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Weaving Mathematics

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Weaving Mathematics

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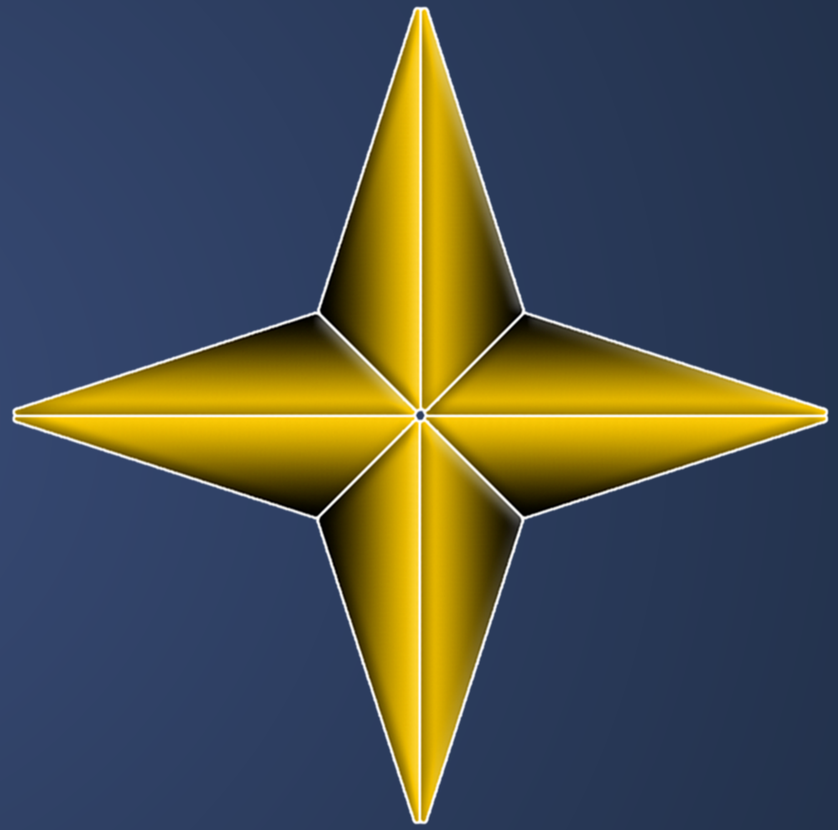
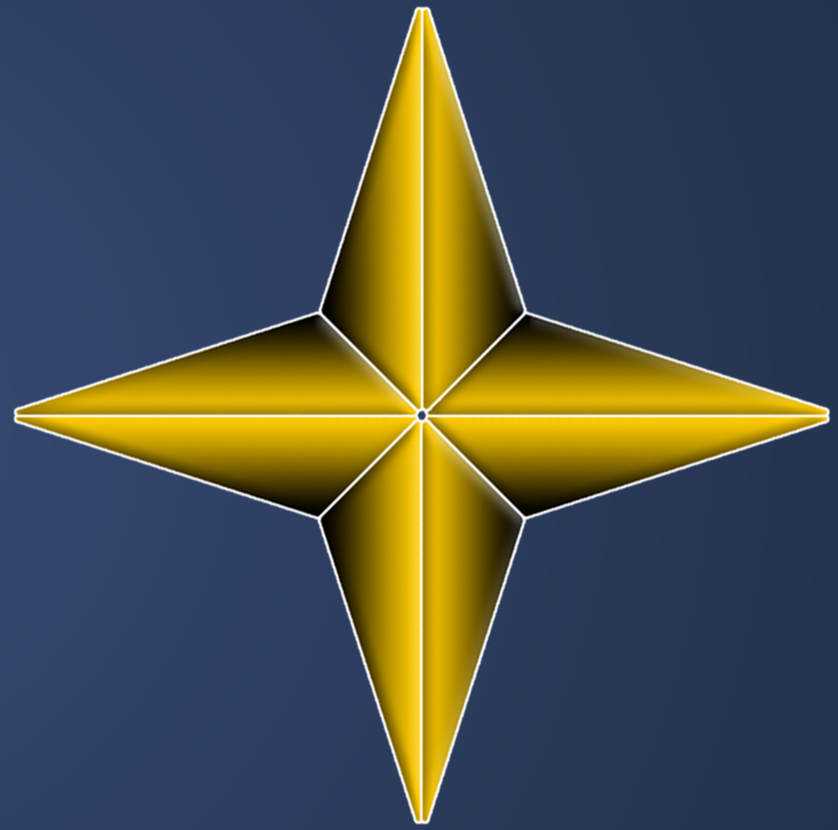
BED KEKEM

Image from Paterno et al (2001)

SYMMETRY

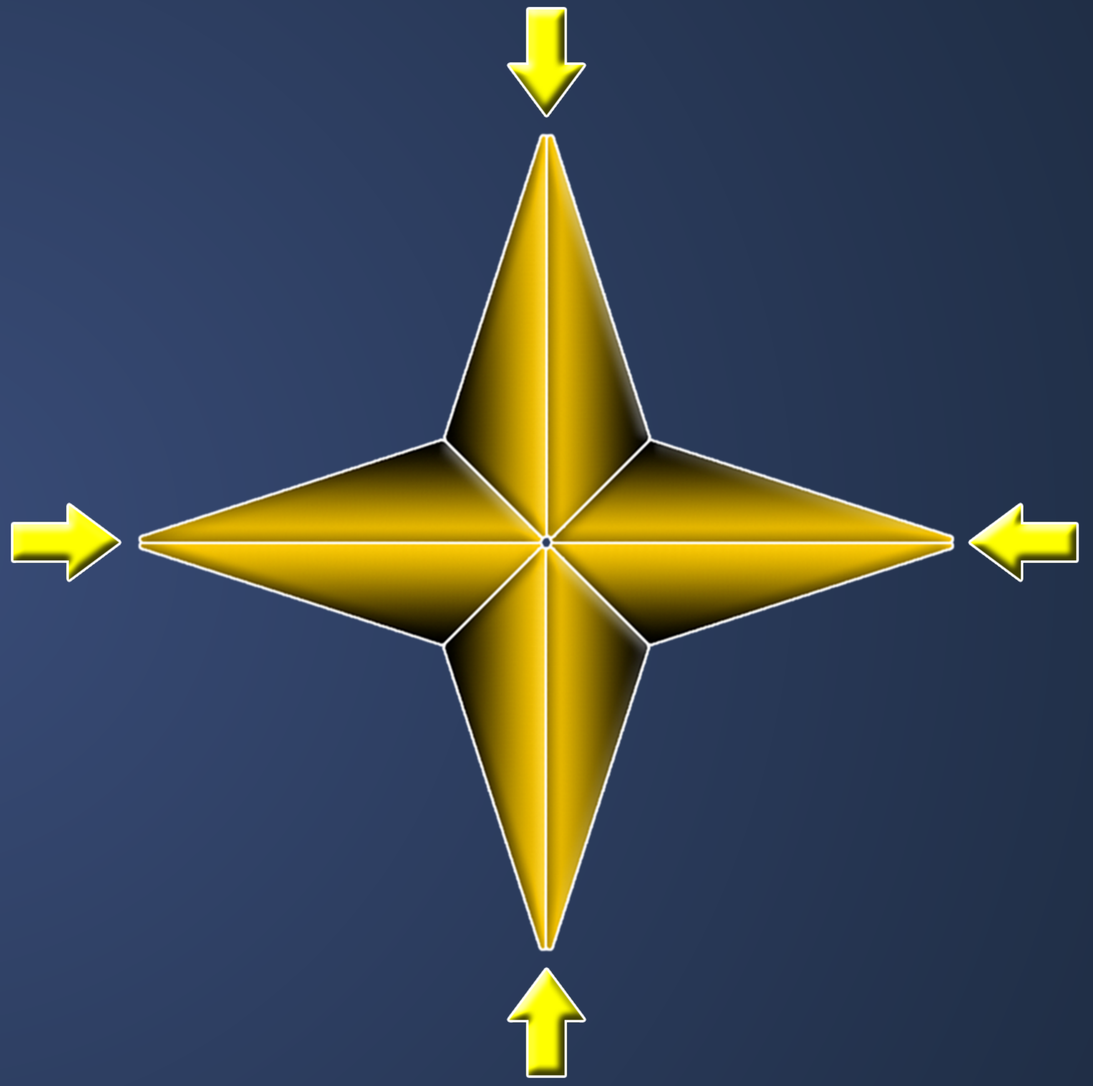


This star is symmetric.



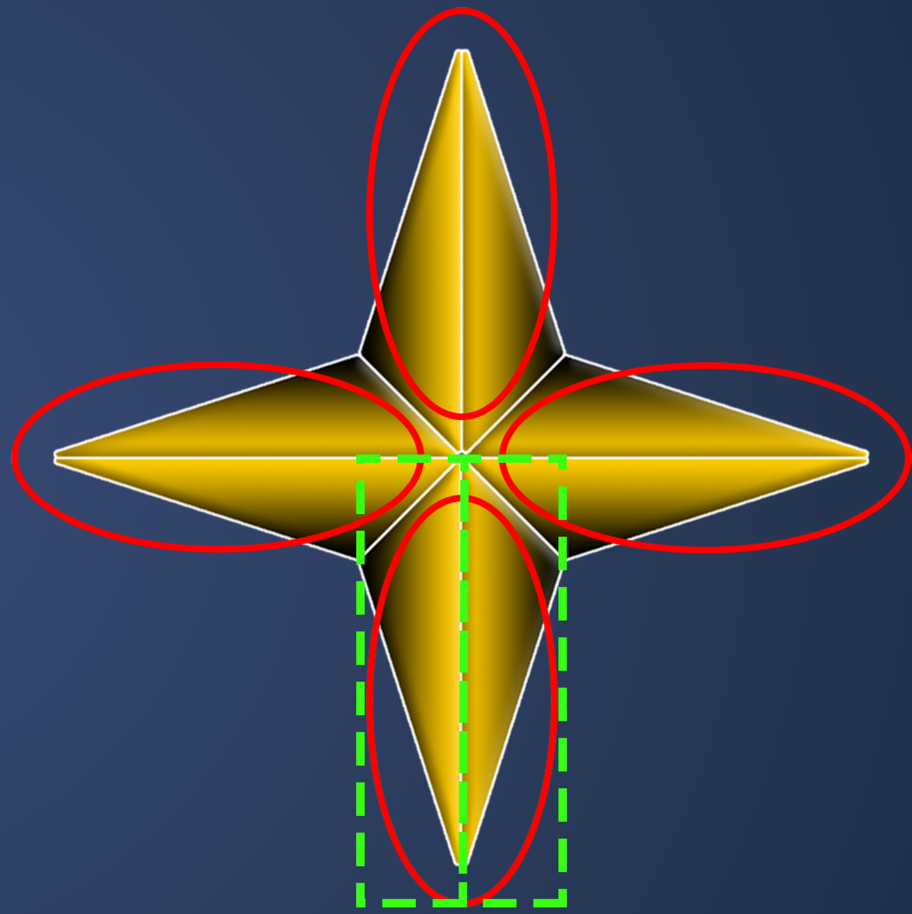
SYMMETRY: THIS STAR IS SYMMETRIC

It looks the same from different positions.



SYMMETRY: THIS STAR IS SYMMETRIC

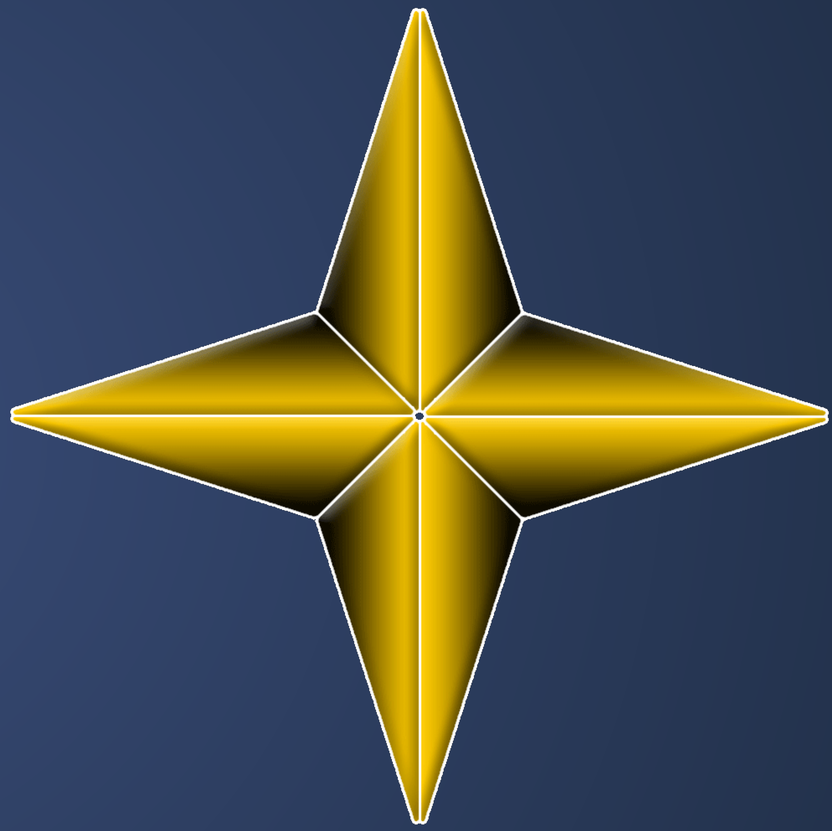
- It looks the same from different positions.
- Some of its parts are repeated.



SYMMETRY: THIS STAR IS SYMMETRIC

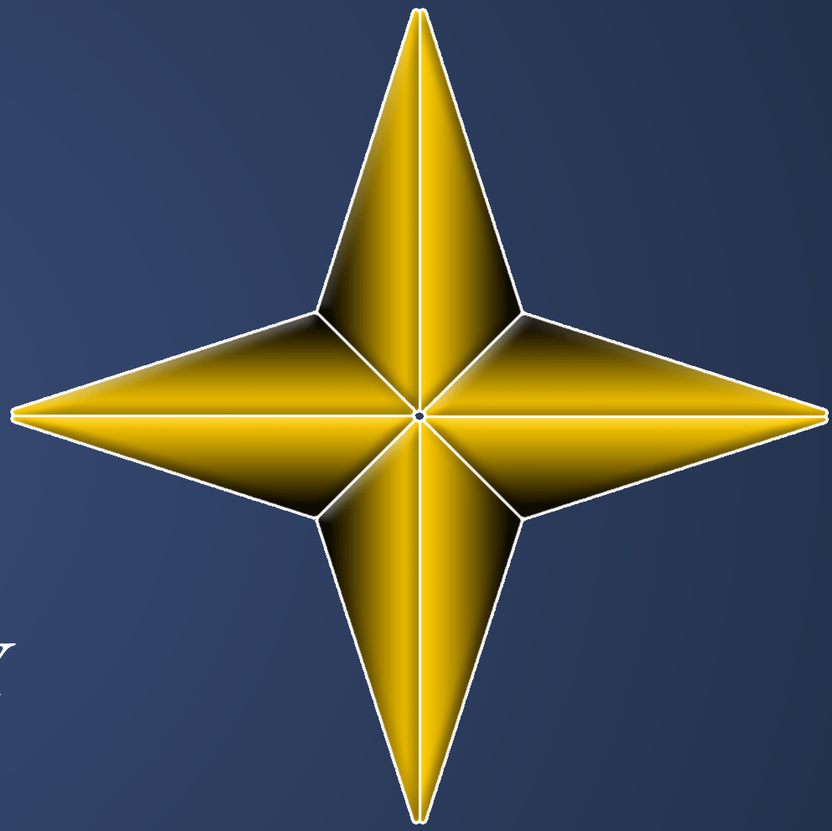
- It looks the same from different positions.
- Some of its parts are repeated.

Rotating the star 90^0 clockwise sends the star to itself.



SYMMETRY: THIS STAR IS SYMMETRIC

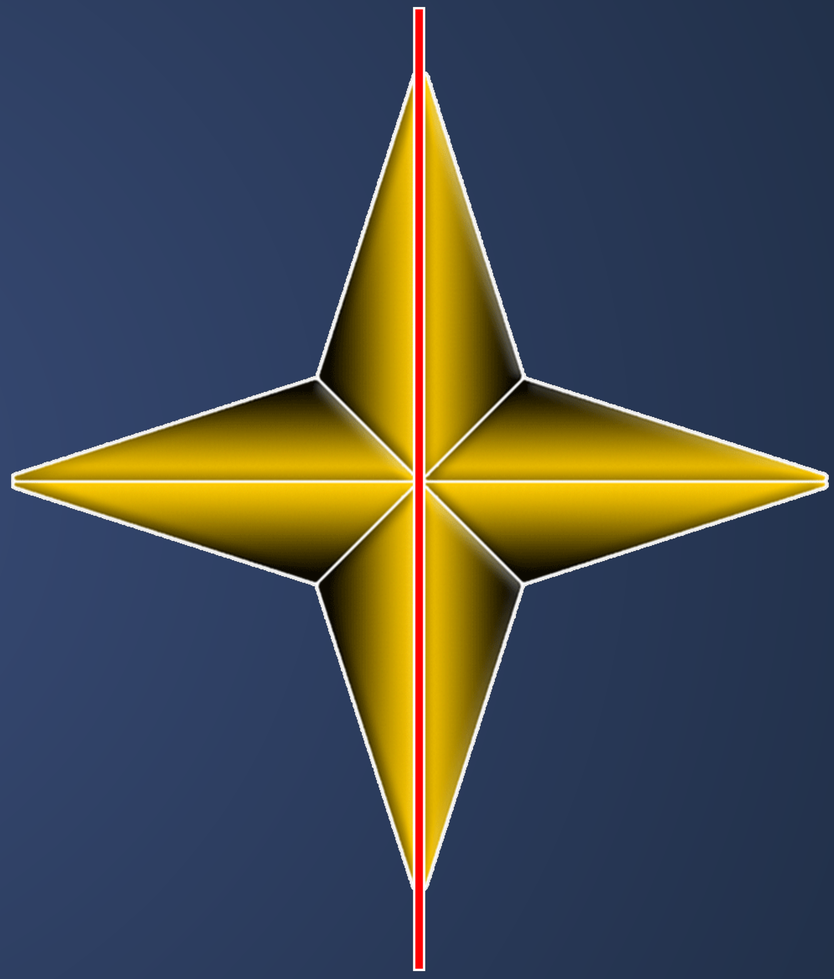
- It looks the same from different positions.
- Some of its parts are repeated.



The 90^0 rotation is called a SYMMETRY of the star.

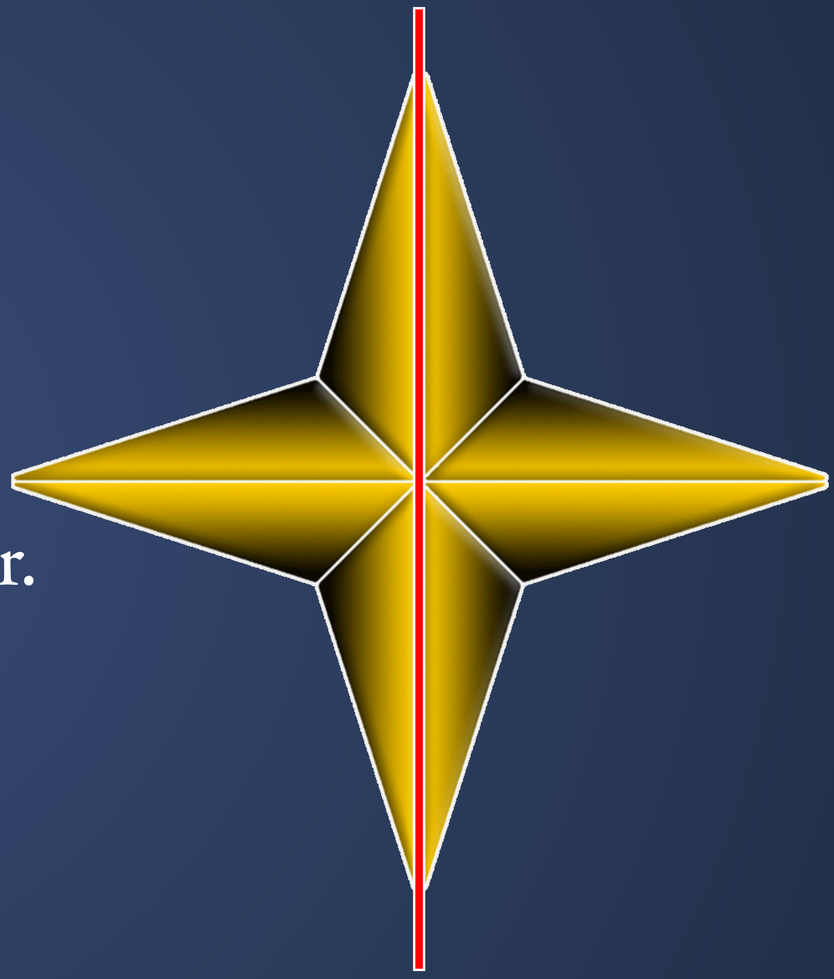
SYMMETRY: THIS STAR IS SYMMETRIC

Reflecting the star about the vertical axis sends the star to itself.



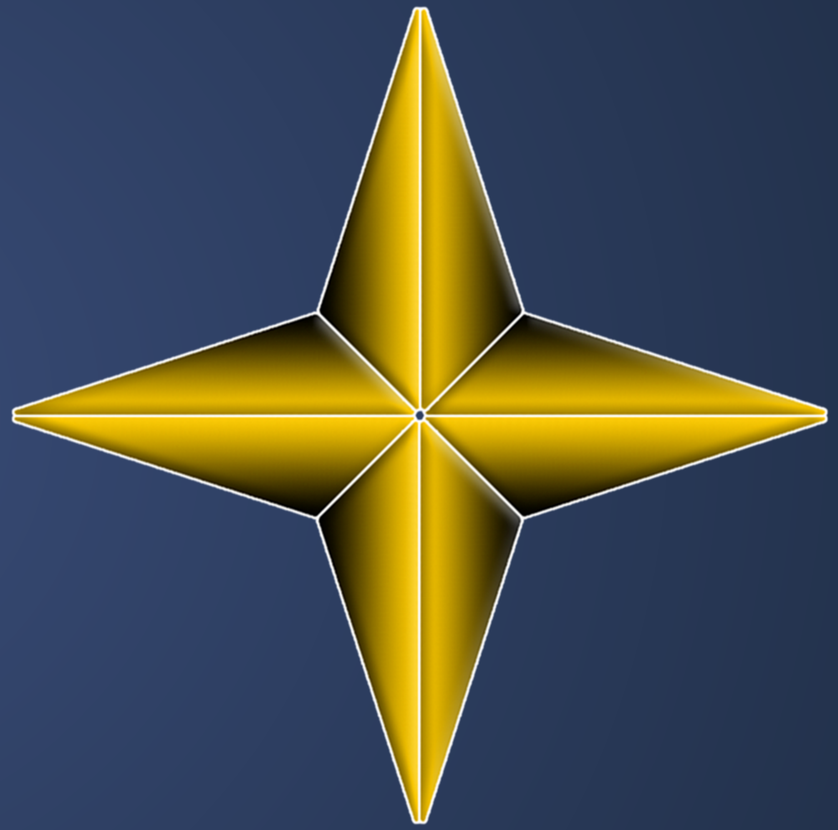
SYMMETRY: THIS STAR IS SYMMETRIC

Reflecting the star sends the star to itself.
The reflection is also a SYMMETRY of the star.



SYMMETRY

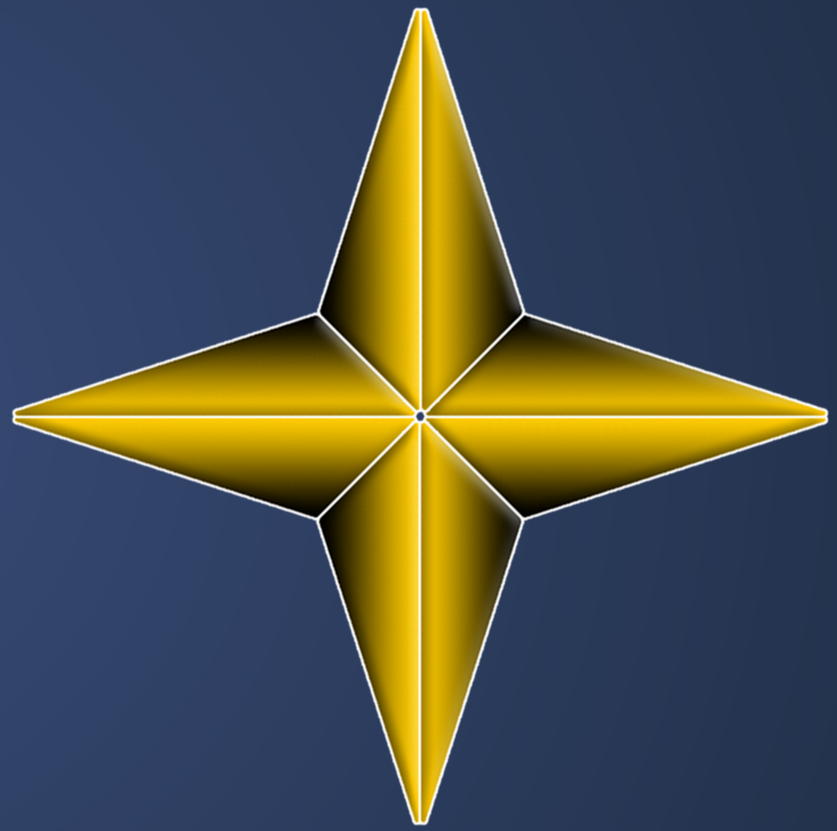
A symmetry of an object in the plane is an isometry of the plane that sends the object to itself.



SYMMETRY

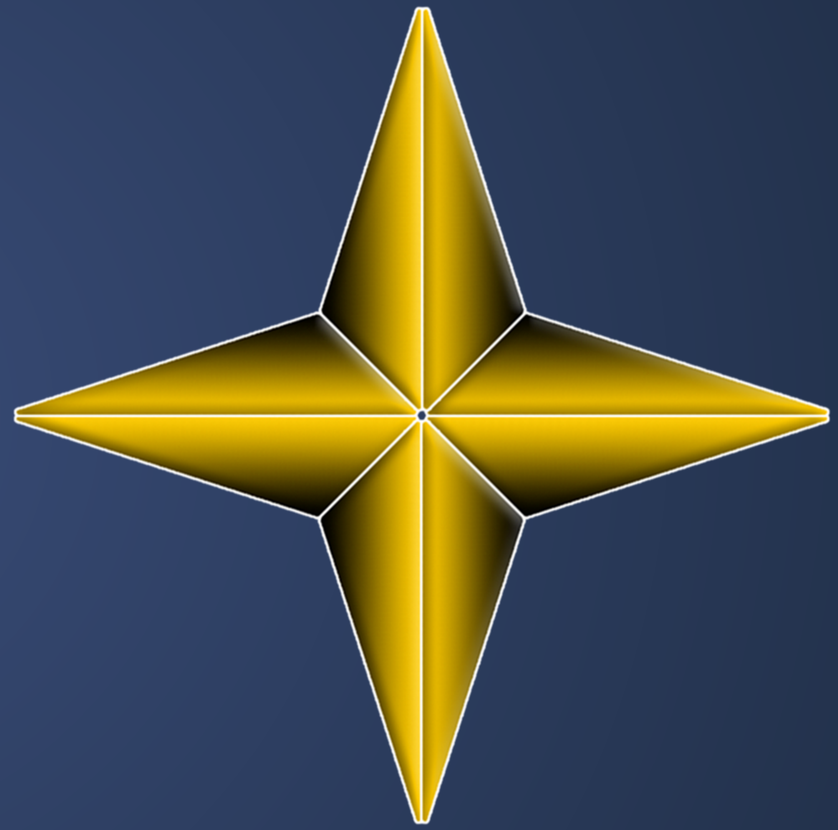
A symmetry of an object in the plane is an isometry of the plane that sends the object to itself.

How many symmetries does the star have?



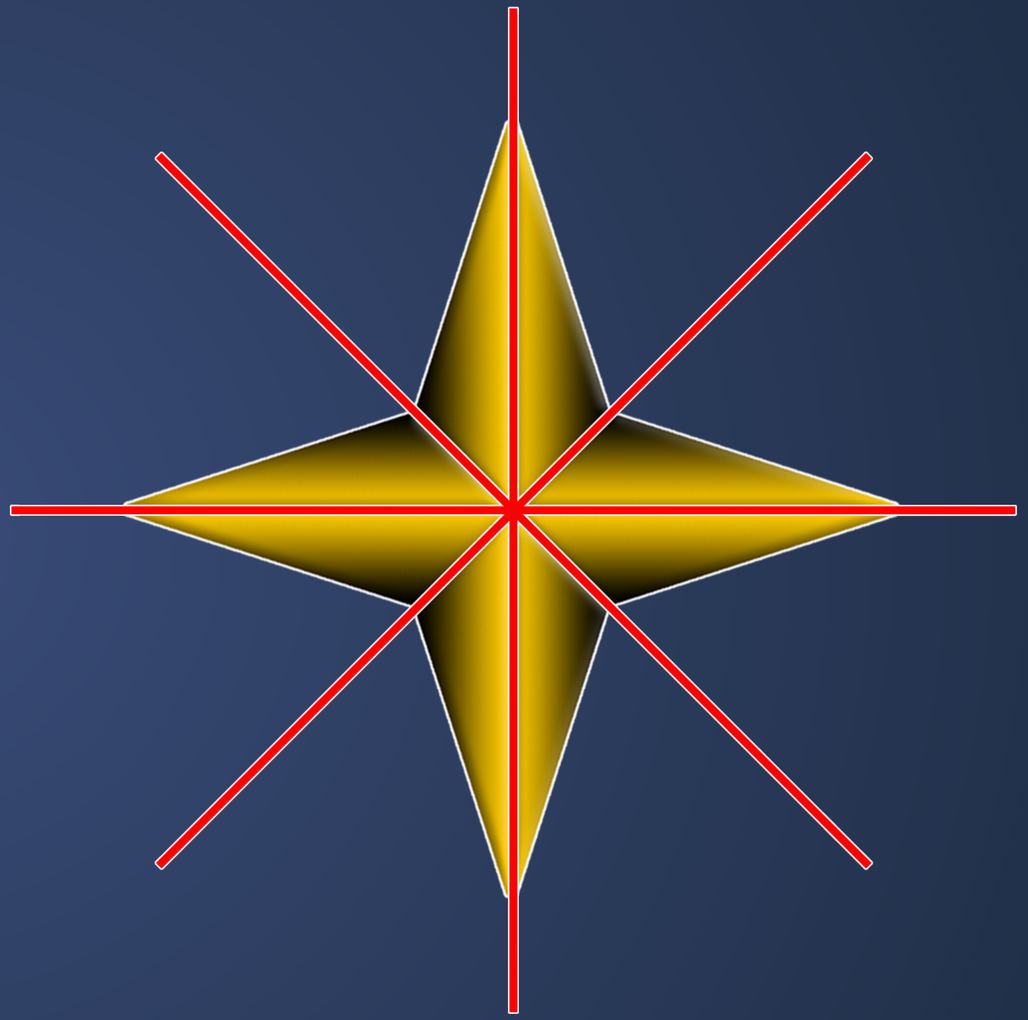
HOW MANY SYMMETRIES DOES THE STAR HAVE?

It has 4 rotational symmetries. There is the rotation about its center by 0^0, 90^0, 180^0, and 270^0.



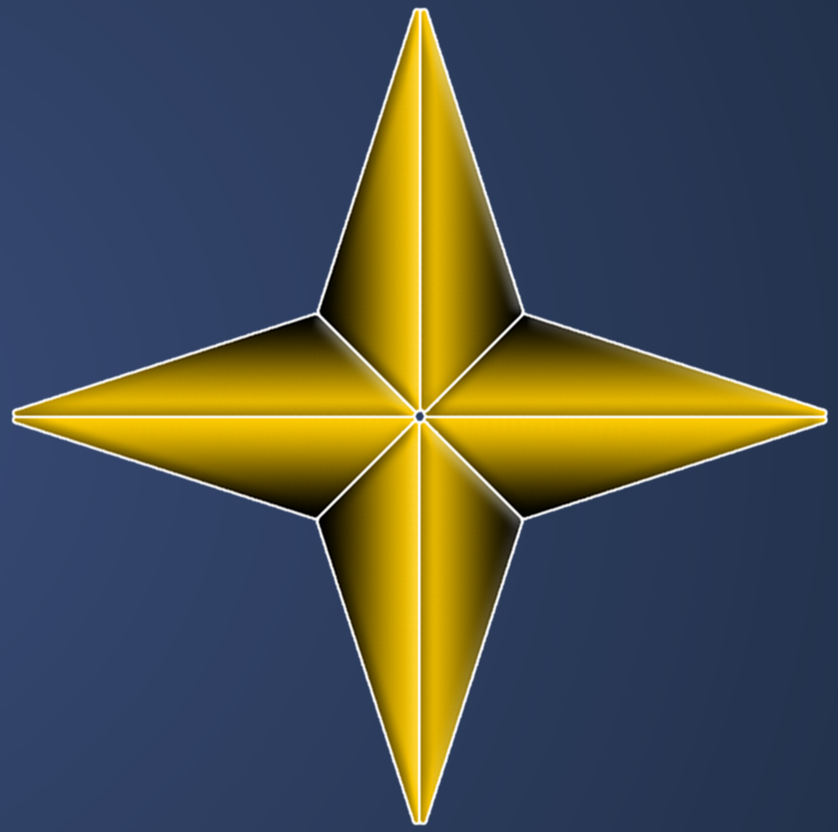
HOW MANY SYMMETRIES DOES THE STAR HAVE?

It also has 4 reflection symmetries.



HOW MANY SYMMETRIES DOES THE STAR HAVE?

The four rotations and 4 reflections form a group, the **symmetry group** of the star.



A repeated pattern in the plane has translational symmetries in two directions.

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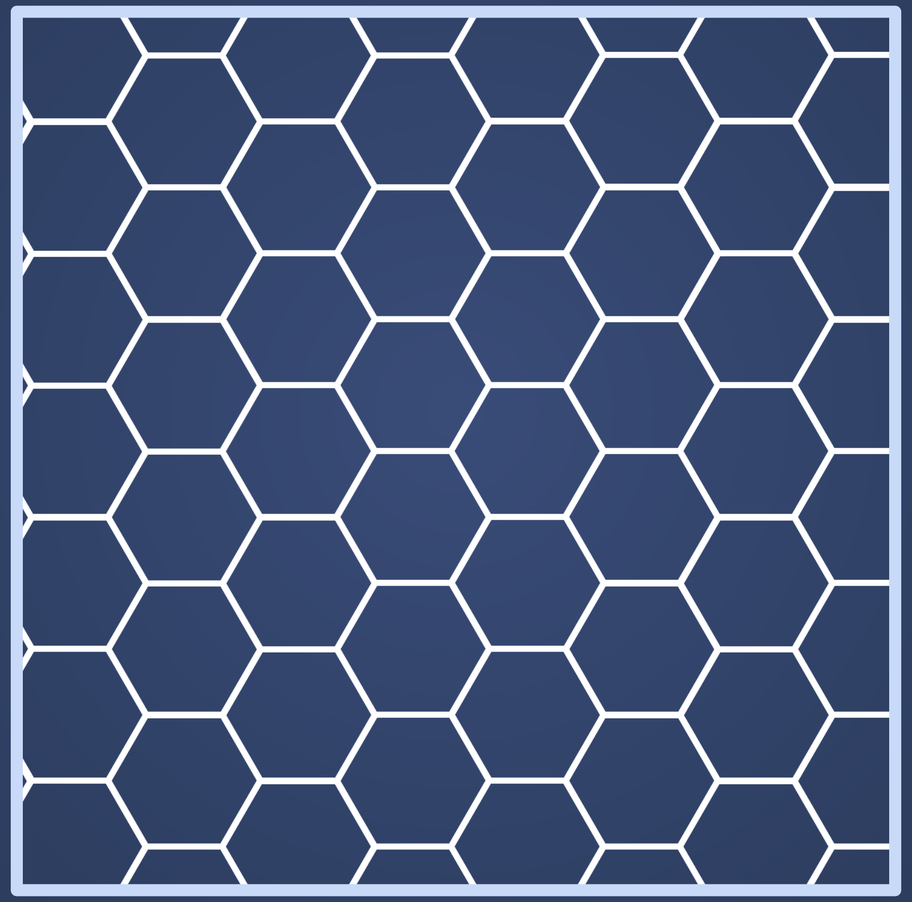
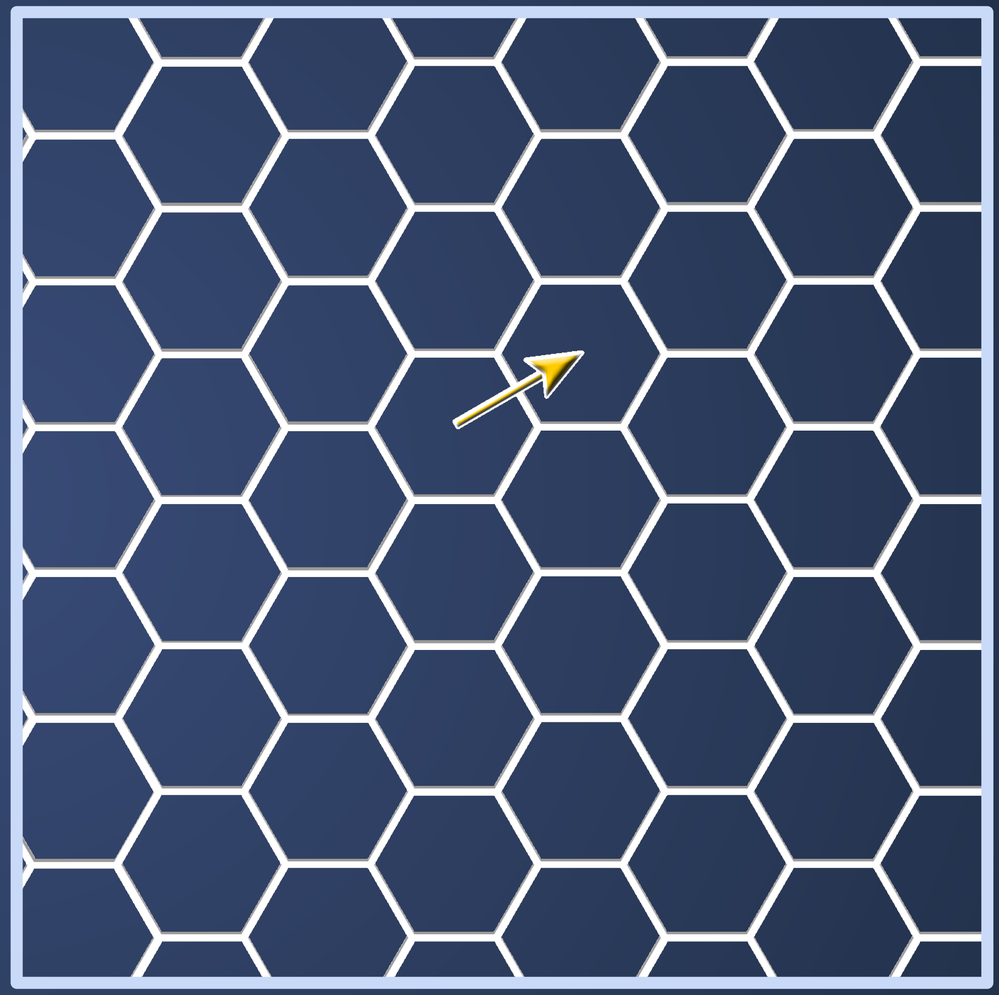
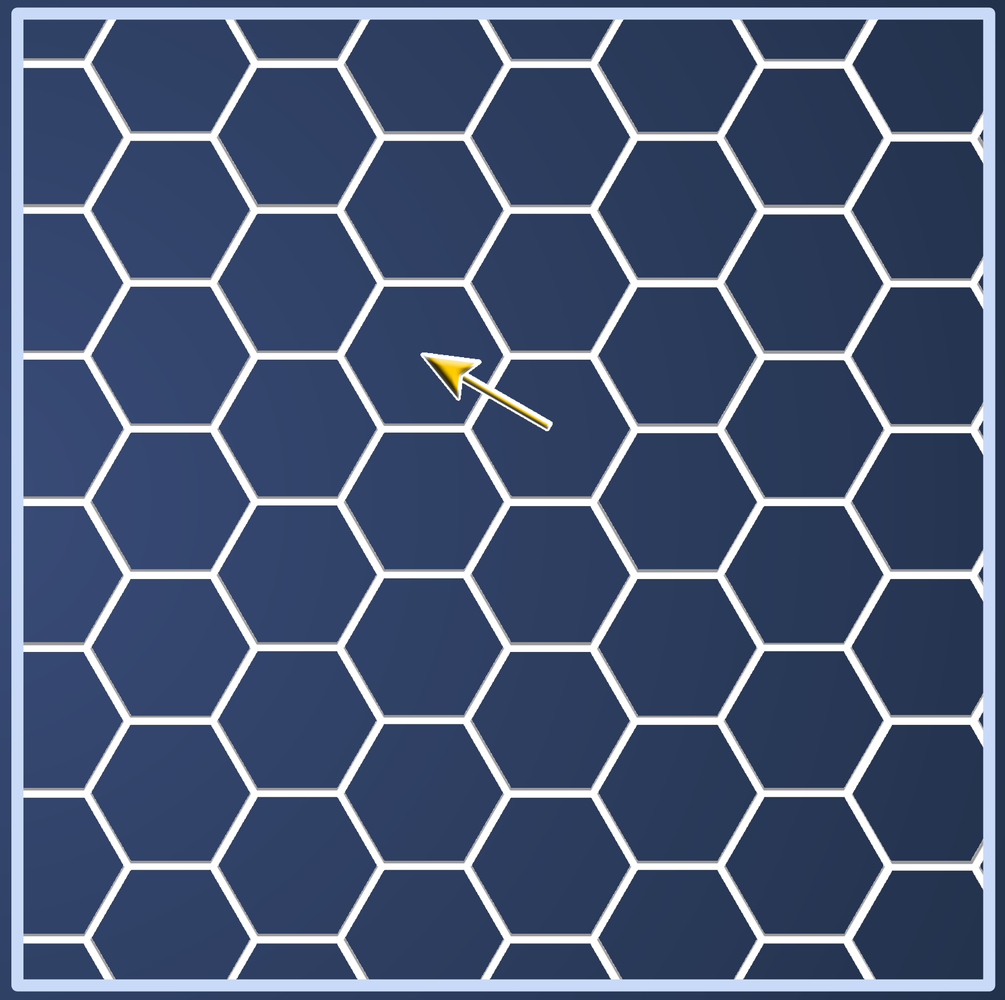
THE HONEYCOMB TILING



A repeated pattern in the plane has translational symmetries in two directions.

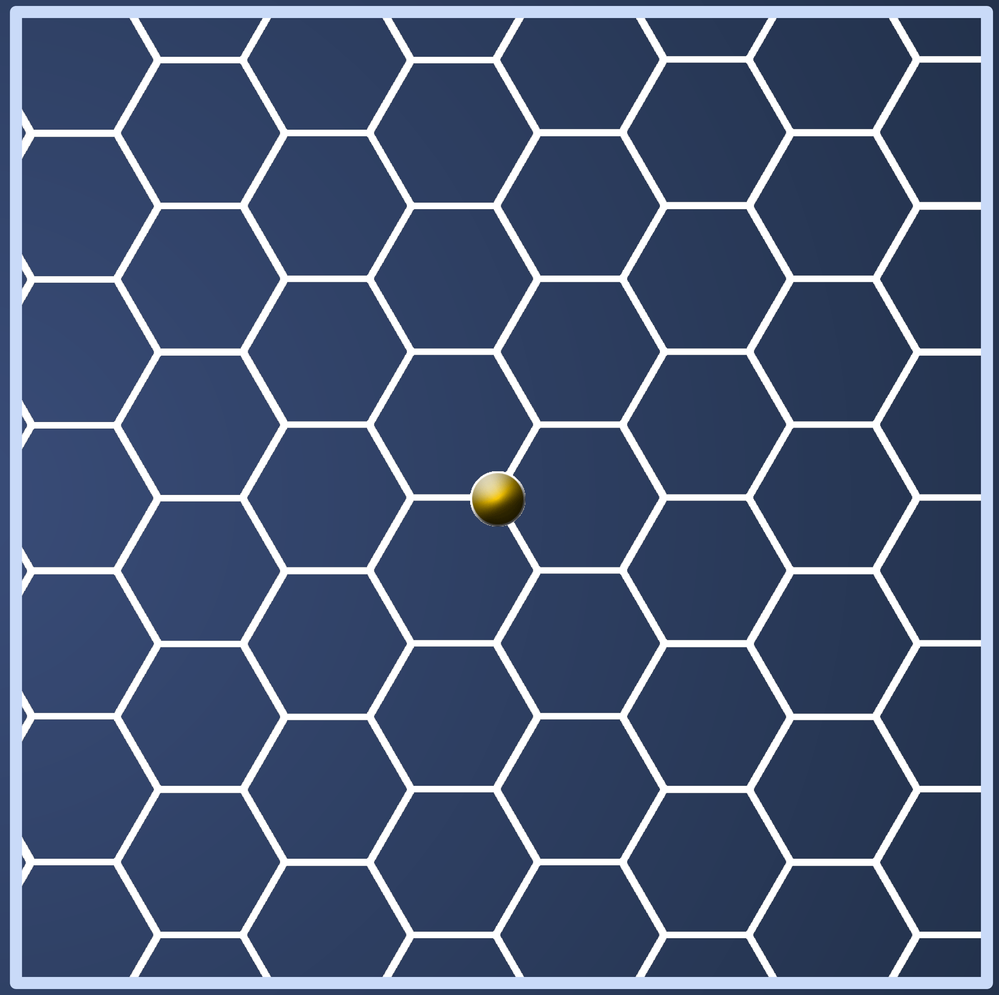


A repeated pattern in the plane has translational symmetries in two directions.

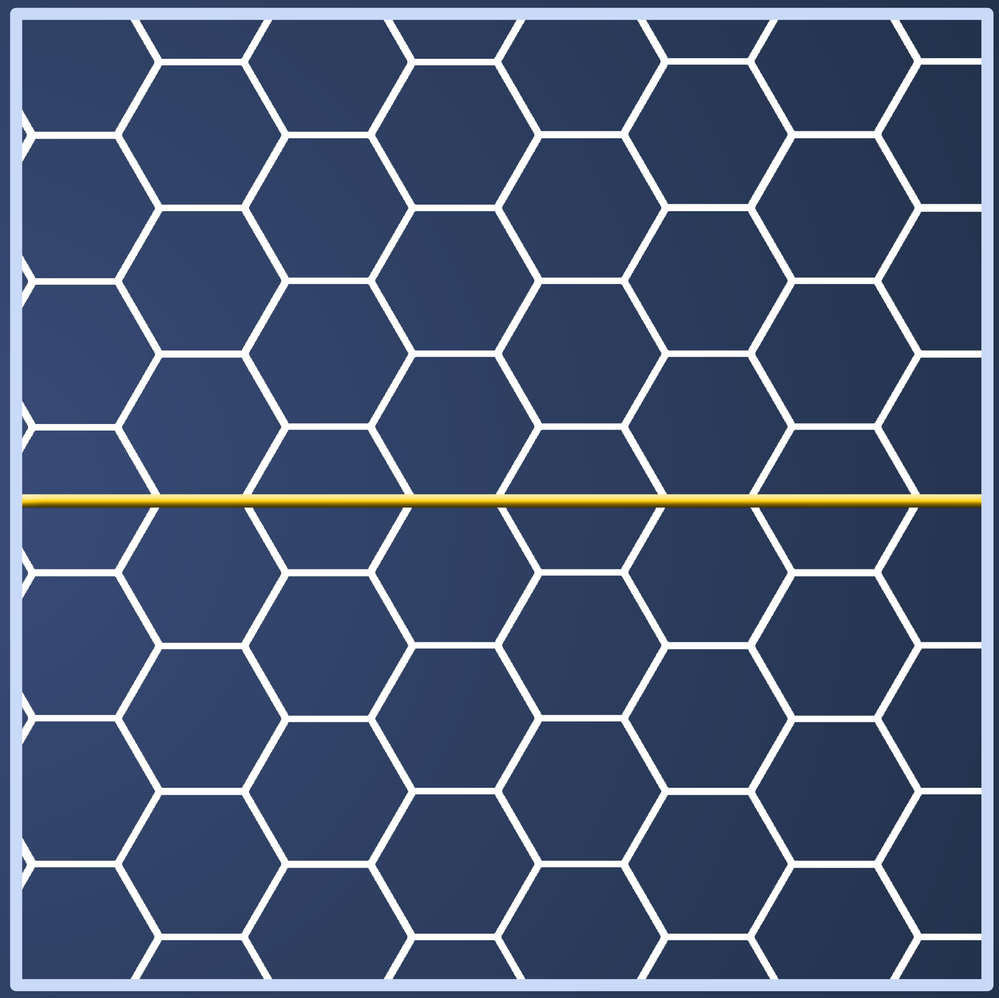


A REPEATED PATTERN IN THE PLANE HAS TRANSLATIONAL SYMMETRIES IN TWO DIRECTIONS.

This pattern also has rotation symmetries.



A REPEATED PATTERN IN THE PLANE HAS TRANSLATIONAL SYMMETRIES IN TWO DIRECTIONS.

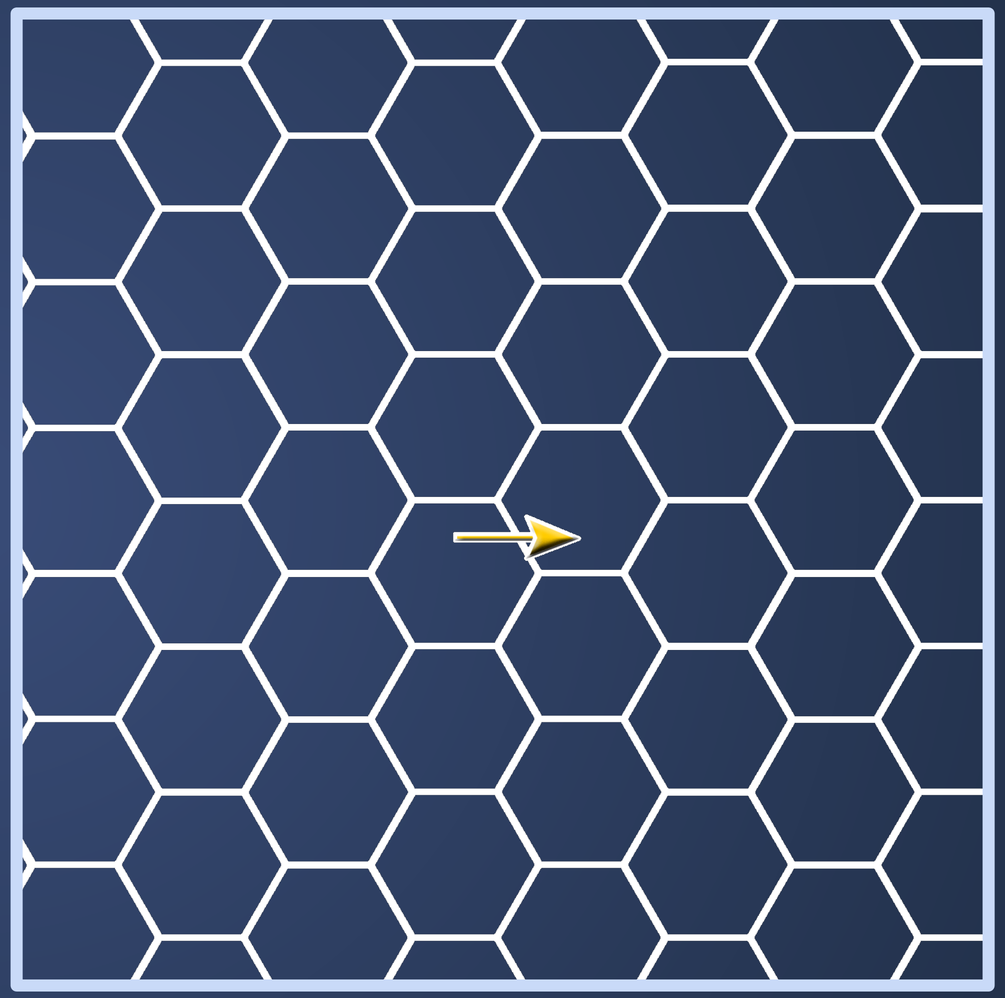


This pattern also has

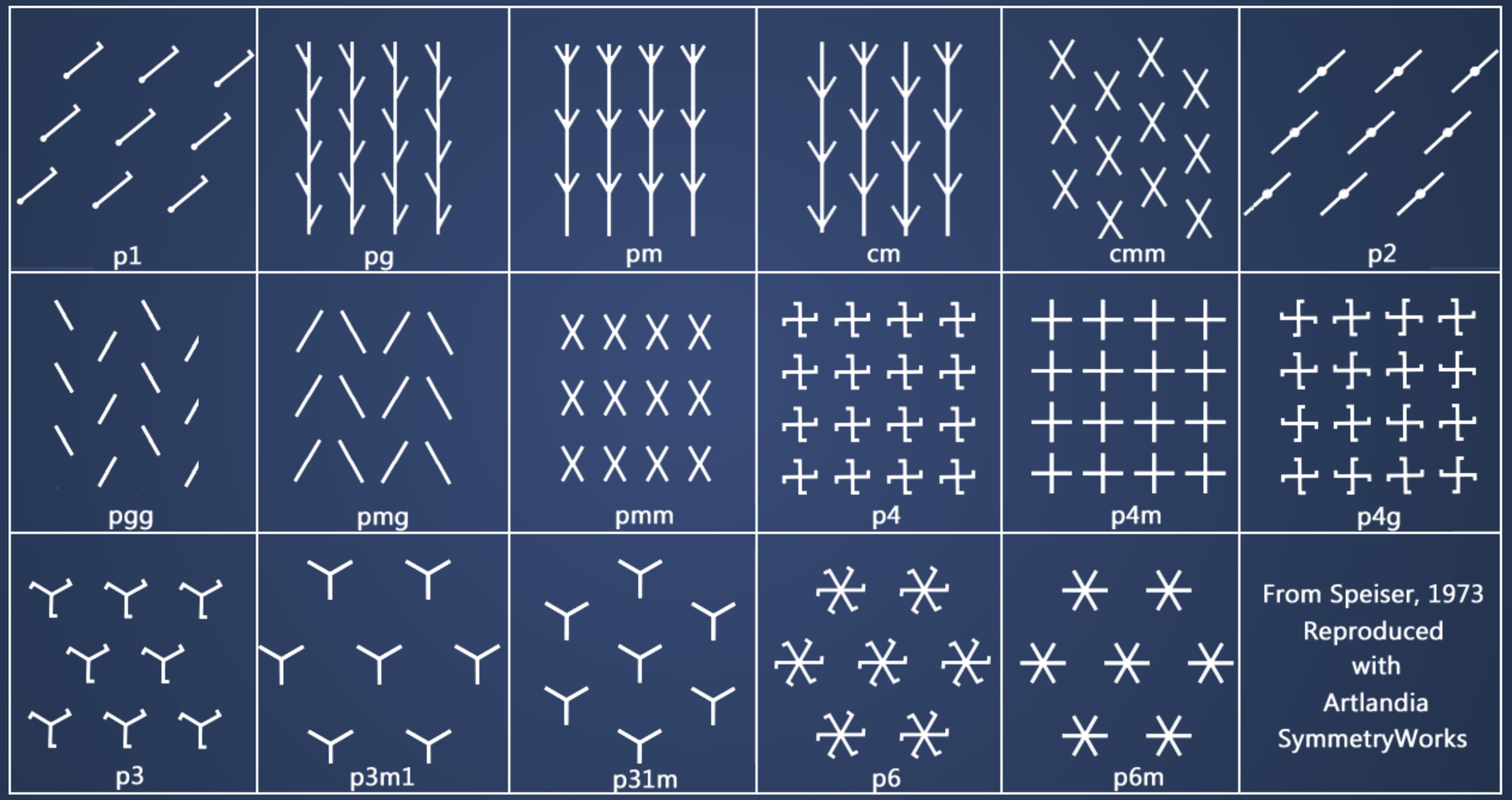
- rotation symmetries
- **reflection** symmetries

A REPEATED PATTERN IN THE PLANE HAS TRANSLATIONAL SYMMETRIES IN TWO DIRECTIONS.

- This pattern has
- rotation symmetries
- reflection symmetries
- glide reflection symmetries



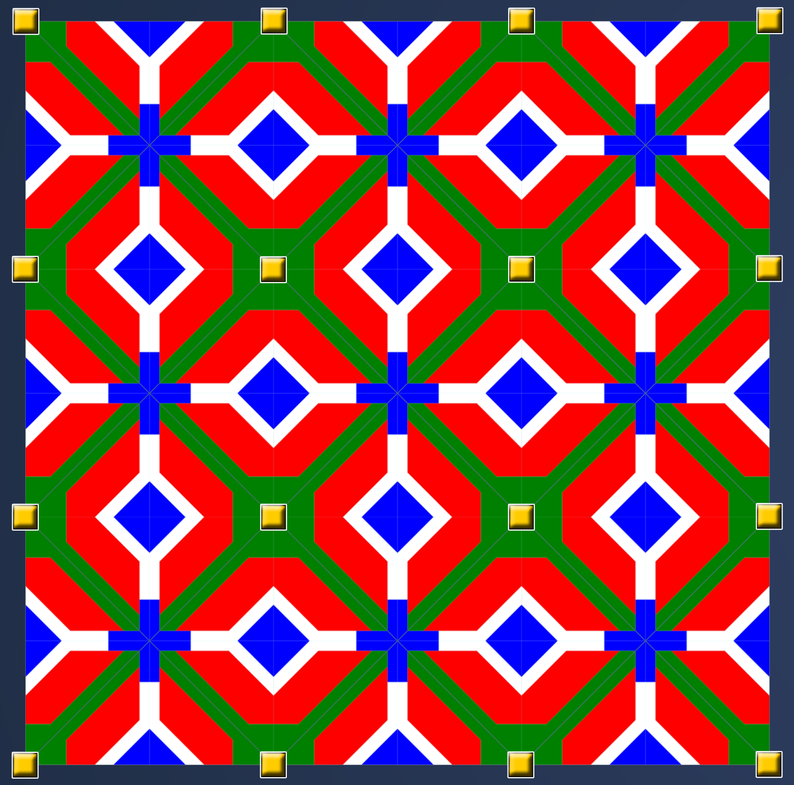
THE SEVENTEEN REPEATED PATTERNS



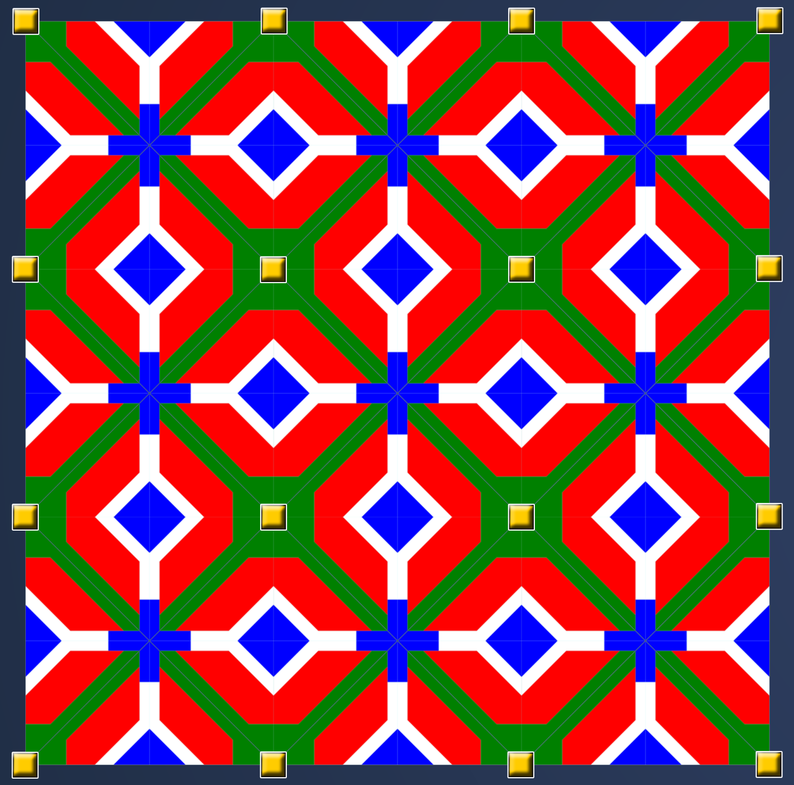
blog.artlandia.com

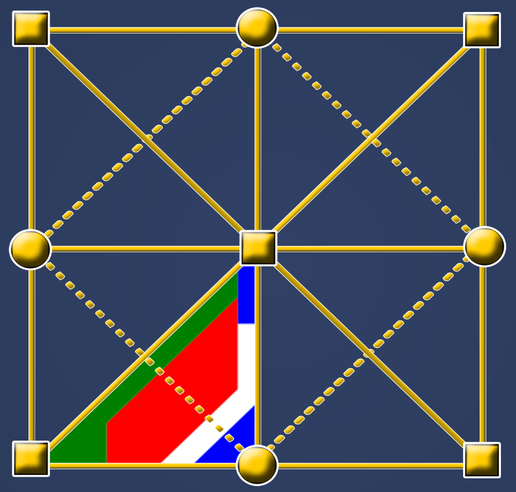
A REPEATED PATTERN WITH SYMMETRY GROUP P4M

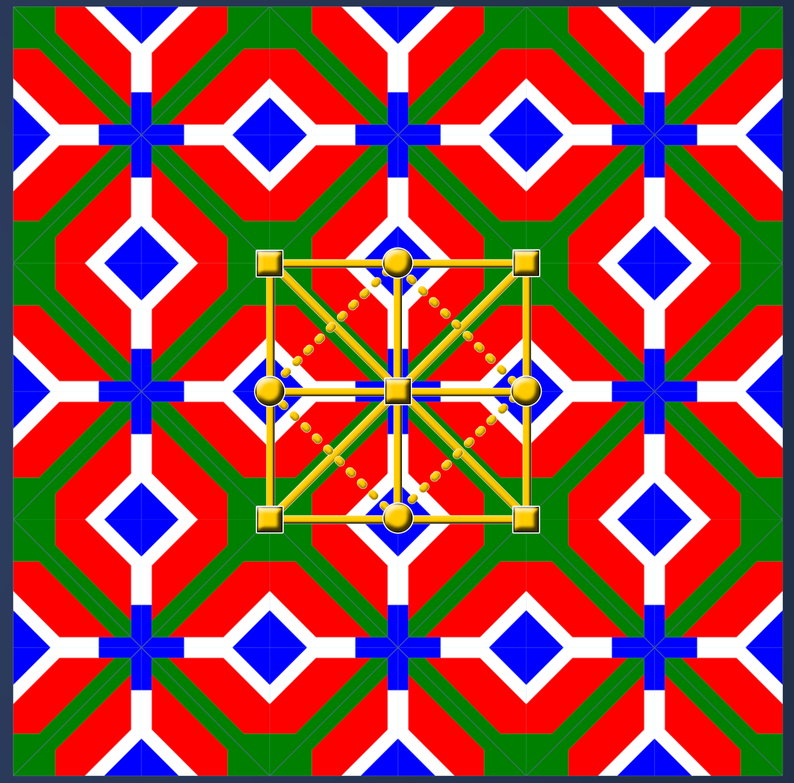
LATTICE OF A REPEATED PATTERN



LATTICE AND UNIT CELL OF A REPEATED PATTERN







LAKE SEBU, COTABATO

THE T'NALAK

THE T'BOLI, THE DREAMWEAVER

IKAT, A DECORATIVE DYEING METHOD OF WEAVING

THE TYING PROCESS

THE WEAVING PROCESS

The Bed Kekem has

- reflection symmetries
- 180^0 rotation symmetries

Its symmetry group is the plane crystallographic group pmm.

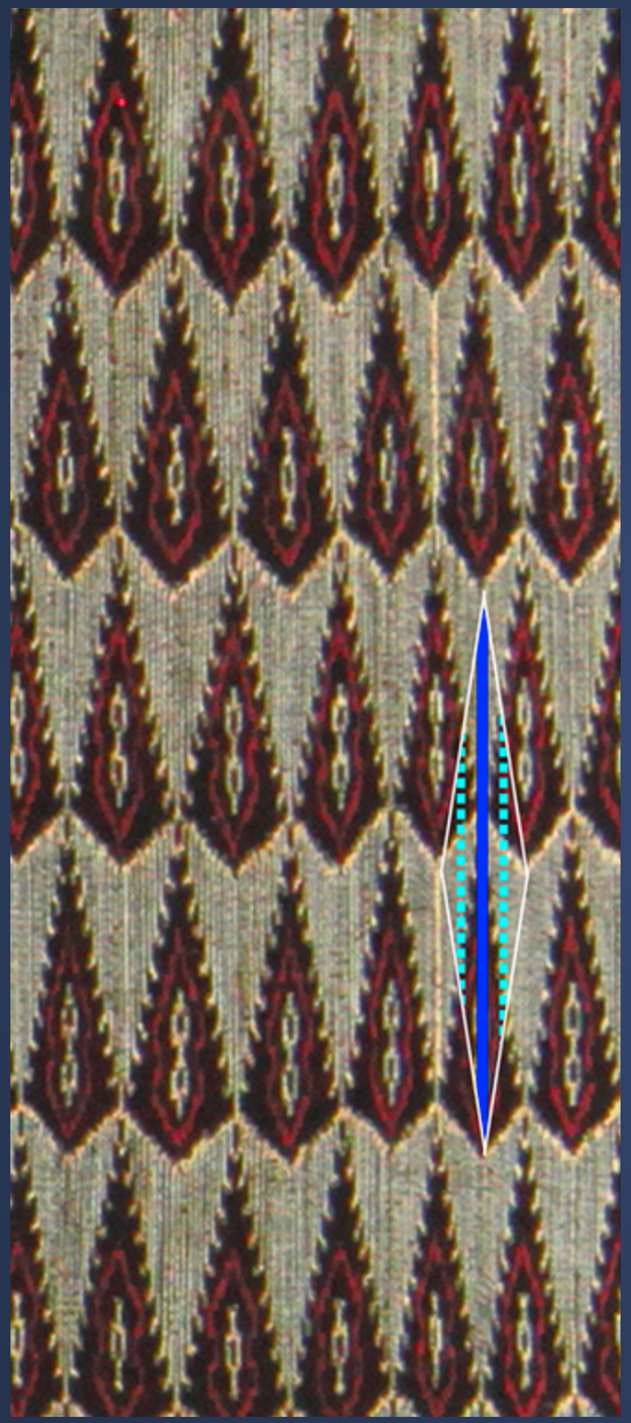
Image from Paterno et al (2001)

The Tofi Kemmu has:

- reflection symmetries
- 180^0 rotation symmetries
- glide reflection symmetries

Its symmetry group is the plane crystallographic group pmg.

Image from Paterno et al (2001)

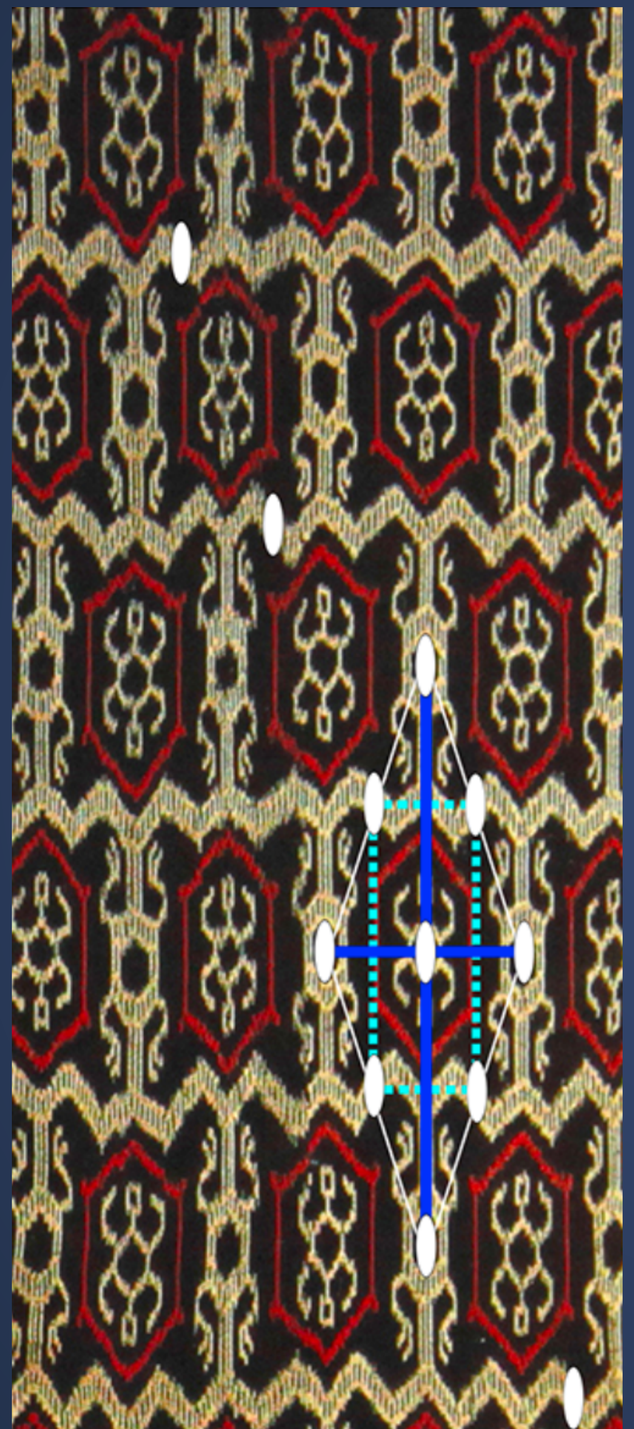


The Doun Basag Senko has:

- reflection symmetries
- glide reflection symmetries

Its symmetry group is the plane crystallographic group cm.

Image from Paterno et al (2001)



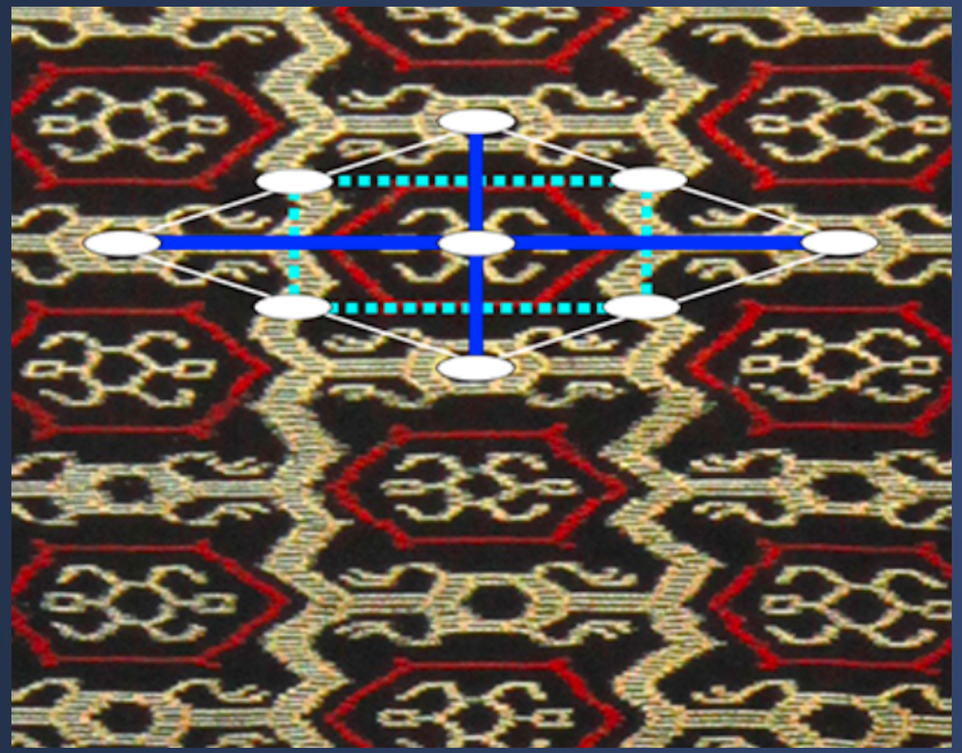
The Gondong Tahu has:

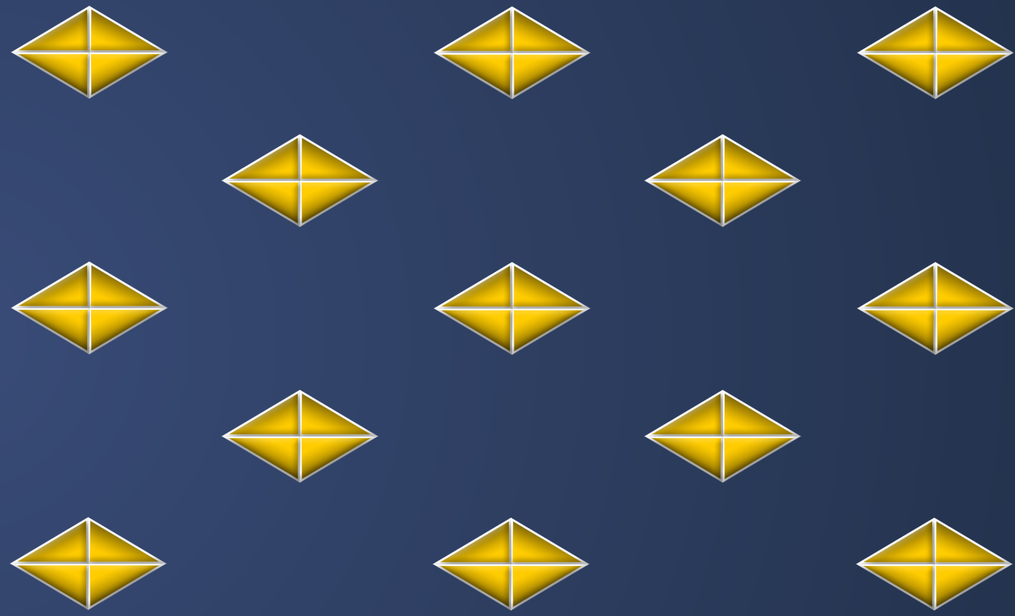
- reflection symmetries
- 180^0 rotation symmetries
- glide reflection symmetries

Its symmetry group is the plane crystallographic group cmm.

Image from Paterno et al (2001)

PATTERNS WITH A RHOMBIC LATTICE





THE KNOTTING PROCESS

Photo by Jojo Vito from happytrip.com

TWO GENERATIONS OF DREAMWEAVERS: LANG AND SEBULAN DULAY

Image from Paterno et al (2001)

WEAVERS OF MATHEMATICS

May 26, 2019, Lake Sebu Cotabato

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