

The test is positive: What are the odds it's wrong?



Measles means spots - but do spots mean measles?

- Aliya has measles. She also has red spots.
- Ben has red spots. Does he also have measles?

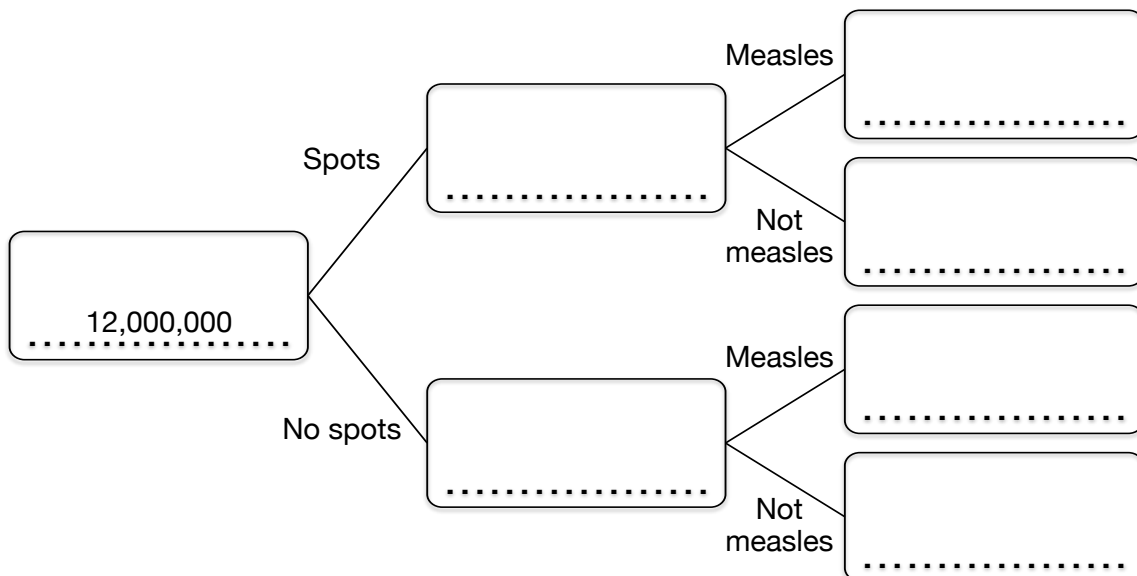
In 2008, there were approximately 12 million children under 16 in the UK, and about 1200 of them got the measles. Suppose that 99% of children who have measles also have red spots. What is the probability that someone who has spots has measles?

Clearly, measles isn't the only condition that causes spots. Suppose a tenth of children under 16 have spots.

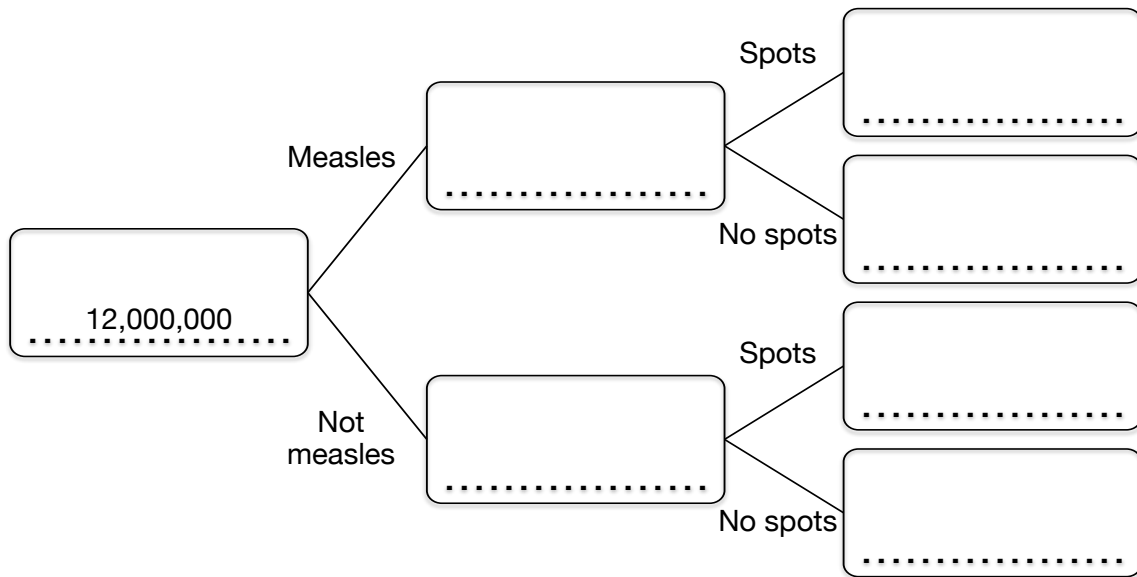
1. Put figures on the table below to show the total number of people in each row and column.
(Check that the total row and column sum to 12 million.)

	Measles	Not Measles	Total
Spots			
No Spots			
Total			12,000,000

2. Complete the tree diagrams, putting the appropriate number of children in each box:



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Let S be the event that a child has spots, S' the event that a child does not have spots, M the event that a child has measles and M' the event that a child does not have measles.

The symbol $|$ means 'given', so eg. $P(M|S')$ means the probability that a child has measles, given that they do not have spots.

Use your trees or your table to calculate:

3. $P(M|S')$ =
4. $P(S|M)$ =
5. $P(M|S)$ =
6. $P(S'|M')$ =

So what is the probability that Ben has measles?