



eClassroom

GCSE MATHEMATICS • DATA & STATISTICS

Comparing Data

Worksheet

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

Free Comparing Data 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: compare two sets of data using an average and a measure of spread, in context • choose a fair average when there are outliers • explain samples, populations and bias • use a sample to estimate for a population • *Higher:* compare using the median and IQR, and combine and weight samples.

Which questions are for me?

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

HIGHER Higher only: comparing with the median and interquartile range, plus mean against median, proportional samples and combining samples. 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**

Class A: median 62, range 30. Class B: median 55, range 18. Compare the marks. *Compare an average and a spread, in context.*

A: higher average; B: more consistent

Your turn A1

Team X: mean time 24 minutes, range 12. Team Y: mean time 21 minutes, range 20. Compare the times.

Worked example A2

P: 4, 7, 7, 9, 13

Q: 6, 8, 8, 9, 9

Compare them using the mean and the range.

Means: $40 \div 5 = 8$ and $40 \div 5 = 8$. Ranges: $13 - 4 = 9$ and $9 - 6 = 3$

same mean; Q more consistent

Your turn A2

R: 12, 15, 15, 18, 20

S: 10, 14, 19, 21, 21

Compare them using the mean and the range.

Worked example A3

In a random sample of 40 students, 14 walk to school. The school has 600 students. Estimate how many walk. $\frac{14}{40}$ of the sample walk. *Assume the same fraction of the school.*

$$\frac{14}{40} \times 600 = 210$$

Your turn A3

In a random sample of 80 students, 25 say maths is their favourite subject. There are 1200 students. Estimate how many say maths.



HIGHER*Higher: the IQR, mean against median, and sampling methods***Worked example A4: the median and the IQR**

A: LQ 20, median 28, UQ 34. B: LQ 25, median 30, UQ 33. Compare A and B. *IQRs: $34 - 20 = 14$ and $33 - 25 = 8$*

B higher on average and more consistent

Your turn A4

C: LQ 40, median 52, UQ 61. D: LQ 45, median 50, UQ 58. Compare C and D.

Worked example A5: mean or median?

Salaries (£1000s): 21, 23, 24, 25, 26, 90. Which average describes a typical salary better? *Mean = $209 \div 6 \approx 34.8$, above five of the six values. Median = 24.5*

the median, £24 500

Your turn A5

Journey times (min): 12, 14, 15, 15, 16, 58. Which average describes a typical time better? Find it.

Worked example A6: bias

A survey about how often people exercise is done outside a gym. Explain why it is biased. *The people asked are not typical of the whole population.*

gym users exercise more than most people

Your turn A6

A school asks only Year 7 students whether school dinners should change. Explain why the sample is biased, and how to improve it.

Worked example A7: a proportional sample

A school has 300 students in Year 7, 200 in Year 8 and 100 in Year 9. A sample of 60 is taken in proportion to the year sizes. How many from each year? *The sample is $\frac{60}{600} = \frac{1}{10}$ of each year.*

30, 20, 10

Your turn A7

Groups of 240, 360 and 400 people. A sample of 50 is taken in proportion. How many from each group?



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 Group *A*: median 45, range 20. Group *B*: median 38, range 32. Is each statement correct? Give a reason.

(a) "On average, group *A* scored higher." (b) "Group *A* is more spread out."

(c) "Group *B* has the higher median." (d) "Group *A*'s scores were more consistent." [4 marks]

B2 X : 3, 5, 6, 8, 8 Y : 2, 4, 7, 9, 13

(a) Find the mean of X

(b) Find the mean of Y

(c) Find the range of each

(d) Compare X and Y

[4 marks]

B3 Estimate each value, assuming the sample is representative.

(a) 18 of a sample of 60 like tennis. Population 500 (b) 35% of a sample like tea. Population 2400

(c) 7 of a sample of 25 are left-handed. Population 12 500 (d) In a sample of 50, 12 said yes. How many in a population of 800 said yes? [4 marks]

B4 Explain what is wrong with each sample.

(a) To find how people travel to work, a survey is done at a bus stop.

(b) To find the favourite sport of a school of 1000, five students are asked.

(c) To find opinions on a new park, only people who live next to it are asked.

(d) An online poll asks people to vote as many times as they like.

[4 marks]



FOUNDATION*continued: choosing measures and comparing from tables*

B5 Which average would you use to compare each pair of groups? Give a reason.

- (a) House prices in two streets, one with a mansion.
- (b) The most popular shoe sizes in two shops.
- (c) Test marks of two classes, with no unusual marks.

[3 marks]

B6 The tables show the number of goals scored by two teams in 20 matches each.

Goals	0	1	2	3	4
Team <i>P</i>	4	7	5	3	1
Team <i>Q</i>	2	5	6	5	2

- (a) Find the mean for team *P*
- (b) Find the mean for team *Q*
- (c) Find the median for each team
- (d) Compare the two teams

[4 marks]**HIGHER***Higher tier only*

B7 (a) Find the IQR of *A*: LQ 15, median 22, UQ 31 (b) Find the IQR of *B*: LQ 18, median 21, UQ 26

- (c) Which group has the higher median? (d) Which group is more consistent? Explain.

[4 marks]

B8 *M*: 2, 5, 6, 8, 9, 11, 15 *N*: 4, 6, 7, 7, 8, 10, 12

- (a) Find the median and IQR of *M*
- (b) Find the median and IQR of *N*
- (c) Which has the higher median?
- (d) Which is more consistent?

[4 marks]

HIGHER*continued: proportional samples and choosing the mean or median*

- B9** (a) Groups of 150 and 350; a sample of 40 in proportion. How many from each?
(b) Groups of 120, 180 and 300; a sample of 50 in proportion. How many from each?
(c) Groups of 205 and 295; a sample of 30 in proportion. How many from each, to the nearest whole number?
(d) A proportional sample of 40 took 14 from a group of 210. How big is the whole population? **[4 marks]**
- B10** Is the mean or the median better for each set of data? Give a reason.
(a) 6, 7, 7, 8, 9, 9, 10 (b) 2, 3, 3, 4, 4, 5, 60
(c) the incomes of everyone in a country (d) the heights of 30 adult women **[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** Tom compares two classes by saying, "Class A did better because its top mark was higher." Explain why this is not a good comparison. [2 marks]
- C2** Sam asks 6 people in his town which supermarket they use. Explain why his results may not be reliable. [2 marks]
- C3** Explain why a sample should be chosen at random, and describe one way to choose a random sample of 50 students from a school. [3 marks]
- C4** A : 12, 15, 18, 19, 21. B : 9, 12, 14, 17, 18. Show that the mean of A is 3 more than the mean of B . [3 marks]



HIGHER*Higher tier only*

- C5** Group X has a range of 40 and an IQR of 8. Group Y has a range of 25 and an IQR of 15. Jo says Y is more consistent.
Explain why the IQR may give a fairer comparison than the range. [3 marks]
- C6** Group A has 20 people and group B has 200 people. Is it fair to compare their medians? Explain. [3 marks]
- C7** A head teacher surveys one Year 11 class to find the views of the whole school on homework. Give two reasons why the results may not represent the school. [3 marks]
- C8** The data are 4, 6, 7, 9, x , where x is a positive whole number.
(a) Show that when $x = 12$ the mean is greater than the median.
(b) Find all the values of x for which the mean is greater than the median. Consider where x lies in the ordered data. [5 marks]

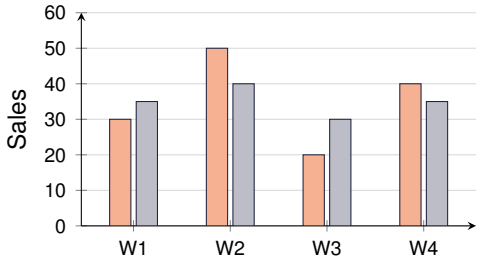


D**Problem solving**

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

FOUNDATION

Everyone starts here

- D1** Two long jumpers' last five jumps (m): Amy: 5.2, 5.8, 5.1, 6.0, 5.4 Bea: 5.5, 5.6, 5.4, 5.7, 5.3
One of them is chosen for a competition. Who would you choose? Use the mean and the range to explain.
[3 marks]
- D2** The chart shows the sales of two shops over four weeks: shop A (orange) and shop B (blue).
(a) Find the mean weekly sales for each shop.
(b) Find the range for each shop.
(c) Compare the two shops.
[4 marks]
- 
- | Week | Shop A (orange) | Shop B (blue) |
|------|-----------------|---------------|
| W1 | 30 | 35 |
| W2 | 50 | 40 |
| W3 | 20 | 30 |
| W4 | 40 | 35 |
- D3** In a random sample of 120 voters, 45% said they would vote for a new park. There are 36 000 voters. Estimate how many would vote for the park, and state one assumption you have made.
[3 marks]
- D4** Group A: 6, 9, 11, 14. Group B: 8, 10, 12, x . Find x so that the two groups have the same mean.
[3 marks]



HIGHER*Higher tier only*

- D5** The table summarises the reaction times (ms) of two groups.

	Smallest	LQ	Median	UQ	Largest
Group A	180	220	245	270	340
Group B	200	230	240	255	300

Compare the reaction times of the two groups in two ways.

[4 marks]

- D6** A factory has 72 managers, 336 office workers and 792 production workers. A sample of 50 is taken in proportion to these numbers.

How many of each should be in the sample? Check that your numbers add up to 50

[4 marks]

- D7** A random sample of 25 bags from a delivery of 2000 has a mean mass of 498 g. The label says each bag holds 500 g.

(a) Estimate the total mass of the delivery.

(b) Give one reason why the true mean could still be 500 g.

[4 marks]

- D8** A college has 180 first-years, 240 second-years and 180 third-years. A proportional sample of 60 is taken. In the sample, 12 first-years, 12 second-years and 7 third-years said “yes”.

(a) How many of each year are in the sample?

(b) Estimate how many students in each year would say “yes”, and the percentage of the whole college.

(c) Explain why your answer to (b) is the same as the percentage of the whole sample who said “yes”.

[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 ages of the members of two clubs are summarised.

Chess club: median 34, range 40. Drama club: median 27, range 22

Compare the ages of the two clubs.

(Total for Question E1 is 3 marks)

E2 The numbers of cars parked each day for five days were:

Car park A: 42, 38, 45, 40, 35 Car park B: 30, 52, 44, 36, 48

(a) Find the mean and the range for each car park.

.....
(2)

(b) Compare the two car parks.

(1)

(Total for Question E2 is 3 marks)

E3 To find out how often people in a town use the library, Ria asks 20 people inside the library.

(a) Give two reasons why her sample may not be reliable.

(2)

(b) Suggest how she could improve her sample.

(1)

(Total for Question E3 is 3 marks)



E4 In a random sample of 50 students, 12 said they cycle to school. The school has 900 students.

(a) Estimate how many students at the school cycle.

.....
(2)

(b) What assumption have you made?

(1)

(Total for Question E4 is 3 marks)

E5 Weekly pay (£): 310, 325, 330, 340, 355, 1240

(a) Which average gives a better idea of the typical weekly pay? Explain.

(2)

(b) Work out that average.

.....
(1)

(Total for Question E5 is 3 marks)

HIGHER

Higher tier only

E6 The marks of two classes are summarised.

Class *P*: LQ 42, median 55, UQ 64. Class *Q*: LQ 50, median 53, UQ 58

Compare the marks of the two classes.

(Total for Question E6 is 3 marks)

E7 *U*: 3, 5, 8, 9, 10, 12, 16 *V*: 6, 7, 7, 9, 10, 11, 13

Use the medians and interquartile ranges to compare *U* and *V*.

(Total for Question E7 is 3 marks)



E8 The times (minutes) for two groups to finish a puzzle were:

Group A: 8, 9, 9, 10, 11, 12, 41 Group B: 10, 10, 11, 12, 12, 13, 15

(a) Find the mean and the median of each group.

.....

(2)

(b) Which average should be used to compare the groups? Explain, and compare them.

(2)

(Total for Question E8 is 4 marks)

E9 Two random samples are taken from the same population. In sample 1, 8 of 40 people have a pet rabbit. In sample 2, 15 of 60 people have a pet rabbit.

(a) Which sample gives the more reliable estimate? Explain.

(1)

(b) Combine the samples to estimate the proportion of people with a pet rabbit.

.....

(2)

(c) The population is 2500. Estimate how many people have a pet rabbit.

.....

(2)

(Total for Question E9 is 5 marks)

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