

# Sums. The're Math Magic

## 18 – Sum Probability

**Please go through each slide stopping until you have understood the concept described**

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## 18 – Sum Probability

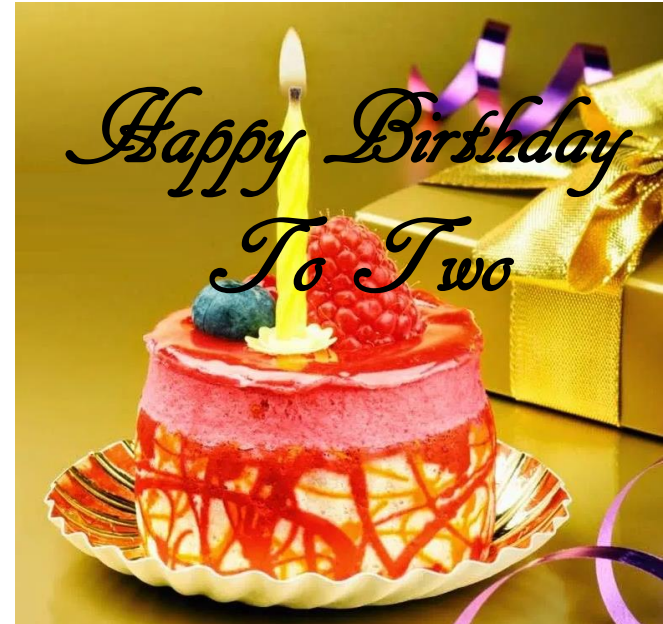
### 30 Birthdays

There are 30 pupils in the class.

What is the probability that two will have the same birthday, month and day?

5%      10%      25%      50%      70%

What do you think?



**Sums. They're Math Magic**

**18 - Sum Probability**

**30 Birthdays**

**The answer is 70%**

**Why?**

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### 30 Birthdays

We prove this by working out the probability of them not have in the same birthday. Imagine all the 30 pupils lining up outside the classroom and then going in one by one. The first pupil has 365 days for their birthday out of 365. The second has 364 out of 365 chances to not have the same birthday. The third has 363 days out of 365, etc. Until the 30th. who has 336 days out of 365.

For the probability we multiply all the results together:

$$\frac{365}{365} \times \frac{364}{365} \times \frac{363}{365} \times \dots \times \frac{337}{365} \times \frac{336}{365}$$

The answer is just over 0.29368 or 30% of different classes will not have two with the same birthday.

**So the probability of two having the same birthday is**  
**1-0.29368 = 0.70631 which is just over 70%**

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### Mountain Race



Tom and Gerry are racing to the top of the mountain by throwing dice.

Tom is at 63 and needs to throw two dice to get 7 to win. Jerry is in front on 67 and only needs 3.

However, if they throw too many they will go past the finish and dive off the mountain. That is the rule, they must exactly land at the top.

What is the probability that Tom will throw a 7?

However, it is Jerry's turn. What is Tom's probability of winning now that Jerry goes first?

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### Mountain Race

(Rounding to 3 decimal places.)

Toms chance of winning is he goes first is  $6/36$   
possibilities = 0.167 or 16.7%

Jerry's chance of winning is just  $2/36 = 0.056$  or 5.6%

If Jerry plays first then Tom's chance of winning is  
Jerrys chance of not winning multiplied by Tom's  
chance of winning if he went first.

Jerry's chance of not winning is  $(1 - 0.056)$

Tom's chance =  $(1-0.056) \times 0.167 = 0.157 = 15.7\%$

Did you get the answers?



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**Please go to the next lesson.**

**More Funny Sums**