**IBSL Probability Revision**

**1.** For the events *A* and *B*, *p*(*A*) = 0.6, *p*(*B*) = 0.8 and *p*(*A*  *B*) = 1.

Find

(a)*p*(*A**B*);

(b) *p*( A  *B*). (Total 4 marks)



**2.** Events *E* and *F* are independent, with P(*E*) = and P(*E*  *F*) = . Calculate



(a) P(*F*);

(b) P(*E*  *F*).

(Total 6 marks)

**3.** The following Venn diagram shows a sample space *U* and events *A* and *B.*



*n*(*U*) *=* 36, *n*(*A*)= 11, *n*(*B*) = 6 and *n*(*A*  *B*)′ = 21.

(a) On the diagram, shade the region (*A*  *B*)′*.*

(b) Find

(i) *n*(*A*  *B*)*;*

(ii) *P*(*A*  *B*)*.*

(c) Explain why events *A* and *B* are not mutually exclusive. (Total 4 marks)

**4.** The eye colour of 97 students is recorded in the chart below. (6 marks)

|  |  |  |
| --- | --- | --- |
| Brown | Blue | Green |
| Male | 21 | 16 | 9 |
| Female | 19 | 19 | 13 |

One student is selected at random.

(a) Write down the probability that the student is a male.

(b) Write down the probability that the student has green eyes, given that the student is a female.

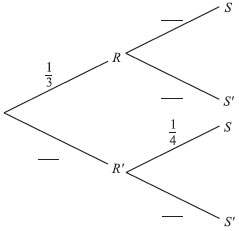
(c) Find the probability that the student has green eyes or is male.

**5.** The following probabilities were found for two events *R* and *S*.

P(*R*) = , P(*S*  *R*) = , P(*S*  *R′*) = .



(a) **Copy** and **complete** the tree diagram.



(3)

(b) Find the following probabilities.

(i) P(*R*  *S*).

(ii) P(*S*).

(iii) P(*R*  *S*).

(7)

(Total 10 marks)

**6.** A box contains 35 red discs and 5 black discs. A disc is selected at random and its colour noted. The disc is then replaced in the box.

(a) In eight such selections, what is the probability that a black disc is selected

(i) exactly once?

(3)

(ii) at least once?

(3)

(b) The process of selecting and replacing is carried out 400 times.

What is the expected number of black discs that would be drawn?

(2)

(Total 8 marks)

**7.** A factory makes switches. The probability that a switch is defective is 0.04.

The factory tests a random sample of 100 switches.

(a) Find the mean number of defective switches in the sample.

(2)

(b) Find the probability that there are exactly six defective switches in the sample.

(2)

(c) Find the probability that there is at least one defective switch in the sample.

(3)

(Total 7 marks)

**8.** A box contains a large number of biscuits. The weights of biscuits are normally distributed with mean 7 g and standard deviation 0.5 g.

(a) One biscuit is chosen at random from the box. Find the probability that this biscuit

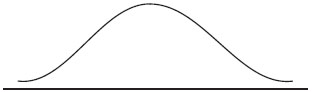
(i) weighs less than 8 g;

(ii) weighs between 6 g and 8 g.

(4)

(b) Five percent of the biscuits in the box weigh less than *d* grams.

(i) Copy and complete the following normal distribution diagram, to represent this information, by indicating *d*, and shading the appropriate region.



(ii) Find the value of *d*.

(5)

(c) The weights of biscuits in another box are normally distributed with mean ** and standard deviation 0.5 g. It is known that 20 of the biscuits in this second box weigh less than 5 g.

Find the value of **.

(4)

Total 13 marks)

**9.** The probability distribution of the discrete random variable *X* is given by the following table.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| *x* | 1 | 2 | 3 | 4 | 5 |
| P(*X* = *x*) | 0.4 | *p* | 0.2 | 0.07 | 0.02 |

(a) Find the value of *p*.

(b) Calculate the expected value of *X*.

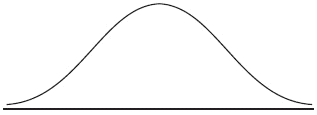
(Total 6 marks)

**10.** The weights of a group of children are normally distributed with a mean of 22.5 kg and a standard deviation of 2.2 kg.

(a) Write down the probability that a child selected at random has a weight more than 25.8 kg.

(b) Of the group 95 weigh less than k kilograms. Find the value of *k*.

(c) The diagram below shows a normal curve.



On the diagram, shade the region that represents the following information:

87 of the children weigh less than 25 kg

(Total 6 marks)

**11.** The heights of certain flowers follow a normal distribution. It is known that 20 of these flowers have a height less than 3 cm and 10 have a height greater than 8 cm.

Find the value of the mean ** and the standard deviation .

(Total 6 marks)