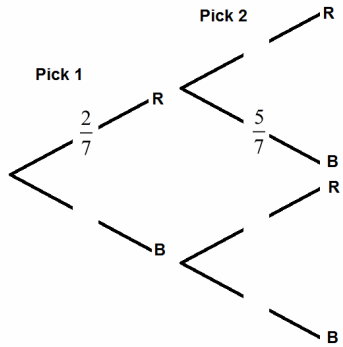**Probability GCSE Higher** - www.m4ths.com
Task 1 – Independent Events - Definitions
(1) What does it mean if an event is independent?

Task 2 - Independent Events – Finding Probabilities
(1) In a bag there are 2 **R**ed balls and 5 **B**lue balls. A ball is taken it out of the bag at random (Pick 1), its colour noted & then **replaced**. This process is repeated (Pick 2).

(a) Explain why the two events (Pick 1 and Pick 2) are independent.
(b) Complete the tree diagram above.
(c) Find the probability that (i) Both balls picked were Blue. (ii) Both balls picked were Red. (iii) Only one ball was Blue. (iv) At least one ball was Red.
(d) Extend the tree diagram to show the probabilities for a third pick (Pick 3).

(2) Fred and Laura play each other once at darts and once at pool. The probability of Fred winning at darts is 0.7 and the probability of Laura winning at pool is 0.6. The two events are independent.
(a) Draw a tree diagram to represent the information.
(b) Find the probability that Fred wins both games.
(c) Find the probability of Laura winning at least one game.
(d) Explain how you could have used your answer to part (b) to answer part (c).

(3) Julie travels to and from school. The probability of her walking to school is 0.35. The probability that she walks home is 0.45. The two events are independent.
(a) Find the probability that she walks to school every day for a week (Monday to Friday).
(b) Find the maximum value of the probability that on a Tuesday she bikes to school and catches the bus home.
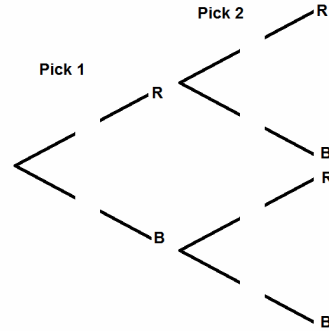
Task 3 – Conditional Probability - Definitions
(1) Explain what is meant by conditional probability.

Task 4 – Conditional Probability – Finding Probabilities
(1) The example used in Task 2 question (1) is repeated but this time the ball is **not** replaced after the first pick.
(a) Complete the tree diagram below to represent the changes in the probabilities.

(b) Find the probability that (i) Both balls picked were Blue. (ii) Both balls picked were Red. (iii) Only one ball was Blue. (iv) At least one ball was Red.
(c) Extend the tree diagram to show the probabilities for a third pick (Pick 3).
(d) Explain what is represented by the calculation:

$$\frac{5}{7} \times \frac{4}{6} \times \frac{3}{5} \times \frac{1}{2} \times \frac{1}{3}$$

(2) Imran is playing a computer game with 2 rounds. The probability of him winning the first round is 0.16. If he wins the first round, the probability of him winning the next round is 0.78. If he loses the first round the probability of him winning is 0.45.
(a) Find the probability he wins both rounds.
(b) Find the probability he loses the first but wins the second round.
(c) Find the probability that he wins at least one round.

(3) Susan has a box of chocolates. There are 3 orange chocolates, 5 strawberry chocolates & 1 caramel chocolate. She takes a chocolate and eats it. She takes a second and eats it.
(a) Find the probability that both chocolates are (i) orange (ii) strawberry (iii) caramel.
(b) How many chocolates will Susan have to eat before the probability of her picking a strawberry is 1?

Task 5 – Mixed Questions
(1) Fred is playing a game that involves the spinner below. He spins it a number of times & records the value scored.
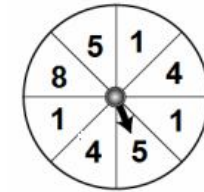
(a) Explain what the value below represents in the context of the questions.

$$\left(\frac{3}{8}\right)^4$$

Fred now introduces a fair 6 sided dice into the game. He spins the spinner once and rolls the dice once.
(b) Find the probability that he scores a prime number on both the spinner and the dice.

(2) Rod has a number of scrabble tiles hidden in a bag. The tiles are shown below.

Rod is playing a game where he must try and spell his name by taking tiles at random from the bag and placing them in the boxes below. He doesn't replace the tiles each time.
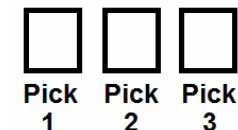
(a) Find the probability that he spells out his name in the correct order after taking 3 tiles at random with his first, second and third pick.
(b) Find the probability that all 3 tiles he picks are (i) consonants and (ii) vowels.
(c) Show that the probability of him spelling the word SPORT in order with only 5 picks from the bag is 1/7560