

A real working, telescopic-action periscope that is easy to make. It uses the 'measureless' box-making technique described in this book.

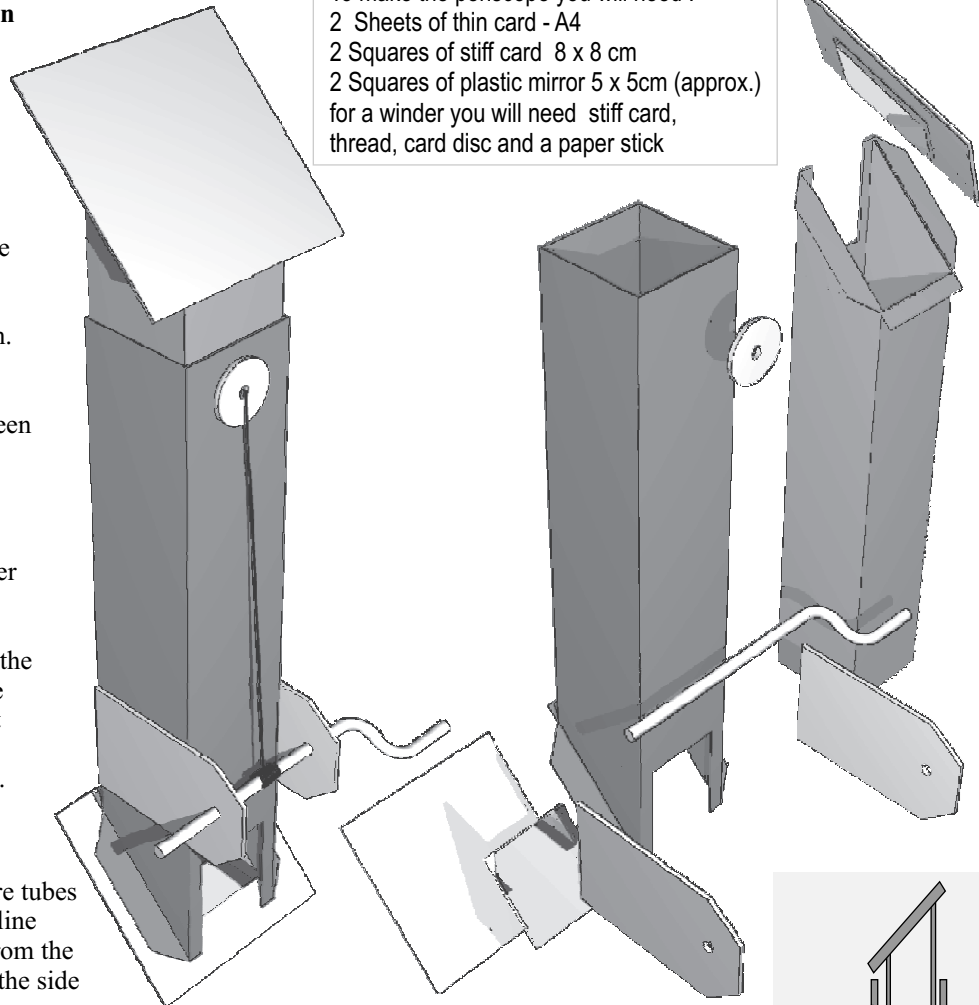
Look at the 'Boxing Clever' page for full instructions for making the two square card tubes. The outer tube is made from an A4 sheet - used lengthwise, ie. 210 x 297mm.

The inner tube has to be 1cm smaller so the A4 rectangle has been trimmed to 200 x 297mm.

This means that, assuming a 1cm glue tab, the sides of the outer section are 50mm (5cm). The inner is approx. 47½mm.

The most difficult step is making the 45° mounting for the mirrors. The way described below must be just about the easiest way to do this without having to measure angles.

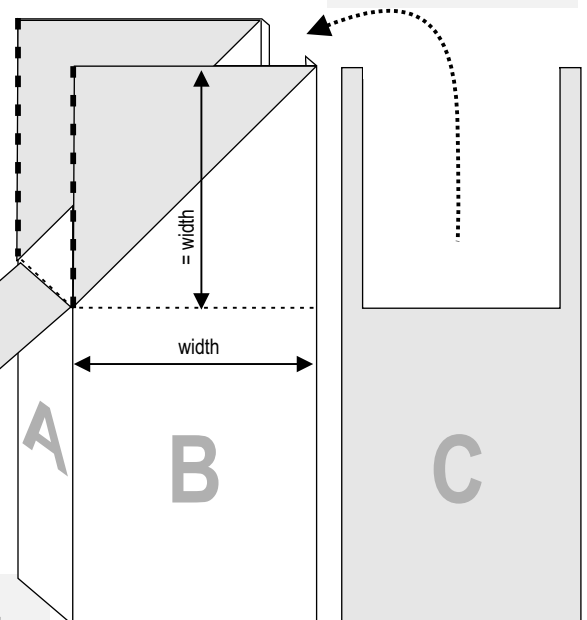
To make the periscope you will need :
 2 Sheets of thin card - A4
 2 Squares of stiff card 8 x 8 cm
 2 Squares of plastic mirror 5 x 5cm (approx.)
 for a winder you will need stiff card, thread, card disc and a paper stick



- Once you have made the square tubes take the outer one and mark a line round one end. The distance from the end should equal the width of the side ie. 5cm.
- Now cut down two ADJACENT corners as far as this line. Fold down the square so formed. This will form a glue tab - it can be cut off leaving about 1cm sticking out. This is side **A**
- The sides next to side A, are the two sides B and B. Fold down the top corner until it meets the drawn line. This will be a diagonal fold - this is how we get the necessary 45°. These also form tabs and may be trimmed as the tab on side A.
- The fourth side has a window cut from it. Notice that a strip is retained on each side. This will help stiffen the structure.
- Prepare the mirror - Glue a 4-5cm square of plastic mirror to an 8cm square of stiff card. This is where a little double sided tape would be ideal. Now fasten this unit to the tabs you've made at the end of the tube. Mirror inside of course.
- Now repeat the whole procedure with the other tube and a second mirror unit. When finished slide one tube inside the other and you should have a periscope. *Even if you have no intention of making it telescopic we would recommend making the periscope from two sections. If your class cut and fold both ends of a square tube then you can be sure many of them will get the angles the wrong way.*

To make the periscope telescopic fasten a thread INSIDE the bottom of the inner section (use masking tape). Bring the thread up and through a hole near the top of the outer section. The one shown has the hole reinforced with a card disc. When the thread is pulled the inner section rises. Make a simple winder if you wish. The information you need is shown on the drawing - or look up the 'crane' worksheets.

Path of the thread - taped inside the bottom of the inner section, then up through a hole in the top of the outer section. This end could be fastened to a winder glued to the outer.



If you turn the inner the other way round you see what's behind you -
 but it's upside down!