

Grades 5-8 (AS), 9-12 (AS)

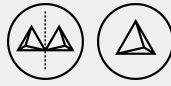
Duration: 20 min

Tools: one Logifaces Set / 1-2 student

Individual / Pair work

Keywords: Symmetry, Planes of symmetry

## 523 - Symmetry of two Blocks



**MATHS / TRANSFORMATIONS**



LOGIFACES  
METHODOLOGY  
Erasmus+

**TEACHER**  
Logifaces

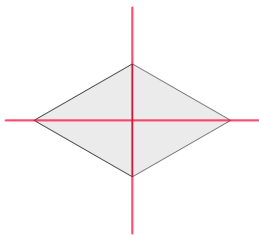
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### DESCRIPTION

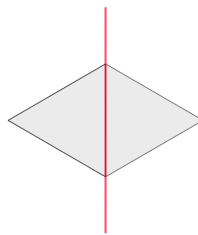
- LEVEL 1** Students build a structure that has at least one plane of symmetry by joining two Logifaces blocks. (When assembling, they keep the base of the blocks on the table and join the pieces together in the usual way along the vertical faces so that their surface is continuous.) They discuss the number of planes of symmetry of the built solid with their partner or with the whole class.
- LEVEL 2** The teacher draws the floor plan of two blocks with one or two lines that represent the planes of symmetry of the solid. Students try to build a solid with the given symmetry and discuss it with their partner.
- LEVEL 3** Students find all possibilities of joining two blocks in a way that the built solid has at least one plane of symmetry. They classify the solids by the type of symmetries.

### SOLUTIONS / EXAMPLES

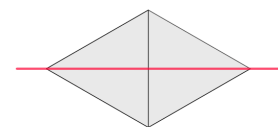
All possibilities of joining two blocks together to build a solid with at least one plane of symmetry are listed below. This list is the solution of the Level 3 question. Any of the listed constructions is a possible solution for the Level 1 question. The floor plans of the Level 2 question are shown in the figure below and the solutions for them are marked in the list of the constructions.



a)



b)

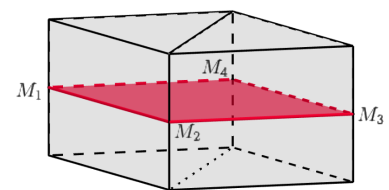
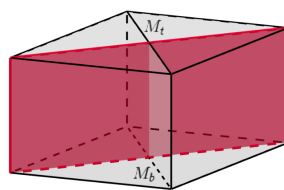
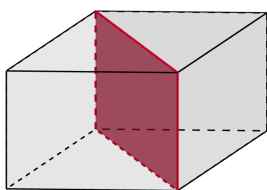


c)

The following symmetrical solids can be built:

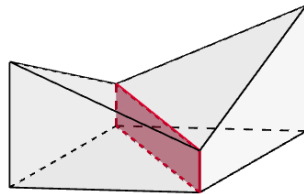
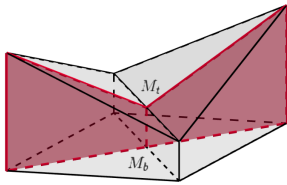
**CASE 1** Two congruent blocks

- If all heights are the same (two congruent blocks of type 111, 222 or 333), then the built solid has 3 planes of symmetry, see the figure. This is a solution for the floor plan a) in the Level 2 question.

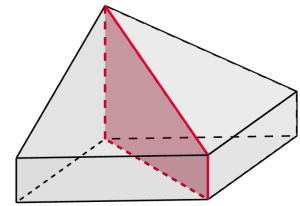


- If the blocks have two identical and one different height (two congruent blocks of type 112, 113, 122, 223, 133 or 233), then there are two ways of joining them. The structure obtained by joining the rectangular faces has two planes of symmetry. This is a solution for the floor plan a) in the Level 2 question. The structure obtained by joining the trapezium faces has one plane of symmetry. This is a solution for the floor plan b) in the Level 2 question.

Solution for floor plan a)



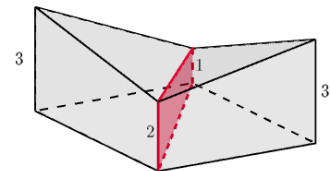
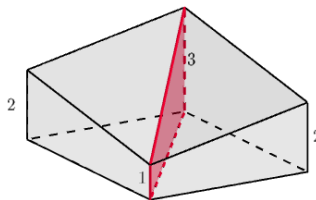
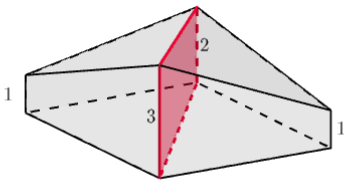
Solution for floor plan b)



- Two blocks of type 123 or two blocks of type 132 cannot be joined.

CASE 2 Using block 123 or block 132

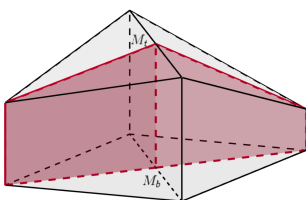
- The blocks 123 and 132 can be joined in three different ways. There is one plane of symmetry in all cases. This is a solution for the floor plan b) in the Level 2 question.



- The block 123 or 132 cannot be joined to any other block to form a symmetrical solid.

CASE 3 Two non-congruent blocks with two vertical edges of the same and equal height

The following pairs fulfil this property: 233-133, 233-333, 133-333, 122-223, 122-222, 223-222, 112-113, 112-111 and 113-111. There is one plane of symmetry in each built solid, which goes through the two mismatched vertical edges, see the figure. These are the solutions for the floor plan c) in the Level 2 question.



Other pairings of blocks can not be joined in any way to create a solid with plane symmetry.

PRIOR KNOWLEDGE

Plane of symmetry

RECOMMENDATIONS / COMMENTS

We recommend this exercise after [522 - Planes of Symmetry](#), which is an easier exercise. Level 3 is a more difficult exercise which can be used to differentiate.