Grades 1-4 (S), 5-8 (SA), 9-12 (SA)

Duration: 20 min

Tools: one 9 pcs Set / 1-2 student

Individual / Pair work

Keywords: Proof

207 - Straight Line

MATHS / LOGIC

LOGIFACES
METHODOLOGY
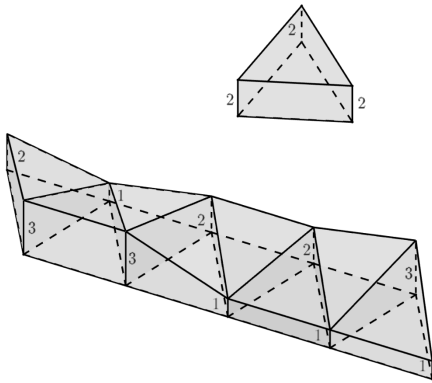Erasmus+

TEACHER
Logifaces

2019-1-HU01-KA201-0612722019-1

DESCRIPTION

LEVEL 1   Leave out the block 222 and arrange the remaining blocks of the 9 pcs Set into a line. (Also level 1: leave out the block 112 or 133 or 123 or 132)

LEVEL 2   Leave out the block 221 and try to arrange the remaining blocks of the 9 pcs Set into a line. After a few failed attempts, prove that it is impossible to arrange the blocks into a line.

LEVEL 3   Leave out the block 113 and try to arrange the remaining blocks of the 9 pcs Set into a line. After a few failed attempts, prove that it is impossible to arrange the blocks into a line.
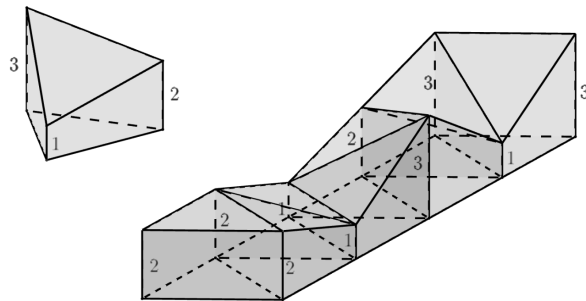
SOLUTIONS / EXAMPLES

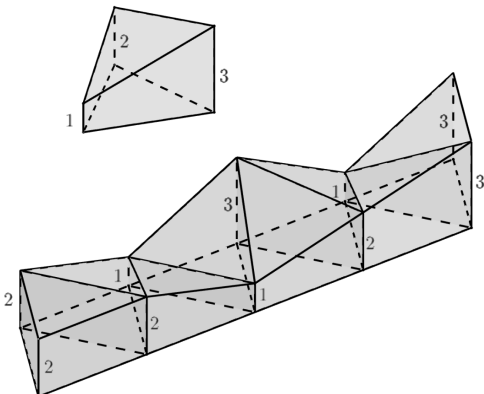LEVEL 1   See the figures for examples of possible solutions.

Block 222 left out:
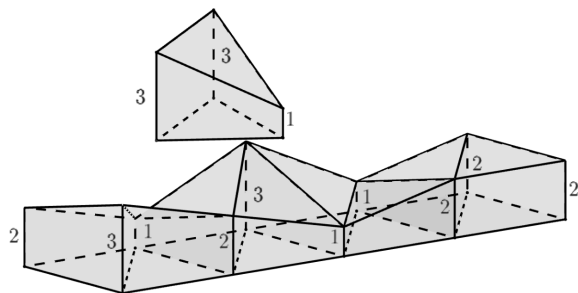
Block 123 left out:

Block 132 left out:

Block 133 left out:

LEVEL 2	The block 221 cannot be left out, because the block 222 can only be placed next to the block 221.
LEVEL 3	The block 222 can be placed only next to the block 221, hence the block 222 must be the first (or last) block in the line, followed by the block 221.

The block 112 cannot be the third block in the line, because it should be followed by a block with an edge 11, and there is no other such block. Therefore the third block must be the block 123 (or 132 depending on the way of arrangement). In the following part of the argument, we continue with the arrangement with block 123 in third place. The case of the other arrangement can be proved similarly.

The fourth block cannot be block 133, because it should be followed by a block with an face 33, and there is no other such block. Therefore the fourth block must be the block 132.

It is clear that the fifth block must be the block 123.
The sixth block cannot be block 112 for the same reason as before. Thus the sixth block must be the block 132. This can be followed only by block 133. The remaining block 112 cannot be placed next to the block 133, hence there is no arrangement into a line.

PRIOR KNOWLEDGE

None

RECOMMENDATIONS / COMMENTS

Exercise 208 - Impossible Line is recommended as an advanced level additional question to this exercise.