Tree Diagrams

1. When a basketball player takes a free throw, the probability that he will score is $\frac{9}{10}$ each time. In a match, he takes two free throws. What is the probability that he will score exactly once?

2. 60% of smartphones in a store are Android phones. 40% are i-phones. 25% of the Android phones are waterproof, and 15% of the i-phones are waterproof. If you buy a phone in the store at random, what is the probability that it is waterproof?

3. A UFC fighter fights at two weights, lightweight and welterweight. $\frac{3}{4}$ of his fights are at lightweight, the rest at welterweight. In a lightweight fight, he knocks out his opponent 60% of the time, at welterweight he knocks out his opponent 40% of the time. If he takes on a fight at random (either lightweight or welterweight opponent), what is the probability he will knock out his opponent?

4. Three contestants, Grace, Ciara and Andrew, take on the Ninja Warrior obstacle course. The probability that each will complete the course are 0.75, 0.65 and 0.55 respectively. Find the probability that :

   i. Grace completes the course, but Andrew and Ciara don't.

   ii. They all complete the obstacle course.

   iii. At least two complete the obstacle course.

5. Adam is an out-half on a rugby team. If a day is calm, he will score his first penalty 80% of the time. If the day is windy, his success rate on his first penalty drops to 50%. In Ireland, 30% of all days are windy.
   In a rugby match on a random day in Ireland, what is the probability that Adam scores his first penalty?

6. When serving a point in tennis, a player can either serve an Ace (where the opponent fails to return the shot), serve a shot that was returned, or serve a fault (where the serve goes 'out'). If a player serves a fault on the first serve, they get a 2nd serve. If they fault again on the 2nd serve, they lose the point with a double fault.
   Ciara plays tennis, and she gets an Ace on 40% of her first serves and 15% of her second serves, against a particular opponent. She gets a fault on 20% of her first serves and on 5% of her second serves.

   i. What is the probability that Ciara wins the point by an Ace on the 2nd serve?

   ii. What is the probability of Ciara getting a double fault?

7. Niamh gets the bus to school everyday from Monday to Friday. The probability that the bus is late on Monday is 0.3 and the probability that the bus is late on any day from Tuesday to Friday is 0.15.

    i. A day is chosen at random. Find the probability that

    ii. It is Monday and the bus is not late.

    iii. The bus is late.

    iv. Given that the bus is late, what is the probability that it is not a Monday?

8. Maedhbh walks, cycles or drives to school with probabilities 0.6, 0.3 and 0.1, respectively. If she walks, she has a probability of 0.3 of being late. If she cycles, the probability of being late is 0.05. If she drives, the probability of being late is 0.45. Find the probability that:

    i. She will be late on a particular day.

    ii. She walked, given that she was late.

    iii. She drove, given that she was not late.