

Data Collection (AS)

K1

Understand and use the terms 'population' and 'sample'

Use samples to make informal inferences about the population

Understand and use sampling techniques, including simple random sampling and opportunity sampling

Select or critique sampling techniques in the context of solving a statistical problem, including understanding that different samples can lead to different conclusions about the population

Commentary

Whenever one conducts a statistical experiment we might ask the following questions:

- What problems am I going to address?
- What data do I need to collect?

Once these decisions have been made the key question is then:

- How will I collect the data?

Information collection often involves taking a sample from all the possible data (the parent population). However, sometimes you are able to collect the whole population; such a 100% sample is called a census. There are many different ways of collecting samples.

A sample typically provides a set of data values of a random variable, drawn from all such possible values, the parent population (often just called the population). The parent population can be finite, such as all professional golf players, or infinite such as the points where a dart can land on a dart board. A sample is intended to give information about the parent population so it must be representative of it.

Sample resource

'Sampling techniques' (which can be found at (<http://integralmaths.org/sow-resources.php>) encourages students to think carefully about different sampling techniques if they are carrying out different statistical investigations.

Instruction Card

For each of the following scenarios discuss and consider the following points:

- Who would you sample? – What would your population be?
- Why might the scenario be a problem?
- Would you use the method selected; what do you think would be a better method?
- Which method of sampling would you use?

John was carrying out a survey to find how far, on average, residents in his town travel to work. He asked all the people at his local railway station one Monday morning.

Effective use of technology

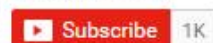
'Excel random sample' is a short video (which can be found at www.mei.org.uk/integrating-technology) showing how to generate a simple random sample in Excel.

Record No	Random
827318409	0.001008
827318428	0.009424
827318292	0.019795
827318349	0.02575
827318369	0.027073
827318297	0.036826
827318250	0.042364
827318429	0.048537
827318364	0.058106
827318315	0.072629
827318279	0.079961
827318343	0.080641
827318329	0.085338
827318366	0.108614

How to Create a Random Sample in Excel (in 3 minutes!)



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Title	Time allocation:
<p>Pre-requisites</p> <ul style="list-style-type: none"> • GCSE: Collecting data and spotting bias in questions • 	
<p>Links with other topics</p> <ul style="list-style-type: none"> • Hypothesis testing: Having a representative sample to work with is essential for conclusions to be valid. • 	
<p>Questions and prompts for mathematical thinking</p> <ul style="list-style-type: none"> • What is the same and what is different about random sampling and opportunity sampling? • Give me an example of a data set with an outlier which should not be removed • 	
<p>Applications and modelling</p> <ul style="list-style-type: none"> • Which colour Smartie is the most common? • Can you predict the winner of the student council elections by taking a sample? • 	
<p>Common errors</p> <ul style="list-style-type: none"> • Removing every item of data which looks like an outlier • Understanding how bias can be introduced in sampling and its effects on data analysis. • Making rash comments such as ‘there <i>are</i> outliers in the data’ rather than ‘there could be some outliers in the final class’. • 	