Probability tree (Independent event)
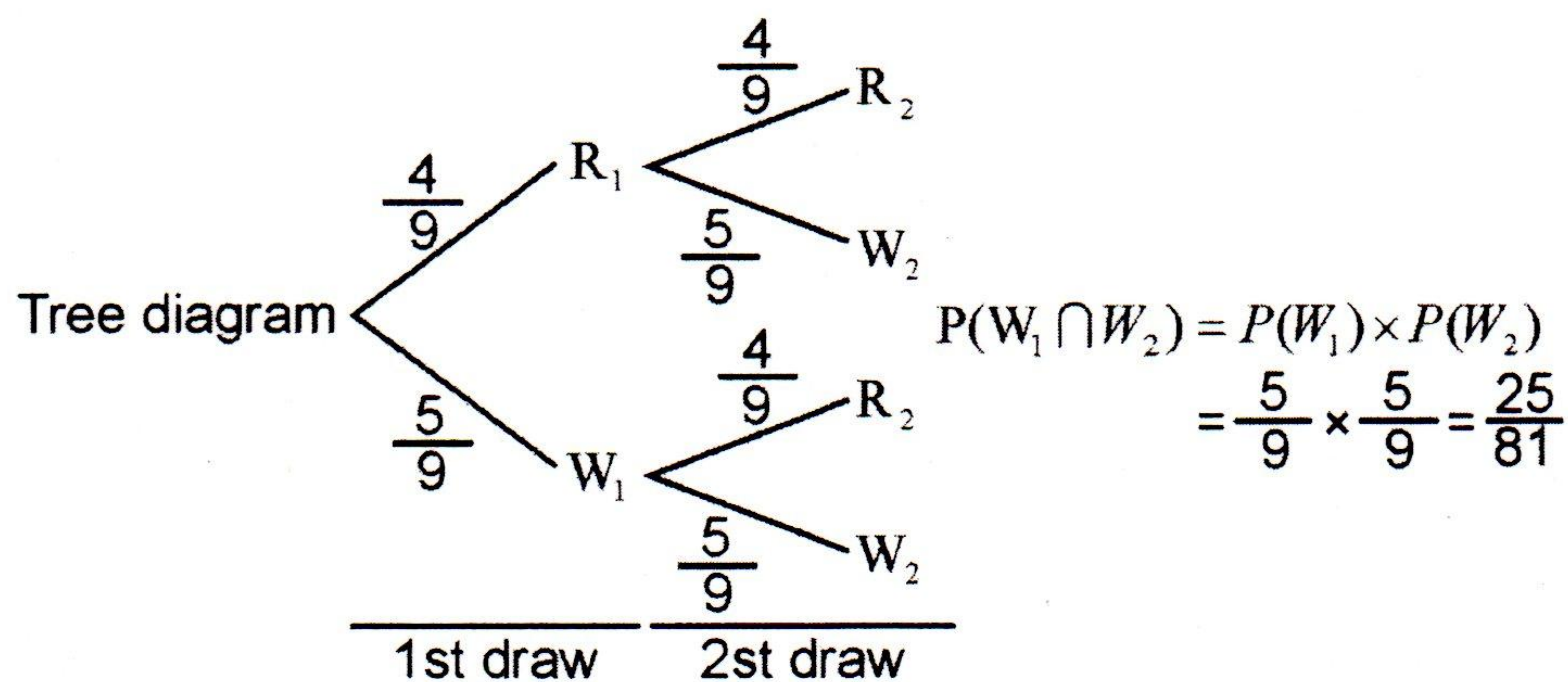
Independent Events: Two events A&B are independent if event A does not affect i.e. P (A and B) = P (A ∩ B) = P (A) × P (B)

Here events are replaced i.e. with replacement case.

Example 1.   A bag contains 4 red and 5 white balls. A ball is drawn from the bag replaced and then a 2nd ball is drawn from the bag. Draw a tree diagram. Find the probability that both balls are white.

$$P(W_1 \cap W_2) = P(W_1) \times P(W_2)$$
$$= \frac{5}{9} \times \frac{5}{9} = \frac{25}{81}$$

1) Bag A contains 3 red, 4 green and 5 blue balls, bag B contains 5red and 4 green balls. A ball is selected from gag A, replaced and another ball is selected then, draw tree diagram find probability that
(i)   All green balls occur.
(ii)   Different color balls appear.

2). A bag contains 7 green and 3 yellow balls.
A ball is taken from the bag at random and replaced.
Another ball is then taken from the bag at random.
(a) Complete the tree diagram.
(b) What is the probability that both balls are different colours?

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3) Each time Terry has a shot at goal, the probability that he will score a goal is 0.75. Terry takes two shots.
a) Complete the probability tree diagram.

b) Calculate the probability that Terry will score two goals   _____

c) Exactly one goals   _____

4) Ahmed has two 10-sided spinners.
The spinners are equally likely to land on each of their sides.
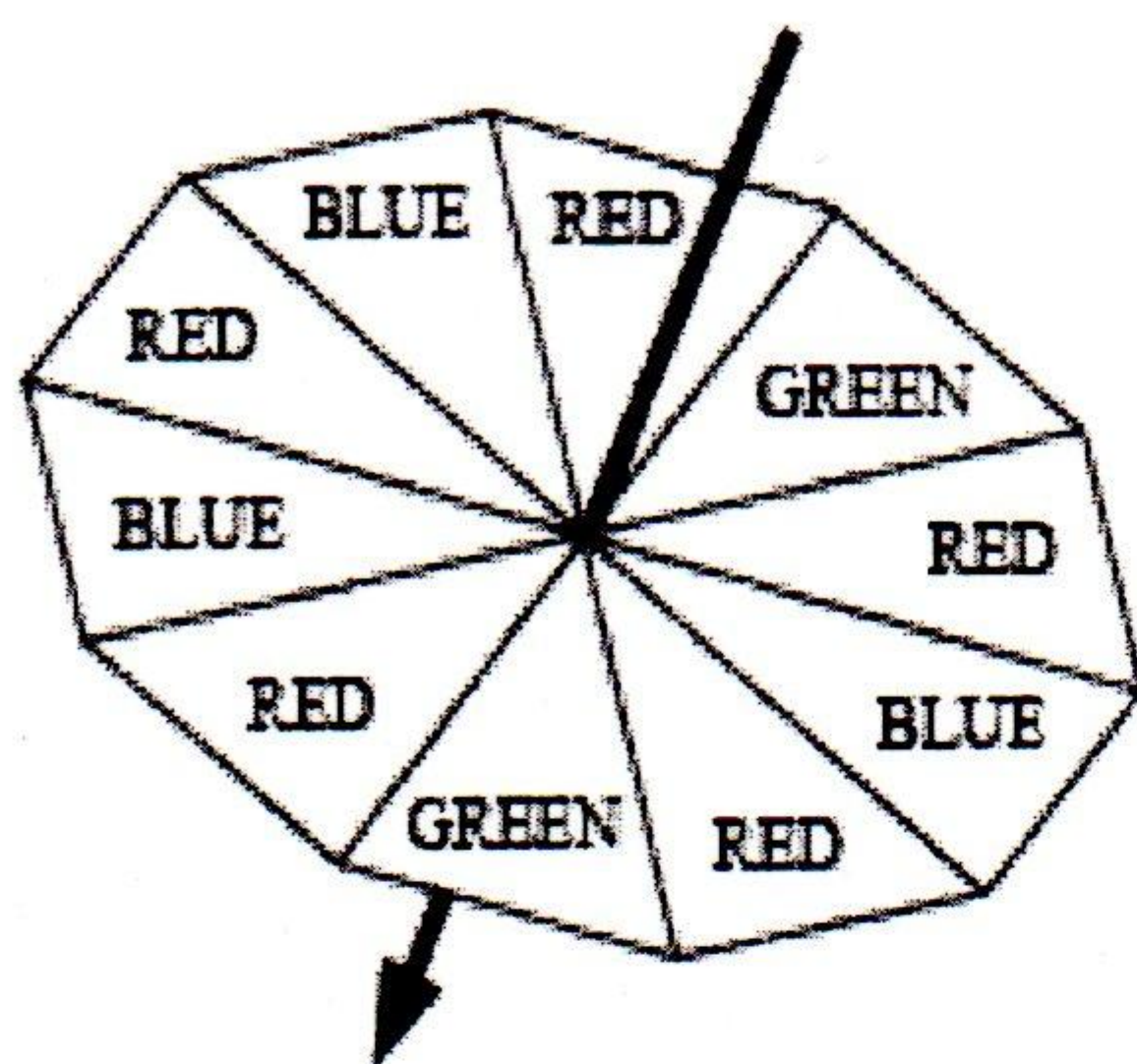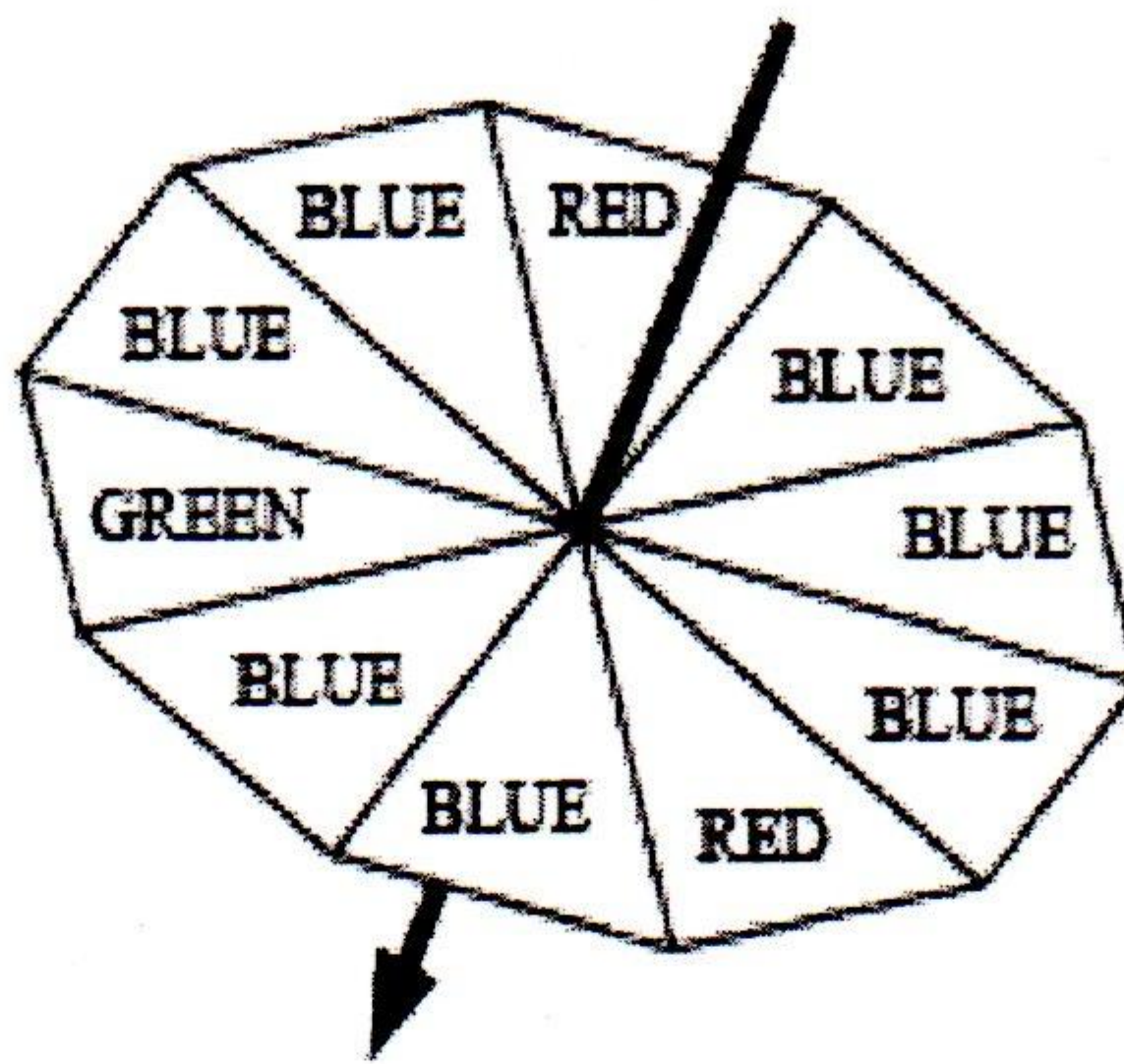
A   B

Spinner **A** has 5 red sides, 3 blue sides and 2 green sides.
Spinner **B** has 2 red sides, 7 blue sides and 1 green side.
William spins spinner **A** once.
He then spins spinner **B** once.
Work out the probability that spinner **A** and spinner **B** do **not** land on the same colour.

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5) A bag contains four red and six blue balls. One ball is chosen and its colour noted. It is chosen and its colour noted. It is not put back into the bag. A 2nd ball is chosen and its colour noted.
(a)   Draw a probability tree diagram.

(b)   Find the probability that
        (i)   Two red ball appear.

_____

        (ii)   One ball of each color

_____

        (iii)   Two blue balls appear.

_____

6. The probability that any piece of buttered toast will land buttered side down when it is dropped is 0.62
Two pieces of buttered toast are to be dropped, one after the other.
Calculate the probability that exactly one piece of buttered toast will land buttered side down.

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7. There are two sets of traffic lights on Georgina's route to school.
The probability that the first set of traffic lights will be red is 0.4
The probability that the second set of traffic lights will be red is 0.3
   (a) Draw the probability tree diagram
   (b)Work out the probability that both sets of traffic lights will be red

   (c) Work out the probability that exactly one set of traffic lights will be red.

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8. Mary has a drawing pin.
When the drawing pin is dropped it can land either 'point up' or 'point down'.
The probability of it landing 'point up' is 0.4
Mary drops the drawing pin twice.
(a) Draw the probability tree diagram.

(b) Work out the probability that the drawing pin will land 'point up' both times

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9. Mr Brown chooses one book from the library each week.
He chooses a crime novel or a horror story or a non-fiction book.
The probability that he chooses a horror story is 0.4
The probability that he chooses a non-fiction book is 0.15
Work out the probability that Mr Brown chooses a crime novel

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10. When Springton Rovers play an away match, the probability they will **not** win is 0.6.
(i) Complete the tree diagram below for the next two away matches.
The results are independent
(ii) Calculate the probability that Springton Rovers **will win** both of these away matches.

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11. On any morning the probability that the school bus is late is 0.2.
(a) Complete the tree diagram below to show the probabilities of the school bus being late on two consecutive mornings

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b. Use the tree diagram to work out the probability that the school bus is not late on the first morning **and** not late on the second morning.

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12. On any day, the probability that Elaine listens to the car radio on her way
     to work is 0.7.
(i) Complete the probability tree diagram to show the probabilities of Elaine listening to the car radio on two consecutive days.
(ii) Find the probability that Elaine listens to the radio on only one of the two days.

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(iii) Find the probability that Elaine listens to the radio on at least one of the two days.

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13. The probability that a boy is left-handed is 0.2
The probability that a girl is left-handed is 0.3
A school has 480 boys and 520 girls.
(a) Estimate the number of left-handed students in the school

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(b) A student is picked at random from the whole school.
Estimate the probability that the student is left-handed.

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14. The probability that a particular component will fail is 0.015. Draw and label a tree diagram to show the possible outcomes when two such components are chosen at random.
         Calculate probability that
(a)   both components will fail.   _____

(b)   exactly one component will fail.   _____

(c)   1st component fail and 2rd not fail.   _____

(d)   both component will not fail.   _____

15. The probability that a car will fail its mot because of lights is 0.32 and prob. It will fail mot due to brakes is 0.55.
         Calculate prob. That car fails due to
(i)   Its light and its brakes   _____

(ii)   Its light only   _____