

## yamátárájabhānasalagám

The word above is an ancient Sanskrit word. It was used hundreds of years ago by Indian poets and musicians and is still in use. As you read across it, each (overlapping) group of three syllables shows one possible triplet of long and short beats (or accents).

For example:

yamátá = short, long, long

mátará = long, long, long

- 1) How many possible triplets are there? Explain.
- 2) How could you represent this word mathematically?
- 3) How many syllables does this word have?
- 4) Could it be shorter, and still have all possible triplets? (Think hard!)
- 5) Make up a memory word for *pairs* of short and long accents.
- 6) How many possible quadruplets of long and short are there?
- 7) Can you make a memory “word” for quadruplets?
- 8) Can you find a different “word” for triplets than the Sanskrit one?
- 9) Can you turn this type of problem into a geometric one?
- 10) Can you memorize the word and say it?
- 11) What can you learn about other codes that use just two symbols, such as short and long, or zero and one? (For example, Morse Code, Baudot Code, and other telegraph codes.) You might also want to do some research on De Bruijn sequences.

Have fun!

Source: Sherman K. Stein devotes a chapter to this topic in his book, *Mathematics: The Man-Made Universe*.

## EGGS

### I. Chicken Little

Chicken Little was going to town with a whole number of eggs in her basket. She met Henny Penny, who bought half of all the eggs Chicken Little had, plus half an egg more. Then Chicken Little went on her way. Next she met Lucky Ducky, who bought half of all the eggs Chicken Little had left, plus half an egg more. On went Chicken Little. Now she met Loosey Goosey, who bought half of what Chicken Little had now, plus half an egg more. Now Chicken Little went home, having sold all her eggs without needing to crack a single one!

- 1) How many eggs did Chicken Little start with? Explain, using words, pictures or charts.
- 2) What if we made up the same story, but Chicken Little met four people, or two, or five? How would the answer change? Can you find a pattern?
- 3) Is there a way to make the story work and have Chicken Little have some whole number of eggs left in her basket at the end? Explain.

Source: I found this problem at [forum.swarthmore.edu/elempow](http://forum.swarthmore.edu/elempow)

### II. Baskets

An old saying says “Don’t put all your eggs in one basket.” Ted has a dozen eggs and three baskets. How many different ways can he distribute his eggs so each basket has at least one egg? Explain your method. Will it make a difference if you can tell one egg from another? Will it make a difference if you can tell the baskets apart? This is a good problem to approach by solving a simpler problem of the same kind!

Have fun!