

FREQUENCY TABLES

DATE OF SOLUTIONS: 15/05/2018
MAXIMUM MARK: 66

SOLUTIONS

GCSE (+ IGCSE) EXAM QUESTION PRACTICE

1. [Edexcel, 2013]

Frequency Distributions (Totals and Averages) [3 Marks]

The table shows information about the mark scored on an examination question by each of 40 students.

Mark (x)	Number of students (f)	$x \times f$
0	13	0
1	2	2
2	3	6
3	8	24
4	14	56

$$\text{TOTAL} = \underline{\underline{88}} \quad (M1)$$

Work out the mean mark.

$$\text{MEAN} = \frac{\text{TOTAL MARKS}}{\text{TOTAL NO. OF STUDENTS}}$$

$$= \frac{88}{40}$$
$$= \underline{\underline{2.2}} \quad (A1)$$

Becky counted the number of matches in each of 50 boxes.
The table shows information about her results.

NOTE THE 50 BOXES

Number of matches	Frequency	Σcf
45	3	135
46	7	322
47	12	564
48	23	1104
49	4	196
50	1	50

(M)

Work out the mean number of matches.

$$\Sigma f = 50 \quad \Sigma = 2371$$

$$\text{MEAN} = \frac{\text{TOTAL NUMBER OF MATCHES}}{\text{NUMBER OF BOXES}}$$

$$= \frac{2371}{50} \quad \text{(M)}$$

$$= \underline{\underline{47.42}} \quad \text{(A)}$$

The table shows information about the numbers of goals scored by some football teams last week.

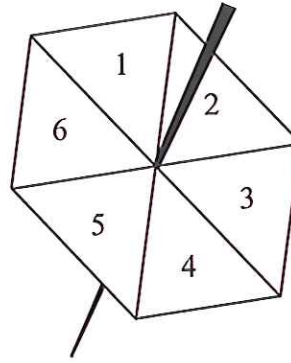
Number of goals	Number of teams	$x \times f$
0	5	0
1	8	8
2	2	4
3	3	9
4	2	8

(m)

Work out the total number of goals scored by these football teams last week.

\rightarrow TOTAL
 $= 29$ *(A)*

Becky has a biased 6-sided spinner.
She spins the spinner 25 times.
She records the score for each spin.
The table shows information about her scores.



Score	Frequency
1	9
2	6
3	3
4	2
5	1
6	4

(a) Find her median score.

$$\frac{25+1}{2} = 13^{\text{TH}} \text{ VALUE}$$

(M1)

2 (A1)

(2)

(b) Work out her mean score.

$$\frac{1 \times 9 + 2 \times 6 + \dots + 6 \times 4}{25}$$

$$= \frac{9 + 12 + 9 + 8 + 5 + 24}{25}$$

$$= \frac{67}{25}$$

$$= \underline{\underline{2.68}}$$

(M1) [EITHER]

(M1) [DIVIDE BY 25]

(A1)

The table gives information about the shoe sizes of 67 people.

Shoe size	6	7	8	9	10
Number of people	20	19	0	26	2

Find the median shoe size.

C.f. 20 | 39

$$\begin{aligned}
 \text{MEDIAN} &= \frac{67+1}{2} \\
 &= 34^{\text{th}} \text{ VALUE (M)} \\
 &= \underline{\underline{7}} \text{ (A)}
 \end{aligned}$$

↑
IN
HERE

The table shows information about the amount of money, in dollars, spent in a shop in one day by 80 people.

MID POINT	Money spent (x dollars)	Frequency	xf
10	$0 < x \leq 20$	24	$10 \times 24 = 240$
30	$20 < x \leq 40$	20	600
50	$40 < x \leq 60$	9	450
70	$60 < x \leq 80$	12	840
90	$80 < x \leq 100$	15	1350

Work out an estimate for the total amount of money spent in the shop that day.

$$\text{TOTAL} = 240 + 600 + \dots + 1350$$

$$= \underline{\underline{3480}}$$

$$3480 \text{ dollars}$$

A school has 60 teachers.

The table shows information about the distances, in km, the teachers travel to school each day.

Distance (d km)	Frequency
$0 < d \leq 5$	12
$5 < d \leq 10$	6
$10 < d \leq 15$	4
$15 < d \leq 20$	6
$20 < d \leq 25$	14
$25 < d \leq 30$	18

MIDPOINT	Σxf
2.5	30
7.5	45
12.5	50
17.5	105
22.5	315
27.5	495

(a) Write down the modal class.

(mi)

$$\underline{25 < d \leq 30} \quad \text{(AI)}$$

(1)

(b) Work out an estimate for the total distance travelled to school by the 60 teachers each day.

$$30 + 45 + 50 + \dots + 495$$

$$\underline{1040} \quad \text{(AI)} \quad \text{km}$$

(3)

Mr Rowland has a class of 30 students.

He gave them 24 words to spell.

The table shows information about the number of correct spellings for each student.

Number of correct spellings	Frequency	MID VALUE (x)	$f \times x$
0 - 4	1	2	2
5 - 9	5	7	35
10 - 14	6	12	72
15 - 19	10	17	170
20 - 24	8	22	176
TOTAL			455

(a) Write down the modal class.

15 - 19

(1)

(b) Work out an estimate for the mean number of correct spellings.

Give your answer to 1 decimal place.

$$\text{MEAN} = \frac{\text{TOTAL NUMBER CORRECT}}{\text{NO. OF STUDENTS}}$$

$$= \frac{2 + 35 + 72 + 170 + 176}{30}$$

$$= \frac{455}{30}$$

$$= 15.1666\dots$$

15.2

(4)

Kim asked 40 people how many text messages they each sent on Monday.
The table shows her results.

MID-VALUE	Number of text messages sent	Frequency	fx Mid-val.
2	0 to 4	6	12
7	5 to 9	3	21
12	10 to 14	5	60
17	15 to 19	12	204
22	20 to 24	14	308
TOTAL			605

(a) Write down the modal class.

(M) [USING MIDPOINTS]

20 to 24 (B)

(1)

(b) Calculate an estimate for the mean number of text messages sent.

$$\text{MEAN} = \frac{\text{TOTAL TEXTS}}{\text{NO. PEOPLE}}$$

$$= \frac{605}{40} \quad \text{(M) [CORRECT DIVISION]}$$

15.125 (A)

(4)

(c) What percentage of these 40 people sent 20 or more text messages?

$$\frac{14}{40} \times 100 \quad \text{(M)}$$

35 (A) %

(2)

The table shows information about the numbers of text messages sent by 40 teenagers in one day.

Number of text messages	Number of teenagers (f)	Mid-interval value (x)	$f \times x$
0 to 2	3	1	3
3 to 5	6	4	24
6 to 8	10	7	70
9 to 11	15	10	150
12 to 14	5	13	65
15 to 17	1	16	16

(a) Write down the modal class.

total = 328 ← (B1)

9 to 11 (A1)
(1)

(b) (i) Work out an estimate for the mean number of texts sent by the 40 teenagers in one day.

(M1) $\frac{328}{40} = \underline{\underline{8.2}}$

8.2 (A1)

(ii) Explain why your answer to part (b)(i) is an estimate.

THE MID-INTERVAL VALUE WAS USED BECAUSE
THE EXACT VALUES WERE NOT KNOWN. (A1)

The table shows information about the time, in minutes, spent on homework by each of 32 pupils in one night.

MIDPOINT \bar{x}	Time (t minutes)	Number of pupils f	$f \times \bar{x}$
10	$0 < t \leq 20$	7	70
30	$20 < t \leq 40$	16	480
50	$40 < t \leq 60$	3	150
70	$60 < t \leq 80$	6	420
TOTAL			1120

- (a) Calculate the percentage of the 32 pupils who spent more than 60 minutes on their homework.

$$\frac{6}{32} \times 100$$

$$\frac{18.75}{(2)} \%$$

- (b) Calculate an estimate for the total time spent on homework by the 32 pupils.

WORKING OUT IS
SHOWN IN TABLE ABOVE!

$$\frac{1120}{(3)} \text{ minutes}$$

The table shows information about the number of bananas the students in class 1B ate in one week.

Number of bananas x	Frequency f	xf
0	1	0
1	6	6
2	5	10
3	2	6
4	7	28
5	4	20
		70

(mi)

(a) Find the mean number of bananas.

TOTAL

$$\text{MEAN} = \frac{\text{TOTAL BANANAS}}{\text{NO. OF STUDENTS}}$$

$$= \frac{70}{25} \quad \text{(mi) [DIVIDE]} \quad \dots \dots \dots \frac{2.8}{(3)} \quad \text{(A)}$$

There are 575 students in the school.

The numbers of bananas eaten by students in class 1B are typical of the numbers eaten by students in the whole school.

(b) Work out an estimate for the number of students in the whole school who will eat exactly one banana next week.

$$\frac{6}{25} \times 575 \quad \text{(mi)} \quad \dots \dots \dots \frac{138}{(3)} \quad \text{(A)}$$

The table shows information about the ages of 24 students.

Age (years)	Number of students
16	9
17	3
18	8
19	4

$x \times f$
144
51
144
76
<u>415</u>

(a) (i) Write down the mode of these ages.

..... 16 years (A1)

(ii) Find the median of these ages.

$$\frac{24+1}{2} = 12.5\text{TH VALUE}$$

..... 17.5 years (A1)

(iii) Calculate the mean of these ages.

$$\text{MEAN} = \frac{\text{TO OF AGES}}{\text{NO OF STUDENTS}}$$

$$= \frac{415}{24} \text{ (M)}$$

$$= 17.2916$$

..... 17.3 years (A1)
(6)

Another student, aged 18, joins the group.

(b) (i) Without calculating the new mean, state whether the mean will increase or decrease or stay the same.

CAN ONLY GET THIS IF \rightarrow INCREASE (A1)
ANSWER TO (ii) IS REASONABLE

(ii) Give a reason for your answer to (i).

..... BECAUSE THE NEW STUDENT'S AGE
..... IS HIGHER THAN THE MEAN. (A1)

(2)

There are four grades of egg.

The table shows how many eggs of each grade were laid by a hen last year.

Grade	Number of eggs	PROBABILITIES
Extra large	55	0.36
Large	48	0.32
Medium	35	0.23
Small	12	0.08
TOTAL		150

- (a) In the first four months of this year, the hen laid 60 eggs.

Work out an estimate for the number of Extra large eggs the hen laid in these four months.

$$\frac{0.36}{(mi)} \times \frac{60}{(mi)}$$

$$\begin{array}{r} 22 \\ \hline \end{array} \quad (AI)$$

(3)

- (b) The table below shows how the grade of an egg is related to its weight.

Grade	Weight (w grams)	MID-VALUE
Extra large	$w \geq 73$	
Large	$63 \leq w < 73$	68
Medium	$53 \leq w < 63$	58
Small	$w < 53$	

Work out an estimate for the total weight of 48 Large eggs and 35 Medium eggs.

$$48 \times 68 + 35 \times 58 \quad (mi)$$

$$\begin{array}{r} 5294 \\ \hline \end{array} \quad (AI)$$

g
(3)

- (c) Jody wants to use the information in the table to work out an estimate for the total weight of all the eggs laid by the hen last year.

Explain why it is difficult to do this.

BECAUSE YOU CAN'T ESTIMATE THE
AVERAGE WEIGHT OF EXTRA LARGE (1)
OR SMALL EGGS. (AI)

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Sometimes a method used in these solutions might be unfamiliar to You. If You are able to use a different method to obtain the correct answer then You should consider to keep using your existing method and not change to the method that is used here. However, the choice of method is always up to You and it is often useful if You know more than one method to solve a particular type of problem.

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B1 - This is an unconditional accuracy mark (the specific number, word or phrase must be seen. This type of mark cannot be given as a result of ‘follow through’).

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A1 - These are accuracy marks. Accuracy marks are typically awarded after method marks. If the correct answer is obtained, then You should normally (but not always) expect to be awarded all of the method marks (provided that You have shown a method) and all of the accuracy marks.

Note that some questions contain the words ‘show that’, ‘show your working out’, or similar. These questions require working out to be shown. Failure to show sufficient working out is likely to result in no marks being awarded, even if the final answer is correct.

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