Solution (#1128) The ellipse $x^2/a^2 + y^2/b^2 = 1$ can be produced by deforming the unit circle $x^2 + y^2 = 1$ under the map

$$\left(\begin{array}{c} x\\ y\end{array}\right)\longmapsto \left(\begin{array}{c} a & 0\\ 0 & b\end{array}\right)\left(\begin{array}{c} x\\ y\end{array}\right).$$

As this matrix has determinant ab (3.48), then the original area of the unit disc – which is π – becomes πab .