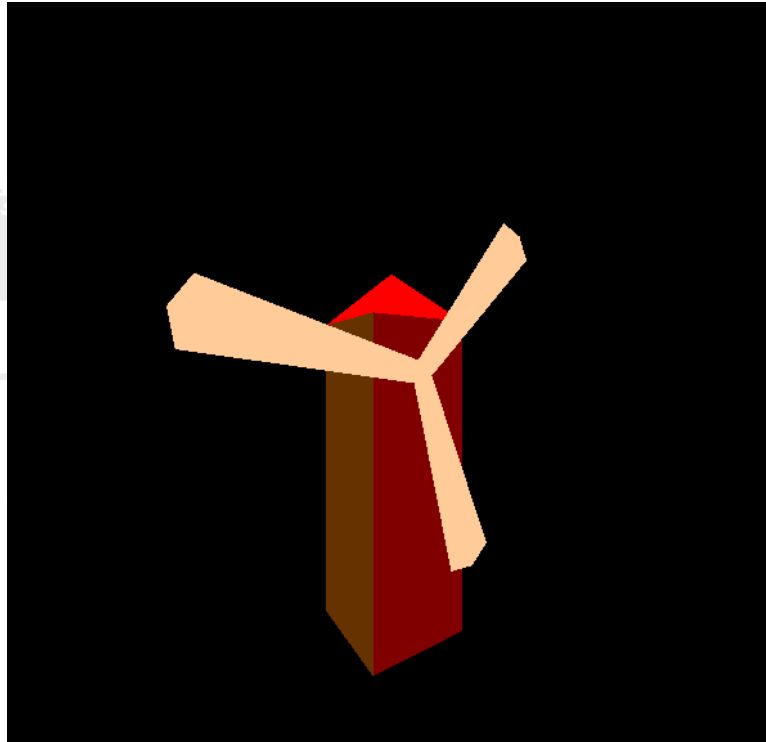


## HW 3: Polygon Windmill

Your job is to make a windmill from basic polygons, as shown in the figure below. The main class you create should be called `Windmill`, and you will also need to create `windmill-vertex.gls1` and `windmill-fragment.gls1`. (You may create helper classes if you wish, or CSV or TSV text files to hold data. However these are optional.)



The windmill will be animated in two ways:

1. The blades of the windmill will spin smoothly around their center.
2. The camera will orbit around the windmill in a circle at the same height as the blades' center, always facing toward the center of the windmill.

The periods of these motions will be defined by the user at runtime (see below).

The body of the windmill consists of a pyramidal roof on top of four rectangles for the walls. These may be any color you wish, but none of the five components should be the same color as one it is touching. The number of blades is defined at runtime. They should be the same color, but a different color from each of the body elements. Each one is a long, symmetrical pentagon with a point at the far tip. They should be evenly spaced around their center, to present a balanced appearance.

The program should take three *command-line arguments*, that will be communicated through the `String[] args` argument in the `main()` function. They will be in this order:

1. A positive integer indicating the number of blades.

2. A real number indicating the period of the blades, in seconds. A positive value will result in clockwise motion (while facing the bladed side of the windmill), a negative one will mean counter-clockwise, and 0 will mean no motion.
3. Another real number indicating the period of the camera's orbit, also in seconds. A positive number means the tower will appear to move left-to-right, a negative means right-to-left, and 0 means the camera will be stationary.

If the number of arguments is wrong or one of them is misformatted, your program should give a friendly error message and exit without starting the graphics. *Note that your program will not query the user for these parameters, once it has started.*

A few more points:

- It should use a standard perspective-based projection, with reasonable values for field of view and clipping planes.
- Parts of the windmill should never go off the edge of the screen, or appear to “pop” in and out of existence. (That is, the viewing frustum should contain the full windmill at all times.)
- The motion should appear natural—the blades should not appear to collide with or disappear inside the body of the windmill.
- All of the polygons should be flat colors. (That is, you should not use textures, gradients, lighting, or other effects.)
- The blades may be flat—they might seem to “disappear” briefly when you are looking at them edge-on.

Good luck!