

Power Hour

Cooking sauces are sold in jars containing a stated weight of 500 g of sauce. The jars are filled by a machine. The actual weight of sauce in each jar is normally distributed with mean 505 g & standard deviation 10 g.

(i) Find the probability of a jar containing less than the stated weight.
 (ii) In a box of 30 jars, find the expected number of jars containing less than the stated weight. (5)

A discrete random variable X has the probability function shown in the table.

x	0	1	2	3
$P(X=x)$	$\frac{1}{6}$	$\frac{1}{3}$	$\frac{1}{3}$	$\frac{1}{6}$

- Find (a) $P(1 < X < 3)$, (2) (b) $E(2.6)$, (1) (c) $E(X)$, (2) (d) $E(2X - 3)$ (2) (e) $Var(X)$ (3)

- One of the objectives of a computer game is to collect keys. There are three stages to collect keys. The probability of collecting a key at the first stage is $\frac{1}{2}$, at the second stage to $\frac{1}{3}$ and at the third stage is $\frac{1}{4}$.
- (a) Draw a tree diagram to represent the 3 stages of the game. (4)
- (c) Find the probability of collecting exactly one key in a game. (5)
- The events A and B are such that $P(A) = \frac{1}{2}$, $P(B) = \frac{1}{3}$ and $P(A \cap B) = \frac{1}{4}$. Represent these probabilities in a Venn diagram.
- Two events A and B are independent, such that $P(A) = \frac{1}{3}$ and $P(B) = \frac{1}{4}$. Find
 (1) $P(A \cap B)$,
 (2) $P(A|B)$,
 (3) $P(A \cup B)$.

A botany student counted the number of daisies in 42 areas of a field. The results are summarised in the following stem & leaf diagram.

(a) Write down the modal value of these data. (1)
 (b) Find the median and the quartiles of these data. (4)

(c) On graph paper and showing your scale clearly, draw a box plot to represent these data. (4)
 (d) Comment on the skewness of this distribution. (1)

A company wants to pay its employees according to their performance at work. The performance score x and the annual salary, y in £100s, for a random sample of 10 of its employees for last year were recorded. The results are shown in the table below.

(a) Calculate exact values of S_{xy} and S_{xx} . (4)

Number of daisies	1	1	2	3	4	4	4	4	4	4	4	4	4	4	4	5	6	6	7	8	8	8	8	9	9	9	9	9	9	9	10	11	11	11	11	11					

x	15	40	27	39	27	15	20	30	19	24
y	216	384	234	399	226	132	175	316	187	196

[You may assume $\Sigma xy = 69\ 798$, $\Sigma x^2 = 7\ 266$]

- (b) Calculate the equation of the regression line of y on x , in the form $y = a + bx$. Give the values of a and b to 3 significant figures. (5)
- The mark, x scored by each student who sat a statistics exam is coded using $y = 1.4x - 20$. The coded marks have mean 60.8 and standard deviation 6.60. Find the mean and standard deviation of x .

