

PUZZLING CARTOON

- WATER LILIES -



AMAZINGMATHS

Materials :

- Video of the puzzle
- Sheets of paper
- Pencils
- Written copies of the puzzle (optional)

The puzzle

My father owns a cottage in the woods. Near his cottage, there is a pond. Every summer, the pond gets completely covered in water lilies. I have noticed that the number of water lilies in the lake doubles every day.



This summer, on June 1st, there was only one water lily. Thirty days later, the pond was entirely covered. Next summer, I will place two water lilies in the pond on the 1st of June.

How many days will it take for the pond to be completely covered again?

Source : *100 casse-tête et problèmes de logique*, Larousse, 2011.



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SCIENCES ET MATHÉMATIQUES EN ACTION



PUZZLE SOLUTION



The answer:

The pond will be covered in 29 days.

Detailed Explanations

Indeed, since the number of water lilies doubles every day and the pond is entirely covered in 30 days, we deduce that after 29 days, the descendants of only one water lily covers half the pond's surface. Therefore, if we have two water lilies, each one will take 29 days to cover half the pond so, the two together, they will have covered the whole pond.

In a more formal mathematical writing, we can note the number of water lilies descending from a water lily as 2^n , n being the number of days that went by since the beginning. But, if we begin with two water lilies, the total number of water lilies after t days will be obtained with $2^t + 2^t = 2(2^t) = 2^{t+1}$. If we want the final quantity generated by a water lily to be the same as the one generated by two water lilies, then necessarily $2^n = 2^{t+1}$, so $t + 1 = n$. If n equals 30 days, then t is worth 29 days.

To go further...

Ask the students to find a formula to know the number of water lilies descending from one water lily after x days, then to modify this formula in the case we begin with 4 water lilies. They should obtain 2^{x+2} .

