

Largest Area

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The largest ellipse that can fit inside a square is a circle. To obtain the answer for an arbitrary rectangle, one must apply an affine transformation to convert the square into a rectangle, which will also transform the circle into an ellipse. Affine transformations preserve area ratios, which implies that the resulting ellipse will have the largest possible area.

From this reasoning, we can conclude that the ratio of the area of the largest ellipse to the area of the rectangle containing it is constant. For a square, this ratio is $\frac{\pi}{4}$; thus, the solution to the problem is to calculate the area of the rectangle (for example, using the pseudo-scalar product of the vectors of two of its adjacent sides) and multiply it by $\frac{\pi}{4}$.