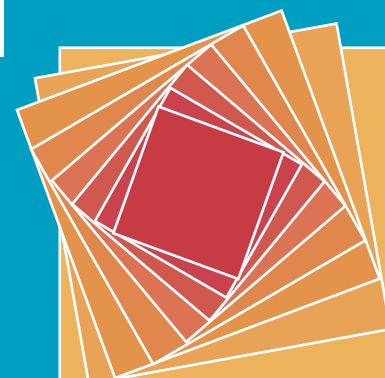


Exeter Maths School Blanket

Skills and Experience ●●●●●

The Exeter Maths School logo is a bright and “mathematical-looking” picture of rotating squares varying in colour between yellow and red, bursting out of the confines of the base square. The corners of the squares make a smooth curve in the bottom right of the picture, although the escaping squares in the top left break the curve.

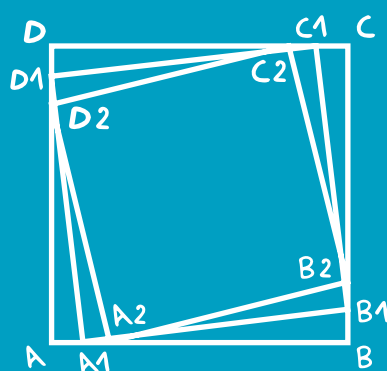
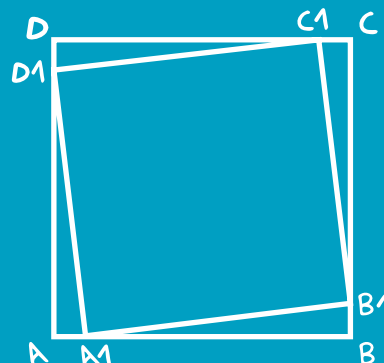
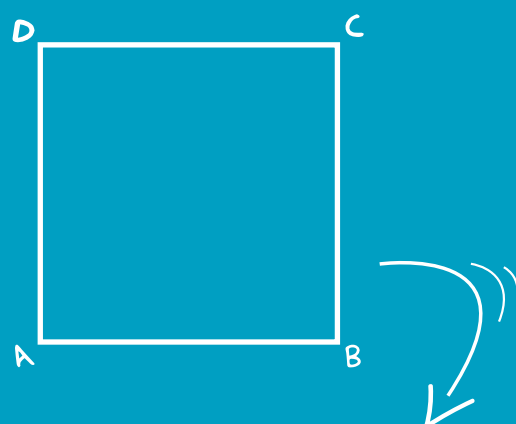


How it relates to maths

The logo is reminiscent of a curve of pursuit diagram. Suppose four robots stand at the four corners of a one metre square. A is chasing B, B is chasing C, C is chasing D and D is chasing A. Each robot looks to see where the robot they are chasing is and then looks down and moves in a straight line towards that position for 10cm. Now each robot looks up and sees the robot they are chasing has moved, so they change their direction towards where it is now, before looking down and moving 10cm in a straight line again. Then each robot looks up again, sees the robot they are chasing has moved again, and moves 10cm towards it once more. The shape this creates is called a curve of pursuit.

Is the Exeter Maths School logo based on this? It has eight squares, so here is a construction of a curve of pursuit with eight squares, moving a constant distance each time:

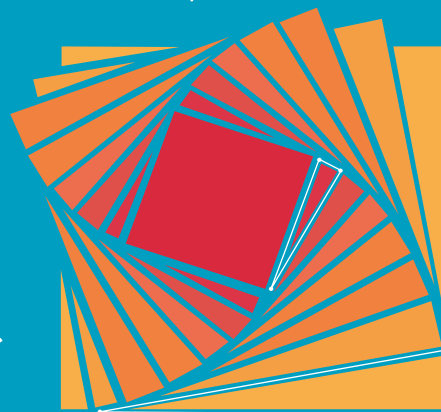
You can see that the angles get larger each time, but this doesn't look quite like our logo.



If you look at the logo again and think in a different way, you could see it as a central square with congruent right-angled triangles on each side. Starting from a square and building right-angled triangles on each side with angles 90° , 9° and 81° gives something like this:



That has more of the feeling of the logo without the breakout squares. So IS it based on triangles with the same angles? Let's see...



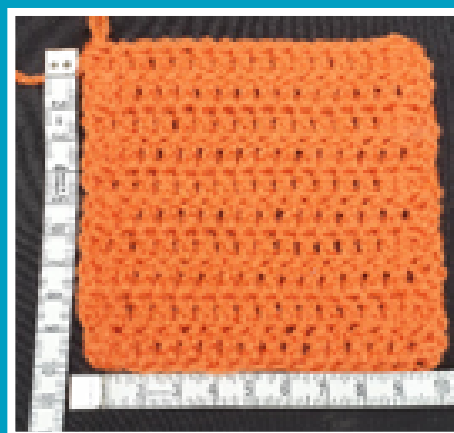
That does look closer to a constant angle than a constant distance travelled.

If you want to see the curve of pursuit on top of the constant angle picture, look at the Geogebra file "Angle Distance". If you click on the box labelled "Constant Angle" you will see the shape the blanket is based on. If you click on the box labelled "Constant Distance" you will see what happens if we start with the same outer square and the same outer triangles as in the constant angle pattern, but continue it with a constant distance moved each time for the same number of steps.

The box labelled "Const dist from inside" shows what happens if you start with the same inner square as the constant angle pattern and the same inner triangles, but then continue, going outwards, moving a constant distance each time for the same number of steps. You might like to think about how I constructed these drawings!

If you want to make a blanket of a different size look at the spreadsheet "Row calculations". I have been working with 16 stitches with the "thick" stitch at either end of ten rows to make a 10cm by 10cm square. In the spreadsheet you can change the yellow cells to take into account a different tension, as well as to see what size blanket will be made and how much yarn of each colour you will need. All of these calculations will be very approximate because everything is rounded, so errors accumulate. The size of the blanket might be a bit bigger too, because crotchet work stretches, making it hard to measure. The spreadsheet can give you a rough idea however.

If you are interested in the trigonometry used to work out the dimensions of this blanket pattern, look at the file called "Trigonometry".



What you'll need

Double knitting yarn in 8 different colours and white to be the outlines to sew the different pieces together. I used Scheepjes Colour Crafter 100% acrylic. I brought 200g of each of the colours from red to yellow and 300g of "Weert" or white. I made a smaller blanket and a larger blanket with this amount. The direction below are for the larger blanket, which ends up about 134cm square and the quantities used were:



100g of Maastricht
40g of Amsterdam
45 g of Vlissingen
60g of Leeuwarden
100g of Weert

75g of Gent
95g of Eindhoven
130g of Gouda
155g of Brussel



A crochet hook
of size 4mm



A tapestry,
darning or
wool needle



Scissors



Stitch markers
or safety pins

Step-by-step instructions

Thick Stitch

The blanket is made of an inner square and seven sets of four triangles, crocheted together with white yarn. The basic stitch used is UK treble crochet (called double crochet in the US) but I want the edges of the inner square and the triangles to be more robust than the usual stitch, so I use a stitch which puts two trebles into one stitch without increasing the number of stitches. I will call this a "thick stitch" in these instructions. It is demonstrated in the video of "[Making a triangle](#)", but a written description is below.

1 Yarn over and put the hook into the stitch you are working on. Pull the yarn through. There should be three loops on your hook.

2 Yarn over and pull through two of the loops on your hook. There should now be two loops on your hook.

3 Yarn over and put the hook through the same stitch as before. Pull the yarn through. There should be four loops on your hook.

4 Yarn over and pull through two of the loops on your hook. There should now be three loops on your hook.

5 Yarn over and pull through all 3 of the loops on your hook. There should now be 1 loop on your hook and your "thick stitch" is complete

Inner square

1 Make a slip knot with Maastricht and chain 83.

2 Chain two more and work a thick stitch into the 83rd chain.

3 Work treble stitches into the next 81 chains.

4 Work a thick stitch into the last chain.

5 Work rows in treble with the first and last stitch of each row being a thick stitch until you have worked 52 rows. This should now be approximately a square.



First Set of Triangles

- 1** Make a slip knot with Amsterdam and chain two.
- 2** Work a thick stitch into the original slip knot.
- 3** Row 2: chain two and work a thick stitch into the last loop of the first row.
- 4** Row 3: chain two and work a thick stitch into the last loop of the second row.
- 5** Row 4: chain two and work a thick stitch into the last loop of the third row.
- 6** Row 4: chain two and work a thick stitch into the last loop of the third row.
- 7** Row 5: chain two and work two thick stitches into the last loop of the fourth row.
- 8** Row 6: chain two and work a thick stitch into each of the two stitches of the previous row.
- 9** Repeat until you have four rows of two stitches.
- 10** Row 9: chain two and put a thick stitch then a normal treble into the first stitch of the previous row and a single thick stitch into the second stitch of the previous row. Put a marker in this row in the first stitch and also one in row five, on the same side of the triangle.
- 11** Row 10: chain two and work a thick stitch, a treble and a thick stitch into the three stitches of the previous row.
- 12** Repeat until you have 4 rows of 3 stitches.
- 13** Row 13: chain two and work a thick stitch and a treble into the first stitch of the previous row, then a treble and a thick stitch into the two remaining stitches. Put a marker in the first thick stitch of this row.
- 14** Continue like this, making every first and last stitch in a row thick and all the middle stitches treble with an increase in every fourth row until you have completed 44 rows.
- 15** Make three more triangles identical to this first one.

Attaching the Triangles to the Squares

- 1** Place the first triangle on top of the square with the hypotenuse along the edge, the larger acute angle in the top right corner and the right angle away from the edge like this:



- 2** Work double crochet (UK double, US single) along the shared edge in Weert completely along the square.

- 3** Attach the other three triangles along the other three sides, and unfold them to make a new, larger square.

Other Triangles

- 1** Work 4 triangles in Vlissingen in the same way as the Amsterdam triangles were made, but with 51 rows each and attach them to the larger square with Weert.

- 2** Work 4 triangles in Leeuwarden with 59 rows each and attach them to the growing square.

- 3** Work 4 triangles in Gent with 68 rows each and attach them to the growing square.

- 4** Work 4 triangles in Eindhoven with 78 rows each and attach them to the growing square.

- 5** Work 4 triangles in Gouda with 89 rows each and attach them to the growing square.

- 6** Work 4 triangles in Brussel with 102 rows each and attach them to the growing square.

- 7** Work double crochet (US single) in Weert completely around the final square.

Quick Tips



Take a look at the video "[Making a triangle](#)" which shows how to do the thick stitches and how to construct a right-angled triangle.

There is also a video called "[Adding the triangles](#)" which shows how to attach the triangles to the square.

There are two mistakes in the video "Adding the triangles". When attaching a triangle to the square I put two stitches in every row. In the video I only put one in the first rows. Also, I started attaching the second triangle on the wrong side of the square. I left it in the video (annotated where the mistake happened!) to show how easy it is to recognise mistakes in crochet and to correct them.

By putting markers on the side of a triangle when you increase it makes it easy to keep count of the number of rows you have made (count the markers and multiply by four), it makes it easy to see which end of a row you should increase on (always increasing on the same side of the triangle makes it right-angled) and it makes it easy to check whether you have gone wrong (the 1st marker should be in a row of two stitches, the 2nd marker in a row of three stitches, and the n th marker in a row of $n+1$ stitches).

