



Puzzling cartoon - Bridge Crossing -



Educational Goals

- ❖ Develop logic
- ❖ Highlight the playful potential of mathematics
- ❖ Work on the decision-making process, the anticipation of consequences and the search for an optimal solution

Key Features of the Targeted Competencies

- ❖ To decode the elements of the situational problem
- ❖ To modelize the situational problem
- ❖ To apply different strategies in order to elaborate the solution
- ❖ To validate the solution
- ❖ To share the information relative to the solution
- ❖ To define the elements of the mathematical situation
- ❖ To mobilize and apply concepts and processes appropriate to the given situation

Concepts Used

- ❖ Arithmetic (addition)
- ❖ Conventional units for time measurement

Materials

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

Targeted Academic Levels
Grades 5-6

**Mathematical Field
Concerned**



**Suggested Teaching
Formulas**



Time Required
20 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 (15 minutes)

Ask the students to individually find a way to make everyone cross, respecting the constraints, that is considering no one can walk in the dark, that a maximum of two people can cross at the same time and that if two people cross at the same time, they have to walk at the pace of the slowest person. Ask each student to calculate how much time this way of crossing would take.

In plenary, compare the different times the students obtained. Try to find the minimum time that respects the constraints (it is possible to cross in 17 minutes). If the crossing times of all the students are above 17 minutes, mention to the students that it is possible to do better and elaborate with them another way of crossing. In the case that the students would not have any suggestions, go to step 3.

Step 3: Reveal the solution (3 minutes)

To get to the solution that will allow everyone to cross in a minimum time, we have to consider this:

- One person only will bring the lamp back to the starting point after crossing the bridge and she must be the fastest one possible. So, this role will be played by either Albert or Bertha. We need to have them cross first so both of them can be available to go back onto the starting bank.
- Diane's time will necessarily be part of the sum since she is the slowest. She has to cross with the second slowest (Carole), this way Carole's time will not be part of the total time's sum.

Based on the foregoing, here is how to coordinate a crossing that does not take over 17 minutes:

Albert and Bertha cross first, which takes 2 minutes. Albert brings the lamp back, since he is the fastest of the two. Three minutes went by since the start.

Carole and Diane cross the bridge together. A total of 13 minutes went by. Bertha brings the lamp back, which gets the number of minutes that went by to 15 minutes. Finally, Albert and Bertha cross the bridge in two minutes and the total time that went by since the start is 17 minutes.

Note: some students could mention the eventuality in which one of the characters carries another character in his arms. Then, one possibility is to encourage the student in this way: what will be the minimum time then? The answer is 5 minutes (considering it is Albert that does two round-trips, then one one-way). We then ask the student to do it the other way, considering that all the characters must walk.

SOURCE : Énigmes Mathématiques Diaboliques, de Sylvain Lhullier