Activity

– *The Vanishing Point* –

Educational Goals

- Raise awareness about constraints of 3D representation
- Observe the presence of mathematics in arts
- Develop the mathematical culture

Key Feature of the Targeted Competency

- To define the elements of the mathematical situation

Concepts Used

- Drawing and describing lines (straight, curved, parallel, convergent and concurrent)
- Geometric transformations (homothety)

Materials

- Original picture of *La Fresque des Québécois* (in the appendix) : electronic version for demonstration and one printed copy per student
- Modified picture of *La Fresque des Québécois* (vanishing point identified) (in the appendix)
- Other images in the appendix
- Marking pens or highlighters

Targeted Academic Levels
Grades 7 to 11

Mathematical Field Concerned

Suggested Teaching Formula

Time Required
Approximately 20 minutes

Suggested Process

Step 1: Introduction (5 minutes)

Start by showing the picture of *La Fresque des Québécois*[1] (picture in the appendix). Discuss with the students about how the artist did to create a successful depth effect. The expected answers are particularly about shadows and the size of the elements (what is closest to the observer must be bigger). Using a vanishing point is also an important element and that is what will be discussed in this activity.

Step 2: Vanishing Point (10 minutes)

Painters often use what we call a vanishing point to create depth in their artworks. The artists represent the objects that are farther in the image smaller and the one that are closer bigger, creating the illusion of 3 dimensions. Plus, the (straight) lines of these images that, in reality, would be parallel and move away from the observer become, in the representation, convergent towards the same point we call the "vanishing point".

Give one printed copy of *La Fresque des Québécois* per person, then ask the students to find the vanishing point by continuing the lines that would be parallel in reality (the lower parts of windows of the same building, the stairs of a staircase, the lower part of a balcony,…). Use a marking pen or a highlighter so the lines are apparent. There is an example of what is expected in the appendix. The students should all find the same vanishing point.

Step 3: Conclusion (5 minutes)

From a more mathematical point of view, the vanishing point also corresponds to the centre of the homothety that links together two objects in the image that in reality have the same dimensions.

Other impressive uses of the vanishing point are found in an art form called "3D Street painting". You can find many examples by doing a quick search on your favourite search engine. With your students, you can have fun finding the vanishing point on these artworks. Finally, some artists have fun creating images that seem impossible to us by playing with the rules of three-dimensional representation, particularly with the vanishing point, the norms of superimposition and shadows. M.C. Escher's work[2] shows many examples. Another known example is the impossible cube (images in the appendix). To stimulate the students' questioning, we suggest that you ask them what the cube would look like from another angle.

[1] It is a mural that was painted in 1999 on a building in Parc de La Cetière, on Notre-Dame Street, in the city of Québec. It tells the story of the city of Québec by highlighting some of its famous landscapes and important names.
[2] http://www.mcescher.com/gallery/impossible-constructions/

APPENDIXES

La Fresque des Québécois, original

Le Fresque des Québécois, vanishing point identified

Impossible Cube