

# Frog Problems

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MathsJam 2024 – Saturday Night Table Activity

- **Frog exchange puzzle 1:**

- Jumping Frogs Puzzle - interactive applet:  
<https://www.primefactorisation.com/frogpuzzle/>
- Frog Jumping Puzzle – interactive applet  
[https://data.bangtech.com/algorithm/switch\\_frogs\\_to\\_the\\_opposite\\_side.htm](https://data.bangtech.com/algorithm/switch_frogs_to_the_opposite_side.htm)
- The Frog Problem: More than You Might Want to Know - article by Derek Holton in the Mathematical Gazette  
<https://www.jstor.org/stable/40378555>
- Why is there a unique solution to the frog puzzle? at Math Stack Exchange  
<https://math.stackexchange.com/questions/2348659/why-is-there-a-unique-solution-to-the-frog-puzzle#2351771>

- **Frog exchange puzzle 2:**

Frogs and toads are placed as follows: ●○○●○○

They want to be separated like this: ●●●○○○

The animals can only move in pairs (two animals next to each other).

These two frog exchange problems can be generalized for  $2n$  frogs.

- **Latin Lilies** - a crossing game for two players (interactive applet)

<https://nrich.maths.org/problems/latin-lilies>

- **Ways of crossing a pond** – video on Numberphile

<https://www.youtube.com/watch?v=JBkmR3rzz5M>

- **Frog crossing a river** – video by Stand-up Maths:

<https://www.youtube.com/watch?v=ZLTyX4zL2Fc>

- **Frog jumping into a river puzzle:**

A frog sits 1m from a river. It jumps forward repeatedly, towards the river, advancing a random amount with each jump, uniformly chosen between 0 and 1m.

The frog stops once it is inside the river (more than 1m from its original position).

How many jumps does the frog make on average?