

Which Average?

Part 1

For each dataset:

- (i) State the correct average to use.
- (ii) Calculate the correct average

- 1) The heights (in cm) of a random sample of 10 students were measured:

111	112	107	111	114	112	107	109	113	111
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- 2) A company takes a random sample its staff, and records their salaries (£1000):

22	27	45	24	108	38	39	21	18	47
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- 3) An ice-cream maker surveys 12 people and asks them their favourite ice-cream (0= Vanilla, 1= Chocolate, 2=Strawberry, 3=Other):

0	0	3	2	2	1
1	1	0	1	2	1

- 4) The age (in years) of 8 people attending a club are recorded.

10	10	10	11	11	10	11	3
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- 5) Amy baked 7 cakes. She weighed each cake in grams:

585	575	578	591	581	578	579
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Part 2

6. Think about the ages of the people in the room you are in right now.
- Which average would be higher: the mean age or the median age?
 - Which average would be most appropriate?

7. Read the following news excerpt from the BBC:

Cryptocurrency analysts say at least \$13.7m (£10.2m) has so far been donated to the Ukrainian war effort through anonymous Bitcoin donations.

Researchers at Elliptic, a blockchain analysis company, say the Ukrainian government, NGOs and volunteer groups have raised the money by advertising their Bitcoin wallet addresses online.

More than 4,000 donations have been made so far, with one unknown donor gifting Bitcoin worth \$3m to an NGO.

The median donation is \$95.

On Saturday afternoon, the official Twitter account of the Ukraine government posted a message: "Stand with the people of Ukraine. Now accepting cryptocurrency donations. Bitcoin, Ethereum and USDT."

Explain why the BBC quoted the median donation.

8. A pollster asked 100 people how many hours they worked per week. The table below summarises the results:

Less than 25 hours	25- 35 hours	More than 35 hours
14	58	28

- State the modal class.
- For each statement, say whether it is true, might be true, or is false:
 - The mean is greater than the median
 - The median is 34 hours
 - The range is greater than 10 hours

Answers

1. Mean, no outliers. 101.7cm
2. Median, outlier. £32,500
3. Mode, categorical data. Chocolate.
4. Median, outlier. 10 years old.
5. Mean, no outliers. 581g.
6. If you're in a classroom, the mean would be higher. The teacher's age will be an outlier, skewing the mean. The median would be more appropriate.
7. The \$3 million donation is a large outlier, which would have skewed the mean.

8.
 - a. 25-35 years
 - b.
 - i. Likely to be true, but not certain to be true. The median will be within 25-35 years, the 28 people working more than this will likely increase the mean. However, if the 14 people in the less than 25 group included many unemployed people, the mean could be less than the median. **As a challenge**, try to create a dataset where this would be the case but the values still match the table. How might you minimise the mean?
 - ii. Might be true. The median would fall between 25 and 35 years.
 - iii. Must be true. The fact that anybody exists in the below 25 group and the above 35 group implies the range must be higher than 10.