

## Building a gothic cathedral

Respective blueprint	Measures from the M-A
Description	Build a gothic cathedral using mathematical tools (plans, templates) and medieval measuring tools
Learning Objectives	<ol style="list-style-type: none"> <li>1: Discover the measuring instruments of the Middle Ages</li> <li>2: Draw a map of a cathedral</li> <li>3: Build your own cathedral</li> </ol>
Related curricular subject(s)	<p>Geometry</p> <p>History</p> <p>Measure</p>
Prerequisites / preparatory actions for teachers	Build the material before the lesson- <b>cf blueprint</b>
Prerequisites / preparatory actions for students	Documentary research on gothic cathedrals
Age of students	12 - 15 years old



Co-funded by the  
Erasmus+ Programme  
of the European Union



Duration	1h - 1h30
Level of difficulty	Medium

## Step by step description of the tasks

### Step 1 Discover the measuring instruments of the Middle Ages

Either the teacher builds the 2 medieval instruments seen in the **corresponding blueprint**, or they ask the students to build them.

For information, the wooden ruler can be made with cardboard instead of wood.

In order for all students to be able to manipulate the tool, a minimum of one tool is needed for approximately 3 people.



Wooden Ruler



13-knot rope

The master builder in the Middle Ages, must have known the means of calculating and all about geometry. He could use the theorems of Pythagoras and Thales, for example. He had read the works of Vitruvius, Heron of Alexandria and Euclid and therefore practiced the teachings of the Greek and Roman masters who preceded him. He also had the mathematical knowledge brought back from the Arabs by the crusades. Generally, the master builder used squares and long squares to establish the plans of buildings and used triangles for elevations.

**The wooden ruler** (la 'pige') is the builder's ruler, the main units of measurement are shown on it. Its size can vary. But generally, stonemasons used common measurements ranging from inches to cubits. This tool was easy to use and could be transported to the site. Each stonemason could take or check measurements at any time. The wooden ruler could also be used as rulers for stonemasons to check the straightness of their work.

**The 13-knot rope** was used to draw geometric figures quickly and easily. Before cutting an element, the builders traced the work to be carried out in real size. They could draw it on the ground, for example. To make these drawings, either they handled the rope between several people, or they used small stakes or spikes to block the rope. We can thus draw all the geometric figures with it: circles for towers, a large rectangle for the court, a triangle for a framework, a semi-circle for a dome... On a construction site, the rope also made it possible to take,



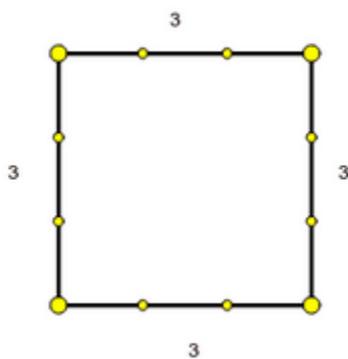
report or check measurements. The worker could thus measure the height of the wall, for example, by counting the number of intervals on the rope.

Some examples of the use of these instruments today:

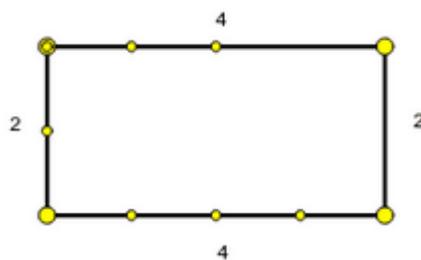
**The teacher can ask the students to use these tools to make a few lines on a large sheet of paper on the floor.**

**With the rope:**

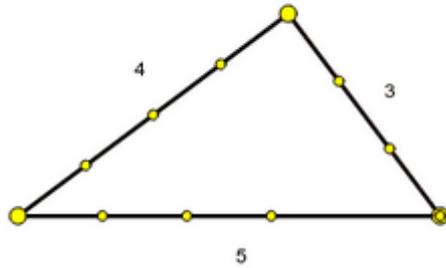
**A square 3/3/3/3**



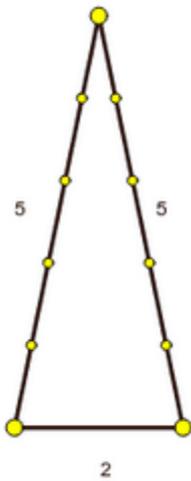
**A rectangle 2/4/2/4**



**A rectangular triangle 3/4/5**



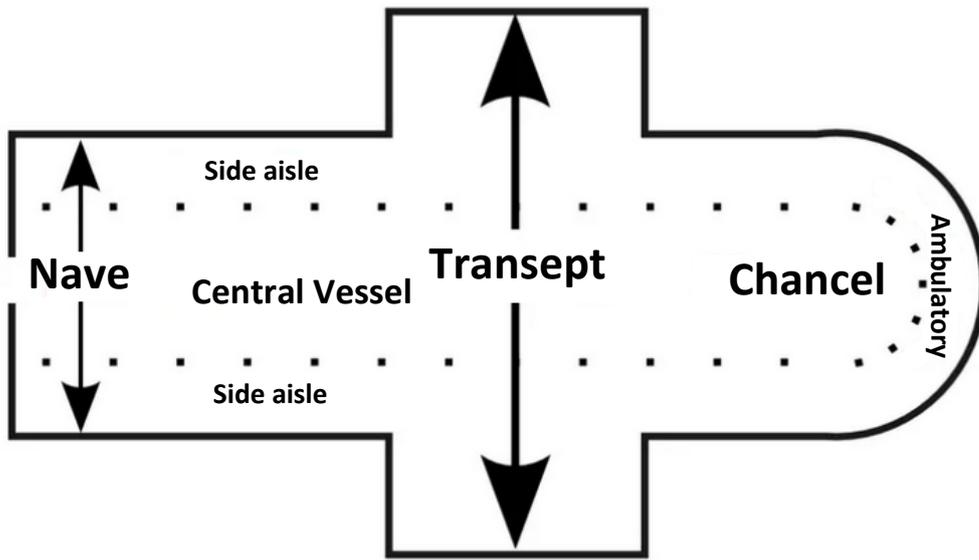
**An isosceles triangle 2/5/5**



Step 2: Draw a map of a cathedral

The teacher gives each group of students (3-5 students): a large sheet of paper, a pencil, a 13-knot rope and several models of existing gothic cathedral plans. The teacher may ask students to conduct documentary research on the internet beforehand.

The teacher can then talk about the different rooms in a cathedral: the nave, vessel, transept, heart, etc.



The instruction is then to draw a plan of a cathedral invented with the tools of the Middle Ages.

### Step 3: Build your own cathedral

On the basis of the drawn plan before, the students freely build a cathedral with wooden planks of the Kapla type.

The objective is to achieve a coherent elevation in terms of construction and solidity.



## Example



## Assessment activities

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

Can you use a 13-knot rope?

What are the names of the different rooms in a Gothic Cathedral?