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Math tricks. The surprising wonders of shapes and numbers. (English) Zbl 1483.00006
Amherst, NY: Prometheus Books (ISBN 978-1-63388-664-3/hbk). viii, 216 p. (2021).

This is an extensive collection of entertaining mathematical tricks and puzzles with a surprising result that can be used to entertain bystanders. Therefore some are wrapped up as magical tricks. The four chapters collect topics involving arithmetic, geometry, logic, and probability respectively.

The arithmetic chapter is the most extensive one. The tricks explore fast multiplication techniques, divisibility properties, number patterns, and a diversity of arithmetic rules. It is explained why the tricks work.

The geometrical examples start with optical illusions, which are not really mathematical tricks, but the rest of the chapter involves mostly geometrical constructions with quadrilaterals, triangles, and circles which result in the (supposedly unexpected) appearance of parallel lines, collinearity of points, or its dual, the intersection of lines in one point. These constructions are a bit less entertaining and read more like theorems of geometry. Some simple justifications are given but if the proof is more involved, only the result is stated without explanation. A proof would be impossible anyway for examples where wrong graphics are used to suggest impossible results. The classical $8 \times 8 = 5 \times 13$ puzzle is an example of the latter.

The logical puzzles are more diverse: rearranging toothpick constellations by (re)moving a minimal number of them, chessboard puzzles, magic squares, weighting puzzles with a balance, card tricks, etc. Here it is not so much the result that is surprising, but the method leading to the solution, which, in retrospect, is often surprisingly simple, but requires thinking outside the box. Most of the tricks in this chapter are presented as puzzles with solutions at the end of the chapter.

The short probability chapter has some examples where the correct result is counter-intuitive, like the well known examples of the high probability that two people of a rather small group have the same birthday, or the Monty Hall problem.

Most of the problems are not in a standard school curriculum, but they are described for the (young) reader who is supposed to be an ambassador for the fun of mathematics, behaving like a 'trickster' entertaining her friends.

Reviewer: Adhemar Bultheel (Leuven)

MSC:

00A08 Recreational mathematics
00A09 Popularization of mathematics

Keywords:

elementary arithmetic; elementary geometry; logical puzzles; elementary probability; mathematics is fun

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