



eClassroom

GCSE MATHEMATICS • DATA & STATISTICS

Frequency Tables

Worksheet

Pearson Edexcel GCSE (1MA1) & International GCSE (4MA1) • Calculator allowed

Free Frequency Tables worksheet for GCSE and iGCSE Maths, with full worked solutions



Tap a section to jump straight to it

By the end of this worksheet you can: make a frequency table from a list • find the mode, median, mean and range from a frequency table • find the modal class and the class containing the median • estimate the mean of grouped data using midpoints • *Higher:* quartiles from a table, estimating within a class, and missing frequencies.

Which questions are for me?

FOUNDATION Everyone starts here. These skills appear on both tiers.

HIGHER Higher only: quartiles and the interquartile range from a frequency table, plus estimating within a class and missing frequencies. Grades 6 to 9.

Every section has both, clearly labelled. Questions get harder as you go, and every skill in Sections A to D is needed in Section E.

Track your progress

Section	B	C	D	E
Foundation marks	23	10	13	15
Higher marks	16	14	17	15
My score				

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A

Worked examples & Your turn

Read each example carefully. Cover it up, then answer the question beside it using the same method.

FOUNDATION

Everyone starts here

Worked example A1

Find the mean number of pets.

Pets	0	1	2	3
Frequency	6	9	4	1

Total pets = $\Sigma fx = 0 + 9 + 8 + 3 = 20$. Total people = $\Sigma f = 20$

$$20 \div 20 = 1$$

Your turn A1

Find the mean number of siblings.

Siblings	0	1	2	3	4
Frequency	3	8	6	2	1

Worked example A2

Find the median shoe size.

Size	4	5	6	7	8
Frequency	3	7	9	4	2

25 people: the median is the 13th. Running totals: 3, 10, 19. The 13th is in size 6

6

Your turn A2

Find the median number of goals.

Goals	0	1	2	3	4
Frequency	5	6	4	3	2

Worked example A3

Estimate the mean time.

Time t (min)	Freq.
$0 < t \leq 10$	4
$10 < t \leq 20$	9
$20 < t \leq 30$	5
$30 < t \leq 40$	2

Midpoints 5, 15, 25, 35: $20 + 135 + 125 + 70 = 350$

$$350 \div 20$$

17.5 minutes

Your turn A3

Estimate the mean mass.

Mass m (kg)	Freq.
$20 < m \leq 30$	6
$30 < m \leq 40$	10
$40 < m \leq 50$	3
$50 < m \leq 60$	1



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HIGHER*Higher only: quartiles, estimating within a class and missing frequencies***Worked example A4: quartiles from a table**

Find the IQR.

Value	1	2	3	4	5
Frequency	3	5	6	3	2

19 values: LQ is the 5th (2), UQ the 15th (4), using running totals 3, 8, 14, 17

$$\text{IQR} = 2$$

Your turn A4

Find the IQR.

Value	0	1	2	3	4
Frequency	4	6	7	4	2

Worked example A5: a missing frequencyThe mean score is 2.4. Find x .

Score	1	2	3	4
Frequency	4	x	6	2

Total of data = $2.4 \times \text{total frequency}$: $30 + 2x = 2.4(12 + x)$

$$x = 3$$

Your turn A5The mean is 1.4. Find x .

Value	0	1	2	3
Frequency	5	x	7	3

Worked example A6: estimating within a class

Estimate how many are taller than 165 cm.

Height h (cm)	Freq.
$150 < h \leq 160$	8
$160 < h \leq 170$	12
$170 < h \leq 180$	5

165 is halfway through $160 < h \leq 170$: about $\frac{1}{2} \times 12 = 6$ of that class, then add 5

$$11$$

Your turn A6

Estimate how many took less than 16 minutes.

Time t (min)	Freq.
$0 < t \leq 10$	7
$10 < t \leq 20$	15
$20 < t \leq 30$	8

Worked example A7: algebraic frequencies

40 people are in age classes $0 < a \leq 20$, $20 < a \leq 40$, $40 < a \leq 60$ and $60 < a \leq 80$, with frequencies x , $2x$, $3x - 2$ and 12. Find x and the modal class.

$6x + 10 = 40$, so $x = 5$; the largest frequency is 13

$$x = 5; 40 < a \leq 60$$

Your turn A7

48 values are in classes $0 < v \leq 5$, $5 < v \leq 10$, $10 < v \leq 15$ and $15 < v \leq 20$, with frequencies $y + 2$, $3y$, $2y + 4$ and y . Find y and the modal class.



B**Fluency**

Each question is a designed sequence. From one part to the next, ask yourself: what changed, and what did it do to the answer?

FOUNDATION*Everyone starts here*

B1 The table shows how many books some people read last month.

Books	0	1	2	3	4
Frequency	2	5	8	4	1

(a) How many people?

(b) Find the mode.

(c) Find the range.

(d) How many books in total?

[4 marks]

B2 Using the same table:

(a) Find the mean.

(b) Find the median.

(c) How many read more than 2 books?

(d) What fraction read at most 1 book?

[4 marks]

B3 The table shows the ages of some people.

Age a	$10 < a \leq 20$	$20 < a \leq 30$	$30 < a \leq 40$	$40 < a \leq 50$
Frequency	3	8	12	7

(a) Write down the modal class.

(b) Write down the midpoint of $20 < a \leq 30$

(c) Which class contains the median?

(d) How many people are older than 30?

[4 marks]

B4 For the same table,

(a) work out midpoint $\times$ frequency for $10 < a \leq 20$ (b) work out midpoint $\times$ frequency for $20 < a \leq 30$ (c) work out the total of midpoint $\times$ frequency

(d) estimate the mean age, to 1 decimal place

[4 marks]**FOUNDATION***continued: making tables and missing values*

B5 Here are 20 scores. 3 1 2 2 4 1 2 3 2 0 1 2 3 2 1 4 2 0 3 2

Make a frequency table, then find

(a) the frequency of 2

(b) the mode

(c) the mean

[3 marks]

B6 (a) The frequencies are 4, x , 9 and 6, and the total frequency is 30. Find x .

(b) The values 1, 2, 3 have frequencies 3, 5 and x . The total of the data, Σfx , is 31. Find x .(c) $\Sigma fx = 45$ and $\Sigma f = 18$. Find the mean.(d) The mean is 3.2 and $\Sigma fx = 64$. Find Σf .**[4 marks]**

HIGHER*Higher tier only***B7** The table shows some data.

Value	1	2	3	4	5
Frequency	2	6	7	4	4

(a) Find the lower quartile.**(b)** Find the median.**(c)** Find the upper quartile.**(d)** Find the IQR.**[4 marks]****B8** The table shows the times some people took.

Time t (min)	$0 < t \leq 10$	$10 < t \leq 20$	$20 < t \leq 30$	$30 < t \leq 40$
Frequency	8	12	15	5

Assuming the values in each class are evenly spread, estimate

(a) how many are less than 15 minutes **(b)** how many are more than 25 minutes**(c)** how many are between 12 and 32 minutes **(d)** the median time**[4 marks]****HIGHER***continued: missing frequencies and bounds***B9** Find the missing frequency in each case.**(a)** Values 1, 2, 3 have frequencies 4, x , 2. The mean is 1.8**(b)** Values 0, 1, 2 have frequencies x , 6, 4. The mean is 1**(c)** Classes $0 < v \leq 10$, $10 < v \leq 20$, $20 < v \leq 30$ have frequencies 6, x , 2. The estimated mean is 13**(d)** Classes $0 < v \leq 10$, $10 < v \leq 20$, $20 < v \leq 30$ have frequencies 7, x , 9. The median is in $10 < v \leq 20$. Find the least possible x .**[4 marks]****B10** The table shows some grouped data.

Value v	$10 < v \leq 20$	$20 < v \leq 30$	$30 < v \leq 40$
Frequency	2	5	3

(a) Estimate the total of all the values. **(b)** Estimate the mean.**(c)** What is the greatest the total could be? **(d)** What is the least the total could be (about)?**[4 marks]**

C**Reasoning**

Show your working and explain your thinking. A correct answer without a reason does not score full marks.

FOUNDATION

Everyone starts here

- C1** The table shows the goals scored in some matches.

Goals	0	1	2	3	4
Frequency	3	6	5	4	2

Sam works out the mean as $(3 + 6 + 5 + 4 + 2) \div 5 = 4$. Explain Sam's mistake, and find the correct mean.

[2 marks]

- C2** In a grouped table, the class $20 < t \leq 30$ has the highest frequency, 12. Jo says the modal class is 12.

Explain Jo's mistake.

[2 marks]

- C3** Explain why the mean found from a grouped frequency table is only an estimate. Would using the upper end of each class instead of the midpoint give a higher or a lower answer?

[3 marks]

- C4** The table shows some data.

Value	1	2	3	4
Frequency	4	6	3	2

Show that the mean is 2.2

[3 marks]



HIGHER*Higher tier only*

C5 The table shows some data.

Value	1	2	3	4	5
Frequency	10	2	3	4	1

Kai says the median is 3, because 3 is the middle row. Explain Kai's mistake, and find the median.

[3 marks]

C6 The same data is put into two grouped tables with different classes. The two estimated means are different. Explain why this can happen.

[3 marks]

C7 Explain why the median can be found exactly from a table of discrete values, but only estimated from a grouped table of continuous data.

[3 marks]

C8 The table shows the number of children in some families.

Children	0	1	2
Frequency	a	b	c

The mean number of children is exactly 1

(a) Show that $a = c$

(b) Explain why the median is also 1, whatever the value of b

[5 marks]



D**Problem solving**

You decide the method. Read the whole question first, and show every step.

FOUNDATION

Everyone starts here

- D1** The table shows the number of cars in some households.

Cars	0	1	2	3
Frequency	5	11	8	x

30 households were asked. Find x and the mean number of cars per household.

[3 marks]

- D2** A shop recorded the shoe sizes it sold in one day.

Size	5	6	7	8	9	10
Frequency	4	9	15	11	6	2

The manager wants to order more of the “average” size. Which average should she use? Find it, and find the mean to compare.

[4 marks]

- D3** The table shows the speeds of some cars on a road.

Speed s (mph)	$10 < s \leq 20$	$20 < s \leq 30$	$30 < s \leq 40$	$40 < s \leq 50$
Frequency	6	24	8	2

The speed limit is 30 mph. Estimate the mean speed, and write down the percentage of cars that were speeding.

[3 marks]

- D4** Here are the times, in minutes, of 12 phone calls. 3.5 12 7 18.5 9 4 11 15 6.5 8 9.5 2

Make a grouped frequency table with classes $0 < t \leq 5$, $5 < t \leq 10$, $10 < t \leq 15$, $15 < t \leq 20$, and write down the modal class.

[3 marks]



HIGHER*Higher tier only*

D5 The table shows the times some people took.

Time t (min)	$0 < t \leq 10$	$10 < t \leq 20$	$20 < t \leq 30$	$30 < t \leq 40$
Frequency	6	10	9	5

Assuming the values are evenly spread within each class, estimate the median time.

[4 marks]

D6 The table shows the goals scored in 20 matches.

Goals	0	1	2	3	4
Frequency	3	4	7	4	2

After one more match the mean number of goals is exactly 2. How many goals were scored in that match?

[4 marks]

D7 The table shows some data.

Value	1	2	3	4
Frequency	5	x	4	6

The median is 3. Find all the possible whole-number values of x .

[4 marks]

D8 The table shows some grouped data.

Value v	$0 < v \leq 10$	$10 < v \leq 20$	$20 < v \leq 30$	$30 < v \leq 40$
Frequency	4	x	y	3

There are 20 values and the estimated mean is 19.5. Find x and y .

[5 marks]



E**Exam practice**

Exam-style questions. Write your answers in the spaces. Aim for about one minute per mark.

FOUNDATION*Foundation and Higher crossover***E1** The table shows the number of goals scored in some matches.

Goals	0	1	2	3	4
Frequency	4	7	6	2	1

(a) Write down the mode.

.....

(1)**(b)** Work out the mean number of goals.

.....

(3)**(Total for Question E1 is 4 marks)****E2** The table shows the heights of 25 plants.

Height h (cm)	$150 < h \leq 155$	$155 < h \leq 160$	$160 < h \leq 165$	$165 < h \leq 170$
Frequency	3	7	9	6

(a) Write down the modal class.

.....

(1)**(b)** Write down the class that contains the median.

.....

(1)**(Total for Question E2 is 2 marks)**

E3 The table shows the times some people waited.

Time t (min)	$0 < t \leq 10$	$10 < t \leq 20$	$20 < t \leq 30$	$30 < t \leq 40$
Frequency	6	8	4	2

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

.....
(3)

(b) Explain why your answer is an estimate.

(1)

(Total for Question E3 is 4 marks)

E4 40 people were asked how many pets they own.

Pets	0	1	2	3	4
Frequency	6	x	12	8	2

(a) Find x .

.....
(1)

(b) Work out the mean number of pets.

.....
(2)

(Total for Question E4 is 3 marks)

E5 The table shows some data.

Value	1	2	3	4	5
Frequency	4	8	5	2	1

Sam says the mean is $(4 \times 1 + 8 \times 2 + 5 \times 3 + 2 \times 4 + 1 \times 5) \div 5 = 9.6$

Explain Sam's mistake, and work out the correct mean.

.....
(Total for Question E5 is 2 marks)



HIGHER*Higher tier only***E6** The table shows some data.

Value	0	1	2	3	4
Frequency	3	5	8	4	3

Work out the interquartile range.

.....

(Total for Question E6 is 3 marks)

E7 The table shows the masses of 30 parcels.

Mass w (kg)	$0 < w \leq 20$	$20 < w \leq 40$	$40 < w \leq 60$	$60 < w \leq 80$
Frequency	4	10	12	4

Estimate how many of the parcels weigh more than 50 kg.

.....

(Total for Question E7 is 3 marks)

E8 Use the table in the previous question.**(a)** Work out an estimate for the mean mass.

.....

(3)

(b) Is the estimated mean in the class that contains the median? Show how you decide.**(1)****(Total for Question E8 is 4 marks)**

E9 The table shows some data.

Value	1	2	3	4
Frequency	k	$k + 1$	$k + 2$	$k + 3$

(a) Show that the mean is $\frac{10k + 20}{4k + 6}$

(2)

(b) Show that the mean is always greater than 2.5

(2)

(c) What happens to the mean as k gets very large?

(1)

(Total for Question E9 is 5 marks)

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