# Teacher notes on sampling methods

In statistics, a population is the entire group that you're interested in studying or gathering information about. It includes all members of that group, not just some of them. A good sampling method collects data that is representative of the whole population, that is, it accurately reflects the characteristics of the whole group.

In this activity, students should try to choose a sampling method that will collect height data that is representative of the whole school.

|  |  |
| --- | --- |
| Sampling method | Overview |
| Simple random sampling | * Sample data is chosen at random, where each member has an equal probability of being chosen. Usually, each member in the population is allocated a number.
* Numbers are chosen at random by drawing from a hat or using a digital tool such as a calculator random number generator or a computer.
 |
| Systematic sampling | * Sample data is selected from a random starting point and selected using a fixed period, for example, choosing every 10th student.
* This is a good method to obtain a sample that is representative of the population.
 |
| Stratified sampling | * The population is divided into separate groups or strata (for example, year groups or by gender).
* A random sample is then taken from each group or strata in an equivalent proportion to the size of that group or strata in the population. For example, if 20% of the school are in Year 7, then 20% of the sample should be in Year 7.
* This is a good sampling method to obtain a sample that is representative of the population.
 |
| Quota sampling | * This is similar to stratified sampling except that a fixed number (the quota) is chosen from each group, for example, the sample should include 10 students from each year group.
* A quota sample may not be fully representative if the groups are of significantly different sizes. For example, Year 12 might be a smaller year group and hence be over-represented in the sample.
 |
| Cluster sampling | * The population is divided into separate clusters and the sample is chosen from one (or two) clusters only, for example, the sample might include only students in A-block classrooms, or in the Main Quad.
* This may or may not be a good sampling method depending on the clusters and how representative they are of the population.
 |
| Self-selection sampling | * This is non-probability sampling, where individuals volunteer to be part of a sample. For example, students may look for volunteers by displaying a large sign asking, ‘Who wants to find out their height?’
* This method is unlikely to be representative of the population (think of who is more likely to volunteer) but is often used as an easy, cheap method to collect data (for example, email surveys).
 |
| Convenience sampling | * Another non-probability sampling where you collect data from the most convenient people, for example, students may measure the height of their friends.
* This method is unlikely to be representative of the population but is often used as an easy, cheap and quick method to collect data (for example, school projects).
 |
| Judgement or purposive sampling | * In this non-probability sampling you collect data from the people you think are best suited to your data project. For example, teachers may decide to survey the prefects or School Council members because they represent all the students.
* This sampling method is unlikely to be representative.
 |

Example sample size calculations

The students at Sunnybrook High School decide to use a stratified sampling approach. The teacher tells them that 60% of the students at the school are boys and provide details of the number of students in each year group. The students decide to survey 80 students.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Year | Number of students | Sample size: all students | Sample size: boys 60% | Sample size: girls (balance) |
| 7 | $$140$$ | $$\frac{140}{500}×80=22.4≈22$$ | $$22×60\%=13.2≈ 13$$ | $$22-13=9$$ |
| 8 | $$125$$ | $$\frac{125}{500}×80=20$$ | $$20×60\%=12$$ | $$20-12=8$$ |
| 9 | $$125$$ | $$\frac{125}{500}×80=20$$ | $$20×60\%=12$$ | $$20-12=8$$ |
| 10 | $$110$$ | $$\frac{110}{500}×80=17.6≈18$$ | $$18×60\%=10.8 ≈11$$ | $$18-11=7$$ |
| Total | $$500$$ | $$80$$ | $$48$$ | $$32$$ |

The students use rounding to the nearest whole number for people and check that the totals agree.

Example data collection sheet (paper based)

It is not possible to collect data from every class in the school, so the students use a cluster approach, focusing on different classes.

Data collection locations

Group 1: Class 7 Food Tech – Room 4 Ms Wong: 4 boys and 3 girls

Group 2: Class 7 Food Tech – Room 4 Ms Wong: 4 boys and 3 girls

Group 3: Class 7 Music – Room 10 Miss Allen: 5 boys and 3 girls

Group 4: Class 8 Maths – Room 28 Mrs Atkinson: 6 boys and 4 girls

Group 5: Class 8 Maths – Room 28 Mrs Atkinson: 6 boys and 4 girls

Group 6: Class 9 History – Room 54 Mr Atah: 6 boys and 4 girls

Group 7: Class 9 History – Room 54 Mr Atah: 6 boys and 4 girls

Group 8: Class 10 PE – Oval Ms Warwick: 6 boys and 3 girls

Group 9: Class 10 PE – Oval Ms Warwick: 5 boys and 4 girls

Example data recording sheet

|  |  |  |  |
| --- | --- | --- | --- |
| Student height in metres to 2 decimal places (e.g. 1.75) | Year (circle answer) | Gender(circle answer) | Tick to indicate that this is your first time being measured today |
|  | 7 8 9 10 | M F Other |  |
|  | 7 8 9 10 | M F Other |  |
|  | 7 8 9 10 | M F Other |  |
|  | 7 8 9 10 | M F Other |  |
|  | 7 8 9 10 | M F Other |  |

See Excel template for an example of a digital data collection sheet.

Example data collection instructions

Each measuring group includes three people. The roles in the group should swap every 10 minutes.

Recorder

1. First ask the student if they are willing to participate in a survey to find the average height of students in the school and confirm that they have not previously been measured today.
2. Explain that their name will not be collected. The only data collected will be their height in metres, their year group and their gender.
3. If they consent, ask them to stand against a wall.

Measurer 1

1. Hold the measuring tape to the floor ensuring the end exactly meets the floor.

Measurer 2

1. Hold the measuring tape vertically upright, place your hand horizontally on top of the person’s head and measure the height from the scale in metres to the nearest cm, for example, 1.75 m.

Recorder

1. Read back the height stated by Measurer 2 and record it on the data collection sheet.
2. Pass the sheet to the student and ask them to circle their gender and year group and tick that they have not already been measured today.