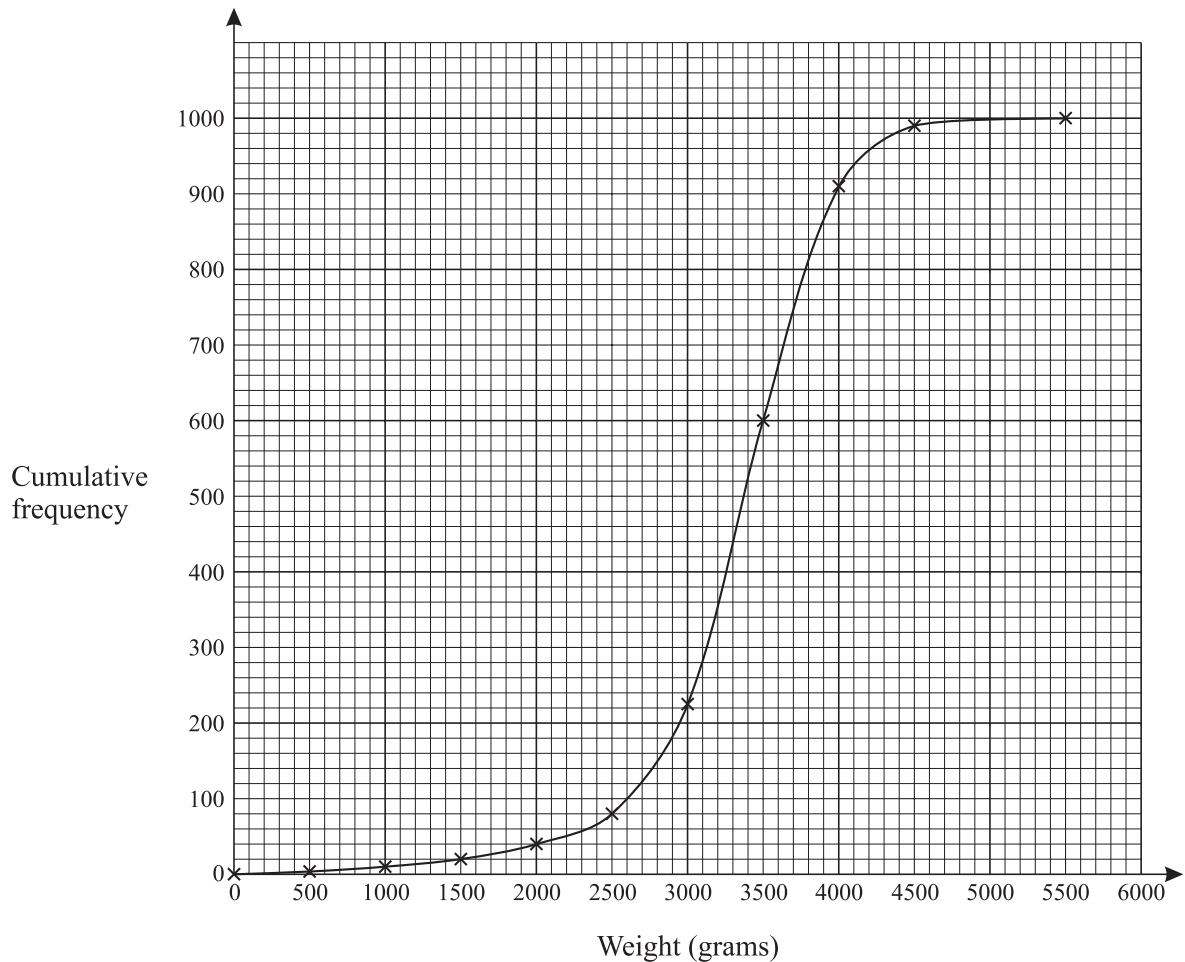


- 1 The birth weights in grams of a random sample of 1000 babies are displayed in the cumulative frequency diagram below.

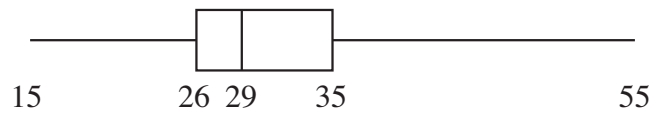


- (i) Use the diagram to estimate the median and interquartile range of the data. [3]
- (ii) Use your answers to part (i) to estimate the number of outliers in the sample. [4]
- (iii) Should these outliers be excluded from any further analysis? Briefly explain your answer. [2]
- (iv) Any baby whose weight is below the 10th percentile is selected for careful monitoring. Use the diagram to determine the range of weights of the babies who are selected. [2]

12% of new-born babies require some form of special care. A maternity unit has 17 new-born babies. You may assume that these 17 babies form an independent random sample.

- (v) Find the probability that
- (A) exactly 2 of these 17 babies require special care, [3]
- (B) more than 2 of the 17 babies require special care. [3]
- (vi) On 100 independent occasions the unit has 17 babies. Find the expected number of occasions on which there would be more than 2 babies who require special care. [1]

- 2 The times taken, in minutes, by 80 people to complete a crossword puzzle are summarised by the box and whisker plot below.



- (i) Write down the range and the interquartile range of the times. [2]
- (ii) Determine whether any of the times can be regarded as outliers. [3]
- (iii) Describe the shape of the distribution of the times. [1]

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- 3 At East Cornwall College, the mean GCSE score of each student is calculated. This is done by allocating a number of points to each GCSE grade in the following way.

Grade	A*	A	B	C	D	E	F	G	U
Points	8	7	6	5	4	3	2	1	0

- (i) Calculate the mean GCSE score,  $X$ , of a student who has the following GCSE grades:

A\*, A\*, A, A, A, B, B, B, B, C, D. [2]

60 students study AS Mathematics at the college. The mean GCSE scores of these students are summarised in the table below.

Mean GCSE score	Number of students
$4.5 \leq X < 5.5$	8
$5.5 \leq X < 6.0$	14
$6.0 \leq X < 6.5$	19
$6.5 \leq X < 7.0$	13
$7.0 \leq X \leq 8.0$	6

- (ii) Draw a histogram to illustrate this information. [3]

- (iii) Calculate estimates of the sample mean and the sample standard deviation. [5]

The scoring system for AS grades is shown in the table below.

AS Grade	A	B	C	D	E	U
Score	60	50	40	30	20	0

The Mathematics department at the college predicts each student's AS score,  $Y$ , using the formula  $Y = 13X - 46$ , where  $X$  is the student's average GCSE score.

- (iv) What AS grade would the department predict for a student with an average GCSE score of 7.4? [2]

- (v) What do you think the prediction should be for a student with an average GCSE score of 5.5? Give a reason for your answer. [3]

- (vi) Using your answers to part (iii), estimate the sample mean and sample standard deviation of the predicted AS scores of the 60 students in the department. [3]

- 4 At a certain stage of a football league season, the numbers of goals scored by a sample of 20 teams in the league were as follows.

22 23 23 23 26 28 28 30 31 33 33 34 35 35 36 36 37 46 49 49

- (i) Calculate the sample mean and sample variance,  $s^2$ , of these data. [3]
- (ii) The three teams with the most goals appear to be well ahead of the other teams. Determine whether or not any of these three pieces of data may be considered outliers. [2]