

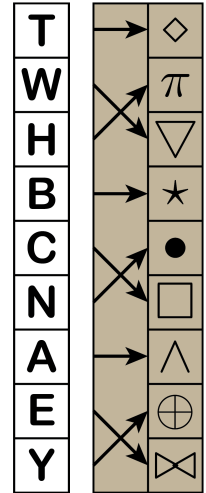


Problem of the Week

Problem D

Scavenger Hunt

Kavi is creating a scavenger hunt for his younger siblings where the clues are all names of places in Canada. To make it more challenging, he encrypts each clue using a homemade cipher machine. He starts with two strips of paper, each with a length equal to the circumference of a paper tube. One paper contains a column of letters and the other contains a column of symbols with an arrow pointing to each symbol, as shown. He wraps each strip of paper around his tube and tapes them so that the paper with the letters can rotate around the tube but the paper with the symbols is fixed in place. The paper with the letters is called the *left rotor* and the paper with the arrows and symbols is called the *right rotor*.



Kavi follows the steps below to encrypt his clues using his cipher machine.

1. Rotate the left rotor so that the letter T points to the symbol \diamond . This is the “start position”.
2. Encrypt the first letter in the message by following the arrow from the letter to the symbol. For example, the letter W would be encrypted as ∇ .
3. Rotate the left rotor up one position and encrypt the second letter in the message. For example, the letter A would be encrypted as \bullet .
4. Rotate the left rotor up two positions and encrypt the third letter in the message. For example, the letter W would be encrypted as \boxtimes .
5. Rotate the left rotor up three positions and encrypt the fourth letter in the message. For example, the letter A would be encrypted as \diamond .
6. Continue the procedure of rotating the left rotor up n positions and encrypting the $(n + 1)^{\text{th}}$ letter in the message until all letters in the message have been encrypted.

Kavi’s clue “WAWA” would therefore be encrypted as $\nabla \bullet \boxtimes \diamond$.

Follow the steps to encrypt Kavi’s clue “BATCHAWANABAY”.

