

# Miura-ori Aid for Math Classes

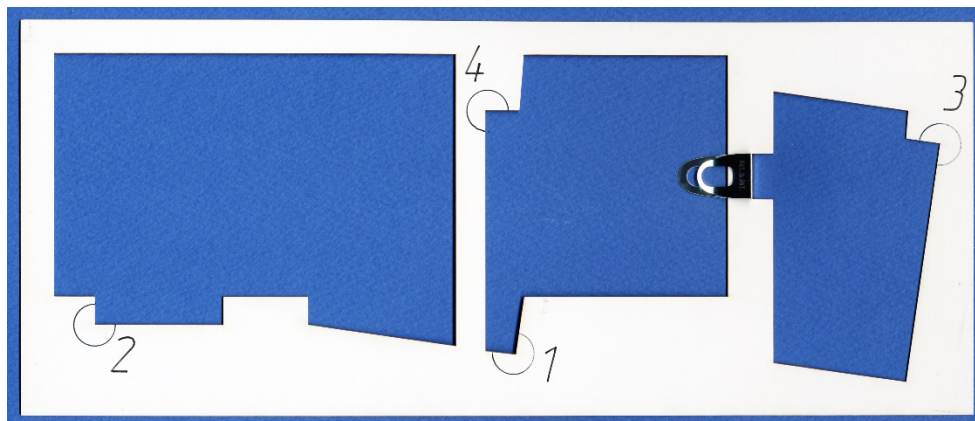
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keywords: Miura-ori, guide, mathematics

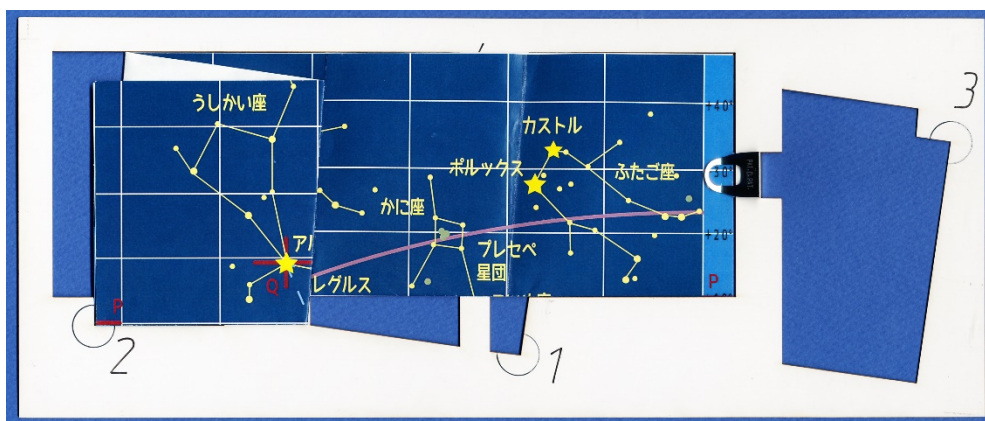
## Abstract

We have developed recently the Miura-ori aid for personal fabrication of paper models. The motivation of this effort is as follows: Miura-ori is a good introduction to origami science. Because, it is a deformable tessellation, a kinetic origami of one degree of freedom, a deployable structure, an actuator, and so on. Therefore, a paper model provides a student an excellent opportunity to touch those phenomena with the hand. However, there are intrinsic difficulties in fabrication of paper models. Without having a sufficiently accurate model, the real properties of Miura-ori are not displayed. The aid can improve that situation.

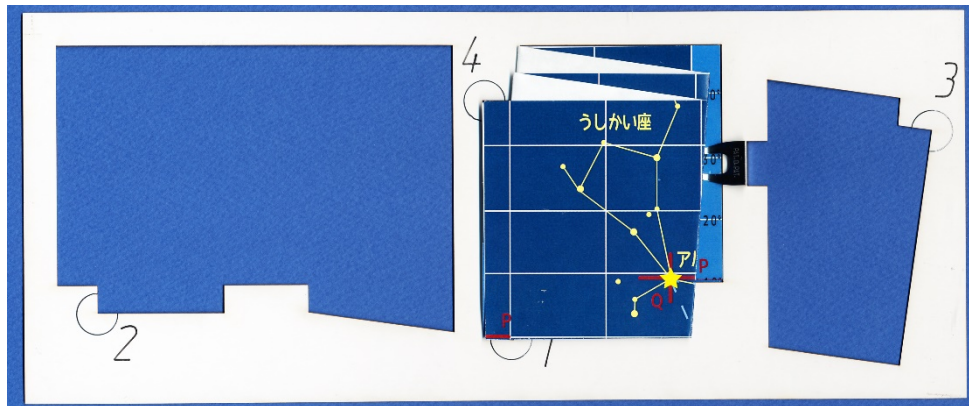
## Steps of Miura-ori aid



**Figure 1:** Miura-ori Aid before instalation



**Figure 2** Step 2 of folding



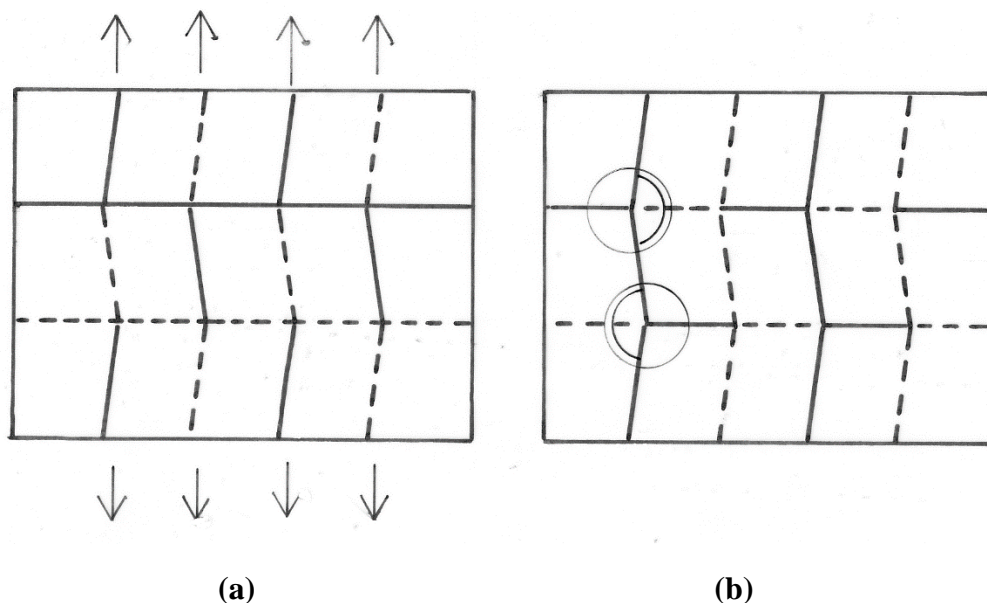
**Figure 3 Final step 4 of folding**

### **Transformation of folds to Miura-ori pattern**

The folds formed by the above operation is shown in Fig. 4 (a). It must be transformed to the fold pattern of Miura-ori in Fig. 4(b). This “transformation” is itself the key phenomenon of Miura-ori, a student is advised to complete the following steps to the final result.

Step 1: Pull ends of any of the longitudinal zigzag chains of fold. Step 2: Observe that through this action, the mountain or valley tend to be unified throughout the zigzag chain. Repeat actions of Step 1 and 2 for every zigzag chains. Step 3: As for a zigzag mountain fold, a lateral fold line located on the concave side tends to become the valley fold, and that located on the convex side tends to become the mountain fold. (the rigid origami principle). For a zigzag valley fold, the reverse principle is applied.

Step 4: After adjust the model a bit, one gets a Miura-ori model..



**Figure 4: Transformation process of folds to Miura-ori pattern**