

# Naturally Mathematical 2019

## A Christmas Challenge for Young Mathematicians

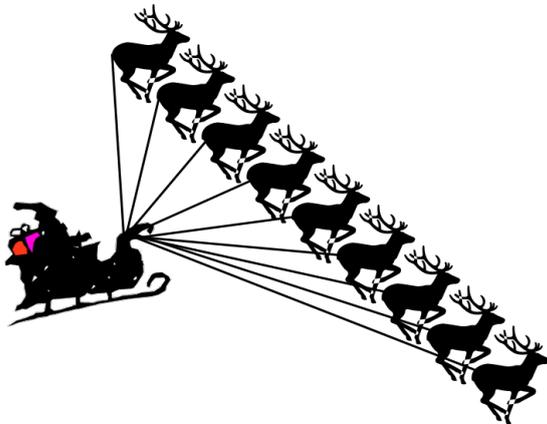
### Question 1: Rudolf has a Problem

Rudolf the red-nosed reindeer knew that the other eight reindeer wished that they had red noses too. So, do you know what he did? He asked Santa's elves to make 8 red reindeer noses that glowed in the dark.

Now he's wondering about how the 9 reindeer could arrange themselves to guide Santa's sleigh around the world on Christmas eve.

What different ways could this be done?

"Could we all be in one line?" he asked himself.



"No, all in a line would be too boring" he thought. But what else could he try?

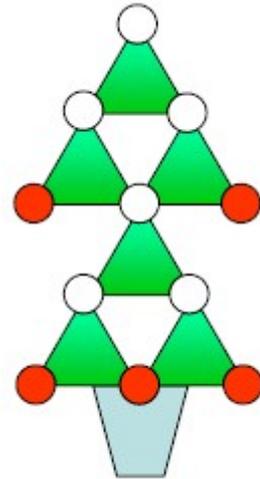
I think he should try to subitize, or use doubles or count-ons, don't you? Please give him some ideas as that would make him very happy.

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## Question 2: Decorate the Xmas Tree

To decorate a Christmas Tree with numbers, you can choose from the numbers 1 - 9 to go into the red circles, but the numbers you choose should all be different.

After that, each white circle is filled with the sum of the two numbers below it. If numbers in the white circles are repeats, that is alright - it's only the numbers in the red circles that have to be different. The number at the top of the Christmas Tree is always 25.



What numbers should you choose for the red circles, and where should they be placed?

In what different ways can you fill the red circles with numbers?

## Question 3: How Many Presents

By December 25th there were 25 presents under the Smith Family Christmas tree.

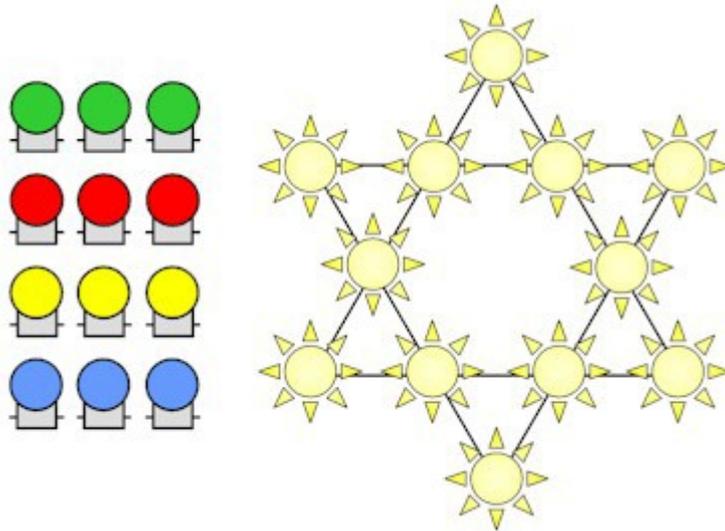
Each person was to get more than one present, but no two people would get the same number of presents. Only the females, Mum, Gran and Lucy, will get an odd number of presents. Both the children, Lucy and Peter, will get three times as many presents as one of their parents and Gran will get as many as Mum and Dad together. How many presents will each person get?



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## Question 4:

Last year we received this beautiful Christmas decoration from our friends overseas, and it came with lights in four colours (three bulbs in each colour):



The instructions say that for best effect, there needs to be one bulb of each colour in each line ... and the part showing how to do this has gone missing.

Please - we need the help of some naturally mathematical people to tell how we can arrange the bulbs ... and if possible, could you also tell us if there is more than one way of making the arrangement. We would really appreciate your help in this matter.