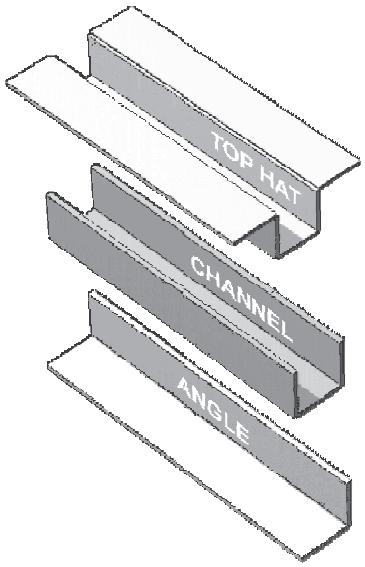


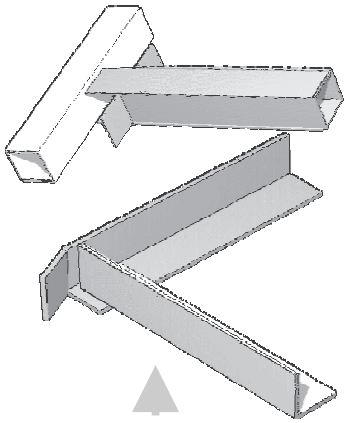
The angle is only one fold, is easy to make and so popular. It does twist easily however, and so can lose some of its stiffness.

The channel has two folds. More awkward to make but easier to use. You can, however, make channel by gluing together two angle girders.

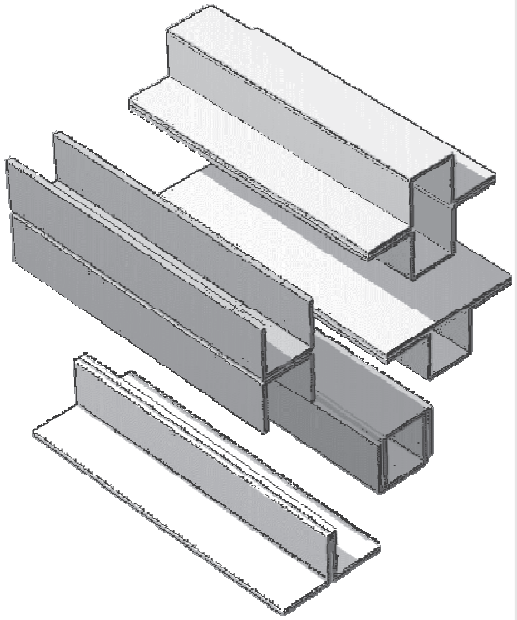
The top hat is very rigid but difficult to fold. If you use a basic tabscorer you will need to score and fold, then push the doubled card into the tabscorer again.

Although the tabscorer opposite was designed to help make glue tabs, it is also useful for scoring longer lengths of thin card or paper for girders.

Every **section** *(the shape you see when you cut across the girder)* shown here can be made with a 1cm. tabscorer. If you want a different distance between the fold and the edge it would be easy to make a tabscorer to produce that measurement.

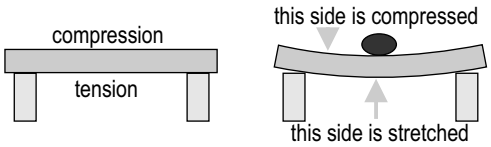


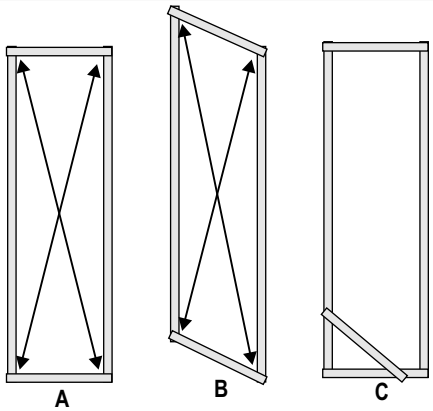
When joining card girders DO NOT be tempted to flatten them where they come together. This will destroy the strength and your construction is doomed!
With a little experimentation you can find ways to join them without distorting the sections.



For larger constructions you can combine the sections opposite to make even stiffer girders. The two angles glued together are very useful and yet straightforward. The square tube made from two channels is very strong - use a strip of 10mm square wood as a former when you glue them together.
You can do the same with the compound shapes formed with the top-hat section.
If any of these are made using A4 copy card, they will be just under 30cm long. Short lengths of 10mm square wood can be pushed into the ends to form linking pieces. Several 30cm lengths may be joined to create longer members.

Here are just a few words about **Compression** and **Tension**, as they are likely to affect our structures. Yes, it can appear very 'technical', but we are only dealing with primary school science and technology here, so we don't need to get carried away with all this **stress**!
1. When we pull a toy along on the end of a piece of string the string is in tension. The force of friction tries to slow down the toy. The string keeps it moving. If it's a length of elastic it will stretch. String copes well with **tension**. Now, if we want to push our toy the string isn't going to be much use. It will bend, because it isn't any good at all at withstanding **compression**. Swap it for a piece of wood and every thing is OK. Wood is good at coping with compression. It is stiff.
A strip of paper or thin card behaves like the string most of the time, except that where the string will bend in all directions, the paper won't. It's pretty difficult to lay a strip of card on the table and then bend it into a curve that's still flat on the table. That's because you would be asking one edge of the strip to get longer and the opposite edge to get shorter. So we find that different parts of the same object can experience tension and compression at the same time. That's what is going to happen to our structures. Some parts will be 'stretched' and others 'squashed'.
A basic understanding of these forces will really help, even if you can't find it mentioned in the curriculum. In fact most of us have gained some knowledge of this through experience, even if we haven't always used the correct terms. If we are worried that a shelf might fall down when something heavy is placed on it, we know that we could prop it up with something stiff (a STRUT to withstand compression), or we could tie it to something higher with a length of cord or rope (a STAY to withstand tension).
Of course if you stood up suddenly underneath the shelf and pushed the shelf up with your head, then neither of our two solutions would be any good whatsoever! Why not?





A is a rectangular frame - note that the diagonals are of equal length.
B is the same frame but it has become distorted by some external force. Note that the diagonals are now different lengths. If we put struts or stays across the corners we could prevent this distortion.
How many STRUTS would be enough?
How many STAYS would do the job?
C is the same frame with an extra piece of wood tacked across one corner, Would this make any difference?