1   In a particular city there are 51 buildings of historical interest. The following table presents the ages of these buildings, given to the nearest 50 years.

Age (years)	50–150	200–300	350–450	500–600
No. buildings (f)	15	18	12	6

   a   Write down the lower and upper boundary values of the class containing the greatest number of buildings.

   b   State the widths of the four class intervals.

   c   Illustrate the data in a histogram.

   d   Estimate the number of buildings that are between 250 and 400 years old.

2   The masses, m grams, of 690 medical samples are given in the following table.

Mass (m grams)	$4 \leq m < 12$	$12 \leq m < 24$	$24 \leq m < 28$
No. medical samples (f)	224	396	p

   a   Find the value of p that appears in the table.

   b   On graph paper, draw a histogram to represent the data.

   c   Calculate an estimate of the number of samples with masses between 8 and 18 grams.

3   The table below shows the heights, in metres, of 50 boys and of 50 girls.

Height (m)	1.2–	1.3–	1.6–	1.8–1.9
No. boys (f)	7	11	26	6
No. girls (f)	10	22	16	2

   a   How many children are between 1.3 and 1.6 metres tall?

   b   Draw a histogram to represent the heights of all the boys and girls together.

   c   Estimate the number of children whose heights are 1.7 metres or more.

4   The heights of 600 saplings are shown in the following table.

Height (cm)	0–	5–	15–	30–u
No. saplings (f)	64	232	240	64

   a   Suggest a suitable value for u, the upper boundary of the data.

   b   Illustrate the data in a histogram.

   c   Calculate an estimate of the number of saplings with heights that are:

   i   less than 25 cm   ii   between 7.5 and 19.5 cm.

5 Each of the 70 trainees at a secretarial college was asked to type a copy of a particular document. The times taken are shown, correct to the nearest 0.1 minutes, in the following table.

Time taken (min)	2.6–2.8	2.9–3.0	3.1–3.2	3.3–3.7
No. trainees (f)	15	25	20	10

a Explain why the interval for the first class has a width of 0.3 minutes.

b Represent the times taken in a histogram.

c Estimate, to the nearest second, the upper boundary of the times taken by the fastest 10 typists.

d It is given that 15 trainees took between 3.15 and b minutes. Calculate an estimate for the value of b when:

i $b > 3.15$ **ii** $b < 3.15$.

6 A railway line monitored 15% of its August train journeys to find their departure delay times. The results are shown below. It is given that 24 of these journeys were delayed by less than 2 minutes.
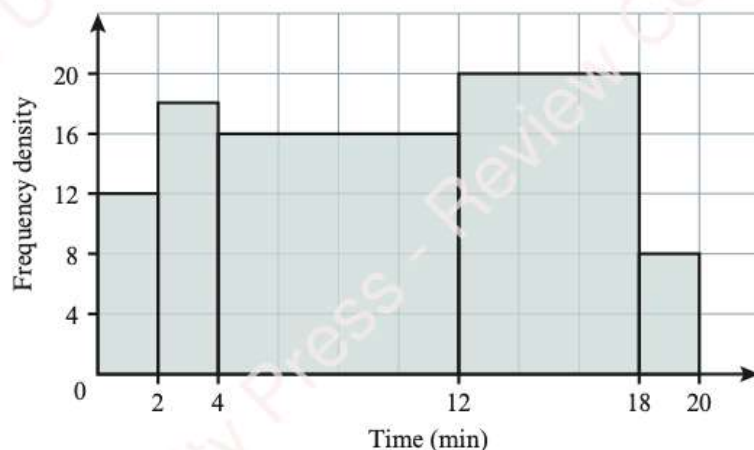

a How many journeys were monitored?

b Calculate an estimate of the number of these journeys that were delayed by:

i 1 to 3 minutes   **ii** 10 to 15 minutes.

c Show that a total of 2160 journeys were provided in August.

d Calculate an estimate of the number of August journeys that were delayed by 3 to 7 minutes. State any assumptions that you make in your calculations.

7 A university investigated how much space on its computers' hard drives is used for data storage. The results are shown below. It is given that 40 hard drives use less than 20 GB for data storage.
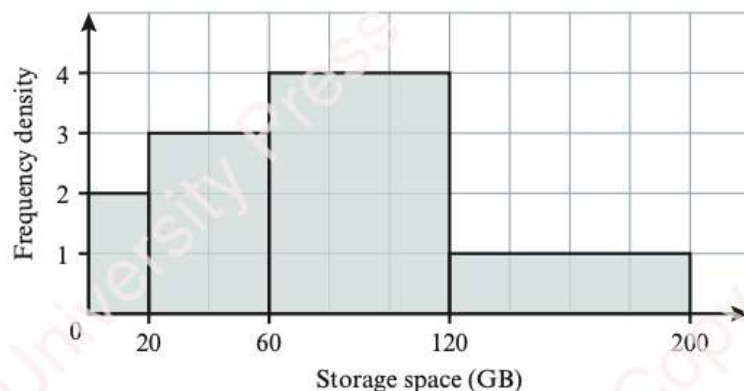

a Find the total number of hard drives represented.

b Calculate an estimate of the number of hard drives that use less than 50 GB.

c Estimate the value of k, if 25% of the hard drives use k GB or more.

8 The lengths of the 575 items in a candle maker's workshop are represented in the histogram.

   a What proportion of the items are less than 25 cm long?

   b Estimate the number of items that are between 12.4 and 36.8 cm long.

   c The shortest 20% of the workshop's items are to be recycled. Calculate an estimate of the length of the shortest item that will not be recycled.
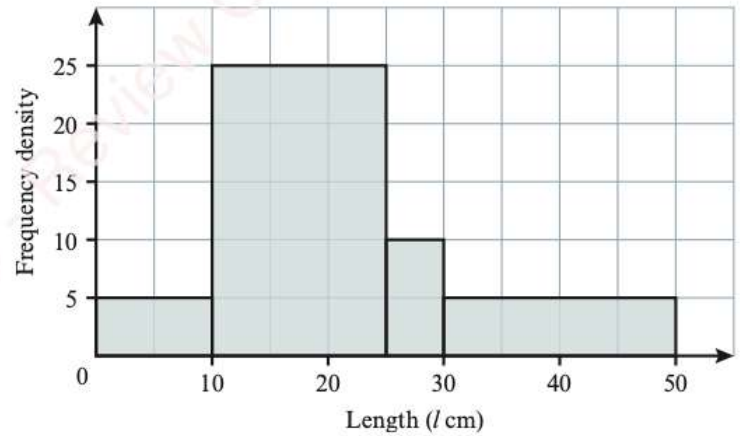
9 The thicknesses, k mm, of some steel sheets are represented in the histogram. It is given that $k < 0.4$ for 180 sheets.
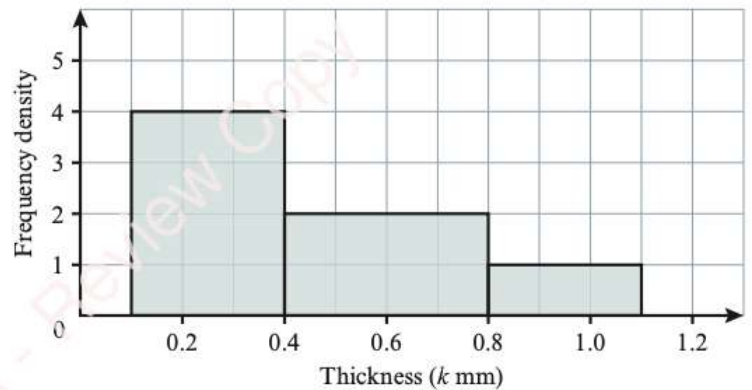
   a Find the ratio between the frequencies of the three classes. Give your answer in simplified form.

   b Find the value of n, given that frequency density measures sheets per n mm.

   c Calculate an estimate of the number of sheets for which:

     i $k < 0.5$ **ii** $0.75 \leqslant k < 0.94$.

   d The sheets are classified as thin, medium or thick in the ratio $1:3:1$.

   Estimate the thickness of a medium sheet, giving your answer in the form $a \leqslant k < b$. How accurate are your values for a and b?

10 The masses, in kilograms, of the animals treated at a veterinary clinic in the past year are illustrated in a histogram. The histogram has four columns of equal height. The following table shows the class intervals and the number of animals in two of the classes.

Mass (kg)	3–5	6–12	13–32	33–44
No. animals	a	371	1060	b

   a Find the value of a and of b, and show that a total of 2226 animals were treated at the clinic.

   b Calculate an estimate of the lower boundary of the masses of the heaviest 50% of these animals.

11 The minimum daily temperature at a mountain village was recorded to the nearest 0.5 °C on 200 consecutive days. The results are grouped into a frequency table and a histogram is drawn.

The temperatures ranged from 0.5 °C to 2 °C on n days, and this class is represented by a column of height h cm.

The temperatures ranged from –2.5 to –0.5 °C on d days. Find, in terms of n, h and d, the height of the column that represents these temperatures.

12 The frequency densities of the four classes in a histogram are in the ratio $4:3:2:1$. The frequencies of these classes are in the ratio $10:15:24:8$.

Find the total width of the histogram, given that the narrowest class interval is represented by a column of width 3 cm.

13 The percentage examination scores of 747 students are given in the following table.

Score (%)	p–50	51–70	71–80	81–q
No. students (f)	165	240	195	147

Given that the frequency densities of the four classes of percentage scores are in the ratio $5:8:13:7$, find the value of p and of q.