



PUZZLING CARTOON

- WATER LILIES -



Educational Goals

- ❖ Develop logic
- ❖ Highlight the playful potential of mathematics
- ❖ Implicitly distinguish proportional linear relationships from exponential relationships

Key Features of the Targeted Competencies

- ❖ To decode the elements that lend to a treatment
- ❖ To represent the situational problem with a mathematical model
- ❖ To elaborate a mathematical solution
- ❖ To validate the solution
- ❖ To establish conjectures
- ❖ To form and apply networks of concepts and mathematical processes

Concepts Used

- ❖ Arithmetic (addition, multiplication, division, powers)
- ❖ Relations of equality and equivalence

Materials

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

Targeted Academic Levels
Grades 7 to 11

Mathematical Field Concerned



Suggested Teaching Formula



Time Required
15 minutes



SUGGESTED PROCESS



Step 1: Introduction (2 minutes)

Play the video of the puzzle a first time.

A written version of the puzzle is included in the appendix of this document. If you believe it is necessary, you can project it or distribute copies to your students.

Play the video a second time to allow the students to thoroughly understand the information.

Step 2: Finding the solution (10 minutes)

Ask the students to find the solution individually. If some students find the solution very quickly, make sure that the solution found is not “15 days”. If it is the case, tell them it is not the right answer and tell them to keep searching. Different representations can then be used to ease the search for solutions, particularly drawing and using materials like pieces of paper.

Step 3: Reveal the solution (3 minutes)

The pond will be covered in 29 days.

Solution's explanation:

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 $2t + 2t = 2(2t) = 2^{t+1}$. 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 $2n = 2t + 1$, 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} .