ABSTRACT. This paper introduces a geometrically constrained variational problem for the area functional. We consider the area restricted to the lagrangian surfaces of a Kähler surface, or, more generally, a symplectic 4-manifold with suitable metric, and study its critical points and in particular its minimizers. We apply this study to the problem of finding canonical representatives of the lagrangian homology (that part of the homology generated by lagrangian cycles). We show that the lagrangian homology of a Kähler surface (or of a symplectic 4-manifold) is generated by minimizing lagrangian surfaces that are branched immersions except at finitely many singular points. We precisely describe the structure of these singular points. In particular, these singular points are represented by lagrangian cones with an associated local Maslov index. Only those cones of Maslov index 1 or -1 may be area minimizing. The mean curvature of the minimizers satisfies a first-order system of partial differential equations of "Hodge-type".