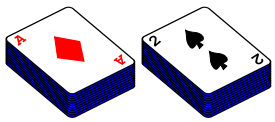
MathsJam Shout

January 2024
East Dorset MathsJam

Puzzle



Card Derangements

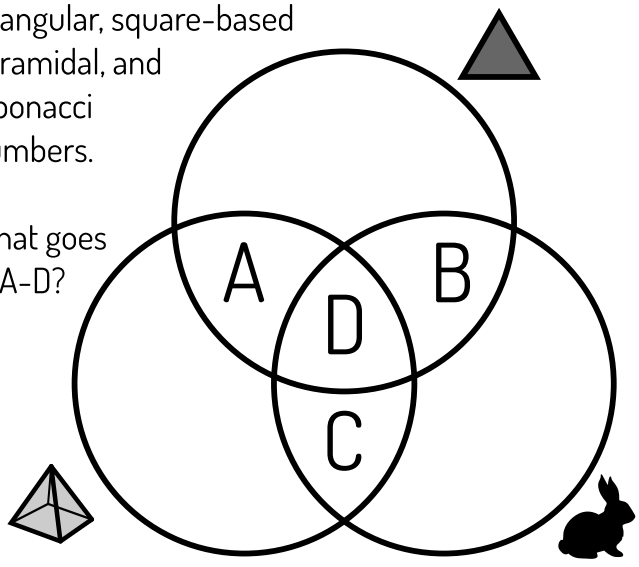
Tom writes: I have 2 decks of cards, which I independently shuffle and place on a table. I turn over the top card of each deck to see if they match. I keep going through the whole 52 cards and never find an exact match. What's the probability that happens?

Discuss

Venn Numbers

The three circles represent Triangular, square-based pyramidal, and Fibonacci numbers.

What goes in A-D?



Puzzles

From Rosalind

• What is the smallest number with exactly 100 factors?

• For any triangle, join each vertex to the two points that result from trisecting the opposite side. Prove that the resulting hexagon in the interior of the triangle has exactly 1/10 the area of the whole triangle.

Challenge

Sequences that go wrong

In each case, work out the first few then try to predict how it will continue. Answers always available at **OEIS.org** if you can type in the first few terms.

• The number of divisors of n!
• The maximum number of regions a circle can be cut into using chords from n points on the circumference
• The number of distinct fractions between 0 and 1 you can make using 0, 1, 2, ..., n (picking one each for numerator and denominator, and cancelling down)

BONUS QUESTION: try to find a mathematically meaningful integer sequence NOT already listed on OEIS.

MathsJam Shout is a monthly sheet of ideas for activities to do at a MathsJam night. It's created using suggestions from a different MathsJam each month, and if you'd like to submit suggestions for a month in the future, email **katie@mathsjam.com** for details.

MathsJam is a monthly opportunity for like-minded self-confessed maths enthusiasts to get together in a pub and share stuff they like. Puzzles, games, problems, or just anything they think is cool or interesting. Monthly MathsJam nights happen in over 70 locations around the world, on the second-to-last Tuesday of each month. To find your nearest MathsJam, visit the website at **www.mathsjam.com**.

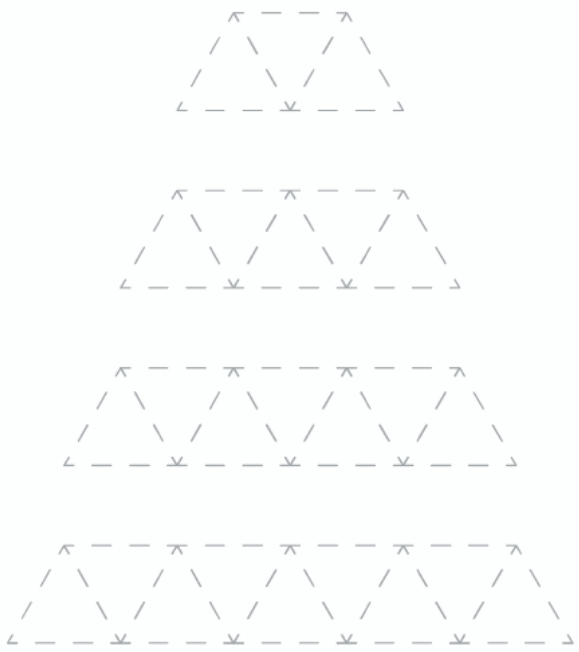
Doodles

Instructions:
Trace each doodle without lifting your pencil.

Rules:
1. Pick any point to start on.
2. Trace the whole doodle without lifting your pencil.
3. You cannot trace a line more than once.

Doodles

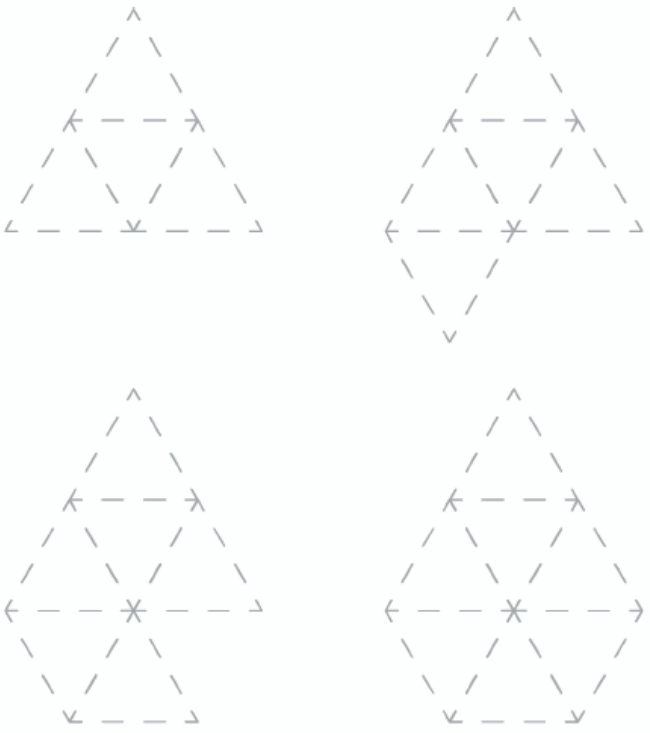
Challenge 1:
Can you trace each doodle without lifting your pencil?



Visit jrmf.org for more fun math.

Doodles

Challenge 2:
One of these doodles is impossible to trace without lifting your pencil. Which one is impossible?



Julia Robinson Mathematics Festival