GCSE Maths – Statistics

Sampling

Worksheet

WORKED SOLUTIONS

This worksheet will show you how to work out different types of sampling questions. Each section contains a worked example, a question with hints and then questions for you to work through on your own.

Section A

Worked Example

Julie wants to find out about healthy eating in her school. She writes a questionnaire. Identify three problems with the first question and rewrite it to improve the responses:

> **"How many portions of vegetables do you eat?"**
>
> **O Lots O Some O A Few**

Step 1: Consider how you would answer this question. Make a note of any issues you come across.

Step 2: Identify and describe the first problem.

The question does not give a time frame. It is not clear whether you are counting portions eaten in an hour, day, week or year.

Step 3: Rewrite the question.

The question should say "How many portions of vegetables do you eat in a day?"

Step 4: Identify two further issues.

The given answers are not numeric so could be open to interpretation (one person's definition of 'lots' may be different to another person's definition).

There is no option for someone who eats 0 portions of vegetables in a day.

The question should be:

> ***"How many portions of vegetables do you eat in a day?"***
>
> ***O None O 1-2 O 3-4 O 5 or more***

Guided Example

Anya wants to find out about the amount of exercise people in her class do. She writes a questionnaire. The first question is:

> **"Do you do a lot of running?"**

Identify a problem with the question and rewrite it, adding appropriate responses.

Step 1: Consider how you would answer this question. Identify any issues that you come across and describe them.

The question does not specify a time frame, or give a quantifiable (number) value for 'a lot' of running.

Step 2: Rewrite the question.

"How many times do you go running in one week?"

- "How many times" — asks for a numerical, integer value
- "one week?" — a sensible time frame

Step 3: Add three or more possible responses. They should be numerical and not overlap.

"How many times do you go running in one week?"

- O — 0 times
- O — 1 - 3 times
- O — more than 3 times

Now it's your turn!

If you get stuck, look back at the worked and guided examples.

1. For each of the questionnaires below, rewrite the question and add three appropriate responses.

a) "How often do you go food shopping?" ← no time frame

"How often do you go food shopping in one month?"

- O 0-4 times
- O 5-9 times
- O 10+ times

any sensible values are correct, as long as ranges do not overlap and any answer can be given.

b) "Do you play sports more than twice?" ← no time frame

"Do you play sports more than twice a week?"

- O Yes
- O No
- O Not sure

c) "How many times do you go for a run?" ← no time frame

"How many times do you go for a run in one month?"

- O 0-5 times
- O 6-15 times
- O 16+ times

2. Bonnie wants to find out more about the people in her school. She writes a questionnaire which contains the following questions:

"How much do your parents earn?"
O Less than £12,000
O £12,000-£30,000
O £30,000-£50,000
O More than £50,000

a) Why is this question not appropriate?
b) Is she using good response boxes? Explain your answer.

a) Bonnie has not given a time frame for her question.

b) She is not using good response boxes because they overlap – someone who earns exactly £12,000 could tick one of two responses.

3. Alaina wants to know how much time people spend reading books. Design two questions for her to use in a questionnaire. Include a table in which to display the data.

1. How many times do you read a book in one week?

O none O 1-2 O 3-4 O 5+

times read in 1 week	0	1-2	3-4	5+
frequency				

2. How many pages of a book do you read each day?

O none O 1-10 O 11-20 O 21+

number of pages	0	1-10	11-20	21+
frequency				

Section B

Worked Example

The owner of a supermarket in a town wants to find out whether people in the town bought milk from his shop in the past week. He stands at the door of his shop and asks 100 customers who enter the shop.

78 people say they have bought milk from his shop in the past week. He concludes that 78% of the town buy milk from his shop every week.

Identify three issues with his study and conclusion.

Step 1: Consider the population and sample.

The population of a town can be thousands of people.

1. ***A sample of 100 is not large enough to represent the views of the whole town.***

Step 2: Consider the sampling method.

The owner has only asked people who are coming into his store. This means that the people he is asking are more likely to be regular customers already, and are therefore very likely to have bought their milk from his shop in the past week.

2. ***His sampling method is biased.***

Step 3: Consider random factors.

Some people in his sample may be visiting the shop as a one-off. Because he has only sampled once, he cannot conclude that this trend is the same for every week.

3. ***His conclusion is not based on enough evidence.***

Guided Example

Jennifer wants to know how often people watch films. She asks 30 people from her film studies class, and 22 of them watch a film every day. She concludes that 73% of people in her town watch a film every day.

Identify two issues with her study and conclusion. Suggest how she could alter her sample to negate one of these issues.

Step 1: Consider the population size in proportion to the sample size.

There are a lot of people in the world who watch films, and Jennifer has only surveyed 30 people. This sample is not large enough to be representative of the population.

Step 2: Consider the sampling method used. Is it biased?

Jennifer has used opportunity sampling and only asked people from a film studies class. This sample is biased because people in her sample are more likely to watch a lot of films than, for example, a group at an old-persons home.

Step 3: Suggest an alternative sampling method that will solve the issue.

Random sampling of people in her town, including people of different occupations and ages.

Now it's your turn!
If you get stuck, look back at the worked and guided examples.

4. The local sports club wants to build a new hockey pitch. The council needs to get the views of local people. Counsellor Washington suggests taking a sample of the local sports teams.

a) Explain what is wrong with this sampling method.
b) Counsellor Taylor suggests taking a random sample of 200 people instead. Describe how the council could take a simple random sample.

a) This sample is biased as it only includes people who are likely to want a new hockey pitch.

b) Number the population; use a random number generator to pick people to add to the sample; ignore repeats; stop when the sample contains 200 people.

5. Martin wants to open a café in his town. He needs to find out how often people visit cafes in the town.

a) Martin's friend suggests that they visit every café in the town and ask the customers how often they visit cafes. Why is this would not be a good sample.
b) Instead, Martin decides to ask his friends and family whether he should open the cafe. Explain whether this sample is biased.

a) This is not a good sampling method as it only includes people of the same demographic (as all these people were in a café).

b) Asking his friends and family is also biased, because they are more likely to support him in opening a new café than the general public would be.

6. Asim wants to find out how much exercise people do. He asks the members of his football club to complete a questionnaire.

a) This may not be a suitable sample. Explain why.
b) Suggest a better sampling method and describe how Asim should collect this sample.

a) This sample is likely to be biased because members of a football club are likely to do more exercise than members of the public.

b) Asim should use a simple random sample to include all genders, ages and demographics. Number the population; use a random number generator to pick people to add to the sample; ignore repeats; stop when the sample contains the required number of people.