherwise the acrylic may snap. Clean up the edge of the holes to remove any burr.

See photo 2



Photo 2a

2.1.3 Finally the acrylic sheet needs to rubbed with wet and dry paper so that there are no reflective surfaces left. See photo 2a

2.2 Abschneiden und Ankleben der Standbeine

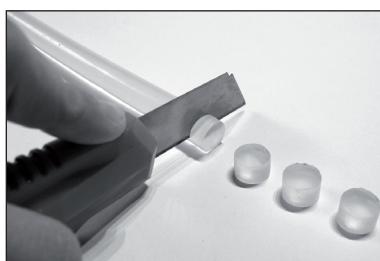


Photo 3

2.2.1 Cut four slices from the solid plastic tube. Use the craft knife to slice the pieces, each of the slices will be about 7mm and are used as the legs. Be careful to cut them equally and to see that the knife cut remains at 90 degrees to the tube. Photo:3



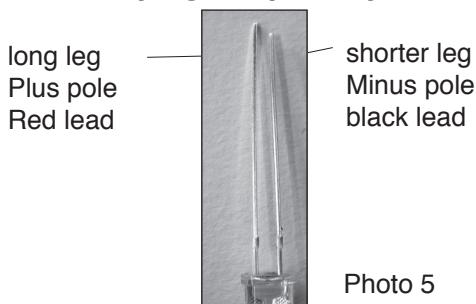
Photo 4

2.2.2 Gluing the legs

Now glue the legs with a hot glue gun into each of the corners on the acrylic sheet

It is important the legs fit exactly into the corners of the acrylic sheet lining up to the edges. Remove any excess glue with a knife. Photo 4

2.3. Identifying the polarity of the LEDs



2.3.1 Each LED has one long leg and one short leg. It is very important that the correct leg is connected to the correct pole of the battery.

The longer leg is the Plus pole (Red lead on the battery connector) and the shorter leg is connected to the minus pole on the battery (connect to black lead on the battery) – Photo: 5

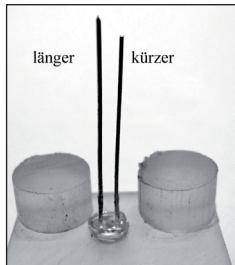


Photo 6

2.3.2 Connecting the first LED

Now insert the first LED into the holes between the feet with the connections uppermost. Ensure that the LED legs are spread apart and do not touch each other. The LED should fit exactly in the hole- the long leg to the right and the shorter to the left. The LED may be stiff to insert, so you must be careful not to damage the connections. Photo: 6

If the hole is too big for any reason apply a spot of hot glue to the LED to hold it in place.

2.3.3 Fixing the second LED

Note:

The second LED must be inserted so that the longer leg faces the shorter leg of the first LED .. The same goes for the remaining LED –shorter leg facing the longer. This must be checked carefully against the photographs otherwise the project will not work if these connections are incorrect. Also note that the legs must be facing upwards and the LED legs parted so that the longer leg is to the left and the shorter to the right see Photo: 7

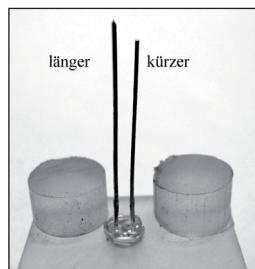


Photo 7

2.4 Wiring the legs of the LED together and connecting to the battery

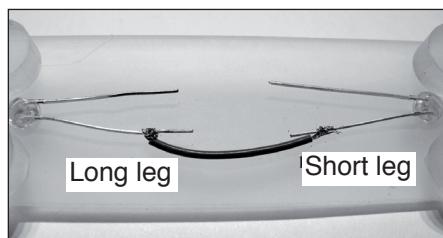


Photo 8

2.4.1 Wiring the LEDs

Cut a 20cm from both the black and red cable. Remove about 5-7mm insulation from the black cable at one end –and 4cm from the other end.

Take the red cable and remove 3.5cm insulation from one end and 5-7mm from the other

Now you can start to wire –carefully

Firstly bend the longer LED leg (+ pole) over about 5mm at the end leaving a small gap. See photo 8a

Now clamp the longer end of the red wire in the bent over LED leg so that it is held tight. See photo 8b

Next bend the shorter leg of the LED (-minus pole) over and connect the black cable

in the same way. See photo 8c

You can of course solder these connections in place

2.4.2 Fixing the end connectors

Slide the other end of the wires into the flat connector then clamp them in place with a pairs of pliers. As this is hard you may need to ask an adult for help. The connectors should be a tight fit on the ends of the wires.

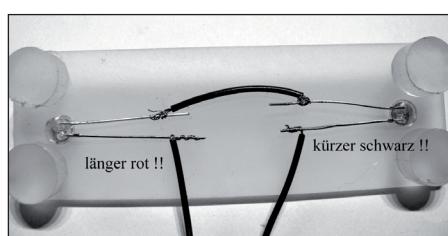


Photo 9

2.5 Testing the connection and protecting the cable from short circuits

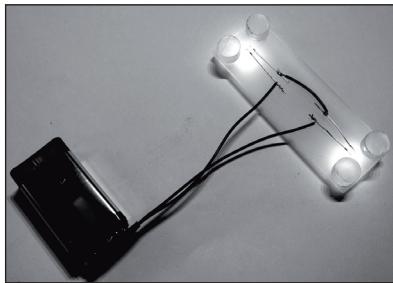


Photo 10

2.5.1 Testing the connections

To test the wiring circuit is functioning properly connect it to a 4.5volt battery

Firstly ben the legs of the LED apart so that thre is no danger f the legs touching each other (short circuit)

The place the black cable flat connector on to the longer metal strip on the battery and the red cable connector on to the short strip on the battery . Now the LED should light up.

Should this not happen immediately remove the connections from the battery. Check the circuit for loose contacts or mistakes in the wiring See photo 10.

2.5.2 Protecting from short circuits

Once the circuit has been tested the next stage is to protect any bare wires from short circuiting. To do this coat any bare wires with a layer of glue from a hot glue gun

It is important to coat where the battery cable connects to the LEDs and to ensure that the glue is thick enough. See Photo11See Photo11



Photo 11

2.6 Cutting and drilling and gluing the bow

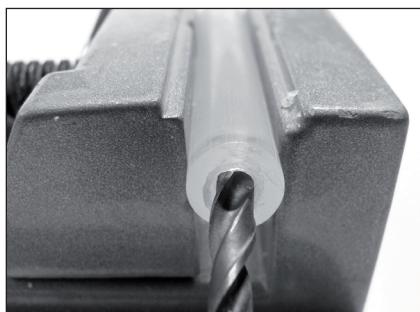


Photo 12

2.6.1 Use a craft knife to cut off a length of 16m from the solid plastic tube. Keep the cut as straight as possible. Also trim a couple of mm from the other end as they are not always manufactured square at the ends.

2.6.2 Drilling

Now drill a 5mm hole in each end of the plastic tube to a depth of 5mm. To do this clamp the tube in a vice as shown . If you drill too deep the hole can be filled using a hot glue gun.

Use the drill on a low speed setting. Photo: 12

2.7 Verkleben des Bogens



Photo 13

2.7.1 Now apply glue in one end of the tube and press it down on one of the LEDs as quick as possible. Leave the glue to set before attempting to bend it around into an arc. Holding it in place until the glue has set. Photo: 13

2.7.2 Now place glue in the other end of the tube and bend it around on to the second LED

So that everything stays in place until set holding both ends down until the glue has cooled down and set. Photo: 14

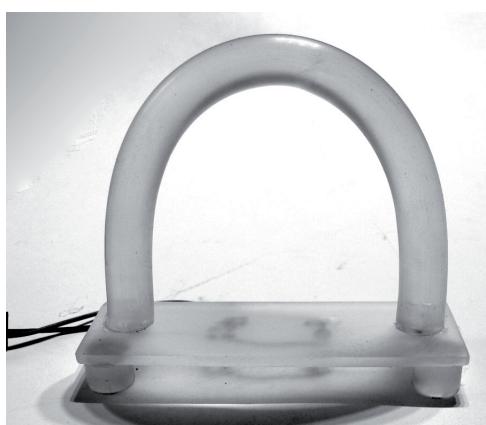
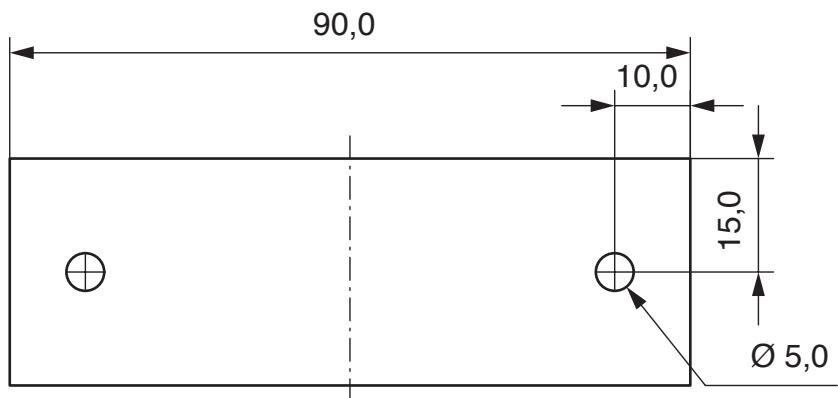


Photo 14

2.7.3 Testing the finished Rainbow -U Light project

Place the finished bow on a table in a darkened room and connect the battery. Now the rainbow should start to glow in the basic colours and within a few minutes the colours will start to mix more and more with each other

Acrylic size



Plastic tube

