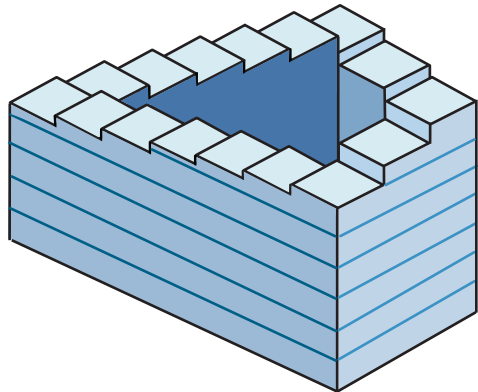


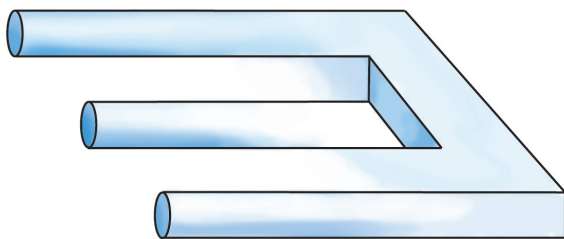
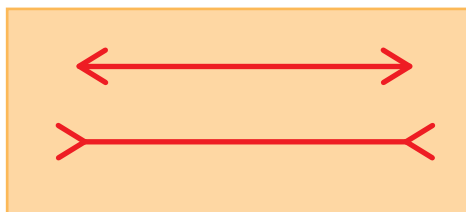
Optical illusions

Graphical and optical illusions are fascinating. Look carefully at the following images. Can you work out how you are being deceived? Using Mathomat it is possible to reproduce them or create some of your own.

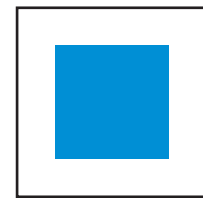
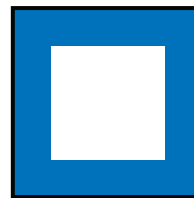


Impossible stairs
Walk down the stairs. Will you ever stop descending? This illusion can be created using shape 21.

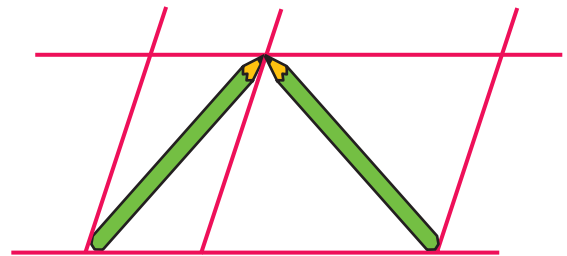
Which is longer?
Which is the longest line? Measure them. The direction of the arrowheads are misleading.



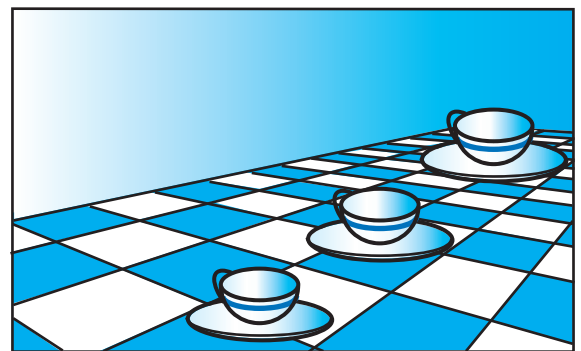
Two or three paradox
The top shows two legs but there are three at the bottom. If you study the drawing you can find how the paradox has been created.



Same squares?
Are the two centre squares the same size? Check them with shape 25.

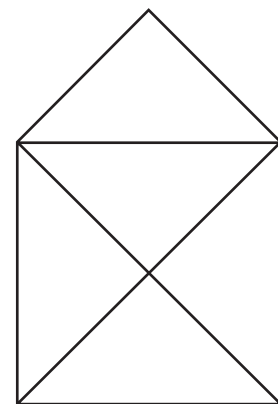
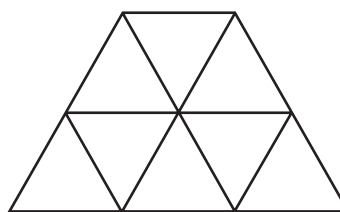
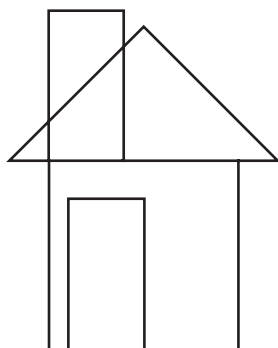
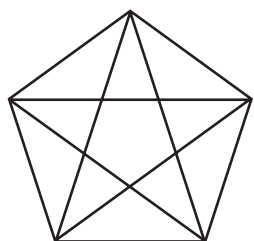


Which is longer?
Which pencil is the longest? Measure them. The parallel lines are there to confuse the eye.

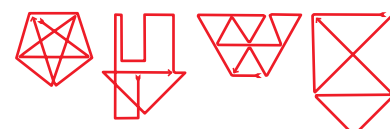


Most tea
Which cup and saucer is the largest? Measure them. The perspective of the tablecloth creates an illusion of depth.

Some geometric challenges

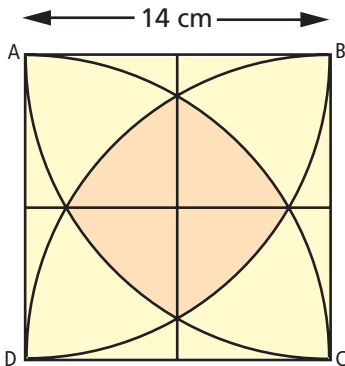


Draw these designs in pencil with Mathomat. Then draw over them in ink without retracing a path or taking the pen from the paper. Turn the page upside down for solutions.



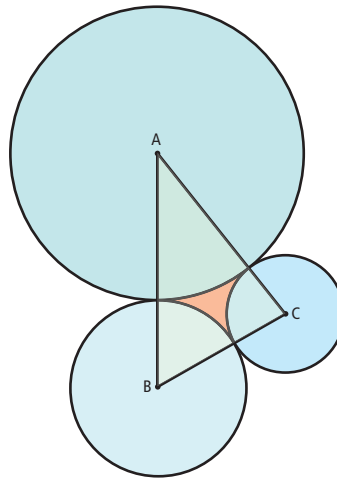
Geometric problem solving

There are many examples where a problem can be solved by drawing a diagram accurately with Mathomat. Here are four that can be solved using Mathomat.



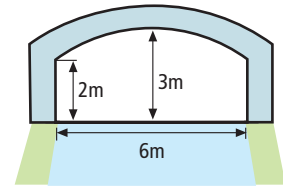
1. A, B, C, and D are the vertices of a square region of sides 14 cm, and are respectively the centres of four quarter circles with a radii of 14 cm drawn within the square. Calculate the area of the region that is common to the four quarter circles and the square.

1. The area is 61.74 square cm.



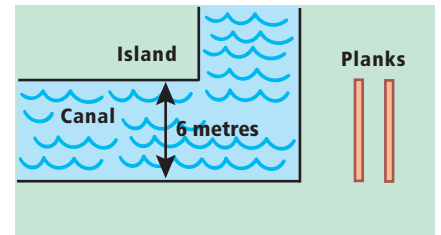
2. Three circular regions with centres A, B, C have respective radii 50, 30, 20 cm and are tangent to each other externally. Find the area enclosed by the curvilinear triangle formed by the three circles. Use shapes 10, 18 and 45. "S" rule-cosine rule.

2. The area is 141.89 square cm.



3. Calculate the radius of a circular archway that is to start 2 metres above ground level, span 6 metres and be 3 metres at its highest point above ground level.

3. 5 metres.



4. How could the two planks, each 6 metres long, be used to bridge the canal to the inner island? Neither is long enough to span the water, and they are not to be fastened together.

4. Solution at foot of following page.

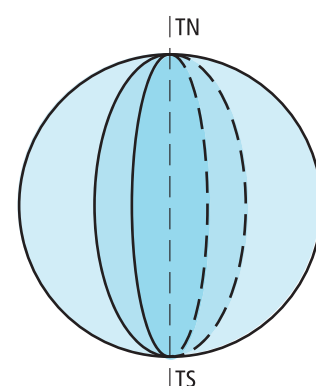
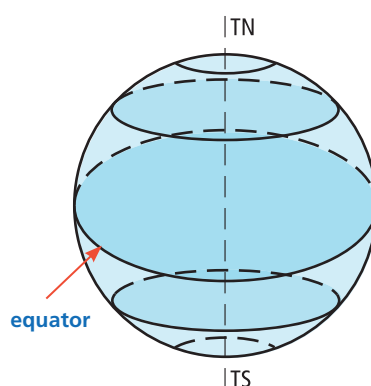
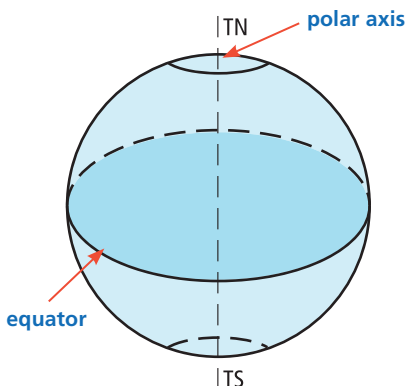
Exploring navigation

You can explore concepts in navigation such as latitude and longitude, great and small circles, and meridians using your Mathomat. Shapes 11, 15, 35, 26, 43 and 39 have been designed to assist in illustrating:

● the earth as a sphere

● parallels of latitude

● meridians of longitude



The earth rotates on its own axis which is known as the geographic Polar Axis. The two points where the axis meets the surface are called the north geographic pole, or **True North (TN)**, and the south geographic pole, or **True South (TS)**.