Dependent Probability ("without replacement")

Starter

In this question you will need to draw two tree diagrams and answer the same questions twice — once for '*with replacement*' and once for '*without replacement*'.

1.   There are 11 discs in a bag — 7 black and 4 white.
        A disc is chosen at random from the bag and the colour is noted.

> (a)   **With replacement**
> The disc *is* replaced before another disc is chosen.

> (b)   **Without replacement**
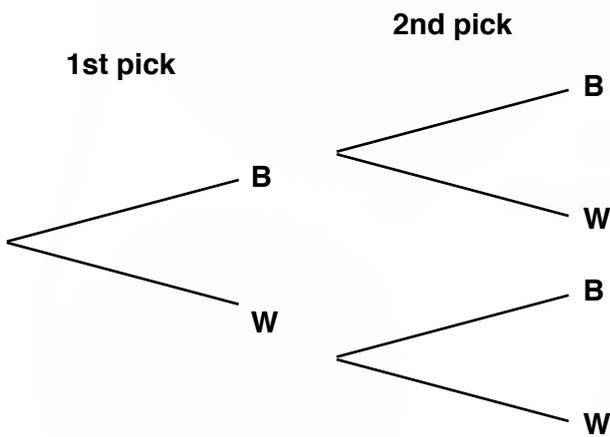> The disc *is not* replaced before another disc is chosen.

> **For both situations (a) and (b):**
> (i)   Draw a tree diagram to represent the outcomes and the probabilities.
> Use your tree diagram to find the probability of getting
> (ii)   2 white discs
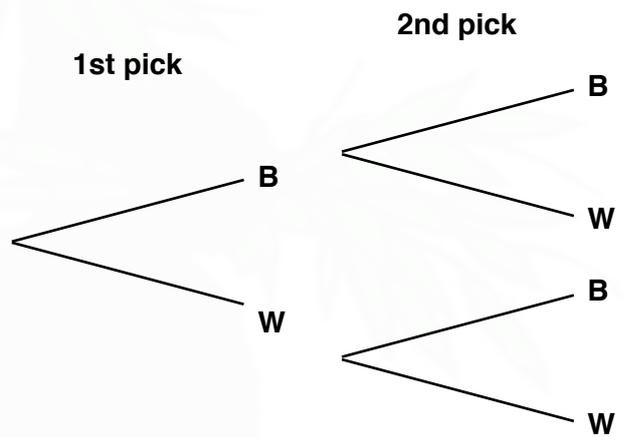> (iii)   at least one black disc.
> (iv)   one white disc.

> *Working:*
> (a)   **With replacement**
> (i)

> (b)   **Without replacement**
> (i)

Notes
When a disc is not returned to the bag, it means that the probabilities for choosing the 2nd disc are different to the 1st disc. Basically, one disc is reduced from the overall total and one disc is taken away from the colour that was chosen first.

This is called *dependent probability* because the probabilities for the second choice are dependent on what is chosen first.

A tree diagram can help to answer the questions. The same rules apply for tree diagrams for 'without replacement' problems.
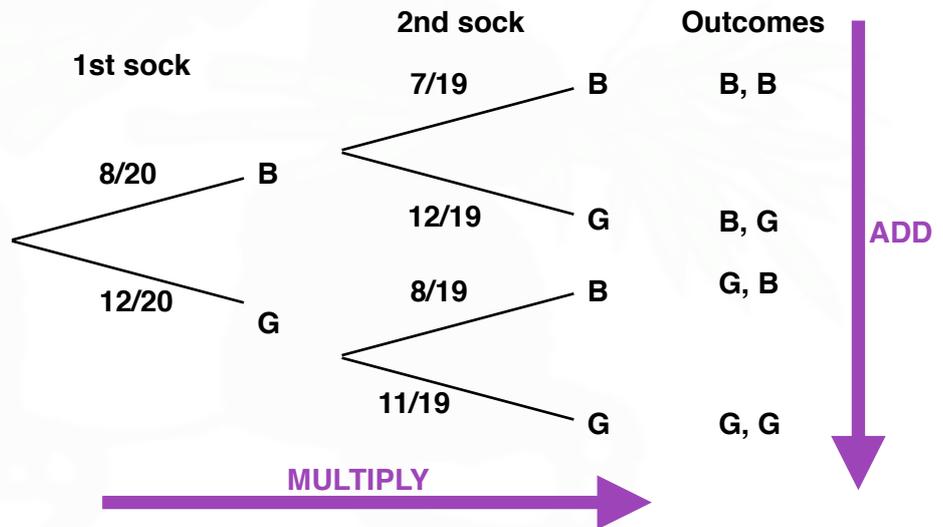- Across — multiply
- Down — add.

N.B. Do not cancel fractions on the branches.
"Takes two socks" means takes one sock and then take another without replacement.

E.g. 1 Jack has 8 black socks and 12 green socks in a drawer. He takes out two socks at random.
(a)
(b) Find the probability that:
(i) both socks are green
(ii) both socks are the same colour
(iii) at least 1 sock is green
N.B. "Takes two socks at random" is equivalent to taking one sock and then taking another.

Working: (a)

Video: **Dependent probability**

Solutions to Starter and E.g.s

Exercise
p187 Ex 10.5 Qu 1-10

Summary
Dependent probability (without replacement) is when the probabilities for the second choice are dependent on what is chosen first.

Use a tree diagram but do not cancel fractions on the branches.
"Takes two socks" means takes one sock and then take another without replacement.