Binomial Questions From Past Papers

May 2006

4 A forester plants ten sapling birch trees.
The success rate for saplings developing to maturity is 85%.

Find the probability that:

(i) exactly eight saplings develop to maturity. [3]

(ii) at least eight saplings develop to maturity. [4]

(iii) at most eight saplings develop to maturity. [2]

In a second area of the forest, the forester has already planted a number of sapling birch trees. His expected number of trees developing to maturity in this area is 13.6

(iv) (a) Find how many trees were planted in the second area of the forest. [2]

(b) Find the probability that exactly one of these saplings does not develop to maturity. [3]

eb 2005

A bus driver drives around her route eight times in a day.
Along the route there is a set of traffic lights at which traffic is stopped thirty five percent of the time.

(i) Find the probability that she is stopped at these lights exactly six times in a day. [3]

(ii) Find the probability that she is stopped at these lights fewer than six times in a day. [5]

Let X be the random variable "the number of times she is stopped at these lights in a day".

(iii) Find E(X) and Var(X). [4]

Jan 2009

Brenda is given a multiple choice chemistry test on a part of the course that she has not prepared so she relies totally on guesswork!
Each question has 5 answers from which to choose the correct one.
There are 10 questions.

(i) Find the probability that she guesses exactly 4 of the answers correctly. [4]

(ii) Find the probability that she guesses at least 1 of the answers correctly. [3]

(iii) How many answers would Brenda be expected to guess correctly? Explain why. [2]

Jan 2010

A biased die is such that the probability of scoring six is 0.25
It is thrown eight times and the scores noted.
Find the probability that:

(i) the score is six on exactly three occasions; [3]

(ii) the score is six on at least three occasions. [5]

(iii) If the score is six on at least three occasions, find the probability that it occurs exactly five times. [4]

Jan 2008

(i) State two necessary conditions when modelling using a Binomial distribution. [2]

A computing company receives 8 requests for quotations in a particular week.
The probability that a quotation is accepted is $\frac{1}{6}$

Find the probability that:

(ii) exactly two quotations are accepted; [3]

(iii) at most two quotations are accepted. [4]

May 2008

In a particular city in 2007, it was known that 18% of children younger than two years had anaemia.
On a particular day in 2007, a doctor examined 11 children under two years old in the city.

By using the Binomial distribution, find the probability that:

(i) exactly 2 will have anaemia; [3]

(ii) more than 2 will have anaemia. [5]

May 2010

(i) In a Binomial distribution, the trials need to be independent. Explain what this means. [1]

(ii) State the other conditions essential for a Binomial distribution. [2]

A survey in a town revealed that 35% of adults carry an organ donor card.
Six adults chosen at random were asked if they carried an organ donor card.
Find the probability that:

(iii) exactly three carried an organ donor card; [2]

(iv) at least half of those questioned carried an organ donor card. [5]

May 2009

In a certain town 14% of the population is left-handed.
Eight customers in a supermarket are chosen at random and asked if they are left-handed.

(i) Give **two** reasons why the binomial distribution would be suited to model this situation. [2]

Find the probability:

(ii) that exactly one customer is left-handed; [2]

(iii) that at least three customers are left-handed. [4]

May 2007

5 A shop sells different flavours of ice cream.
Of the ice creams sold, $\frac{2}{5}$ are honeycomb flavour.
Eight ice creams are sold on a Saturday evening.

Calculate the probability that:

(i) the first 2 ice creams sold are honeycomb flavour; [1]

(ii) at least 2 of the ice creams sold are honeycomb flavour. [4]

Suppose that n ice creams are sold at the weekend.
Y is defined as the random variable – "the number of vanilla ice creams sold at the weekend".
The probability that an ice cream sold is vanilla flavour is $\frac{1}{5}$
The variance of Y is 24

(iii) Find n. [3]

(iv) Find $E(Y)$. [2]

Jan 2006

3 It is known that 75% of a doctor's patients will need a prescription when visiting the surgery. During morning surgery she sees twelve patients.
Find the probability that the doctor gives:

(i) exactly 10 prescriptions; [3]

(ii) fewer than 10 prescriptions. [5]

During the afternoon surgery the doctor sees fifteen patients.

(iii) Find the expected number of prescriptions given during the afternoon surgery. [2]

May 2005

4 Fifteen percent of pupils at a school sing in the school choir.
In a sample of ten pupils chosen at random find the probability that:

(i) none of them sings in the school choir; [3]

(ii) at least two sing in the school choir. [4]

(iii) State one modelling assumption made when answering parts **(i)** and **(ii)**. [1]