

NAME: Avani



FROGS

YEAR 6 MATHS



Aim of investigation

To work logically and systematically on an open-ended problem

To record your findings

To identify and explore patterns, making and checking predictions

To establish a general rule and apply that rule to find a solution

To consider ways to develop and extend the original question.

▶ Question.

▶ To find out how many jumps and slides and total moves for 100 frogs on one side and 100 frogs on the other to swap places.

Introduction

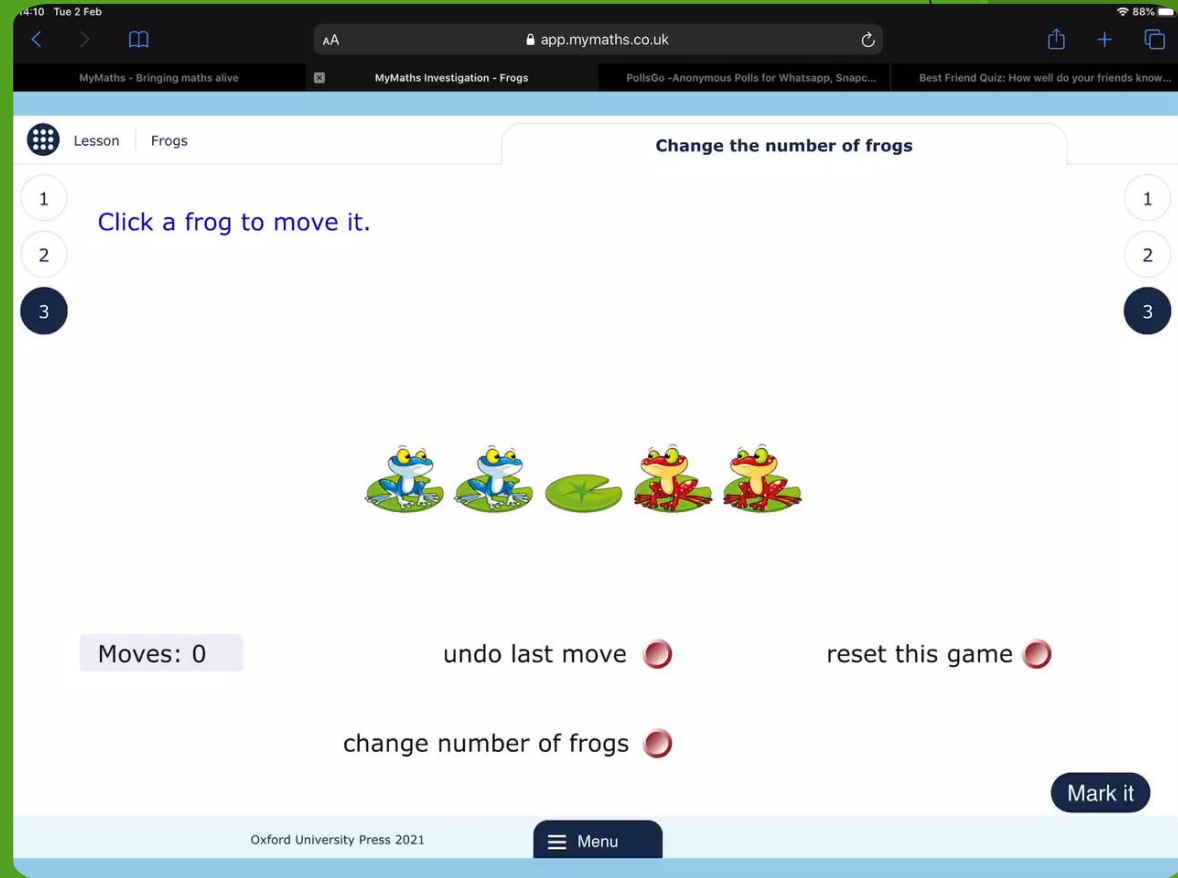
Rules

there are two moves in the game. One of them are a slide a slide can only go one lily pad at a time. The other one is a jump they can jump over one frog to get to another lily pad(so they can go two spaces). The other rule is that the frogs can not go backwards it can only go forward.



This is for 2 frogs on each side

- Jumps- 4
- Slides- 4
- Total- 8



This is for 3 frogs on each side

- Jumps- 9
- Slides- 6
- Total- 15

The screenshot shows a mobile browser interface for the 'Frogs' investigation on the MyMaths website. The browser address bar shows 'app.mymaths.co.uk'. The page title is 'Lesson Frogs'. The main heading is 'Change the number of frogs'. The instructions are 'Click a frog to move it.' There are three numbered steps on the left and right sides of the page, with step 3 highlighted. The game board shows three blue frogs on the left, a lily pad in the middle, and three red frogs on the right. The 'Moves: 0' counter is displayed. There are buttons for 'undo last move', 'reset this game', and 'change number of frogs'. A 'Mark it' button is in the bottom right corner. The footer includes 'Oxford University Press 2021' and a 'Menu' button.

This is for 4 frogs
on each side.

Jumps- 16

Slides- 8

Total- 24

The screenshot shows the 'Frogs' game interface on the MyMaths website. The browser address bar shows 'app.mymaths.co.uk'. The page title is 'Lesson Frogs'. The main heading is 'Change the number of frogs'. The instructions say 'Click a frog to move it.' There are three numbered steps on the left and right sides, with step 3 highlighted. The game board shows four blue frogs on the left, a lily pad in the center, and four red frogs on the right. Below the board, there is a 'Moves: 0' counter, buttons for 'undo last move', 'reset this game', and 'change number of frogs', and a 'Mark it' button. The footer includes 'Oxford University Press 2021' and a 'Menu' button.



Table of results

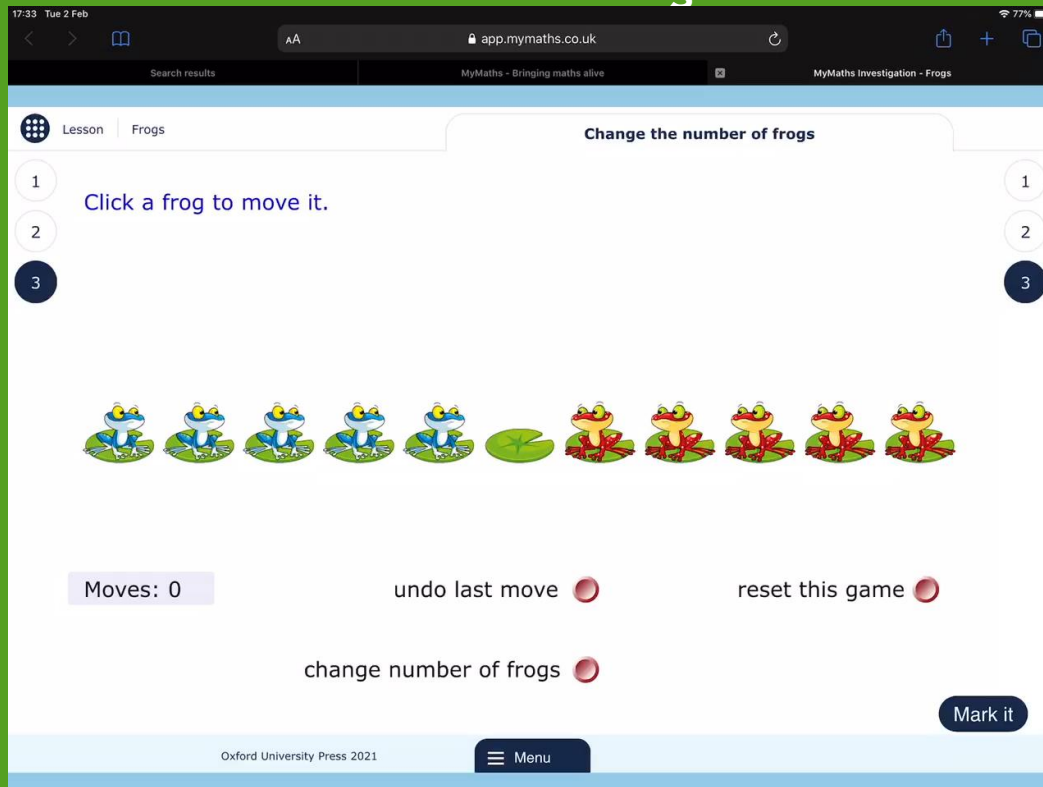
Number of frogs on each side	Number of slides	Number of jumps	Total moves
2	4	4	8
3	6	9	15
4	8	16	24

My predictions

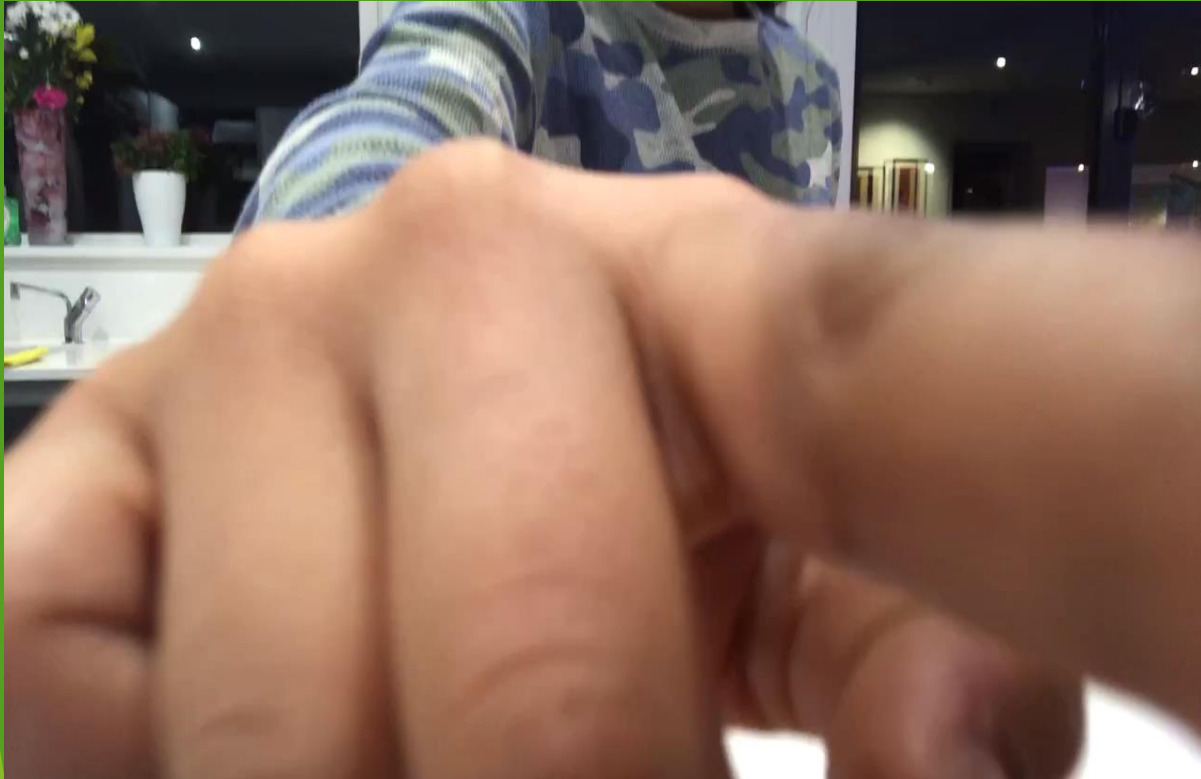
here are my thought on how many moves there would be for 5 frogs on each side.



- ▶ My prediction is that the moves for 5 frogs on each side are 35.



The pattern to solve the frog's problem



. First sort it out in the pattern (blue frog, green frog, blue frog, green frog etc). Or in my case orange then bowl then orange then bowl.. Then you find a way too put them to the opposite side.



General rule for problem

- ▶ Formula for jumps = n^2
- ▶ Formula for slides = $2n$
- ▶ Formula for total = $J + S$
- ▶ So for 6 frogs on each side it is...
- ▶ Jumps = $6^2 = 36$
- ▶ Slides = $2 \times 6 = 12$

$$\begin{array}{r} 36 \\ + 12 \\ \hline \text{Total} = 48 \end{array}$$



The answer and solution to the question

To find out how many jumps and slides and total moves for 100 frogs on one side and 100 frogs on the other to swap places.

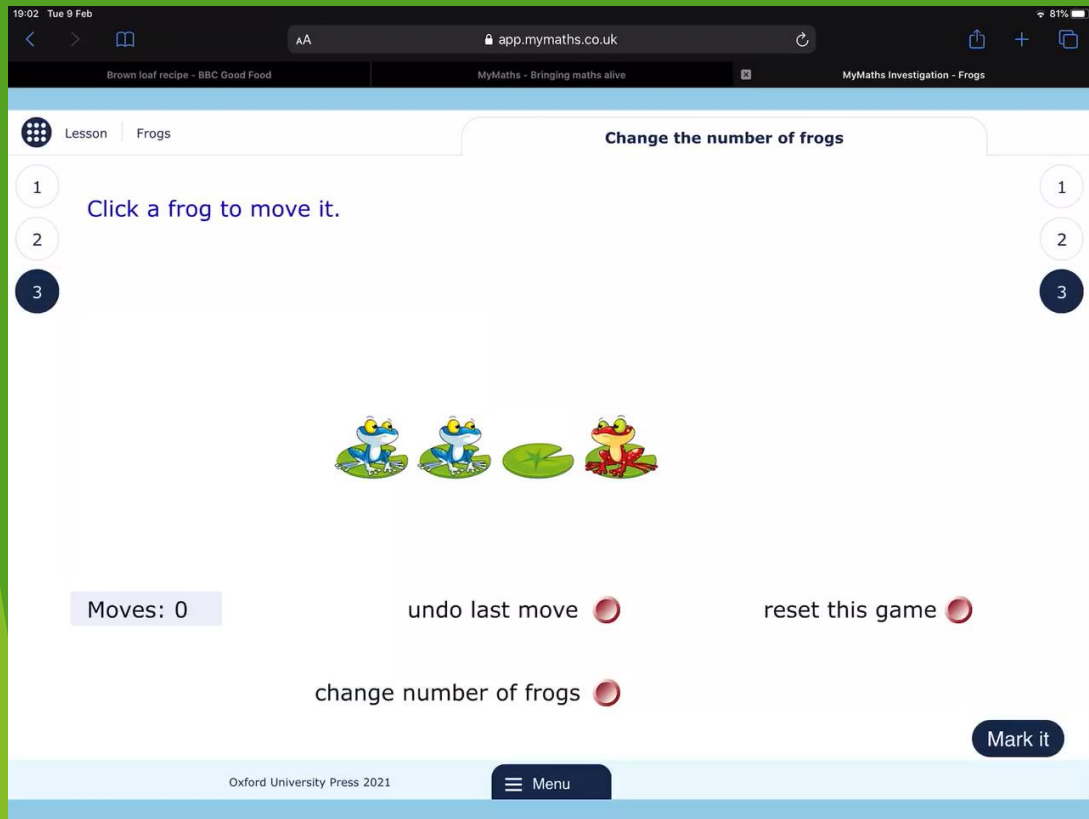
- ▶ How to work it out....
- ▶ Jumps=100 squared= 10, 000
- ▶ Slides= 100 times 2=200
- ▶ Total 10,000 + 200=10,200

Here is the table of result of the whole project!

The algebraic pattern is also in the table at the bottom so look carefully and see if you can spot the pattern now.

No. of Red Frogs	No. of green frogs	Total Number of Moves	No. of Slides	No. of Jumps
1	1	3	2	1
2	2	8	4	4
3	3	15	6	9
4	4	24	8	16
5	5	35	10	25
6	6	48	12	36
10	10	120	20	100
100	100	10200	200	10000
n	n	$(n \times n) + 2n$	$2n$	$n \times n$

Extension



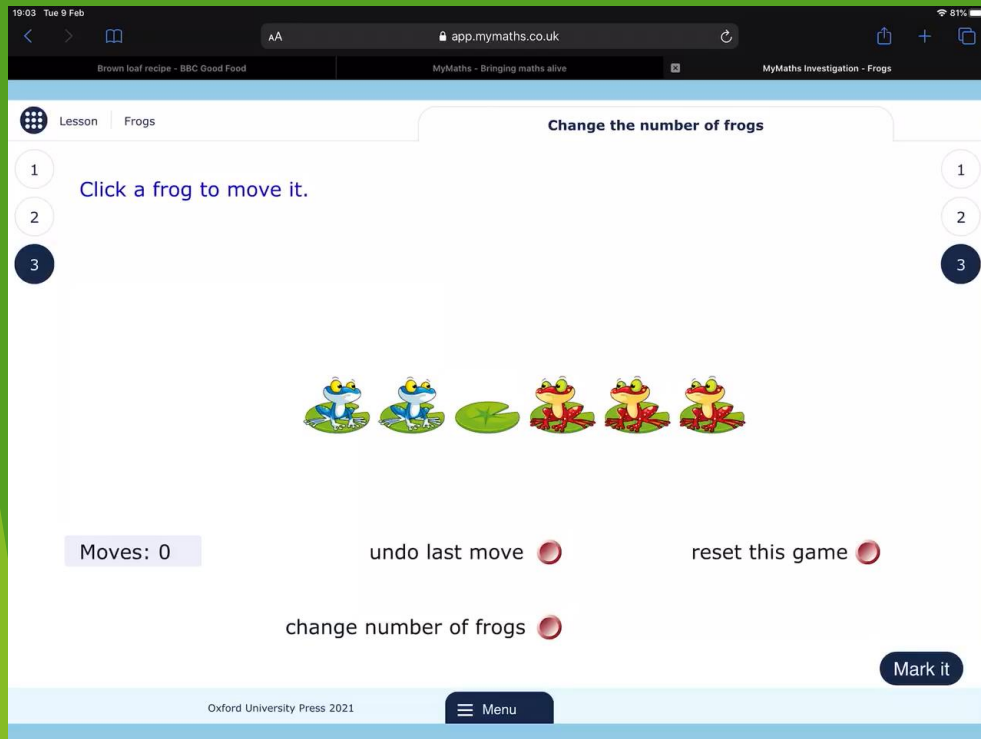
- ▶ Question
- ▶ How do you solve the problem with a different number on frogs on each side. And find out how many frogs for 10 on one side and 9 on one side.
- ▶ Jumps- 2
- ▶ Slides-3
- ▶ Total-5

This is for 3 frogs on one side and 2 on the other.

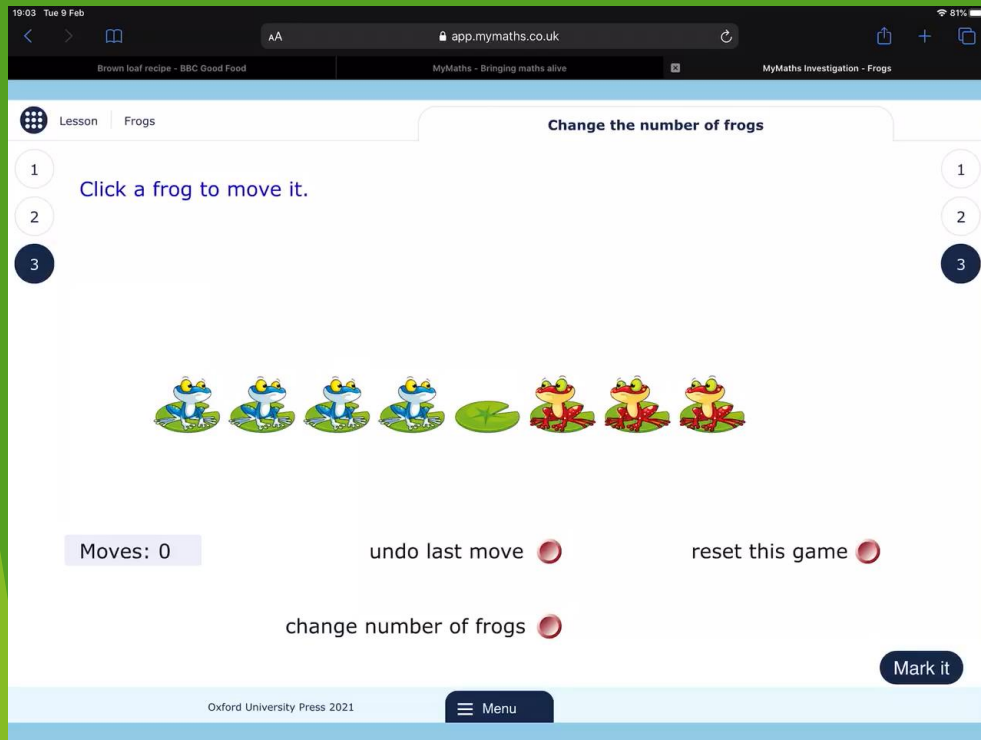
► Slides-5

► Jumps-6

► Total-11



This is for 3 frogs on one side and 4 on an other

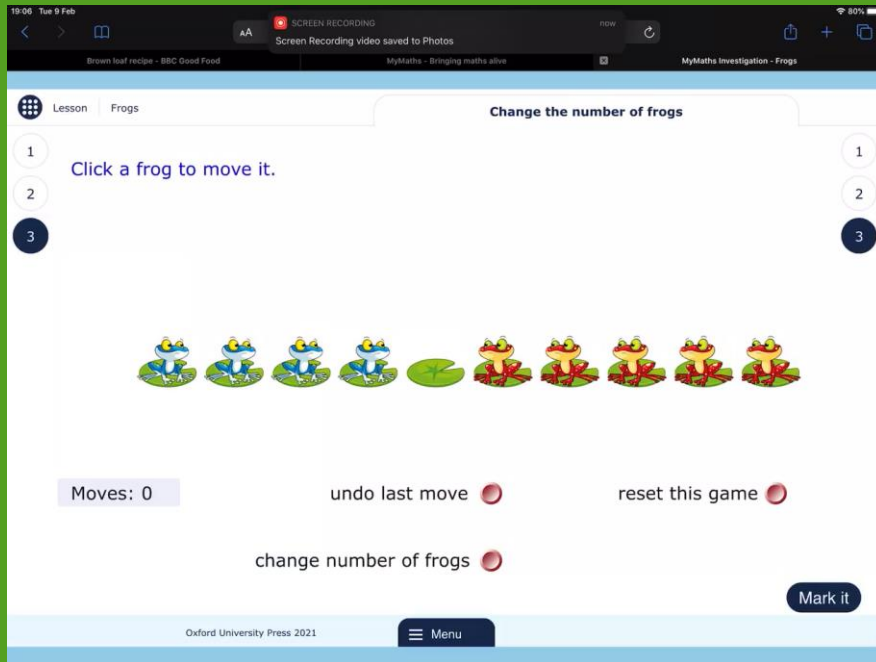


▶ Jumps- 12

▶ Slides-7

▶ Total-19

This is for 4 frogs in one side and 5 on the other.



- ▶ Jumps- 19
- ▶ Slides-10
- ▶ Total-29

Table of results

No. of Red Frogs	No. of green frogs	Total Number of Moves	No. of Slides	No. of Jumps
1	2	5	3	2
2	3	11	5	6
3	4	19	7	12
4	5	29	9	20

Finding the pattern

- ▶ Jumps- $n \times m$
- ▶ Slides $n + m$
- ▶ Total $n \times m + (n + m)$

Number of frogs in one side	2	N
Number of frogs on the other side	1	M
		Algebra letter term