# **Statistics**

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**2** 40 students are asked about the number of people in their families.

The table shows the results.

Number of people in family	2	3	4	5	6	7
Frequency	1	1	17	12	6	3
<ul><li>(a) Find</li><li>(i) the mode,</li></ul>						
(ii) the median,			Answer(a)(i	)		[1
			Answer(a)(i	i)		[1
(iii) the mean.						
			Answer(a)(i	ii)	<u></u>	[3
<b>b)</b> Another <i>n</i> students are a	asked about the	e number of	f people in th	eir families		
The mean for these $n$ str	udents is 3.					
Find, in terms of <i>n</i> , an e	expression for	the mean nu	umber for all	(40 + n) stu	udents.	
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			Answer(1	<i>b)</i>		[2

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6 The masses of 60 potatoes are measured. The table shows the results.

Mass ( <i>m</i> grams)	$10 < m \le 20$	$20 < m \le 40$	$40 < m \le 50$
Frequency	10	30	20

(a) Calculate an estimate of the mean.



(b) On the grid, draw an accurate histogram to show the information in the table.



7 200 students were asked how many hours they exercise each week.

The table shows the results.

Time ( <i>t</i> hours)	0< <i>t</i> ≤5	5< <i>t</i> ≤10	10< <i>t</i> ≤15	15< <i>t</i> ≤20	20< <i>t</i> ≤25	25< <i>t</i> ≤30	30< <i>t</i> ≤35	35< <i>t</i> ≤40
Number of students	12	15	23	<b>3</b> 0	40	35	25	20

(a) Calculate an estimate of the mean.

Answer(a) h [4]

(b) Use the information in the table above to complete the cumulative frequency table.

Time ( <i>t</i> hours)	<i>t</i> ≤ 5	<i>t</i> ≤ 10	<i>t</i> ≤ 15	<i>t</i> ≤ 20	<i>t</i> ≤ 25	<i>t</i> ≤ 30	<i>t</i> ≤ 35	<i>t</i> ≤ 40
Cumulative frequency	12	27	50	80	120			200

[1]



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(a) The table shows how many books were borrowed by the 126 members of a library group in a 7 month.

Number of books	11	12	13	14	15	16
Number of members (frequency)	35	28	22	18	14	9

Find the mode, the median and the mean for the number of books borrowed.

Answer(a) mode = median = ..... mean = [6]

.....

(b) The 126 members record the number of hours they read in one week.

The histogram shows the results.



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Number of hours ( <i>h</i> )	$0 < h \leq 5$	$5 < h \leq 8$	$8 < h \le 10$	$10 < h \le 12$	$12 < h \le 16$	$16 < h \le 20$
Frequency				20	24	10

(i) Use the information from the histogram to complete the frequency table.

(ii) Use the information in this table to calculate an estimate of the mean number of hours. Show your working.

Answer(b)(ii) hours [4]

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[3]

## 5) November 2010 V1

5 The cumulative frequency table shows the distribution of heights, *h* centimetres, of 200 students.

Height ( <i>h</i> cm)	≤130	≤140	≤150	≤160	≤165	≤170	≤180	≤190
Cumulative frequency	0	10	50	95	115	145	180	200

(a) Draw a cumulative frequency diagram to show the information in the table.



(ii) One of the 200 students is chosen at random and then a second student is chosen at random from the remaining students.

Calculate the probability that one has a height greater than 170 cm and the other has a height of 140 cm or less. Give your answer as a fraction.

Answer(c)(ii) [3]

(d) (i) Complete this frequency table which shows the distribution of the heights of the 200 students.

Height ( <i>h</i> cm)	130< <i>h</i> ≤140	140< <i>h</i> ≤150	150< <i>h</i> ≤160	160< <i>h</i> ≤165	165< <i>h</i> ≤170	170< <i>h</i> ≤180	180< <i>h</i>
Frequency	10	40	45	20			



## 6) November 2010 V2

**3** 80 boys each had their mass, *m* kilograms, recorded. The cumulative frequency diagram shows the results.



Answer(b) [2]

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Mass, m	Frequency
$30 < m \le 40$	8
$40 < m \le 50$	Ś
$50 < m \le 60$	14
$60 < m \le 70$	22
$70 < m \le 80$	
$80 < m \le 90$	10

(c) (i) Use the cumulative frequency graph to complete this frequency table.

(ii) Calculate an estimate of the mean mass.

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Answer(c)(ii) kg [4]

[2]

## 7) November 2010 V3

10 (a) For a set of six integers, the mode is 8, the median is 9 and the mean is 10.

The smallest integer is greater than 6 and the largest integer is 16.

Find the two possible sets of six integers.

Answer(a)	First set	 ,	,	 ,	 ,	 ,	
	Second set	,	,	 ,	 ,	 ,	

(b) One day Ahmed sells 160 oranges. He records the mass of each orange. The results are shown in the table.

Mass ( <i>m</i> grams)	$50 < m \le 80$	$80 < m \le 90$	$90 < m \le 100$	$100 < m \le 120$	$120 < m \le 150$
Frequency	30	35	40	40	15

(i) Calculate an estimate of the mean mass of the 160 oranges.

Answer(b)(i)	 g	[4]

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[5]



(ii) On the grid, complete the histogram to show the information in the table.

8 The table below shows the marks scored by a group of students in a test.

Mark	11	12	13	14	15	16	17	18
Frequency	10	8	16	11	7	8	6	9

(a) Find the mean, median and mode.

Answer(a) mean =	
median =	
mode =	[6]

(b) The table below shows the time (t minutes) taken by the students to complete the test.

Time ( <i>t</i> )	$0 < t \le 10$	$10 < t \le 20$	$20 < t \le 30$	$30 < t \le 40$	$40 < t \le 50$	$50 < t \le 60$
Frequency	2	19	16	14	15	9

(i) Cara rearranges this information into a new table.

Complete her table.

Frequency 9	Time ( <i>t</i> )	$0 < t \le 20$	$20 < t \le 40$	$40 < t \le 50$	$50 < t \le 60$
	Frequency				9

[2]

(ii) Cara wants to draw a histogram to show the information in **part (b)(i)**.

Complete the table below to show the interval widths and the frequency densities.

	$0 < t \le 20$	$20 < t \le 40$	$40 < t \le 50$	$50 < t \le 60$
Interval width				10
Frequency density				0.9

[3]

(c) Some of the students were asked how much time they spent revising for the test.

10 students revised for 2.5 hours, 12 students revised for 3 hours and *n* students revised for 4 hours.

The mean time that these students spent revising was 3.1 hours.

Find *n*.

Show all your working.

Answer(c) n =

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6

Time ( <i>t</i> mins)	$0 < t \le 20$	$20 < t \le 35$	$35 < t \le 45$	$45 < t \le 55$	$55 < t \le 70$	$70 < t \le 80$
Frequency	6	15	19	37	53	20

The table shows the times taken, in minutes, by 150 students to complete their homework on one day.

(a) (i) In which interval is the median time?

Answer(a)(i) [1]

(ii) Using the mid-interval values 10, 27.5, ......calculate an estimate of the mean time.

Answer(a)(ii) min [3]

(b) (i) Complete the table of cumulative frequencies.

Time ( <i>t</i> mins)	<i>t</i> ≤ 20	<i>t</i> ≤ 35	<i>t</i> ≤ 45	<i>t</i> ≤ 55	<i>t</i> ≤ 70	<i>t</i> ≤ 80
Cumulative frequency	116/11	21	Ma	ths.co	M	

(ii) On the grid, label the horizontal axis from 0 to 80, using the scale 1 cm represents 5 minutes and the vertical axis from 0 to 150, using the scale 1 cm represents 10 students.

Draw a cumulative frequency diagram to show this information.

[5]



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# 10) June 2011 V3 6 200 180 160 140 120-Cumulative 100 frequency 80. 60 40 20m $\overline{0}$ 2 3 5 6 9 1 4 7 8 10 Mass (kilograms) The masses of 200 parcels are recorded. The results are shown in the cumulative frequency diagram above. (a) Find (i) the median, Answer(a)(i) kg [1] (ii) the lower quartile,

(iii) the inter-quartile range,

Answer(a)(iii) kg [1]

kg [1]

Answer(a)(ii)

(iv) the number of parcels with a mass greater than 3.5 kg.

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Answer(a)(iv) [2]

(b) (i) Use the information from the cumulative frequency diagram to complete the grouped frequency table.

Mass $(m)$ kg	$0 \le m \le 4$	$4 \le m \le 6$	$6 \le m \le 7$	$7 \le m \le 10$
Frequency	36			50

(ii) Use the grouped frequency table to calculate an estimate of the mean.

Answer(b)(ii) kg [4]

(iii) Complete the frequency density table and use it to complete the histogram.



19

[2]

#### 11) November 2011 V1

3 The table shows information about the heights of 120 girls in a swimming club.

Height ( <i>h</i> metres)	Frequency
$1.3 < h \le 1.4$	4
$1.4 < h \le 1.5$	13
$1.5 < h \le 1.6$	33
$1.6 < h \le 1.7$	45
$1.7 < h \le 1.8$	19
$1.8 < h \le 1.9$	6

(a) (i) Write down the modal class.

Answer(a)(i) m[1]

(ii) Calculate an estimate of the mean height. Show all of your working.

Answer(a)(ii) m[4]

- (b) Girls from this swimming club are chosen at random to swim in a race. Calculate the probability that
  - (i) the height of the first girl chosen is more than 1.8 metres,

Answer(b)(i) [1]

(ii) the heights of **both** the first and second girl chosen are 1.8 metres or less.

Answer(b)(ii) [3]

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Height (h metres)	Cumulative frequency
<i>h</i> ≤ 1.3	0
<i>h</i> ≤ 1.4	4
<i>h</i> ≤ 1.5	17
<i>h</i> ≤ 1.6	50
<i>h</i> ≤ 1.7	
$h \leq 1.8$	114
<i>h</i> ≤ 1.9	

[1]

(c) (i) Complete the cumulative frequency table for the heights.

(ii) Draw the cumulative frequency graph on the grid.



#### 12) November 2011 V2

5 (a) The times, *t* seconds, for 200 people to solve a problem are shown in the table.

Time ( <i>t</i> seconds)	Frequency
$0 < t \le 20$	6
$20 < t \le 40$	12
$40 < t \le 50$	20
$50 < t \le 60$	37
$60 < t \le 70$	42
$70 < t \le 80$	50
$80 < t \le 90$	28
$90 < t \le 100$	5

Calculate an estimate of the mean time.

Answer(a) s [4]

(b) (i) Complete the cumulative frequency table for this data.

Time ( <i>t</i> seconds)	$t \leq 20$	$t \le 40$	$t \le 50$	$t \le 60$	$t \le 70$	$t \le 80$	<i>t</i> ≤ 90	<i>t</i> ≤ 100
Cumulative Frequency	6	18	38			167		

[2]

(ii) Draw the cumulative frequency graph on the grid opposite to show this data. [4]

#### (c) Use your cumulative frequency graph to find

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(i) the median time,

Answer(c)(i) s [1]

- (ii) the lower quartile,
- Answer(c)(ii) s [1]

(iii) the inter-quartile range,

Answer(c)(iii) s [1]

(iv) how many people took between 65 and 75 seconds to solve the problem,

Answer(c)(iv) [1]

(v) how many people took longer than 45 seconds to solve the problem.

- $Answer(c)(v) \qquad [2]$
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## 13) November 2011 V3

- Time (t minutes)
    $0 < t \le 2$   $2 < t \le 3$   $3 < t \le 4$   $4 < t \le 8$  

   Frequency
   24
   68
   72
   36
- 7 The times, *t* minutes, taken for 200 students to cycle one kilometre are shown in the table.

(a) Write down the class interval that contains the median.

Answer(a) [1]

(b) Calculate an estimate of the mean. Show all your working.

Answer(b) \_\_\_\_\_ min [4]

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#### (c) (i) Use the information in the table opposite to complete the cumulative frequency table.



(b) Find the number of motorists whose journey took more than 5 hours but no more than 7 hours.

Answer(b) [1]

(c) The frequency table shows some of the information about the 80 journeys.

Time in hours ( <i>t</i> )	$0 < t \le 2$	$2 < t \le 3$	$3 < t \le 4$	$4 < t \le 5$	$5 < t \le 6$	$6 < t \le 8$
Frequency	20	25	18			

- (i) Use the cumulative frequency diagram to complete the table above.
- (ii) Calculate an estimate of the mean number of hours the 80 journeys took.

h [4] Answer(c)(ii)

(d) On the grid, draw a histogram to represent the information in your table in part (c).

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[2]

1

Mathematics mark	30	50	35	25	5	39	48	40	10	15
English mark	26	39	35	28	9	37	45	33	16	12

The table shows the test marks in Mathematics and English for 10 students.

(a) (i) On the grid, complete the scatter diagram to show the Mathematics and English marks for the 10 students. The first four points have been plotted for you.



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4 (a) In a football league a team is given 3 points for a win, 1 point for a draw and 0 points for a loss.

The table shows the 20 results for Athletico Cambridge.

Points	3	1	0
Frequency	10	3	7

(i) Find the median and the mode.

Answer(a)(i) Median =

Mode = [3]

(ii) Thomas wants to draw a pie chart using the information in the table.

Calculate the angle of the sector which shows the number of times Athletico Cambridge were given 1 point.

Answer(a)(ii) [2]

(b) Athletico Cambridge has 20 players.

The table shows information about the heights (*h* centimetres) of the players.

Height (h cm)	$170 < h \le 180$	$180 < h \le 190$	$190 < h \le 200$
Frequency	5	12	3

Calculate an estimate of the mean height of the players.

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*Answer(b)* ..... cm [4]

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The pie charts show information on the grades achieved in mathematics by the girls and boys at a school.

(a) For the Girls' pie chart, calculate

(i) *x*,

(ii) the angle for grades *B*, *C* or *D*.

#### Answer(a)(ii) [1]

Answer(a)(i) x =

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(b) Calculate the percentage of the **Boys** who achieved grades E, F or G.

Answer(b) % [2]

(c) There were 140 girls and 180 boys.

(i) Calculate the percentage of students (girls and boys) who achieved grades A or  $A^*$ .

*Answer(c)*(i) % [3]

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[2]

(ii) How many more boys than girls achieved grades B, C or D?

Answer(c)(ii) [2]

(d) The table shows information about the times, t minutes, taken by 80 of the girls to complete their mathematics examination.

Time taken ( <i>t</i> minutes)	$40 < t \le 60$	$60 < t \le 80$	$80 < t \le 120$	$120 < t \le 150$
Frequency	5	14	29	32

(i) Calculate an estimate of the mean time taken by these 80 girls to complete the examination.

Answer(d)(i) min [4]

(ii) On a histogram, the height of the column for the interval  $60 < t \le 80$  is 2.8 cm.

Calculate the heights of the other three columns. **Do not draw the histogram.** 

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Answer(d) (11)	$40 < t \le 60$ column height =	 cm
:	$80 < t \le 120$ column height =	 cm

1 . 1

 $120 < t \le 150$  column height = \_\_\_\_\_ cm [4]

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#### 18) November 2012 V2

5 (a) A farmer takes a sample of 158 potatoes from his crop. He records the mass of each potato and the results are shown in the table.

Mass ( <i>m</i> grams)	Frequency
$0 < m \leq 40$	6
$40 < m \le 80$	10
$80 \le m \le 120$	28
$120 < m \le 160$	76
$160 < m \le 200$	22
$200 < m \le 240$	16

Calculate an estimate of the mean mass. Show all your working.

Answer(a) \_\_\_\_\_ g [4]

(b) A new frequency table is made from the results shown in the table in part (a).

	Mass ( <i>m</i> grams)	Frequency	
l	$0 < m \le 80$	Maths.	.00
	$80 \le m \le 200$		
	$200 < m \le 240$	16	

(i) Complete the table above.

(ii) On the grid opposite, complete the histogram to show the information in this new table.

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[2]



The farmer puts 3 potatoes which have a mean mass of 130 g into the bag.

Calculate the mean mass of all the potatoes in the bag.

Answer(c)		g	[3]	
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# 19) November 2012 V3

**9** 200 students take a Mathematics examination. The cumulative frequency diagram shows information about the times taken, *t* minutes, to complete the examination.



(a) Find

(i) the median,

(ii) the lower quartile, *Answer(a)*(ii) ..... min [1]
(iii) the inter-quartile range, *Answer(a)*(iii) .... min [1]
(iv) the number of students who took more than 1 hour.

(b) (i) Use the cumulative frequency diagram to complete the grouped frequency table.

Time, <i>t</i> minutes	$30 < t \le 40$	$40 < t \le 50$	$50 < t \le 60$	$60 < t \le 70$	$70 < t \le 80$	$80 < t \le 90$
Frequency	9		16	28	108	28

(ii) Calculate an estimate of the mean time taken by the 200 students to complete the examination.Show all your working.

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Answer(b)(ii) min [4]

Answer(a)(i) min [1]

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35

[1]




#### (a) Find

	the median,						
				Answer(a)(	i)		g [1
( <b>ii</b> )	the upper qu	artile,					
				Answer(a)(i	i)		.g[1
(iii)	the 80th per	centile,					
				Answer(a)(ii	i)		g [1
(iv)	the number	of students wh	ose estimate is	7 g or less.			
				Answer(a)(iv	v)		[1
) (i)	Use the cum	ulative freque	ncy diagram to	o complete the	frequency tab	le.	
) (i) Mas	Use the cum s ( <i>m</i> grams)	The function of the function	ncy diagram to $2 < m \le 4$	complete the $4 < m \le 6$	frequency tab $6 < m \le 8$	le. $8 < m \le 10$	

The probability that the student estimates that the mass is greater than *M* grams is 0.3.

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Find the value of *M*.

 $Answer(b)(ii) M = \dots [2]$ 

## 21) June 2013 V1

5

Height ( <i>h</i> cm)	$150 < h \le 160$	$160 < h \le 165$	$165 < h \le 180$	$180 < h \le 190$
Frequency	5	9	18	10

The table shows information about the heights of a group of 42 students.

(a) Using mid-interval values, calculate an estimate of the mean height of the students. Show your working.



## 22) June 2013 V3

**9** Sam asked 80 people how many minutes their journey to work took on one day. The cumulative frequency diagram shows the times taken (*m* minutes).



(b) One of the 80 people is chosen at random.

1

0

10

Find the probability that their journey to work took more than 35 minutes. Give your answer as a fraction.

(c) Use the cumulative frequency diagram to complete this frequency table.

Time ( <i>m</i> minutes)	$0 < m \le 10$	$10 < m \le 15$	$15 < m \le 30$	$30 < m \le 40$	$40 < m \le 50$
Frequency	30	12	18		
				NIIIII IX	

(d) Using mid-interval values, calculate an estimate of the mean journey time for the 80 people.

- Answer(d) ..... min [3]
- (e) Use the table in **part** (c) to complete the histogram to show the times taken by the 80 people. One column has already been completed for you.

4 3 Frequency density
2 2

<u>2</u>0

Time (minutes)

40

30

[5]

40

m

50

## 23) November 2013 V1

7 120 students are asked to answer a question.The time, *t* seconds, taken by each student to answer the question is measured.The frequency table shows the results.

Time	$0 < t \le 10$	$10 < t \le 20$	$20 < t \le 30$	$30 < t \le 40$	$40 < t \le 50$	$50 < t \le 60$
Frequency	6	44	40	14	10	6

(a) Calculate an estimate of the mean time.

Answer(a) ..... s [4]

(b) (i) Complete the cumulative frequency table.

Time	$t \le 10$	$t \le 20$	$t \le 30$	$t \le 40$	$t \le 50$	$t \le 60$
Cumulative frequency	6			104		120

[2]

(ii) On the grid below, draw a cumulative frequency diagram to show this information.



(iii) Use your cumulative frequency diagram to find the median, the lower quartile and the 60th percentile.

Answer(b)(iii)	Median	 S	
	Lower quartile	s	
	60th percentile	s	[4]

- (c) The intervals for the times taken are changed.
  - (i) Use the information in the **frequency table** on the opposite page to complete this new table.

Time	$0 < t \le 20$	$20 < t \le 30$	$30 < t \le 60$
Frequency		40	

(ii) On the grid below, complete the histogram to show the information in the new table. One column has already been drawn for you.



[2]

## 24) November 2013 V3

5 (a) 80 students were asked how much time they spent on the internet in one day. This table shows the results.

Time ( <i>t</i> hours)	$0 < t \le 1$	$1 < t \le 2$	$2 < t \leq 3$	$3 < t \le 5$	$5 < t \le 7$	$7 < t \le 10$
Number of students	15	11	10	19	13	12

(i) Calculate an estimate of the mean time spent on the internet by the 80 students.





(iii) the 70th percentile.

*Answer*(*a*)(iii) ..... min [2]

(b) The times taken by the 80 people are shown in this grouped frequency table.

Time ( <i>t</i> minutes)	$0 < t \le 20$	$20 < t \le 30$	$30 < t \le 45$	$45 < t \le 50$
Frequency	12	21	33	14

(i) Calculate an estimate of the mean time.

Answer(b)(i) ..... min [4]

(ii) Draw a histogram to represent the grouped frequency table.





The histogram shows some information about the masses (*m* grams) of 39 apples.

(i) Show that there are 12 apples in the interval  $70 < m \le 100$ .

Answer(a)(i)

(ii) Calculate an estimate of the mean mass of the 39 apples.

Answer(a)(ii) ..... g [5]

[1]

(b) The mean mass of 20 oranges is 70 g. One orange is eaten. The mean mass of the remaining oranges is 70.5 g.

Find the mass of the orange that was eaten.

*Answer(b)* ..... g [3]

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*Answer*(*b*) \$ ..... [4]

## 28) November 2014 V1

6 A company tested 200 light bulbs to find the lifetime, *T* hours, of each bulb. The results are shown in the table.

Lifetime ( <i>T</i> hours)	Number of bulbs
$0 < T \le 1000$	10
$1000 < T \le 1500$	30
$1500 < T \le 2000$	55
$2000 < T \le 2500$	72
$2500 < T \le 3500$	33

(a) Calculate an estimate of the mean lifetime for the 200 light bulbs.

Answer(a) ..... hours [4]

(b) (i) Complete the cumulative frequency table.

Lifetime ( <i>T</i> hours)	$T \leq 1000$	$T \le 1500$	$T \leq 2000$	$T \leq 2500$	$T \leq 3500$
Number of bulbs					

[2]



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## 29) November 2014 V2

Time ( <i>t</i> seconds)	$20 < t \le 25$	$25 < t \le 30$	$30 < t \leq 35$	$35 < t \le 40$	$40 < t \le 45$	$45 < t \le 50$
Frequency	2	6	7	19	9	7

3 The time, *t* seconds, taken for each of 50 chefs to cook an omelette is recorded.

(a) Write down the modal time interval.

- Answer(a) ...... s [1]
- (b) Calculate an estimate of the mean time. Show all your working.

Answer(b) ..... s [4]

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#### (c) A new frequency table is made from the results shown in the table opposite.

#### 30) November 2014 V3

9 (a) Ricardo asks some motorists how many litres of fuel they use in one day. The numbers of litres, correct to the nearest litre, are shown in the table.

Number of litres	16	17	18	19	20
Number of motorists	11	10	р	4	8

(i) For this table, the mean number of litres is 17.7.

Calculate the value of *p*.

 $Answer(a)(i) p = \dots$ [4]

(ii) Find the median number of litres.

Answer(a)(ii) ..... litres [1]

- (b) Manuel completed a journey of 320 km in his car. The fuel for the journey cost \$1.28 for every 6.4 km travelled.
  - (i) Calculate the cost of fuel for this journey.
- *Answer*(*b*)(i) \$.....[2]
- (ii) When Manuel travelled 480 km in his car it used 60 litres of fuel. Manuel's car used fuel at the same rate for the journey of 320 km.

Calculate the number of litres of fuel the car used for the journey of 320 km.

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#### Answer(b)(ii) ..... litres [2]

(iii) Calculate the cost per litre of fuel used for the journey of 320 km.

*Answer*(*b*)(iii) \$..... [2]

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(c) Ellie drives a car at a constant speed of 30 m/s correct to the nearest 5 m/s. She maintains this speed for 5 minutes correct to the nearest 10 seconds.

Calculate the upper bound of the distance in **kilometres** that Ellie could have travelled.



## 31) June 2015 V1

Time taken ( <i>t</i> mins)	$0 < t \le 10$	$10 < t \le 24$	$24 < t \le 30$	$30 < t \le 40$	$40 < t \le 60$	$60 < t \le 70$
Frequency	10	90	135	85	70	10

6 The table shows the time, *t* minutes, that 400 people take to complete a test.

(a) (i) Write down the modal time interval.

*Answer(a)*(i) ..... min [1]

(ii) Calculate an estimate of the mean time taken to complete the test.

*Answer(a)*(ii) ..... min [4]

(b) (i) Complete the table of cumulative frequencies.

Time taken ( <i>t</i> mins)	<i>t</i> ≤ 10	<i>t</i> ≤ 24	$t \leq 30$	$t \leq 40$	$t \le 60$	<i>t</i> ≤ 70	
Cumulative frequency	10	100				400	
			•				[2]

(ii) On the grid opposite, draw a cumulative frequency diagram to show this information.



## 32) June 2015 V2

7 (a) A group of 50 students estimated the mass, *M* grams, of sweets in a jar. The results are shown in the table.

Mass (M grams)	Number of students		
$0 < M \le 200$	5		
$200 < M \le 300$	9		
$300 < M \le 350$	18		
$350 < M \le 400$	12		
$400 < M \le 500$	6		

(i) Calculate an estimate of the mean.







(b) A group of 50 adults also estimated the mass, M grams, of the sweets in the jar. The histogram below shows information about their estimates.

Use the histograms to make two comparisons between the distributions of the estimates of the students and the adults.



## 33) June 2015 V3

4 The table shows the times, *t* minutes, taken by 200 students to complete an IGCSE paper.

Time ( <i>t</i> minutes)	$40 < t \le 60$	$60 < t \le 70$	$70 < t \le 75$	$75 < t \le 90$
Frequency	10	50	80	60

(a) By using mid-interval values, calculate an estimate of the mean time.



November 2015 V1
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- 6 120 students take a mathematics examination.
  - (a) The time taken, *m* minutes, for each student to answer question 1 is shown in this table.

Time ( <i>m</i> minutes)	$0 < m \leq 1$	$1 < m \leq 2$	$2 < m \leq 3$	$3 < m \leq 4$	$4 < m \leq 5$	$5 < m \leq 6$
Frequency	72	21	9	11	5	2

Calculate an estimate of the mean time taken.

(b) (i) Using the table in part (a), complete this cumulative frequency table.

Time ( <i>m</i> minutes)	$m \leq 1$	$m \leq 2$	<i>m</i> ≤ 3	$m \leq 4$	$m \leq 5$	$m \leq 6$
Cumulative frequency	72					120

[2]

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[4]

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- (iii) Use your cumulative frequency diagram to find
  - (a) the median,
    Answer(b)(iii)(a) ......min [1]
    (b) the inter-quartile range,
    Answer(b)(iii)(b) ......min [2]
    - (c) the 35th percentile.

Answer(b)(iii)(c) ..... min [2]

(c) A new frequency table is made from the table shown in part (a).

Time ( <i>m</i> minutes)	$0 < m \leq 1$	$1 < m \leq 3$	$3 < m \leq 6$
Frequency	72		

 $\bigcap \bigcap \bigcap i i$ 

- (i) Complete the table above.
- (ii) A histogram was drawn and the height of the first block representing the time  $0 \le m \le 1$  was 3.6 cm. Calculate the heights of the other two blocks.

		<i>Answer(c)</i> (ii) cm and	cm [3]
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[4]

[2]

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## 35) November 2015 V2

3 Leo measured the rainfall each day, in millimetres, for 120 days. The cumulative frequency table shows the results.

Rainfall (r mm)	$r \le 20$	<i>r</i> ≤ 25	<i>r</i> ≤ 35	$r \le 40$	$r \le 60$	<i>r</i> ≤ 70
Cumulative frequency	5	13	72	90	117	120

(a) On the grid below, draw a cumulative frequency diagram to show these results.



(c) Use the information in the cumulative frequency table to complete the frequency table below.

Rainfall (r mm)	$0 < r \le 20$	$20 < r \le 25$	$25 < r \le 35$	$35 < r \le 40$	$40 < r \le 60$	$60 < r \le 70$
Frequency	5		59			3

[2]

(d) Use your frequency table to calculate an estimate of the mean. You must show all your working.

(e) In a histogram drawn to show the information in the table in part (c), the frequency density for the interval  $25 < r \le 35$  is 5.9.

Calculate the frequency density for the intervals  $20 < r \le 25$ ,  $40 < r \le 60$  and  $60 < r \le 70$ .

www.Q8Maths.com Answer(e)  $20 < r \le 25$  ....  $40 < r \le 60$ www.Q8M aths.com 63

## 36) November 2015 V3

6 The table shows information about the masses, *m* grams, of 160 apples.

Mass ( <i>m</i> grams)	$30 < m \le 80$	$80 < m \le 100$	$100 < m \le 120$	$120 < m \le 200$
Frequency	50	30	40	40

(a) Calculate an estimate of the mean.



(b) On the grid, complete the histogram to show the information in the frequency table.



(c) An apple is chosen at random from the 160 apples.

Find the probability that its mass is more than 120 g.

(d) Two apples are chosen at random from the 160 apples, without replacement.

Find the probability that

(i) they both have a mass of more than 120 g,

*Answer(d)*(i) ......[2]

(ii) one has a mass of more than 120 g and one has a mass of 80 g or less.

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# 37) March 2015 V2

9 The table shows the height, hcm, of 40 children in a class.

			Height (cm)			
	120	130 14	40 150	160	170	
	0.5					
		<u>e. ( 22</u> 22				
density	1	×				
Frequency						
	1.5					
	2					
(c) Complete	e the histogram.					
			Answei	(0)	21	
					<u>Î</u>	
b) Calculate	e an estimate of th	e mean height.				
		Answe	er(a)	< <i>h</i> ≤		
a) Write do	wn the class interv	al containing the n	nedian.			
equency	3	14	4	6	13	
						/0



Time taken ( <i>t</i> minutes)	$0 < t \le 40$	$40 < t \le 60$	$60 < t \le 70$	$70 < t \le 80$	$80 < t \le 90$	$90 < t \le 100$
Frequency	8				4	
						[

(b) Use the cumulative frequency diagram to complete the frequency table below.

(c) On the grid below, complete the histogram to show the information in the table in part (b).





June 2	2016	V3					
4 ( ]	Coins The p	are put into a mach robability that the m	ine to pay for par nachine rejects a o	king cars.			
(	( <b>a</b> ) <i>A</i>	Adhira puts 2 coins i	into the machine.				
		(i) Calculate the pr	robability that the	e machine rejects	both coins.		
	6	i) Calculate the p	robability that the	machine accent	s at least one coi	n	[2]
	()						
					·		
(	<b>b</b> ) I	Raj puts 4 coins into	the machine.				
		Calculate the probab	oility that the mac	hine rejects exac	tly one coin.		
							[3]
(	(c) [	The table shows the	amount of mone	y, \$ <i>a</i> , received fo	r parking each da	ay for 200 days.	
(			250 < a < 200	$300 \le a \le 350$	$350 \le a \le 400$	$400 \le a \le 450$	150 < a < 500
Amour	nt (\$ <i>a</i>	) $ 200 < a \le 250$	$230 < a \leq 300$	500 < u < 550	550 × u × 100	100 44 4 100	$430 < u \leq 300$

Calculate an estimate of the mean amount of money received each day.

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(b) The 200 students also estimate the total area,  $A m^2$ , of the windows in the classroom. The results are shown in the table.

Area (A m <sup>2</sup> )	$20 < A \le 60$	$60 < A \le 100$	$100 < A \le 150$	$150 < A \le 250$
Frequency	32	64	80	24

#### (i) Calculate an estimate of the mean. Show all your working.



(iii) Two of the 200 students are chosen at random.

Find the probability that they both estimate that the area is greater than  $100 \text{ m}^2$ .
41) June 2017 V1

2 The time taken for each of 90 cars to complete one lap of a race track is shown in the table.

Time ( <i>t</i> seconds)	$70 < t \le 71$	$71 < t \le 72$	$72 < t \le 73$	$73 < t \le 74$	$74 < t \leqslant 75$
Frequency	17	24	21	18	10

- (a) Write down the modal time interval.
- (b) Calculate an estimate of the mean time.

(c) (i) Complete the cumulative frequency table.

Time ( <i>t</i> seconds)	<i>t</i> ≤ 71	<i>t</i> ≤ 72	<i>t</i> ≤ 73	<i>t</i> ≤ 74	<i>t</i> ≤ 75
Cumulative frequency	17		an Contr		

[2]

..... s [4]

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..... km/h [4]

5 The histogram shows the distribution of the masses, *m* grams, of 360 apples.



(a) Use the histogram to complete the frequency table.

Mass ( <i>m</i> grams)	Number of apples
$140 < m \le 170$	
$170 < m \le 180$	2
$180 < m \le 190$	5
$190 < m \le 210$	92
$210 < m \le 240$	42

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[3]





42) June 2018 V2

2 The time taken for each of 120 students to complete a cooking challenge is shown in the table.

Time ( <i>t</i> minutes)	$20 < t \le 25$	$25 < t \le 30$	$30 < t \le 35$	$35 < t \le 40$	$40 < t \le 45$
Frequency	44	32	28	12	4

(a) (i) Write down the modal time interval.

 $\dots \dots < t \leq \dots \dots [1]$ 

 $\ldots < t \leq \ldots$ [1]

..... min [4]

.....[1]

[2]

- (ii) Write down the interval containing the median time.
- (iii) Calculate an estimate of the mean time.

(iv) A student is chosen at random.

Find the probability that this student takes more than 40 minutes.

(b) (i) Complete the cumulative frequency table.

Time ( <i>t</i> minutes)	<i>t</i> ≤ 20	<i>t</i> ≤ 25	<i>t</i> ≤ 30	<i>t</i> ≤ 35	<i>t</i> ≤ 40	<i>t</i> ≤ 45
Cumulative frequency	0	44				

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.....[2]

## 43) June 2019 V1

- (a) The test scores of 14 students are shown below. 4
  - 21 21 23 26 25 21 22 20 21 23 23 21 27 24

Range =

Mode = .....

(i) Find the range, mode, median and mean of the test scores.

Median = A student is chosen at random. **(ii)** Find the probability that this student has a test score of more than 24.

(b) Petra records the score in each test she takes.

The mean of the first *n* scores is *x*. The mean of the first (n-1) scores is (x + 1).

Find the *n*th score in terms of *n* and *x*. Give your answer in its simplest form.

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......[3]

[1]

(c) During one year the midday temperatures,  $t^{\circ}$ C, in Zedford were recorded. The table shows the results.

Temperature ( $t^{\circ}$ C)	$0 < t \le 10$	$10 < t \le 15$	$15 < t \le 20$	$20 < t \le 25$	$25 < t \le 35$
Number of days	50	85	100	120	10

(i) Calculate an estimate of the mean.



## 44) June 2020 V2

**3** The speed, v km/h, of each of 200 cars passing a building is measured. The table shows the results.

Speed (v km/h)	$0 < v \leq 20$	$20 < v \leq 40$	$40 < v \le 45$	$45 < v \le 50$	$50 < v \le 60$	$60 < v \le 80$
Frequency	16	34	62	58	26	4

(a) Calculate an estimate of the mean.

- (b) (i) Use the frequency table to complete the cumulative frequency table.

Speed (vkm/h)	$v \leq 20$	$v \leq 40$	$v \leq 45$	$v \leq 50$	$v \le 60$	$v \leq 80$
Cumulative frequency	16	50	at the second		196	200





(a) th	e upper quartile,				
					km/h [1
<b>(b)</b> th	e number of cars wi	ith a speed gre	eater than 35 ki	n/h.	
		92			[2
e) Two of the 2	200 cars are chosen	at random.			
Find the pro	bability that they be	oth have a spe	ed greater that	n 50 km/h.	
					[
I) A new frequ	ency table is made	by combining	; intervals.		
	Speed (vkm/h)	$0 < v \leq 40$	$40 < v \le 50$	$50 < v \le 80$	
	Frequency	50	120	30	
On the grid	, draw a histogram t	to show the in	formation in th	is table.	
	15				
	15				
	15-				
Frequency	15-				
Frequency density	15-				
Frequency density	15- 10- 5-				
Frequency density	15-				
Frequency density	15- 10- 5- 0				
Frequency density		30 40 Speed (km	50 60 7		
Frequency density		30 40 Speed (km/	50 60 7 /h)		[
Frequency density		30 40 Speed (km.	50 60 7 /h)		[:
Frequency density		30 40 Speed (km.	50 60 7 /h)		[



The box-and-whisker plots show the times spent exercising in one week by a group of women and a group of men.

Below are two statements comparing these times.

For each one, write down whether you agree or disagree, giving a reason for your answer.

On average, the women spent less time exercising	
than the men.	
The times for the women show less variation than the times for the men.	

(b) The frequency table shows the times, *t* minutes, each of 100 children spent exercising in one week.

Time ( <i>t</i> minutes)	$0 < t \le 60$	$60 < t \le 100$	$100 < t \le 160$	$160 < t \le 220$	$220 < t \le 320$
Frequency	41	24	23	8	4

(i) Calculate an estimate of the mean time.

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