Asking a statistical question

A statistical question expects different answers and can be investigated with data.

Worked example

Instead of “How long does Ava spend travelling to school?”, ask “How many minutes do third-year students spend travelling to school on a typical day?”

Variable	Type	Example
Travel method	Categorical	Bus
Number of buses	Numerical, discrete	2
Journey time	Numerical, continuous	18.5 minutes

What are you measuring?

Name the population, the variable and its units before you collect data. Rounding a measurement to a whole number does not make the underlying variable discrete.

Population, sample and bias

The population is the whole group. The sample is the group you actually collect data from.

Worked example

To estimate travel times for all third-year students, collect responses across the year group. Asking only students at the bicycle rack would over-represent cyclists.

A better sample

Randomly select students from a complete list of third-year students. If you need every class represented, randomly select within each class in proportion to its size.

A fair question

Ask “How many minutes did your journey take today?” rather than “Was your journey too long?” Keep the wording neutral.

From data to a conclusion

Use a number from the data to support your answer, and say who the result applies to.

Journey time	Under 15 minutes	15 minutes or more
Number of students	18	12

What percentage of the 30 respondents travelled for under 15 minutes?

$18 + 12 = 30$	Find the number of responses.
$\frac{18}{30} \times 100 = 60$	Divide the group by the total, then multiply by 100.

60% of respondents

Report the limitation

This was 60% of the students who answered. How well it represents all third-year students depends on how the sample was chosen.

Statistical Investigations

Try the questions before opening the separate answer key. Show one step per line.

23.1 · Fluency

Classify walking time and method of travel as numerical or categorical.

23.2 · Variation

Rewrite “Do students travel far?” as a statistical question with a measurable variable.

23.3 · Choose a method

A survey about the library asks only pupils currently in the library. Explain the concern and propose a change.

Check your work: are the sign, units and level of accuracy appropriate?