



Quota, cluster and other samples

About 50 minutes Calculator allowed 44 marks

Date _____

A Do Now

The first question is what today's lesson needs. The others bring back earlier topics.

- A1** Needed today [2 marks]

A systematic sample of 50 is taken from a list of patients of 1500 names, numbered 1 to 1500. The random start is 24. Write down the number of the last name chosen.

A2 Last lesson [2 marks]

A cinema's members has 4500 people, and 475 of them are students. A stratified sample of 150 is taken. How many students are in the sample?

Answer

Answer

- A3** Maths skill [2 marks]

Write $\frac{10}{4}$ as a mixed number in its simplest form.

A4 Maths skill [2 marks]

A car is worth £3400. Its value falls by 20% each year. Find its value after 2 years.

Answer

Answer

B Examples, then your turn

Your teacher works through each example with you. Then try the one beside it.

EXAMPLE 1

Name the sampling method in each case.

- (a) A researcher chooses 6 of the 40 primary schools in a county at random and asks every teacher in those 6 schools.
- (b) A reporter asks the first 30 people she meets outside a station.
- (c) A TV show asks viewers to text in their vote.

Hint Who decides who is in the sample: a random choice, the researcher, or the people themselves?

- B1** Name the sampling method in each case. [3 marks]

- (a) An interviewer must find 25 men and 25 women aged over 60, and she chooses who to ask.
- (b) A teacher picks the 10 students she thinks are most typical of her class.
- (c) A clerk takes every 15th name on a list, after a random start.

Answer

EXAMPLE 2

In a town, 46% of adults are under 40. A researcher takes a quota sample of 150 adults by age. How many adults under 40 does she ask, and how does she choose them?

Hint Find 46% of the sample, then think about who picks the people.

EXAMPLE 3

A supermarket chain has 80 stores. To survey its staff, it chooses 4 stores at random and asks every member of staff in those 4 stores. Give one advantage and one disadvantage of this cluster sample.

Hint Think about travel, and about how alike the 4 stores might be.

EXAMPLE 4

A student wants to know how much exercise the adults in her town do. She asks people in a gym. Explain why this sample is biased.

Hint Are people in a gym typical of the town?

B2 A cinema has 1800 customers a week: 810 adults, 540 students and 450 children. The manager takes a quota sample of 60 customers.

- (a) Work out the quota for each group. [2 marks]

Answer _____

- (b) Give one advantage of a quota sample here. [1 mark]

- (c) Explain why it is not a random sample. [1 mark]

Total for B2: 4 marks

B3 A council wants to know what households think of bin collections in its 30 villages. It chooses 3 villages at random and asks every household in them. Give one advantage and one disadvantage of this method. [2 marks]

B4 A newspaper wants to know how adults in a city travel to work. It asks people at the main train station at 8 am. Explain why this sample is biased. [2 marks]

EXAMPLE 5

Kim wants the views of the residents of her town on a new skate park. She stands outside the youth club on a Friday evening and asks 25 people under 18 and 25 people aged 18 or over. Assess her plan.

Hint Comment on WHERE she asks and on HOW she chooses, then conclude.

B5 Tom wants to find the mean amount families in his town spend on food each week. He posts a link on the town's online forum and uses the first 100 replies. Assess Tom's plan.

C Practice

C1 A radio station asks listeners to phone in if they think the speed limit on a road should be lowered. Of the callers, 82% say yes. Explain why this may not show what all the listeners think. [2 marks]

C3 A college emails a survey about its canteen to 600 students. Only 90 reply. Explain why the results may be biased. [2 marks]

C2 A head teacher chooses 12 students she thinks represent the school for a group about the school day. Give one advantage and one disadvantage of this judgement sample. [2 marks]

C4 Sam says, "A quota sample is just as good as a stratified sample, because both have the right number from each group." [2 marks]

Explain why Sam is wrong.

D Exam-style questions

D1 Ben says, "My quota sample does not need a sampling frame, so it cannot be biased." [2 marks]

Explain why Ben is wrong.

D2 A delivery company wants the views of 300 of its customers. It has 9 depots. It thinks about three methods.

Method A: choose 2 of the 9 depots at random and ask every customer of those depots.

Method B: number all the customers and use random numbers to choose 300.

Method C: put a link to a survey on the company's website.

(a) Name each method. [2 marks]

Answer

(b) Which method should the company use? Give reasons, commenting on the other two methods. [3 marks]

Total for D2: 5 marks

D3 Ana wants to find out how many hours of television adults in her town watch each week. She uses a quota sample of 40 men and 40 women, and she asks people in the town's shopping centre on a Tuesday afternoon. Assess Ana's plan, and suggest one improvement. You must give a conclusion. [4 marks]

E Extension

No route is given. The hints are at the end of the sheet. Use one at a time.

E1 A quota sample of 200 adults is taken by gender and age. In the town, 45% of adults are men. 40% of the men and 30% of the women are under 30. How many adults aged 30 or over should be in the sample? [3 marks]

Answer

Extension hints

Cover these with paper. Uncover one at a time.

- E1** **Hint 1** Find how many men and how many women are in the sample first.
- Hint 2** There are 90 men and 110 women, so 0.4×90 men and 0.3×110 women are under 30.
- Hint 3** $36 + 33 = 69$ are under 30, so subtract from 200.

How did it go?

Colour one circle on each line: not yet, nearly, yes.

I can name quota, cluster, convenience, judgement and self-selecting samples. ○ ○ ○

I can work out quotas and explain why a quota sample is not random. ○ ○ ○

I can assess a sampling plan by its location and its method, and improve it. ○ ○ ○