



## Problem of the Week



### Problem C and Solution

#### Fruit Display

##### Problem

Jigme placed five oranges in a row on a long plate. He then placed one apple in each of the spaces in the row between two oranges.

Next, he placed one banana in each of the spaces between two fruits already in the row.

He then repeated this procedure with pears, then peaches, and finally with strawberries.

Determine the total number of fruits in the row.

##### Solution

After placing 5 oranges in the row, there are 4 spaces between the fruits. So Jigme placed 4 apples in the row. At this point, there are  $5 + 4 = 9$  fruits in the row.

Since there are now 9 fruits in the row, there are 8 spaces between the fruits. So Jigme placed 8 bananas in the row. At this point, there are  $9 + 8 = 17$  fruits in the row.

Since there are now 17 fruits in the row, there are 16 spaces between the fruits. So Jigme placed 16 pears in the row. At this point, there are  $17 + 16 = 33$  fruits in the row.

Since there are now 33 fruits in the row, there are 32 spaces between the fruits. So Jigme placed 32 peaches in the row. At this point, there are  $33 + 32 = 65$  fruits in the row.

Finally, since there are now 65 fruits in the row, there are 64 spaces between the fruits. So Jigme placed 64 strawberries in the row. At this point, there are  $65 + 64 = 129$  fruits in the row.

Thus, there are 129 fruits in the row in total.

##### EXTENSION:

You may have noticed a pattern in the total number of fruits after each new fruit was added. If Jigme placed fruits in this way using  $n$  different fruits, there will be a total of  $2^{n+1} + 1$  fruits in the row. Can you see why? Start by looking at the number of spaces between the fruits.