

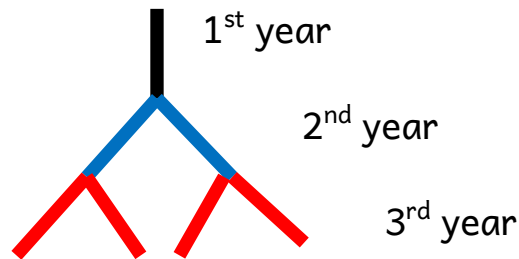


# The Mistletoe



Number Patterns

The mistletoe is a plant which grows mathematically. Every year each branch splits into two.



1. How many branches will this mistletoe have next year? **Ans: 8**

Year	Number of Branches
1	1
2	2
3	4
4	8
5	16
6	32
7	64

8	128
9	256
10	512

Continue the table to find the number of branches in its 10<sup>th</sup> year.

2. Which year will be the first year to see over 10,000 branches?  
 15<sup>th</sup> year with 16, 384 branches

Something extra about Mistletoe:



# The tallest toilet roll square-based pyramid

## Number Patterns



The tallest toilet roll square-based pyramid is 4.36 m (14 ft 3.75 in), achieved by Kimberly-Clark Corporation and Meijer in USA, on 24 May 2018.

The base of the pyramid measures approximately 4.87 m long on each side. It took 14 people 10 hours to build the pyramid.

The pyramid was comprised of 25,585 separate rolls.

### Task 1

What number pattern is used to build the tiers of this pyramid?

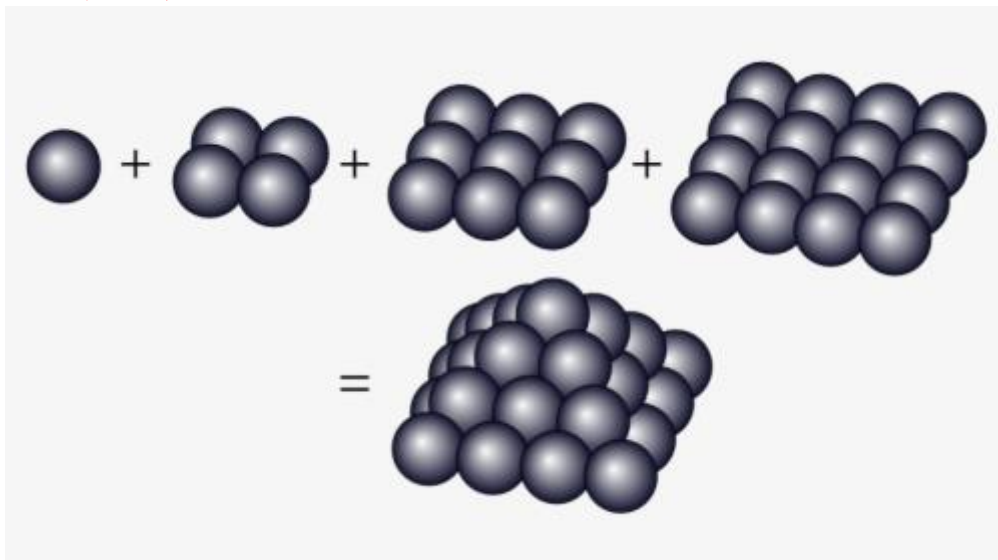
Show your work by drawing a labelled diagram.

Each tier is made up of a square number of toilet rolls therefore each tier is adding the next square number.

1<sup>st</sup> tier  $(1 \times 1) = 1$  roll

2<sup>nd</sup> tier add  $(2 \times 2) = 1 + 4 = 5$  rolls

3<sup>rd</sup> tier add  $(3 \times 3) = 5 + 9 = 14$  rolls



## TASK 2

Imagine you are building a square-based pyramid out of toilet-rolls yourself:

- a) How many tiers (layers) of toilet rolls would your square-based pyramid have if you had 91 toilet rolls in total?

1<sup>st</sup> tier – 1 roll

2<sup>nd</sup> tier – (1 + 4) 5 rolls

3<sup>rd</sup> tier – (5 + 9) 14 rolls

4<sup>th</sup> tier – (14 + 16) 30 rolls

5<sup>th</sup> tier – (30 + 25) 55 rolls

6<sup>th</sup> tier – (55 + 36) 91 rolls

- b) A toilet roll is approximately 9.5cm in height.  
How high would your pyramid be?

9.5 cm x 91 =

$$91 \times 9 = 810 \text{ cm}$$

$$91 \times 0.5 = 45.5 \text{ cm (this is the same as } \frac{1}{2} \text{ of 91cm)}$$

$$810 \text{ cm} + 45.5 \text{ cm} = 855.5 \text{ cm}$$

$$8 \text{ m } 55\text{cm } 5 \text{ mm}$$