1. 30 adults took part in a survey.
They were each asked how much money they spent on lottery tickets last week.
The table shows the results of the survey.

Money (£)	**Frequency**	
0	5	
2	16	
4	6	
20	2	
30	1	

Work out the mean amount of money the 30 adults spent on lottery tickets.

£ .....

(Total 3 marks)

2. Fred did a survey on the areas of pictures in a newspaper.
The table gives information about the areas.

Area (A cm^2)	Frequency
$0 < A \leq 10$	38
$10 < A \leq 25$	36
$25 < A \leq 40$	30
$40 < A \leq 60$	46

Work out an estimate for the mean area of a picture.

.....cm^2

(Total 4 marks)

3. The table gives some information about the time taken by a group of 100 students to complete an IQ test.

Time (*t* seconds)	**Frequency**	
$60 < t < 70$	12	
$70 < t < 80$	22	
$80 < t < 90$	23	
$90 < t < 100$	24	
$100 < t < 110$	19	

(a) Write down the modal class interval.

.....

(1)

(b) Calculate an estimate for the mean time taken by the students.

..... seconds

(4)

(Total 5 marks)

4. The table gives some information about the time taken by a group of 100 students to complete an IQ test.

Time (*t* seconds)	**Frequency**	
$60 < t \leq 70$	12	
$70 < t \leq 80$	22	
$80 < t \leq 90$	23	
$90 < t \leq 100$	24	
$100 < t \leq 110$	19	

Calculate an estimate for the mean time taken by the students.

..... seconds

(Total 4 marks)

5. The table gives information about the times, in minutes, that 106 shoppers spent in a supermarket.

Time (*t* minutes)	**Frequency**	
$0 < t \leq 10$	20	
$10 < t \leq 20$	17	
$20 < t \leq 30$	12	
$30 < t \leq 40$	32	
$40 < t \leq 50$	25	

(a) Find the class interval that contains the median.

.....

(1)

(b) Calculate an estimate for the mean time that the shoppers spent in the supermarket. Give your answer correct to 3 significant figures.

..... minutes

(4)

(Total 5 marks)

6. 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)

7. 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)

8. Marcus collected some pebbles.
He weighed each pebble.

The grouped frequency table gives some information about weights.

Weight (w grams)	Frequency		
$50 \leq w < 60$	5		
$60 \leq w < 70$	9		
$70 \leq w < 80$	22		
$80 \leq w < 90$	27		
$90 \leq w < 100$	17		

Work out an estimate for the mean weight of the pebbles.

…… grams
(Total 4 marks)

9. A teacher asked 50 children how much pocket money they got each week.
The table shows some information about their replies.

Pocket money (£x)	Frequency
$0 < x \leq 2$	1
$2 < x \leq 4$	10
$4 < x \leq 6$	23
$6 < x \leq 8$	14
$8 < x \leq 10$	2

Work out the estimate for the mean amount of pocket money the children got.

£ .....

(Total 4 marks)

10. Vanessa made 80 phone calls last month.

The table gives information about the length of the calls.

Length of call (t minutes)	**Frequency**		
$0 < t \leq 10$	20		
$10 < t \leq 20$	32		
$20 < t \leq 30$	14		
$30 < t \leq 40$	9		
$40 < t \leq 50$	5		

Work out an estimate for the mean length of the calls.

..... minutes

(Total 4 marks)

11. 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)

12. 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)

13. 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)

14. 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)

01. $0 \times 5 + 2 \times 16 + 4 \times 6 + 20 \times 2 + 30 \times 1$ 3
$= 0 + 32 + 24 + 40 + 30$
$=126$

$126 \div 30$
$= 4.2(0)$

M1 for $0 \times 5 + 2 \times 16 + 4 \times 6 + 20 \times 2 + 30 \times 1$
or at least 3 correct entries of 0, 32, 24, 40, 30 in the table
or 126 seen
M1 (dep) for "126" ÷ 30
A1 cao
***SC**: Award M2 for 131 ÷ 30 with or without working*

[3]

02. 38×5; 36×17.5; 30×32.5; 46×50;
(= 190; 630; 975; 2300)
$\Sigma fx = 190 + 630 + 975 + 2300 = 4095$
Mean $\Sigma fx/\Sigma f = 4095/150$
27.3 4

M1 for fx within intervals (including ends) at least two consistently
M1 (dep) fx consistently using midpoints
M1 (dep on 1st M) for use of $\Sigma f x/ \Sigma f$
A1 for 27.3

[4]

03. (a) $90 < t \leq 100$ 1

B1 for $90 < t \leq 100$; accept 90 – 100.

(b) $65 \times 12 = 780$
$75 \times 22 = 1650$
$85 \times 23 = 1955$
$95 \times 24 = 2280$
$105 \times 19 = 1995$
8660/100 =
= 86.6 4

M1 for use of fx with x consistent within intervals (including end points). Allow one slip.
M1 (dep) for use of midpoints
M1 (dep on 1st M1) for use of $\sum fx/100$ or $\sum fx/\sum f$
A1 86.6

[5]

04. $65 \times 12 = 780$
$75 \times 22 = 1650$
$85 \times 23 = 1955$
$95 \times 24 = 2280$
$105 \times 19 = 1995$
$8660/100 = 86.6$ 4

M1 for use of fx with x consistent within intervals (including end points). Allow one slip even if outside interval
M1 (dep) for use of midpoints
M1 (dep on 1st M1) for use of $\sum fx/100$ or $\sum fx/\sum f$
A1 86.6

[4]

05. (a) $(106 + 1) \div 2$ th value 1

$= 30 < T \leq 40$

B1 cao

(b) $5 \times 20 + 15 \times 17 + 25 \times 12 + 35 \times 32 + 45 \times 25 =$
$= (100 + 255 + 300 + 1120 + 1125) \div 106$
$= 2900 \div 106$ 4

$= 27.4$

M1 fx consistent within each interval, allow 1 error.
M1 use of midpoints in fx
M1 (dep on 1st M1) $\frac{\sum fx}{\sum f}$
A1 27.3 – 27.4

[5]

06. $(0 \times 0) + 1 \times 8 + 2 \times 12 + 3 \times 6 + 4 \times 4 + 5 \times 2 = 76$
$76 \div ((0) + 8 + 12 + 6 + 4 + 2)$

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*

[3]

07.

$15 \times 3 = 45$	15×3.5
$25 \times 9 = 225$	25×9.5
$20 \times 15 = 300$	20×15.5
$12 \times 21 = 252$	12×21.5
$8 \times 27 = 216$	8×27.5
$1038 \div 80 =$	$1078 \div 80 =$

$12.97 - 13.48$ 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

[4]

08. (a) 80.25 4

$55 \times 5 + 65 \times 9 + 75 \times 22 + 85 \times 27 + 95 \times 17 = 6420$

$\text{Mean} = \frac{6420}{80}$

M1 for fx values within intervals (const.)
M1 for using correct midpoints
M1 (dep on at least one M1) for summing fx and dividing by 80
A1 cao

[4]

09. 5.24 4

$(1 \times 1) + (3 \times 10) + (5 \times 23) + (7 \times 14) + (9 \times 2) = 262$

$\text{Mean} = \frac{262}{50}$

M1 for fx values within intervals (consistent)
M1 for using correct midpoints
M1 (dep on at least M1) for summing fx and dividing by 50
A1 cao

[4]

10. $(20 \times 5) + (32 \times 15) + (14 \times 25) + (9 \times 35) + (5 \times 45)$
$= 100 + 480 + 350 + 315 + 225$
$1470 \div 80 = 18.375$

18.4 4

M1 for f × consistent part of interval condone 2 errors
M1 for f × mid interval (allow 2 arithmetic errors)
M1 (dep on first M1) for "1470" ÷ 80
A1 for 18.4 or better

[4]

11. $(0 \times 5) + (1 \times 9) + (2 \times 7) + (3 \times 4) + (4 \times 3) + (5 \times 2)$
$0 + 9 + 14 + 12 + 12 + 10$
$57 \div 30$
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)

[3]

12. $(6 \times 5) + (11 \times 15) + (8 \times 25) + (5 \times 35) = 570$

"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 Σfx/Σf
A1 cao

[4]

13. (a) 15 1

B1cao

(b) $(1 \times 11 + 3 \times 12 + 0 \times 13 + 2 \times 14 + 4 \times 15) \div 10$
$= 135 \div 10$
$= 11 + 36 + 0 + 28 + 60$
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

[4]

14. $(1 \times 11 + 3 \times 12 + 0 \times 13 + 2 \times 14 + 4 \times 15) \div 10$
$= 135 \div 10$
$= 11 + 36 + 0 + 28 + 60$
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

[3]

01. The third blank column in the table of values was not always used and, where working was shown, the values were repeated in the working space which used up valuable examination time. Totals from the two given columns of values were often obtained and sometimes used to obtain a final answer. For those realising that the values in the two columns were to be multiplied together the first entry of '5 × 0' appeared as '5' rather than '0' in many instances. Some candidates saw a connection between a pie chart and the table of values and went on to produce a calculation which seemed to be connected to the number of degrees in each sector totally ignoring the fact that they had been asked to 'find the mean'. In spite of the fact that the question was topical there were some very unrealistic answers with the average person buying thousands of pounds of lottery tickets each week. Many responses indicated that the candidates had little idea what to do, with many writing 126 (or 131) ÷ 5 or 126 ÷ 56 or even 56 ÷ 5. Others attempted to write the cumulative frequency values and then tried to use these values to calculate the mean. Over half the candidates failed to score any marks on this question with only around 20% scoring 2 or 3 marks.

02. It was disappointing that although this is a standard question, there were relatively few correct answers. Many candidates simply divided 150 by 4 and gave an answer of 37.5. Even those who knew how to find an estimate of the mean had problems finding the correct midpoints for the 10 – 25 and 25 – 40 intervals. Unfortunately, some candidates divided $\sum fx$ by 4 instead of by the total frequency and failed to recognize that their answer was considerably larger than the areas in the table.

03. In part (a) most candidates understood the modal class interval and gave the correct interval, sometimes writing it without inequality signs, but nevertheless unambiguously. Weaker candidates confused the mode with the median, and gave the class interval 80-90.

Correct answers to part (b) were in the minority. Most who used fx used the midpoint correctly rather than using another value in the interval. Mistakes included adding up the frequency incorrectly (though 100 was stated in the question), dividing by 5, or adding up a cumulative frequency and dividing by 5. A significant number performed fx in the table, but then chose to use another method to work out an incorrect answer in the part (b) answer space, which would receive no marks.

04. This was a standard task which was well carried out by many of the candidates. Even on this paper there were the usual misapprehensions, such as $100 \div 5 = 20$ and $8660 \div 5 = 1720$ as well as some students thinking that the midpoint of the first interval was at 65.5.

05. Weaker candidates tended to score a low mark on this question. There was the usual confusion when trying to find a median of ordering the frequencies or just picking the middle class interval. In part (b), many candidates had a correct method for calculating an estimate for a mean, but lost an accuracy mark through the miscalculation $17 \times 25 = 225$ rather than 255. One or two candidates calculated an estimate of the total time (2900) but then went on to divide by the number of class intervals getting the rather high mean time of 580 minutes. There were too many candidates who found $106 \div 5 = 21.2$

06. 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 $32 \div 6$ or $32 \div 5$. 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.

07. Foundation

Very few candidates earned any marks for this question, which was designed only for the more able at the Foundation level. $80 \div 5 = 16$ 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.

08. A common error was to sum the mid-points and divide by 5. A number of candidates tried to use the cumulative frequency. Those candidates who made a good start by finding the product of the frequencies and mid-points often then divided by 5 instead of 80.

09. There were many good answers to this standard question. There were more candidates using the upper end point of each class interval than expected. Some candidates interpreted 'estimate' as an instruction to round off their final answer. Weaker candidates multiplied the frequencies by the class width or added up the frequencies and divided by 5. The use of cumulative frequencies was also seen.

10. This question was not very well understood and there were many very poor attempts, 79% of candidates scored no marks. This type of question has been set on many Data Handling Module tests but the multistage process seemed beyond the competence of many of the candidates. The total of the frequencies, 80 was often divided by the number of the categories, 5, giving 16 as the most common response. Of those who did have some understanding of the method only about half of them used the mid-values. Working showing 1070 (the lower end of the interval × frequency) or 1870 (the upper end of the interval × the frequency) was not uncommon, as was 1470 (the correct response at this stage - the mid point of the interval × the frequency). Having got this far most candidates were unsure as to how to proceed and many divided these figures by 125 (the sum of the frequencies), or 5 (the number of class intervals). Many then went on to add the frequency and their mid range value. There were a disappointing number of good candidates who rounded to 18.3 or 18 without showing intermediate steps thus losing the final accuracy mark. Only 6% of candidates scored all the marks in this question.

11. 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.

12. 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.

13. 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.

14. 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.