CAKES AND MORE CAKES - THINKING
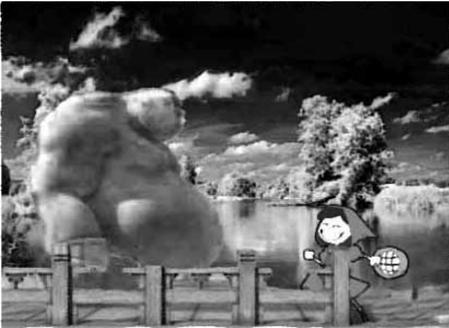
NAME:

Griddle is planning to surprise her grandmother for her birthday with some cakes. Her grandmother's home is located in the land of Trollypolly and she must cross ten bridges to get to her house. All the bridge guards love cake and require a payment before she can cross each bridge. In order to cross a bridge she has to give the guard half of the cakes she is carrying but since she is so kind and sweet they each give one cake back.

How many cakes will she have to make to be able to have 2 cakes left when she arrives at her Grandmother's house?

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ANSWER AND HELP

If you think about this problem you will realize it is a trick question. There are ten bridges and each guard will take half of what she is carrying and give one back. This means the total cakes will become odd and then will become fractions and then will become one big mess.

The simplest way to solve this problem is to work backwards, which you will instantly see the answer is 2 cakes. If she leaves with two cakes the first guard will take half which is only 1, but then give one back which leaves her two again. This will continue with all the guards until she reaches her grandmother's house with exactly two cakes

2 cakes ⌒2⌒ ⌒2⌒ ⌒2⌒ ⌒2⌒ ⌒2⌒ ⌒2⌒ ⌒2⌒ ⌒2⌒ ⌒2⌒ ⌒2⌒ 2 cakes

start   1   2   3   4   5   6   7   8   9   10   end

Ask yourself, "how will I end up with two cakes after the tenth bridge?"
4 cakes means the guard will take 2 but give 1 back leaving her 3. NO
3 cakes is messy. NO
2 cakes means the guard will take 1 but give 1 back leaving her 2. YES
Keep doing this until you get back to the start or you see the pattern.