

Tree diagrams

Starter

1. **(Review of last lesson)** The same number of children under 13, teenagers and adults were asked about their favourite pets and the results are below.

	Child	Teenager	Adult
Likes cats	45	36	24
Likes dogs	30	38	43
Likes fish	5	6	13

Calculate the probability that:

- a person chosen at random prefers cats given they are a teenager.
 - an adult chosen at random prefers dogs.
 - a dog-lover is not a teenager
 - if the person does not prefer cats, they are not an adult.
2. The probability that Olivia revises before her exam is $\frac{5}{6}$. Her probability of passing the exam if she revises is $\frac{9}{10}$ but this is halved if she does not revise. Find the probability that she passes the exam.

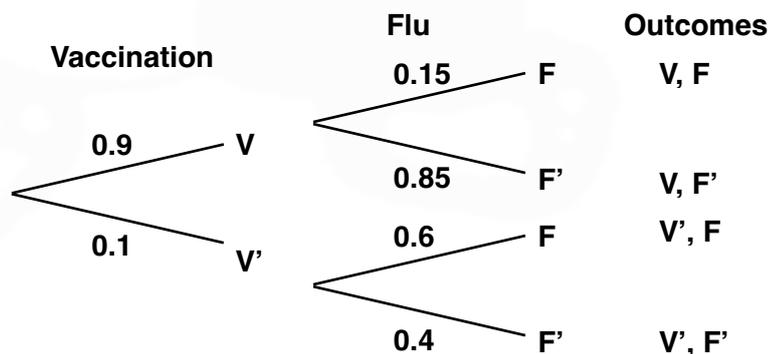
Notes

With **conditional probability**, when deciding how to order your events on the tree diagram, think about the **chronological order** they happen i.e. what comes first.

E.g. 1 The probability of a person over 70 getting flu after having had the vaccination is 0.15 and 0.6 if they haven't had the vaccination. In a town, 90% of the people over 70 are vaccinated against flu. Find the probability that a person over 70 chosen at random

- gets the flu.
- is vaccinated given that they did not get the flu.

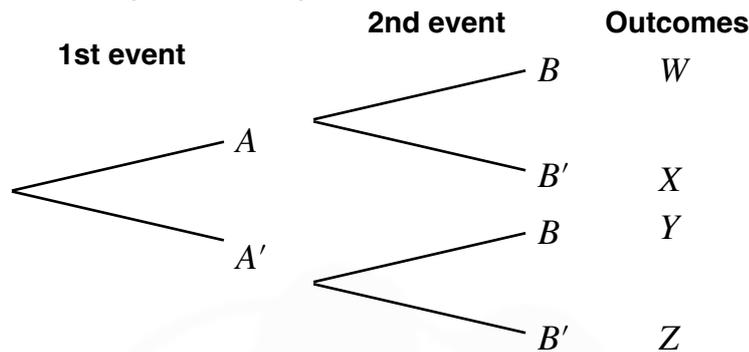
Working: (a)



E.g. 2 The probability a golfer hits the ball onto the green if it is windy when he strikes the ball is 0.4 and the corresponding value if it is not windy is 0.7. The probability of the wind blowing as he strikes the ball is 0.35. Find the probability that:

- he hits the ball onto the green
- it was not windy, given that they do not hit the ball onto the green.

E.g. 3 Below is a tree diagram showing two successive events, A and B .



- (a) Label the correct branches with:
- | | |
|---------------|----------------|
| (i) $P(B A')$ | (ii) $P(B' A)$ |
|---------------|----------------|
- (b) State which outcome, W , X , Y or Z , is equal to:
- | | |
|--------------------|----------------------|
| (i) $P(A \cap B')$ | (ii) $P(A' \cap B')$ |
|--------------------|----------------------|

E.g. 4 Events X and Y are such that $P(X) = \frac{1}{3}$, $P(Y|X) = \frac{1}{4}$ and $P(Y'|X') = \frac{4}{5}$. By drawing a tree diagram, or otherwise, find:

(a) $P(Y'|X)$ (b) $P(X \cap Y)$ (c) $P(Y)$ (d) $P(X \cup Y)$

Video: [Tree diagrams](#)
Video: [Tree diagrams for independent events](#)
Video: [AND and OR rule](#)
Video: [Tree diagrams for dependent events](#)
Video: [Conditional probability with tree diagrams](#)

Exam questions: [Tree diagrams](#)

[Solutions to Starter and E.g.s](#)

Exercise

p369 16C Qu 1i, 2-11, (12-15 red)

Summary

With **conditional probability**, when deciding how to order your events on the tree diagram, think about the **chronological order** they happen i.e. what comes first.