Probability Tree Diagrams

1. There are 3 green marbles and 5 red marbles in a box.

   Sam picks a marble at random from the box and without putting it back into the box he then picks a second marble at random.

   Find the probability that,

   (a) both of the marbles that Sam picked are red.

   (b) one of the marbles Sam picked is green and the other is red.

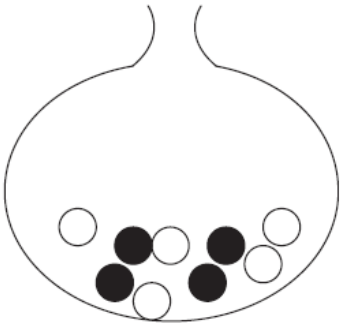
2. There are 4 green marbles, 2 red marbles and 3 blue marbles in a box.

Jay picks 2 marbles at random from the box without replacement.

Find the probability that the two marbles he picked are of different colours.

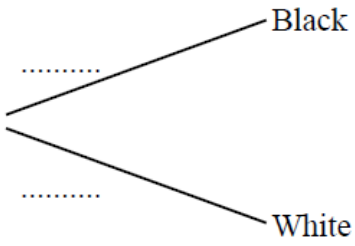
3.

A bag contains 4 black discs and 5 white discs.



Ranjit takes a disc at random from the bag and notes its colour.
He then replaces the disc in the bag.
Ranjit takes another disc at random from the bag and notes its colour.

(a) Complete the probability tree diagram to show all the possibilities.



(4)

(b) Calculate the probability that Ranjit takes two discs of different colours.

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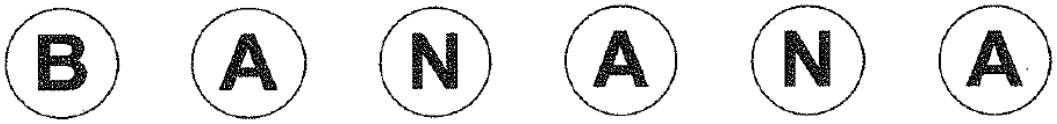
(3)

4.

The diagram shows six counters.



Each counter has a letter on it.

Bishen puts the six counters into a bag.
He takes a counter at random from the bag.
He records the letter which is on the counter and replaces the counter in the bag.
He then takes a second counter at random and records the letter which is on the counter.

(a) Calculate the probability that the first letter will be A and the second letter will be N.

.....

(2)

(b) Calculate the probability that both letters will be the same.

.....

(4)

5. Alan has three 50p coins, two 20p coins and one 10p coin in his pocket.

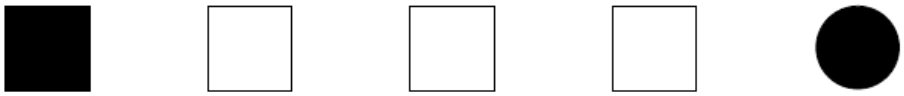
He picks two coins at random from the pocket to put in a charity box.

(a) What is the probability that he puts a total of £1 into the charity box?

(c) What is the probability that he puts a total of more than 50p in the charity box?

6.

Here are five shapes.



Four of the shapes are squares and one of the shapes is a circle.
One square is black.
Three squares are white.
The circle is black.
The five shapes are put in a bag.

Alec takes a shape at random from the bag and does **not** replace it.
Bashir then takes a shape at random from the bag.

Work out the probability that

(i) they both take a square,

.....

(ii) they take shapes of the same colour.

.....

(5)

7.

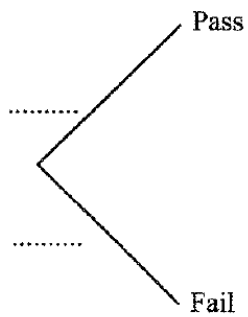
In order to start a course, Bae has to pass a test.
He is allowed only two attempts to pass the test.

The probability that Bae will pass the test at his first attempt is $\frac{2}{5}$.

If he fails at his first attempt, the probability that he will pass at his second attempt is $\frac{3}{4}$.

(a) Complete the probability tree diagram.

First attempt Second attempt



(b) Calculate the probability that Bae will be allowed to start the course.

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(3)

8.

The probability that Gill will walk to school on Monday is $\frac{3}{5}$.
If Gill walks to school on Monday, the probability that she will walk to school on Tuesday is $\frac{1}{6}$.
If she does not walk to school on Monday, the probability that she will walk to school on Tuesday is $\frac{7}{10}$.

(a) Calculate the probability that she walks to school on Monday but not on Tuesday.

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(2)

(b) Calculate the probability that she walks to school on at least one of the two days.

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(3)

9.

Here are five counters.
Each counter has a number on it.

Layla puts the five counters in a bag.
She takes two counters at random from the bag without replacement.

Calculate the probability that

(i) **both** counters will have the number 3 on them,

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(ii) the sum of the numbers on the two counters will be 6

.....

10.

Box A Box B

In Box A, there are 3 black counters and 2 white counters.
In Box B, there are 2 black counters and 1 white counter.

Farah takes at random a counter from Box A and puts it in Box B.
She then takes at random a counter from Box B.

Work out the probability that the counter she takes from Box B will be a black counter.

11.

A box contains 7 good apples and 3 bad apples.

Nick takes two apples at random from the box, **without** replacement.

(a) (i) Calculate the probability that both of Nick's apples are bad.

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(ii) Calculate the probability that at least one of Nick's apples is good.

.....

(4)

Another box contains 8 good oranges and 4 bad oranges.

Crystal keeps taking oranges at random from the box one at a time, **without** replacement, until she gets a good orange.

(b) Calculate the probability that she takes exactly three oranges.

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(2)

12.

The sides of a fair six-sided dice are numbered from 1 to 6
The dice is thrown three times.
Find the probability that it shows a 1 at least twice.

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13.

Younis spins a biased coin twice.
The probability that it will come down heads both times is 0.36

Calculate the probability that it will come down tails both times.

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14.

Here are 9 cards.
Each card has a number on it.

20	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**

Lee takes a card at random.
He records the number which is on the card and replaces the card.
He then takes a second card at random and records the number which is on the card.

(a) Calculate the probability that he will take two even numbers.

.....

(2)

(b) Calculate the probability that he will take two numbers with a sum of 43

.....

(3)

15.

$\frac{1}{3}$ of the people in a club are men.

The number of men in the club is n.

(a) Write down an expression, in terms of n, for the number of people in the club.

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(1)

Two of the people in the club are chosen at random.

The probability that both these people are men is $\frac{1}{10}$

(b) Calculate the number of people in the club.

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(5)

16.

There are 10 beads in a box.
n of the beads are red.
Meg takes one bead at random from the box and does not replace it.
She takes a second bead at random from the box.
The probability that she takes 2 red beads is $\frac{1}{3}$.

Show that $n^2 - n - 30 = 0$