

- 1 The amounts of electricity, x kWh (kilowatt hours), used by 40 households in a three-month period are summarised as follows.

$$n = 40 \qquad \Sigma x = 59\,972 \qquad \Sigma x^2 = 96\,767\,028$$

- (i) Calculate the mean and standard deviation of x . [3]
- (ii) The formula $y = 0.163x + 14.5$ gives the cost in pounds of the electricity used by each household. Use your answers to part (i) to deduce the mean and standard deviation of the costs of the electricity used by these 40 households. [3]

- 2 Three fair six-sided dice are thrown. The random variable X represents the highest of the three scores on the dice.

- (i) Show that $P(X = 6) = \frac{91}{216}$. [3]

The table shows the probability distribution of X .

r	1	2	3	4	5	6
$P(X = r)$	$\frac{1}{216}$	$\frac{7}{216}$	$\frac{19}{216}$	$\frac{37}{216}$	$\frac{61}{216}$	$\frac{91}{216}$

- (ii) Find $E(X)$ and $\text{Var}(X)$. [5]

- 3 The probability distribution of the random variable X is given by the formula

$$P(X = r) = k + 0.01r^2 \text{ for } r = 1, 2, 3, 4, 5.$$

- (i) Show that $k = 0.09$. Using this value of k , display the probability distribution of X in a table. [3]

- (ii) Find $E(X)$ and $\text{Var}(X)$. [5]

4 The probability distribution of the random variable X is given by the formula

$$P(X = r) = k(r^2 - 1) \text{ for } r = 2, 3, 4, 5.$$

(i) Show the probability distribution in a table, and find the value of k . [3]

(ii) Find $E(X)$ and $\text{Var}(X)$. [5]

5 Yasmin has 5 coins. One of these coins is biased with $P(\text{heads}) = 0.6$. The other 4 coins are fair. She tosses all 5 coins once and records the number of heads, X .

(i) Show that $P(X = 0) = 0.025$. [2]

(ii) Show that $P(X = 1) = 0.1375$. [4]

The table shows the probability distribution of X .

r	0	1	2	3	4	5
$P(X=r)$	0.025	0.1375	0.3	0.325	0.175	0.0375

(iii) Draw a vertical line chart to illustrate the probability distribution. [2]

(iv) Comment on the skewness of the distribution. [1]

(v) Find $E(X)$ and $\text{Var}(X)$. [5]

(vi) Yasmin tosses the 5 coins three times. Find the probability that the total number of heads is 3. [4]