Q1. Josh asked 30 students how many minutes they each took to get to school.

The table shows some information about his results.

Time taken (t minutes)	**Frequency**		
$0 < t \leq 10$	6		
$10 < t \leq 20$	11		
$20 < t \leq 30$	8		
$30 < t \leq 40$	5		

Work out an estimate for the mean number of minutes taken by the 30 students.

..... minutes

(Total 4 marks)

Q2. Josh asked 30 adults how many cups of coffee they each drank yesterday.

The table shows his results.

Number of cups	**Frequency**	
0	5	
1	9	

2	7	
3	4	
4	3	
5	2	

Work out the mean.

.....

(Total 3 marks)

Q3. Zach has 10 CDs.
The table gives some information about the number of tracks on each CD.

Number of tracks	**Frequency**	
11	1	
12	3	
13	0	
14	2	
15	4	

Work out the mean.

.....

(Total 3 marks)

Q4. Zach has 10 CDs.
The table gives some information about the number of tracks on each CD.

Number of tracks	Frequency	
11	1	
12	3	
13	0	
14	2	
15	4	

(a) Write down the mode.

.....

(1)

(b) Work out the mean.

.....

(3)

(Total 4 marks)

Q5. The table gives some information about the weights, in kg, of 50 suitcases at an airport check-in desk.

Weight (w kg)	**Frequency**
$0 < w \leq 10$	16
$10 < w \leq 15$	18
$15 < w \leq 20$	10
$20 < w \leq 35$	6

(a) Work out an estimate for the mean weight.

..... kg

(4)

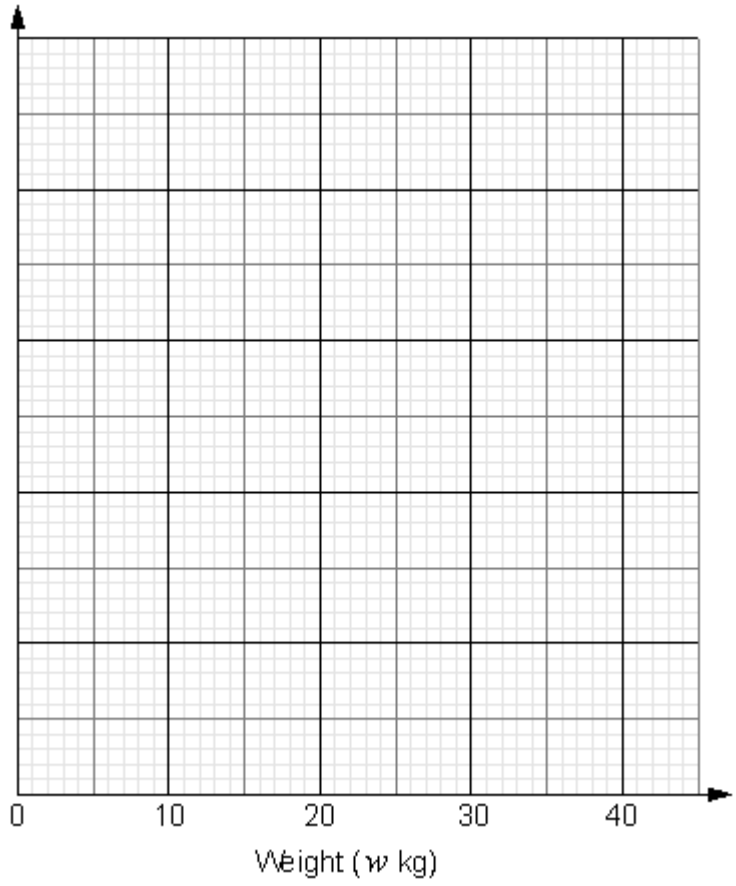
Passengers have to pay extra money for any suitcase that weighs more than 20 kg.
Two of the 50 suitcases are chosen at random.

(b) Work out the probability that both suitcases weigh more than 20 kg.

.....

(2)

(c) On the grid, draw a histogram for the information in the table.



(3)
(Total 9 marks)

Q6. The table shows some information about the weights, in grams, of 60 eggs.

Weight (w grams)	Frequency		
$0 < w \leq 30$	0		
$30 < w \leq 50$	14		
$50 < w \leq 60$	16		
$60 < w \leq 70$	21		
$70 < w \leq 100$	9		

(a) Calculate an estimate for the mean weight of an egg.

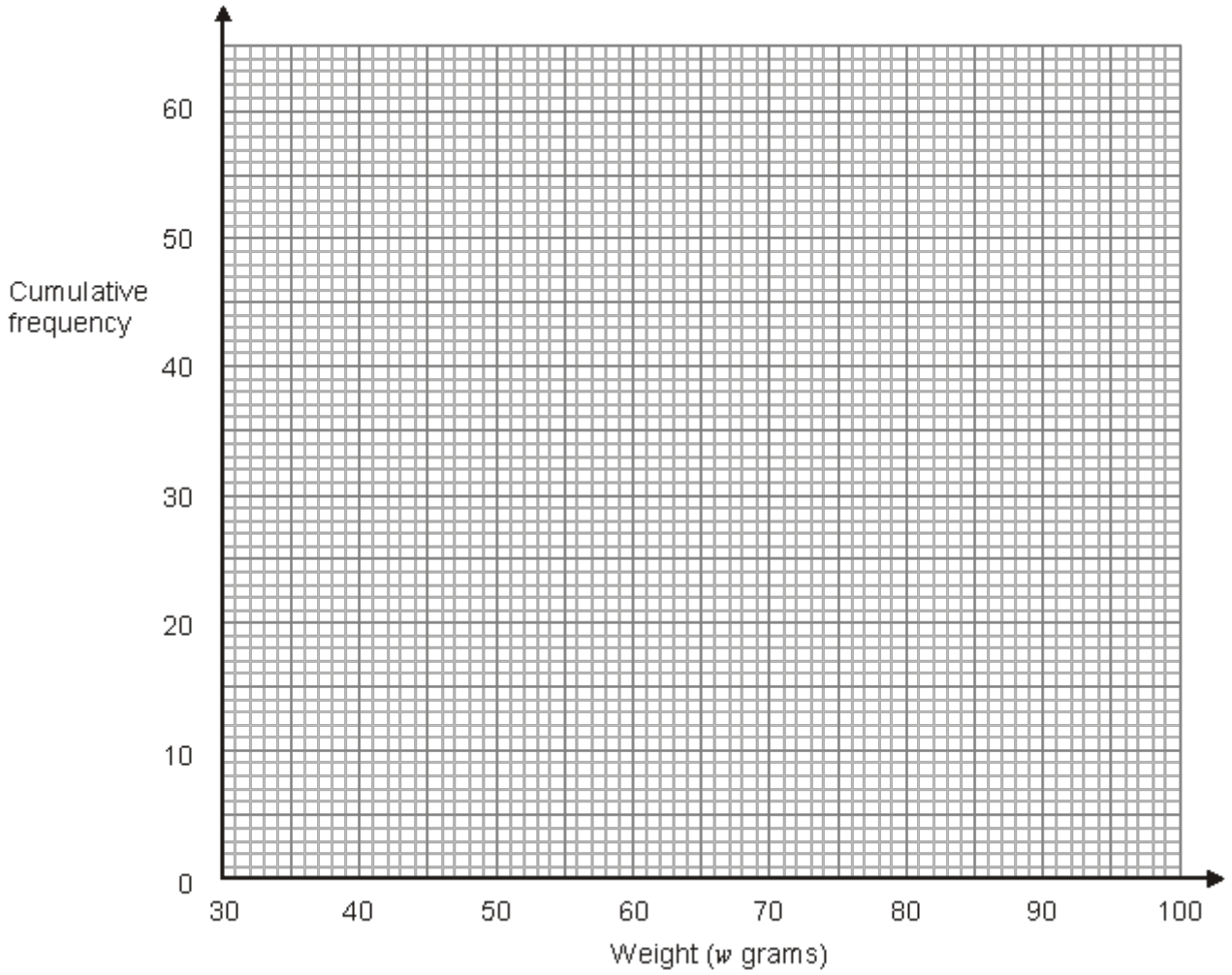
..... g

(4)

(b) Complete the cumulative frequency table.

Weight (w grams)	Cumulative frequency
$0 < w \leq 30$	0
$0 < w \leq 50$	
$0 < w \leq 60$	
$0 < w \leq 70$	
$0 < w \leq 100$	

(1)



(c) On the grid, draw a cumulative frequency graph for your table.

(2)

(d) Use your graph to find an estimate for the number of eggs with a weight greater than 63 grams.

.....

(2)
(Total 9 marks)

Q7. Majid carried out a survey of the number of school dinners 32 students had in one week.

The table shows this information.

Number of school dinners	Frequency	
0	0	
1	8	
2	12	
3	6	
4	4	
5	2	

Calculate the mean.

.....

(Total 3 marks)

Q8. Sethina recorded the times, in minutes, taken to repair 80 car tyres.
Information about these times is shown in the table.

Time (*t* minutes)	Frequency		

$0 < t \leq 6$	15		
$6 < t \leq 12$	25		
$12 < t \leq 18$	20		
$18 < t \leq 24$	12		
$24 < t \leq 30$	8		

Calculate an estimate for the mean time taken to repair each car tyre.

..... minutes

(Total 4 marks)

Q9. The table shows information about the number of hours that 120 children used a computer last week.

Number of hours	**Frequency**
$0 < h \leq 2$	10
$2 < h \leq 4$	15
$4 < h \leq 6$	30
$6 < h \leq 8$	35
$8 < h \leq 10$	25
$10 < h \leq 12$	5

Work out an estimate for the mean number of hours that the children used a computer.
Give your answer to 2 decimal places.

..... cm

(Total 4 marks)

M1.

Working	Answer	Mark	Additional Guidance
(6 × 5) + (11 × 15) + (8 × 25) + (5 × 35) = 570 "570" – "(6+11+8+5)"	19	4	**M1** for use of fx with x consistent within intervals (including end points) accept one error **M1** (dep) for use of midpoints **M1** (dep on 1st **M1**) for use of $\Sigma fx/\Sigma f$ **A1** cao
			Total for Question: 4 marks

M2.

Working	Answer	Mark	Additional Guidance
(0 × 5) + (1 × 9) + (2 × 7) + (3 × 4) + (4 × 3) + (5 × 2) 0 + 9 +14 +12 + 12 + 10 57 ÷ 30	1.9	3	**M1** for 0 × 5, 1 × 9, etc (min 3 attempts shown) may be implied by 0, 9 etc **M1** (dep) for attempt to add and divide by 30 **A1** cao (**B2** sc for 2.06 – 2.1)
			Total for Question: 3 marks

M3.

Working	Answer	Mark	Additional Guidance
(1 × 11 + 3 × 12 + 0 × 13 + 2 × 14 + 4 × 15) ÷ 10 = 135 ÷ 10 = 11 + 36 + 0 + 28 + 60	13.5	3	**M1** for 1 × 11 or 3 × 12 or 0 × 13 or 2 × 14 or 4 × 15 or sight of any two or more of the correct answers 11, 36 , 0, 28, 60 (must be from a product however) **M1** (dep) for adding 4 or 5 of these products and dividing by 10 **A1** cao [SC: **B2** available for using '13 × 0 = 13' without further mistakes] giving an answer of 14.8
			Total for Question: 3 marks

M4.

	Working	Answer	Mark	Additional Guidance
(a)		15	1	**B1** cao
(b)	(1 × 11 + 3 × 12 + 0 × 13 + 2 × 14 + 4 × 15) ÷ 10 = 135 ÷ 10 = 11 + 36 + 0 + 28 + 60	13.5	3	**M1** for 1 × 11 or 3 × 12 or 0 × 13 or 2 × 14 or 4 × 15 or sight of any two or more of the correct answers 11, 36 , 0, 28, 60 (must be from a product however) **M1** (dep) for adding 4 or 5 of these products and dividing by 10 **A1** cao [SC: **B2** available for using '13 × 0 = 13' without further mistakes] giving an answer of 14.8
				Total for Question: 4 marks

M5.

	Working	Answer	Mark	Additional Guidance
(a)	5 × 16 = 80 12.5 × 18 = 225 17.5 × 10 = 175 27.5 × 6 = 165 645 ÷ 50 = 12.9 or 5.5 × 16 = 88 13 × 18 = 234 18 × 10 = 180 28 × 6 = 168 670 ÷ 50 = 13.4	12.9	4	**M1** for fx consistently within interval including ends (allow 1 error) **M1** consistently using appropriate midpoints **M1** (dep on first M1) for $\sum fx \div \sum f$ **A1** for 12.9 or 13.4
(b)	$\frac{6}{50} \times \frac{5}{49} = \frac{30}{2450}$	$\frac{3}{245}$	2	**M1** for $\frac{6}{50} \times \frac{5}{49}$ **A1** for $\frac{3}{245}$ oe If M0A0, SC B1 for $\frac{9}{625}$ oe
(c)	$0 \le d < 10$ fd 1.6 $10 \le d < 15$ fd 3.6 $15 \le d < 20$ fd 2 $20 \le d < 35$ fd 0.4	Correct histogram	3	**B2** for 4 correct histogram bars (±½ square) (B1 for 2 or 3 histogram bars of different widths correct) **B1** for frequency density label or key and consistent scaling SC if B0 then M1 for clear attempt to use frequency density or area
				Total for Question: 9 marks

M6.

	Working	Answer	Mark	Additional Guidance
(a)	15 × 0 = 0 40 × 14 = 560 55 × 16 = 880 65 × 21 = 1365 85 × 9 = 765	59.5	4	**M1** for finding at least 4 products fx consistently within interval (including end points) **M1** (dep) for use of at least 4 correct midpoints

	3570 ÷ 60			**M1** (dep on first M) for "Σfx" ÷ 60 **A1** for 59.5
(b)		14, 30, 51, 60	1	**B1** all 4 correct
(c)			2	**M1** for at least 4 of "5 points" plotted consistently within each interval, ± 0.5 full square, and joined by curve or line segments providing no gradient is negative. **A1** for a fully correct cf graph.
(d)			2	**B2** for answer in the range 21 – 25 (**B1** for answer in the range 35 – 39) **OR** **M1** (dep on graph being cf) for using w = 63 **A1** ft (± 0.5 square)
				Total for Question: 9 marks

M7.

Working	Answer	Mark	Additional Guidance
(0 × 0) + 1 × 8 + 2 × 12 + 3 × 6 + 4 × 4 + 5 × 2 =76 76 ÷ ((0) + 8 + 12 + 6 + 4 + 2)	2.375	3	**M1** for 1 × 8 and 2 × 12 and 3 × 6 and 4 × 4 and 5 × 2 condone one error **or** sight of 76. **M1**(dep on 1st **M1**) for $\Sigma fx \div \Sigma f$ **A1** for 2.375 **or** 2.37 **or** 2.38 **or** 2.4
			Total for Question: 3 marks

M8.

Working	Answer	Mark	Additional Guidance
15 × 3 = 45 15 × 3.5 25 × 9 = 225 25 × 9.5 20 × 15 = 300 20 × 15.5 12 × 21 = 252 12 × 21.5 8 × 27 = 216 8 × 27.5 1038 ÷ 80 = 1078 ÷ 80 =	12.97 - 13.48	4	**M1** for fx consistently within interval including ends (allow 1 error) **M1** (dep) consistently using appropriate midpoints **M1** (dep on first M) for $\Sigma fx \div \Sigma f$ **A1** for 12.97 – 13.48
			Total for Question: 4 marks

M9.

Working	Answer	Mark	Additional Guidance
$\frac{10 + 45 + 150 + 245 + 225 + 55}{120}$	6.08 hours	4	**M1** for mid interval values **M1** for multiplying frequencies by mid-interval values **M1** for adding (freq × mid-interval values) ÷ 120 **A1** cao
			Total for Question: 4 marks

E1. This question proved challenging for many candidates. A significant number of candidates, having correctly arrived at the result $\Sigma fx = 570$, then went on to divide this by 6. Other common errors included working with the end point 10, 20, 30 and 40 (rather than the mid point of the interval), and in summing the products of the cumulative frequencies and the mid interval values.

E2. This question proved challenging to many candidates. The extra column in the table gave a clue to many candidates, most filling this in with something. The most common error here was to add together the number of cups and the frequencies to give 5, 10, 9, 7…, and then to add these up and divide by 6. Some candidates thought that they had to use a mid-interval value of some sort to calculate the mean, and consequently attempted to use values such as 2.5, 4.5, 3.5... or 0.5, 1.5, 2.5...in their calculation. For those candidates using the correct method to find the total number of cups, a common error was to work out 0 × 5 as 5, thus leading to the special case B2 on the mark scheme. A large number of candidates simply found the sum of the frequencies and divided this by 6.

E3. In this question 44% of candidates gained full marks for the correct answer of 13.5. 24% of candidates gained one mark for gaining at least 2 out of the 5 products of number of tracks multiplied by the frequency, but only 6% of candidates gained the mark for dividing their total by the total number of CD's (10). A very common response was 27, obtained by dividing the total number of tracks by the number of groups. This only gained any credit if their totalling of the number of tracks on a minimum of 2CD's was shown. A special case, which gained 2 marks, was allowed for candidates who thought that 13 × 0 was 13 and made no further errors resulting in an incorrect average of 14.8. Other instances of poor arithmetic often lost the accuracy mark.

E4. In this question part only 12% gained full marks for the correct answer of 15 for the mode and 13.5 for the mean. 33% of candidates gained one mark for gaining at least 2 out of the 5 products of number of tracks multiplied by the frequency but only 6% of candidates gained the mark for dividing their total by the total number of CD's (10). A very common response was 27, obtained by dividing the total number of tracks by the number of groups. This only gained any credit if their totalling of the number of tracks on a minimum of 2CD's was shown. A special case, which gained 2 marks, was allowed for candidates who thought that 13 × 0 was 13 and made no further errors resulting in an incorrect average of 14.8.

##

Part (a) of this question was poorly attempted. About one third of candidates gained all four marks. Many candidates attempts were blighted by the inability to find the midpoint of each of the intervals in the table. It was common to see these recorded as 5, 13, 18 and 28. Some candidates used the lengths of the intervals, 10, 5, 5 and 15 to represent the weights of the suitcases. Other lower attaining candidates merely carried out the calculation "50 ÷ 4" or summed their midpoints and divided by 4. About one in every ten candidates gave a correct answer in part (b). Few candidates identified the need to use multiplication and there were many instances of fractions appearing on the answer line, most commonly 6/50 or equivalent, without any working shown. For part (c) a fair proportion of candidates worked out the frequency densities but only about one third were able to go on to use them in order to complete a histogram. Even the better candidates often failed to label/scale the vertical axes or provide a key for their graph. A large proportion of lower attaining candidates drew bars with heights representing the frequencies.

##

In part (a) many candidates scored the 2 marks for obtaining the products of the midpoints and the frequencies, showing correct calculations for at least 4 of the 5 products fx and using the correct midpoints. The most common error seemed to be
15 x 0 = 15. After gaining the first two marks many went on to add and then divide by 60 but division by 260 or 5 were common errors. In some cases it was clear that candidates did not know how to approach this question and instead used the columns to calculate cumulative frequency or frequency density.

Part (b) was answered correctly by a majority of candidates although a few did not seem to know what was required and listed midpoints or worked out frequency density. Even though candidates had a calculator, again arithmetic errors were seen.

In part (c) students generally managed to plot the points that they had identified in (b) correctly but many lost the marks as they failed to join the points. Points were sometimes badly joined particularly the last two often resulting in a curve which contained a negative

gradient. Encouragingly the plotting at midpoints was rarely seen.

Many candidates who had a cumulative frequency graph understood what to do in part (d), although a few had difficulty reading the vertical axis with 36 or 37 being read as 46 or 47. Some failed to read the question carefully and so did not subtract their value from 60 so giving an answer for a weight less than 63 grams rather than more than.

E7. Since there was only one blank column on the question paper, a very significant number of students assumed that this was a question involving cumulative frequency. Weaker candidates gave the response as 32 ÷ 6 or 32 ÷ 5. Some candidates who did realise they had to multiply and then add, then divided their '76' by 6 or 5 instead of 32. Despite a calculator being available there were a lot of arithmetical errors seen particular in the multiplication and then addition. The correct answer was seen from only 30% of candidates.

E8. Foundation

Very few candidates earned any marks for this question, which was designed only for the more able at the Foundation level. 80 ÷ 5 = 16 was the most common error, but few considered using midpoints. Many failed to attempt the question.

Higher

Most candidates made full use of the extra columns in the table. A significant number of candidates correctly found fx using the appropriate midpoints but then divided the sum by "5" (the number of groups) or "75" the sum of the midpoints (this was particularly disappointing with 80 having been given in the question).

The most common response from those only gaining 1 or 2 marks was to use the end points when calculating fx. Weaker candidates divided the sum of the frequencies or the sum of the midpoints by 5. Most candidates seemed to realise that the extra columns in the table had a purpose and wrong responses included finding the frequency density and producing cumulative frequency.