

Cover of the December 1, 1984, issue of *Journal of Chemical Education*. The art is an actual needlework by one of the editors of the journal, from I. Hargittai and G. Lengyel, "The Seven One-Dimensional Space-Group Symmetries Illustrated by Hungarian Folk Needlework." Reprinted with permission, © 1984, American Chemical Society.

The Seven One-Dimensional Space-Group Symmetries Illustrated by Hungarian Folk Needlework^a

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The idea of infinite translations is a crucial point in teaching crystallography and symmetry. However, for some students it is difficult to grasp because of its abstract nature. Experience shows that analogies from outside crystallography greatly facilitate the understanding of this concept.

The seven one-dimensional classes are the simplest space-group symmetries. They are illustrated here by patterns of genuine Hungarian needlework. This kind of needlework is a real "one-sided band" and is ideally suited for this purpose.

Figure 1 shows a consistent system of an asymmetric motif, a black triangle, corresponding to the seven symmetry classes of the one-dimensional space groups. In the table, the symmetry elements are enumerated together with a brief description of the corresponding needlework presented in Figure 2.



Figure 1

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Figure 2

Symmetry Elements and Corresponding Needlework Designs

Symmetry Elements Shown in Figure 1		Needlework Designs from Figure 2	Symmetry Elements Shown in Needlework Designs Figure 1 Figure 2	Needlework Designs from Figure 2	
1. Tran tra be	Islation axis. The period of anslation is the distance etween two identical points of nsecutive black triangles	Edge decoration of table cover from Kalocsa, southern Hungary	4. Translation by transverse symmetry planes Embroidered edge dect sheet from the 18th of the deviations from the symmetry in the low	pration of bed century. Note he described ver stripes of	
2 Glid	Glide-reflection plane. The black triangle comesinto coincidence with itself after translation through half of the translation periodand reflection ina plane perpendicular to the plane of the drawing	Pillow end decoration from Tolna County, southwest Hungary	the pattern 5. Translation axis combined with a Decoration of shirt from	t from Karad	
CC			longitudinal symmetry plane southwestHungary	southwestHungary	
tra tra re pe th			6 Combination of a glide-reflection plane with transverse symmetry planes. Translation axis and two-fold rotation axes are generated	rn from Transylvania,	
3. Tran 18 pe th	nslation on rotation through 80° around an axis erpendicular to the plane of ne one-sided band	Decoration patched onto a long embroidered felt coat of Hungarian shepherds in Bihar County, eastern Hungary	7. Combination of translation axis with transverse and longitudinal symmetry planes. Two-fold rotation axes are generated Grape leaf pattern from east of the river Tisz	the territory a	