

JWST Mirror Activity – Construction Notes

These notes provide guidance on how to construct the reflectors used in the JWST Mirror Activity.

They have been designed so as to make construction as simple and economic as possible, whilst remaining robust enough for classroom demonstrations. A material such as acrylic could be used but is expensive, it is prone to scratching and cracking if dropped. The materials used also have a lower environmental impact.

This resource enables the demonstrator to show how the JWST is able to focus, by moving the individual segments. It also gives an idea of scale of the real JWST as one collection of 18 segments when arranged correctly is approximately the same size as one real segment on the JWST, but within the limits of A3 sized material, to reduce costs and wastage.

Supplies needed:

18 off 100mm x 100mm Corrugated craft board 300gsm (for handle)

18 off A3 Foil Gold Card 240gsm

*18 off A3 Grey Board 2mm**

1 off 'Pritt' stick Adhesive

(* Grey board is available which is printed black on one side – this gives a very nice appearance, but is more expensive)

Tools Needed:

1 off Seam roller

1 off Clean work surface

1 off Craft knife

1 off Cutting mat

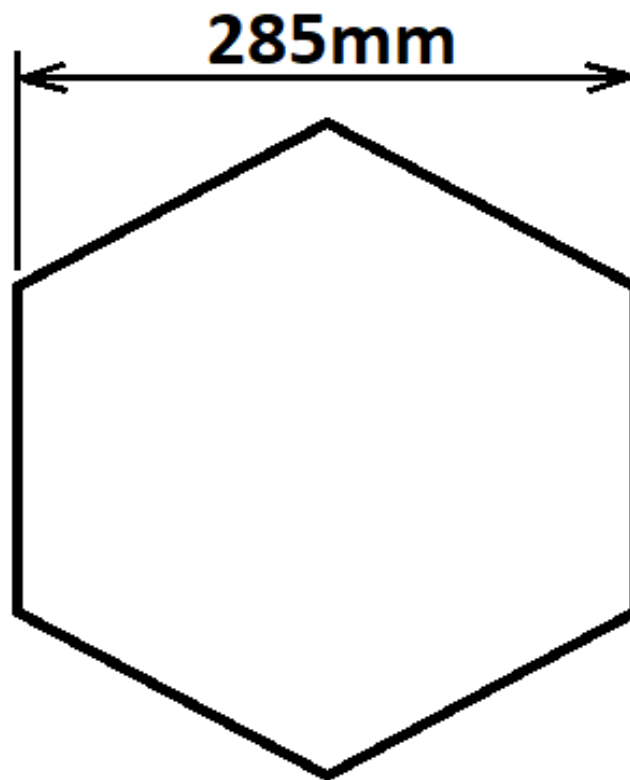
1 off Safety ruler

1 off Pencil for marking

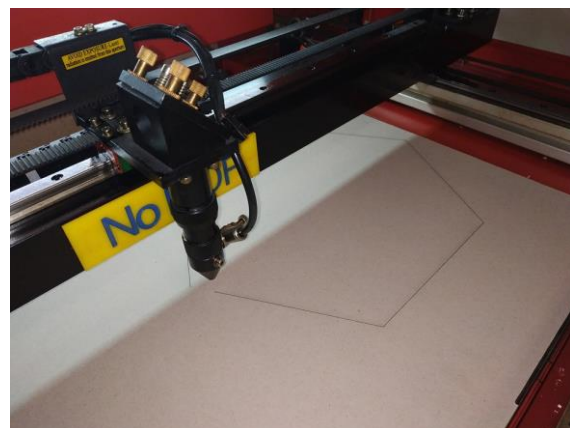
Alternatively a laser cutter can be used, this greatly speeds up the process. A DXF file for laser cutting is available on request: hillsdave@sky.com or d.l.hills@soton.ac.uk

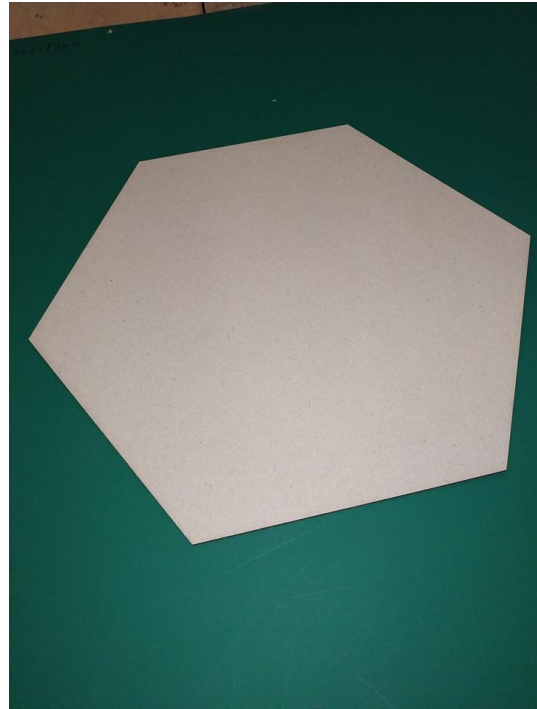
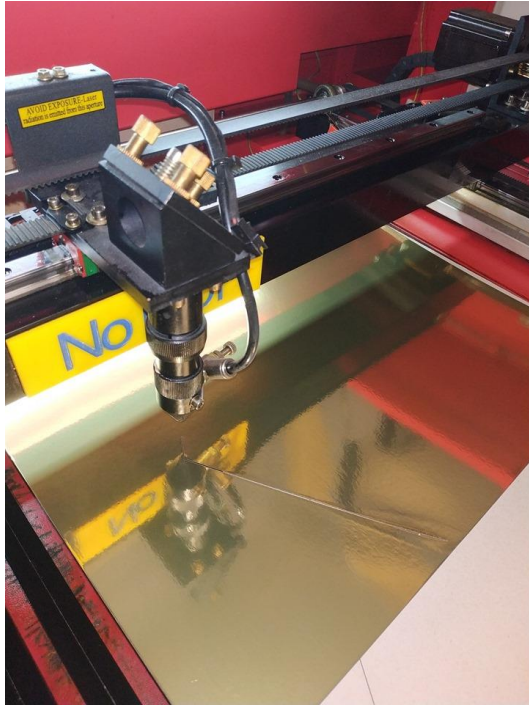
Assembly:

Begin by cutting 18 hexagon shapes from the grey card, to the dimensions shown.

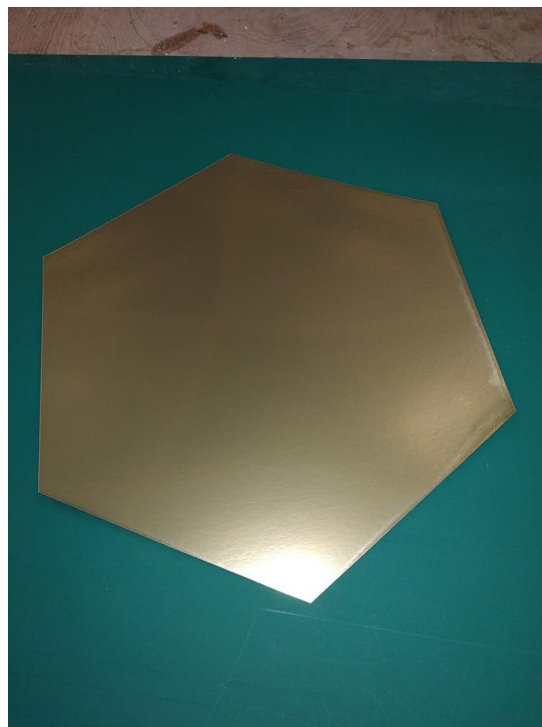


This is easily achieved, if you have a laser cutter, alternatively they can be gut using a craft knife, suitable ruler and cutting mat.

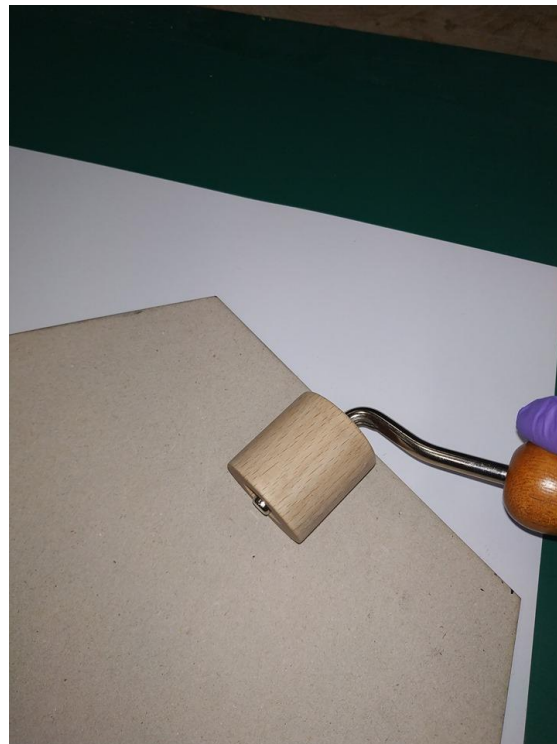
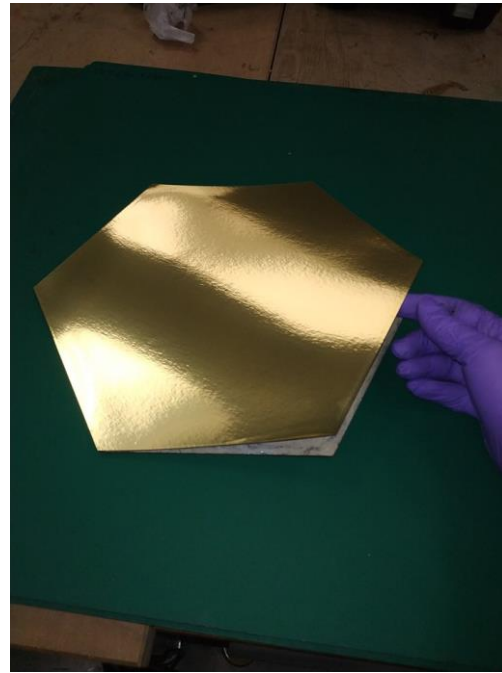
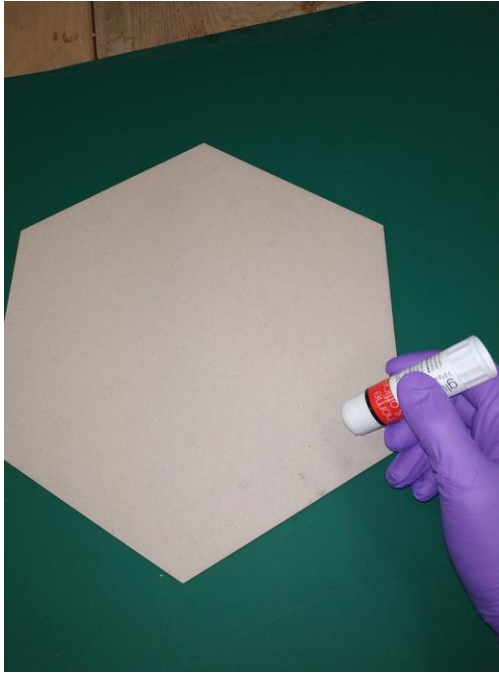




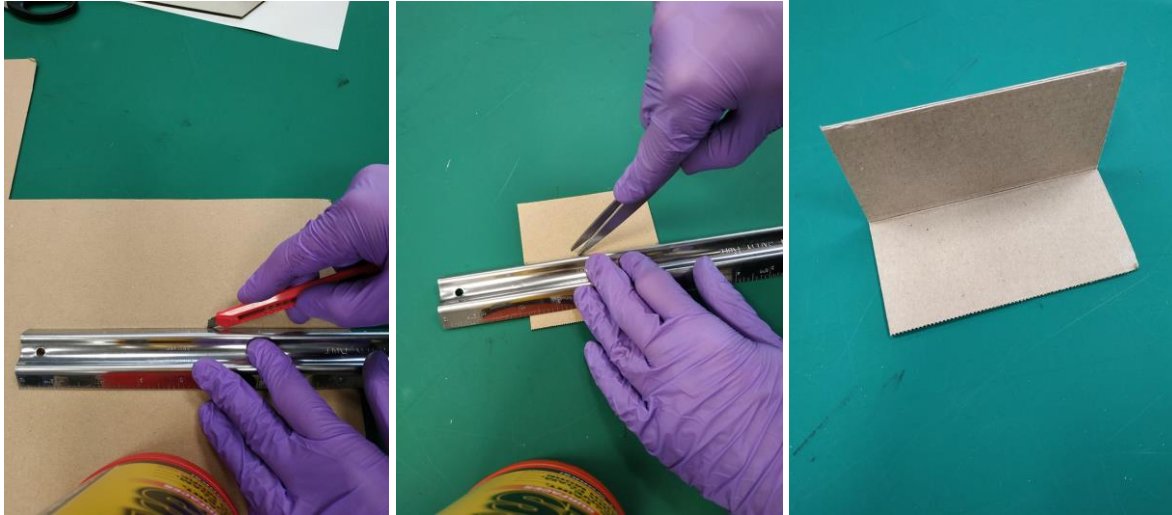
Next, cut 18 hexagon shapes from the mirrored card. Care should be taken not to mark the front surface of the card. It may be beneficial to wear gloves to do this.



Next, stick the grey card to the mirrored card using “Pritt” type adhesive. Simply coat the outside edge of the top surface of the grey board with adhesive; a strip about 1.5mm wide is sufficient. Apply the gold card hexagon and reposition if required, paying particular attention to the edges. Flip the parts over and gently apply pressure with the “seam roller” around the edges.



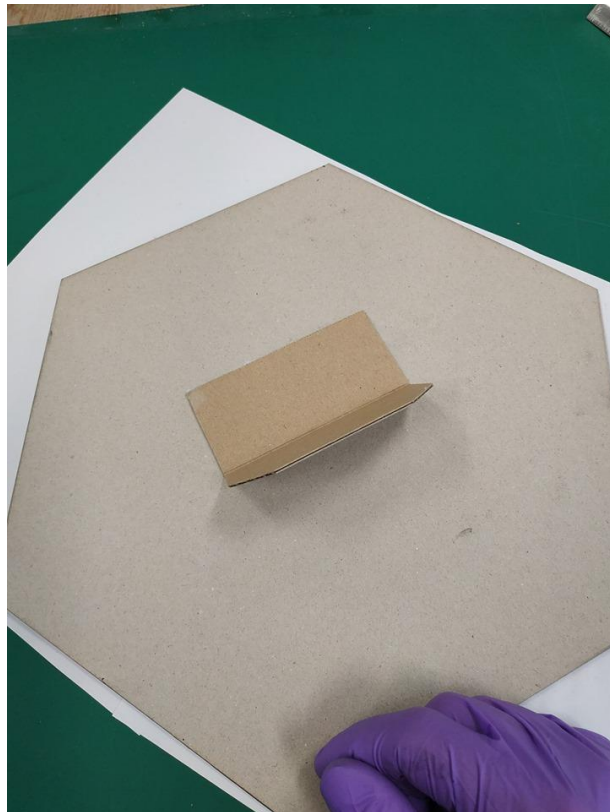
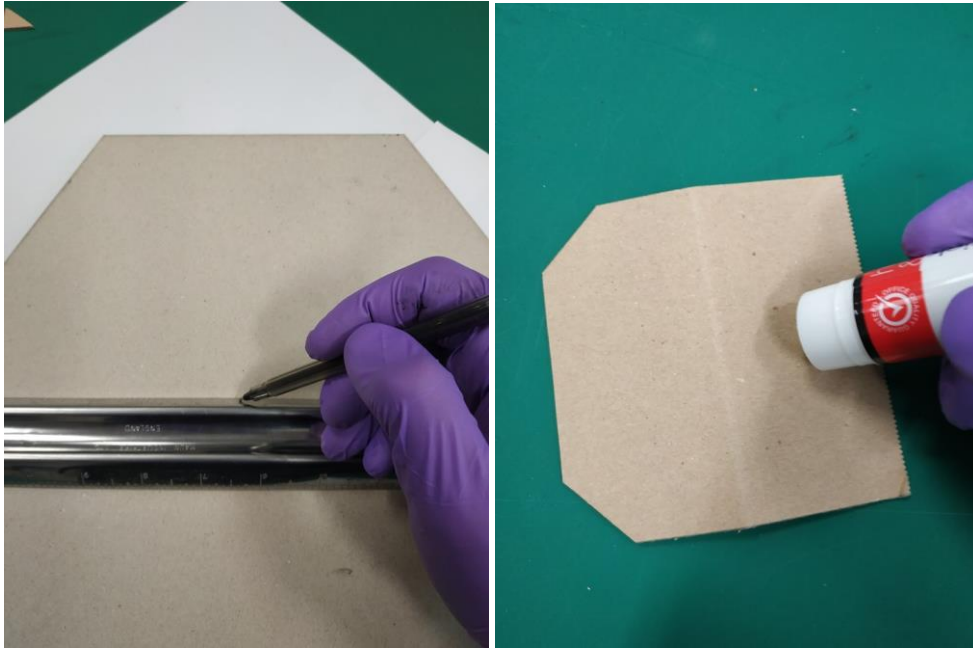
Then, cut a piece of corrugated craft card to 100mm x 100mm as shown and fold down the middle. This will become the handle. You will find that this card is easier to fold in one direction than the other. Ensure that you fold this piece of card along the “grain” for the neatest result. It helps to “indent” the cardboard with a blunt implement as shown, as this will result in a neater fold.



For an even neater appearance, trim two corners of this piece at 45° as shown.



Mark the centre of the hexagon, as shown. Apply adhesive to one side of the handle and stick to the rear of the hexagon, such that the fold sits on the centre line.



Repeat until you have 18 completed hexagons.

Note that when 18 of these hexagons are arranged as per the photograph, they are approximately the size of one real segment from the JWST.



Questions?

Please contact me (Dave Hills) on: hillsdave@sky.com or d.l.hills@soton.ac.uk and I'll attempt to answer your queries as soon as possible.