NOT-SO-SQUARE FENCE

A fence is built around a square field. Suppose another fence is built exactly one metre longer so the path between the two fences is the same width all the way round including at the corners of the field where the fence goes along an arc of a circle.

1. How wide would this path be?
2. Would a mouse be able to run along this path?
3. Could a farmer drive his cows along the path between the two fences?
4. If you were the farmer and you had already decided on the width that you wanted to make the path how would you work out how much fencing to buy for the outer fence.

Help

The diagram shows that the outer fence is curved at the corners to make the path the same width everywhere. What sort of curve is this? Copy the diagram and mark the 'extra' fence at the corners. What shape do you get if you put the four extra curved bits of fence together? The length of this curve has a different name but it is still the distance all the way round the edge (the perimeter).

Next

See 'Belt around the Earth' problem https://aiminghigh.aimssec.ac.za/years-8-12-belt-around-the-earth/ on the AIMING HIGHER Teacher Network.

To solve this problem you also need the circumference of a circle. In this problem there is a belt around the Equator and it is stretched by exactly one metre and lifted up so that it is the same distance away from the Earth everywhere. You have to find this distance.

Then you might generalize the problem and investigate what happens if the field is in the shape of an equilateral triangle. How wide would the path then be?