To ensure the sample represents everyone in the country you would need to ensure that you include people:

- of different ages
- of different social and economic backgrounds
- who live in different areas
- of different cultural backgrounds.

You must also make sure the sample is large enough to be a good representation of the population, but not so large that it is too costly or time consuming.

WORKIT!

A scientist wishes to investigate the life expectancy of emperor penguins. The population of emperor penguins is approximately 600 000. The scientist takes a sample of 600 birds, all aged between 2 and 3 years old.

Give two reasons why this is not a good sample.

The sample size is small.

She is only sampling $\frac{600}{600\,000} \times 100 = 0.1\%$ of the population.

The sample is biased since she is only considering birds who are between 2 and 3 years old, therefore every member of the population does not have an equal chance of being chosen.

Stratified sampling

If the population you are considering is split into distinct groups, one way of sampling is to ensure the number of people from each group that you sample is proportional to the size of the group.

This is called **stratified sampling**.

For example, if there are twice as many German people as there are French people at a meeting and you took a stratified sample, you should sample twice as many German people as French people.

WORKIT!

In a tennis club there are 3500 members, of which 2625 are male.

A stratified sample of 200 members is taken. How many women should be included in the sample?

$3500 - 2625 = 875$ female members ← First work out how many of the members are female.

$\frac{875}{3500} \times 200 = 50$ ← Then work out how many women should be in the sample.

50 women should be included in the sample.

STRETCHIT!

If you wanted to find out what the people in your school enjoyed doing in their free time, how would you choose your sample?

NAILIT!

Try to include mathematical values when commenting on sample size.

NAILIT!

To work out how many of each group to include in a stratified sample:

1. Calculate the percentage or fraction of the population that is in that group.
2. Multiply the sample size by the percentage or fraction.