

1 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				
$P(X=r)$	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]

2 In a traffic survey, the number of people in each car passing the survey point is recorded. The results are given in the following frequency table.

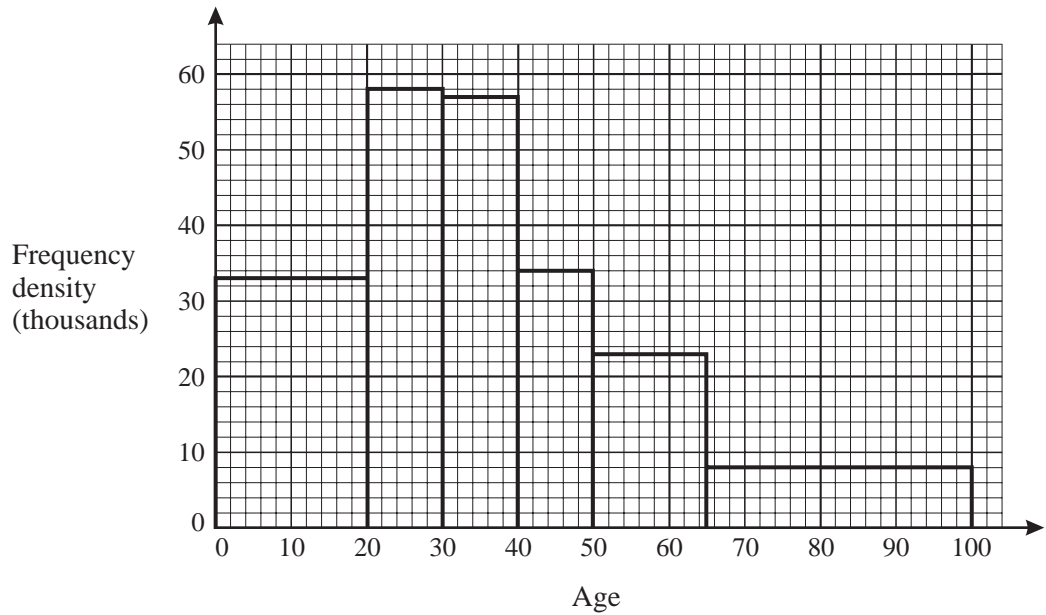
Number of people	1	2	3	4
Frequency	50	31	16	5

(i) Write down the median and mode of these data. [2]

(ii) Draw a vertical line diagram for these data. [2]

(iii) State the type of skewness of the distribution. [1]

3 The histogram shows the age distribution of people living in Inner London in 2001.



Data sourced from the 2001 Census,  
[www.sta.is.ics.gov.uk](http://www.sta.is.ics.gov.uk)

- (i) State the type of skewness shown by the distribution. [1]
- (ii) Use the histogram to estimate the number of people aged under 25. [3]
- (iii) The table below shows the cumulative frequency distribution.

Age	20	30	40	50	65	100
Cumulative frequency (thousands)	660	1240	1810	$a$	2490	2770

- (A) Use the histogram to find the value of  $a$ . [2]
- (B) Use the table to calculate an estimate of the median age of these people. [3]

The ages of people living in Outer London in 2001 are summarised below.

Age ( $x$ years)	$0 \leq x < 20$	$20 \leq x < 30$	$30 \leq x < 40$	$40 \leq x < 50$	$50 \leq x < 65$	$65 \leq x < 100$
Frequency (thousands)	1120	650	770	590	680	610

(iv) Illustrate these data by means of a histogram. [5]

(v) Make two brief comments on the differences between the age distributions of the populations of Inner London and Outer London. [2]

(vi) The data given in the table for Outer London are used to calculate the following estimates.

Mean 38.5, median 35.7, midrange 50, standard deviation 23.7, interquartile range 34.4.

The final group in the table assumes that the maximum age of any resident is 100 years. These estimates are to be recalculated, based on a maximum age of 105, rather than 100. For each of the five estimates, state whether it would increase, decrease or be unchanged. [4]