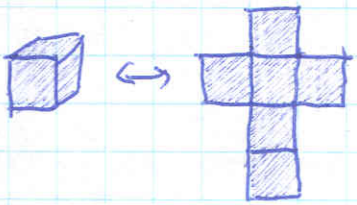
Polyhedron (un)folding



6.885
L 10.1
Oct. 13, 2004

Overview:

- [Metamorphis of Cube video]
- unfolding: when can a polyhedron be cut along its surface & unfolded into the plane without overlap?
- folding: when can a polygon be glued along its boundary & folded to form a (convex) polyhedron?
  (exact covering – no multiple layers like origami)

Types of unfolding: (more later)

- edge unfolding: just cut along polyhedron edges
- general unfolding: cut anywhere along surface
- goal: one piece, no overlap
  ← (unless otherwise specified)

Summary:

	edge unfolding?	general unfolding?
convex polyhedra	OPEN	YES
nonconvex polyhedra	NO	OPEN

Big problems:

OPEN: does every convex polyhedron have an edge unfolding?
[Dürer 1525; Shephard 1975]

OPEN: does every polyhedron without boundary (e.g., homeomorphic to sphere) have a general unfolding?
[Bern, Demaine, Eppstein, Kuo 1999]