MATHSAURUS

AS Mathematics Exam Questions by Topic
Chapter 16: Probability

These questions are taken from the Specimen Exam materials and the real 2018 papers for the new syllabus AS and A-level mathematics courses and arranged by chapter of the textbooks by Goldie et al (available here: `https://amzn.to/39umfr5` and `https://amzn.to/3hE8kBL`). There are a mixture of questions from OCR A, OCR B (MEI) and Edexcel. Although the style of questions varies a little across the exam boards the content of the syllabus is almost identical so these are suitable for students preparing for any exam board.

Free problem sets for all other chapters, as well as video solutions, full past papers and other content for GCSE and A-level maths can be found at:

`https://mathsaurus.com/`

OCR A Sample Paper 2 Question 14:

14 A random variable X has probability distribution given by

$$P(X=x)=\frac{1}{860}(1+x) \quad \text{for } x=1, 2, 3, \ldots, 40.$$

(i) Find $P(X>39)$. **[2]**

(ii) Given that x is even, determine $P(X<10)$. **[6]**

OCR B MEI 2018 Paper 2 Question 3:

3 The probability that Chipping FC win a league football match is $P(W) = 0.4$.

(i) Calculate the probability that Chipping FC fail to win each of their next two league football matches. **[1]**

The probability that Chipping FC lose a league football match is $P(L) = 0.3$.

(ii) Explain why $P(W) + P(L) \neq 1$. **[1]**

OCR B MEI 2018 Paper 2 Question 11:

11 The discrete random variable X takes the values 0, 1, 2, 3, 4 and 5 with probabilities given by the formula

$$P(X = x) = k(x + 1)(6 - x) .$$

(i) Find the value of k. **[2]**

In one half-term Ben attends school on 40 days. The probability distribution above is used to model X, the number of lessons per day in which Ben receives a gold star for excellent work.

(ii) Find the probability that Ben receives no gold stars on each of the first 3 days of the half-term and two gold stars on each of the next 2 days. **[2]**

(iii) Find the expected number of days in the half-term on which Ben receives no gold stars. **[2]**

OCR B MEI AS 2018 Paper 2 Question 4:

4 The probability distribution of the discrete random variable X is given in Fig. 4.

r	0	1	2	3	4
$P(X = r)$	0.2	0.15	0.3	k	0.25

Fig. 4

(i) Find the value of k. **[2]**

X_1 and X_2 are two independent values of X.

(ii) Find $P(X_1 + X_2 = 6)$. **[3]**

OCR B MEI AS Sample Paper 2 Question 4:

4 There are four human blood groups; these are called O, A, B and AB. Each person has one of these blood groups. The table below shows the distribution of blood groups in a large country.

Blood group	**Proportion of population**
O	49%
A	38%
B	10%
AB	3%

Two people are selected at random from this country.

(i) Find the probability that at least one of them has blood group O. **[2]**

(ii) Find the probability that they have different blood groups. **[3]**

OCR A AS Sample Paper 1 Question 9:

9 The probability distribution of a random variable X is given in the table.

x	1	2	3
$P(X = x)$	0.6	0.3	0.1

Two values of X are chosen at random. Find the probability that the second value is greater than the first. **[3]**

OCR A AS 2018 Paper 1 Question 10:

10 The probability distribution of a random variable X is given in the table.

x	0	2	4	6
$P(X = x)$	$\frac{3}{8}$	$\frac{5}{16}$	$4p$	p

(i) Find the value of p. **[2]**

(ii) Two values of X are chosen at random. Find the probability that the product of these values is 0. **[3]**

Edexcel AS 2018 Paper 2 Question 2:

2. A factory buys 10% of its components from supplier A, 30% from supplier B and the rest from supplier C. It is known that 6% of the components it buys are faulty.

Of the components bought from supplier A, 9% are faulty and of the components bought from supplier B, 3% are faulty.

(a) Find the percentage of components bought from supplier C that are faulty.

(3)

A component is selected at random.

(b) Explain why the event "the component was bought from supplier B" is not statistically independent from the event "the component is faulty".

(1)

Edexcel AS Sample Paper 2 Question 3:

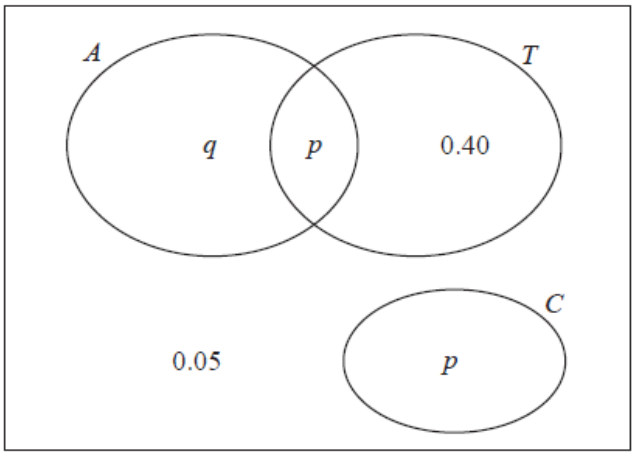
3. The Venn diagram shows the probabilities for students at a college taking part in various sports

A represents the event that a student takes part in Athletics.

T represents the event that a student takes part in Tennis.

C represents the event that a student takes part in Cricket.

p and q are probabilities.



The probability that a student selected at random takes part in Athletics or Tennis is 0.75

(a) Find the value of p.

(1)

(b) State, giving a reason, whether or not the events A and T are statistically independent. Show your working clearly.

(3)

(c) Find the probability that a student selected at random does not take part in Athletics or Cricket.

(1)