RUDOLPH

and his flashing red nose

R1
(100R)
(brown, black, brown, gold)

R2
(220R)
(red, red, brown, gold)

LED
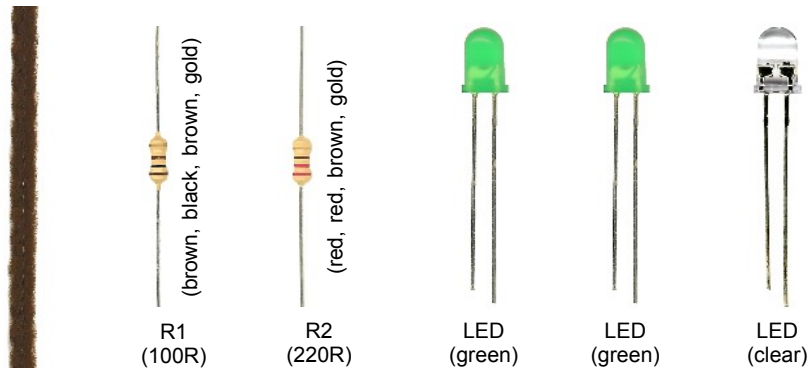(green)

LED
(green)

LED
(clear)

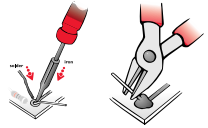Battery connectors

Polymorph
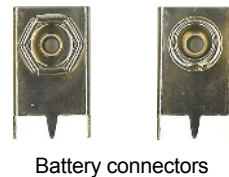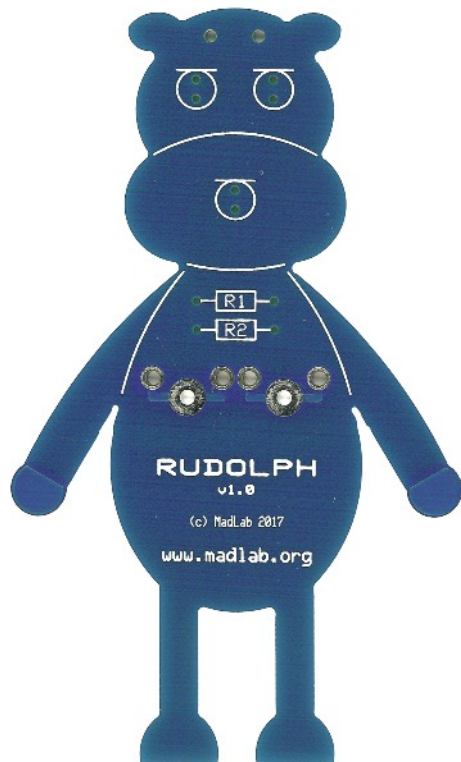
Pipe cleaner

Circuit board

1. Identify the different components using the spotter chart.

2. Find the resistors (R1 and R2) telling them apart by the coloured bands around their bodies. Bend the leads into a U-shape then fit them flat onto the front side of the circuit board. Bend the leads outwards into a V-shape to hold them in place. They can be fitted either way around.
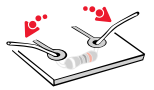
3. Fit the lights to the board - the coloured lights are the eyes and the clear light is the nose - putting the shorter lead into the hole with the line. The shorter lead also has a flattened edge on the rim. Bend the leads away from each other.

4. Solder the leads of the components to the back side of the board then clip the leads close to each solder joint.

5. Fit the battery connectors (BATT+ and BATT-) to the **back of the board** matching the shape to the symbol on the board (the hexagonal connector is positive, the circular negative). Ensure the connectors are pushed fully into the board and are at right angles to it. Solder the battery connectors to the **front side** of the board making sure all the holes are well filled with solder.

6. Connect a battery **(9V PP3)** to the battery connectors. The eyes should light up and the nose should start flashing.

7. Tip the polymorph into a cup or small bowl then melt it by pouring hot, but not boiling, water over it. With a spoon or similar tool collect the granules into a ball then place it over *Rudolph*'s nose and form it into a rounded shape. As the polymorph cools it will become white.

8. Cut the pipe cleaner into one 10cm piece and four 5cm pieces. Feed the long piece through the two holes in the head from the back of the board, then attach the smaller pieces two on each side to form the antlers. See picture overleaf.

Pipe cleaner cutting guide