# Design your own non-standard bookshelf: Guidelines for teachers

**Abstract**
The students design a non-rectangular bookshelf for a wall. The design must be feasible with the available tools/possibilities and must contain a detailed plan for realizing the bookshelf. In a less open formulation the bookshelf has to possess several properties: have regular polygonal cells, modular construction, etc.
**Discipline**: mathematics
**Age group**: 11-18 years
**Time**: 100 minutes

**Preparation:**
- Make copies of the student worksheets
- Materials: paper, scissors, rulers, pairs of compasses
- Optional: computers to investigate regular polygonal shapes

**Extra information**
The task focuses on two particular aspects in the interior design of a room (home or office), the design itself and the manufacturing part as well, so it is a challenging experience to connect the theoretical design with the technical part. Provides a lot of opportunity to organize how the teacher works with the students (they can design a bookshelf for their classroom, for their home, they can work in pairs to make a design for each other).
it is a great opportunity to focus on how practical demands (like modular construction, reduced number of cuttings, etc.) influence the design, beyond the geometry of the design.
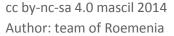
**Experiences**
A seven minutes video with a classroom experience

**End product**: a real bookshelf design, or a bookshelf

**Example lesson plan**:

First decide whether the given task is to design a non-standard bookshelf that completely covers a wall of 4m x 2,5m, has a modular construction and is formed by cells having regular polygonal shapes, or that you just ask the student to design a non-rectangular bookshelf.

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| 5 min | Organize your class in small working groups (2-3 students) and introduce the problem and the workplace: an interior designer or carpenter. and explain what is expected as a product. |
| 45 min | (worksheet) Students start to plan their task. You may decide after some time, to have a brief moment to check and share their ideas. Then the students can continue working. |
| 10 min | Present (all or a few) examples and discuss results. |
| | Possible solutions can be related to plane tiling with regular polygons, but the wow aspect is crucial because students must deal with the physical dimensions of the objects (for a mathematical background see http://en.wikipedia.org/wiki/Tiling_by_regular_polygons or Chavey, D. (1989). "Tilings by Regular Polygons—II: A Catalog of Tilings". *Computers & Mathematics with Applications* **17**: 147–165. doi:10.1016/0898-1221(89)90156-9. ). |