| # A geometric city | |
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| Respective blueprint | Building a medieval city |
| Description | Discover and build a geometric town in the Middle-Age: a bastide |
| Learning Objectives | 1: History of new towns in the Middle Ages (architecture, history of society)<br>2: Spatial location - use orthonormal markers<br>3: Tracing shapes |
| Related curricular subject(s) | History<br>Math (geometry, coordinate system) |
| Prerequisites / preparatory actions for teachers | It may be a good idea for the teacher to build a model in advance so that they have an idea of where the challenges might be, and the students will have a model to build from |
| Prerequisites / preparatory actions for students | Students should be able to create a simple coordinate system. |
| Age of students | 11-15 according to curricular standards |
| Duration | 2h |
| Level of difficulty | Easy |

## Step by step description of the tasks

Step 1 Discovering the “bastides”

The teacher explains what is a bastide and how the plan is drawn. All the information is on the corresponding blueprint

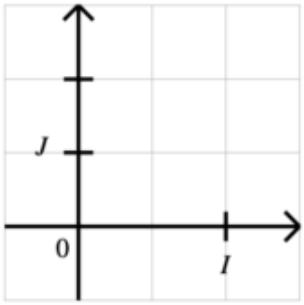
Bastide of Monpazier, in Dordogne (credit Wikipédia)

Credit Collège Despeyroux Beaumont de Lomagne

After having seen the history of bastides in Europe, the teacher explains to the students that they are going to make a model of a bastide located in the south of France, Beaumont de Lomagne. Moreover, this city is the home of Pierre de Fermat, the famous mathematician - a short presentation of this mathematician can be made.
They will first have to draw a map of the town, then draw and build the architectural elements that are emblematic of a bastide.

Step 2: Spatial location – using orthonormal markers

As they saw in the introduction to this lesson, the bastides have a very geometric structure. Students will draw a map of the town using an orthonormal coordinate system.




An orthogonal coordinate system is composed of 2 perpendicular graduated axes. The graduation of the axes makes it possible to locate points within the frame of reference.

Read the coordinates of the point

Point A is associated with 2 relative numbers which are its coordinates:

The 1st number is the abscissa: it indicates the position on the horizontal axis.

The 2nd number is the ordinate: it indicates the position on the vertical axis.

The coordinates of a point are always written in brackets and separated by a semicolon.

Locate a point

Draw two perpendicular lines:

A line perpendicular to the horizontal axis passing through the x-coordinate.

A line perpendicular to the vertical axis passing through the ordinate.

The point of intersection of the 2 lines is the position of a point in the frame of reference.

A group of 5 students build their own base, using the material provided. - cf blueprint.

The rest of the class have to locate the given points then they have to connect them with a rope.

Step 3: Tracing shapes

In this step, students will design the different elements of a bastide - cf blueprint:

- « Moulons » - house grouping
- Arcades
- Convents
- A presbytery
- Doors
- A church
- A market hall

The teacher divides the class into groups and each group must design different elements. They will have to use their mathematical instruments because each element is symbolized by a geometrical shape: a rectangle or a square.
The teacher must be attentive to students who do not use the instruments correctly.

Then, they have to locate these elements designed on the mathematical marker following the given coordinates. Cardboard glasses can also be placed.
The teacher should check if each element has been placed correctly.
It is necessary to pay attention, to make sure the coordinates of the given point correspond to the bottom left of each element.

To go further, it is possible to design elements in volume thanks to a 3D printer: the church, the hall, the « moulons »... in order to position them directly on the plan - cf blueprint.

## Assessment activities

The following questions can be asked by teachers to evaluate the activity:

What do you know about the Bastides?

How to place a point on an orthonormal coordinate system?