

## Aula Prática 3

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The objective of this tutorial is to introduce the student to some of the most basic 3D concepts. We will use indexed geometry and understand model matrix transformations. It is important that you not only copy and run the code but carefully examine each section marked as **!![NEW]!!**. It is strongly suggested that you download and open the references at the end of this document, and read it during these exercises in order to fully understand the basic concepts of OpenGL.

1. Download the 3rd Framework from the following link:  
[http://www.dcc.fc.up.pt/~mcoimbra/lectures/CG\\_1213/cg\\_framework\\_v3.zip](http://www.dcc.fc.up.pt/~mcoimbra/lectures/CG_1213/cg_framework_v3.zip)
2. Launch Visual Studio and open the project file “cg\_framework.sln”
3. Open the file “main.cpp”
4. Copy the contents of the file “step11.txt” into the “main.cpp” file
5. Read the code comments very carefully and run it
6. Repeat steps 8-10 for file “step12.txt”
7. [Optional] Download and solve Exercise Sheet 1:  
[http://www.dcc.fc.up.pt/~mcoimbra/lectures/CG\\_1213/CG\\_1213\\_ExerciseSheet1.pdf](http://www.dcc.fc.up.pt/~mcoimbra/lectures/CG_1213/CG_1213_ExerciseSheet1.pdf)

Download and study the following references:

- Ed Angel, “Introduction to Modern OpenGL Programming”, SigGraph 2012  
[http://www.dcc.fc.up.pt/~mcoimbra/lectures/CG\\_1213/SIGGRAPH\\_2012.pptx](http://www.dcc.fc.up.pt/~mcoimbra/lectures/CG_1213/SIGGRAPH_2012.pptx)
- Ed Angel, Dave Shreiner, “An Introduction to Modern OpenGL Programming”  
[http://www.dcc.fc.up.pt/~mcoimbra/lectures/CG\\_1213/SIGGRAPH\\_2011.pdf](http://www.dcc.fc.up.pt/~mcoimbra/lectures/CG_1213/SIGGRAPH_2011.pdf)