Guidance for tutors

Outcome	S7	**Student can consistently:**	Understand sampling methods and determine the numbers required for a stratified random sample.

How the topic is examined	• Examined through exam paper questions. • This topic is usually tested on calculator papers. • Students require some knowledge of different sampling methods and how to carry out a simple random sample. • Questions might ask students to work out the number of objects/people that need to be chosen from each category in a stratified random sample.

Prior knowledge	• Students should be confident with:
	  ○ Proportion (NR2)
	  ○ Substituting into a formula (AEx5)

Suggested tuition approaches	• Students should understand that collecting a representative sample of a population is a difficult task and there is a huge science behind it. It is important that students know key words related to sample (e.g. population, sample, random)
	• There are many different sampling strategies that are used (e.g. systematic, stratified sampling, cluster sampling etc…) Students should know the advantages and disadvantages of sampling methods. The following link provides a summary. http://www2.hawaii.edu/~cheang/Sampling%20Strategies%20and%20their%20Advantages%20and%20Disadvantages.htm
	• Students need to know how to carry out a stratified sample. The steps involved in this are:
	  ○ Split the population up into different strata (categories). In an exam this will be done for you. (e.g. male, female or age groups etc…)
	  ○ Choose a total number you wish to sample (again this will be given in the question)
	  ○ Choose the same proportion of people/objects in the sample as there are in the population, (e.g. if there are 20% of males in the population, then your sample should be 20% males)
	  ○ To find the number of people/objects you should choose you can use the following formula:
	$$Strata\ size = \frac{number\ of people\ in\ shis\ start a\ in\ the\ population}{total\ population} \times sample\ size\ required$$

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- Once the number in each strata has been decided, check that the sample chosen from each strata adds up to the sample size required. If not you will need to adjust one or more of the sample to ensure that it does.

- You will need to round your strata sample sizes as you cannot sample part of a person or object. You may not be able to round to the nearest whole number each time.
(e.g.

Sample size required	100
Males needed	33.5
Females needed	66.5

- In this example you could not round to 34 and 67 as the total would give 101. Instead we round one of the numbers up and one down. It doesn't matter which way you do this.
- You may occasionally need to rearrange this formula if you are told a particular number of objects or people you want in a sample from a strata (e.g. 55 males are required in the sample) and you want to calculate the total stratified sample size. This type of question is rare.

Common errors and misconceptions

- Students mix up the different sampling methods.
- When carrying out a simple random sample, students over-elaborate the process. The easiest way to do it is to put names in a hat and take out the required number at random or number each person in the population and use the random number generator on your calculator.
- Often the sample sizes do not add up to the total sample size required. Ensure students check the values add up and adjust any that don't.
- Students end up with strata values that are greater than the total sample size. Encourage students to go back and check their working – they have clearly done something wrong.

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Suggested resources	• Questions
	  ○ http://www.cimt.org.uk/projects/mepres/allgcse/bkb8.pdf (pp 140 - 144)
	  ○ https://corbettmaths.files.wordpress.com/2013/02/stratified-sampling-pdf.pdf
	• Past GCSE Questions
	  ○ https://keshgcsemaths.files.wordpress.com/2013/11/110_stratified-sampling.pdf
	• Video tutorial
	  ○ http://corbettmaths.com/2012/08/27/stratified-sampling/