



Stratified sampling

About 50 minutes Calculator allowed 40 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] **A2** Last lesson [2 marks]
- A1 There are 63 people at a concert. $\frac{1}{3}$ of them are adults and $\frac{1}{3}$ of the adults are women. How many women are at the concert?
- A2 The 720 customers are numbered 001 to 720. Split these random digits into threes from the left and use them to choose 3: 49696 64960 00300 90860 886

Answer

Answer

- A3** From chapter 2 [2 marks] **A4** Maths skill [2 marks]
- A3 Kemi wants the views of the 12 staff in a small office on a new lunch break. Should Kemi use a census or a sample? Give a reason.
- A4 Work out $27.2 \div 0.08$.

Answer

B Examples, then your turn

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

EXAMPLE 1

A sports club has 820 members: 312 juniors and 508 seniors. A stratified sample of 50 members is taken by age group. How many juniors and how many seniors are in the sample?

Hint Juniors are $\frac{312}{820}$ of the club, so they are $\frac{312}{820}$ of the sample.

- B1** A college has 4120 students. 1730 of them study a science. A stratified sample of 150 students is taken by subject. How many science students are in the sample? [2 marks]

Answer

EXAMPLE 2

A hospital has 115 doctors, 245 nurses and 640 other staff. A stratified sample of 30 staff is taken by job. Work out how many of each job are in the sample.

Hint Round each number, then check that they add up to 30.

EXAMPLE 3

The table shows the students in Years 10 and 11 of a school. A stratified sample of 70 is taken by year group and gender. How many Year 10 girls are in the sample?

	Boys	Girls
Year 10	86	94
Year 11	78	92

Hint Find the total of the whole table first.

EXAMPLE 4

A head teacher asks students about school lunches. She takes a stratified sample by year group instead of a simple random sample. Give one advantage and one disadvantage of doing this.

Hint Think about what each year group gets in the sample.

- B2** A charity has 840 volunteers: [3 marks]
244 drivers, 161 cooks and 435 helpers. A stratified sample of 40 volunteers is taken by role. Work out how many of each role are in the sample.

Answer

- B3** The table shows the members [2 marks]
of a leisure centre and the activity they use most. A stratified sample of 50 members is taken by age group and activity. How many adults who use the gym are in the sample?

	Swimming	Gym
Adults	156	124
Children	88	112

Answer

- B4** Arjun wants a stratified sample of the students at a boys' school to find out how they travel to school.

- (a) Explain why gender is not [1 mark]
a sensible variable to stratify by.

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- (b) Suggest a better variable [2 marks]
to stratify by. Give a reason in context.

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Total for B4: 3 marks

EXAMPLE 5

The sports club in Example 1 needs 19 juniors in its sample. Describe how to choose the 19 juniors.

Hint A stratified sample is random inside each group.

B5 A school takes a stratified sample by year group. It [2 marks]

needs 12 Year 8 students, so it takes the first 12 Year 8 students in the lunch queue. Explain why this is not a stratified random sample, and say how it should choose them.

C Practice

C1 A firm has 1500 employees. In a stratified sample of 60 employees by department, 22 work in sales. How many of the firm's employees work in sales? [2 marks]

Answer

C2 A school has 1080 students, and 180 of them are in Year 7. A stratified sample by year group has 15 Year 7 students. How many students are in the whole sample? [2 marks]

Answer

C3 Of the 4600 adults in a town, 46 live on a farm. A stratified sample of 40 adults is taken by where they live. How many farm adults are in it? Explain why this could be a problem. [2 marks]

C4 Jo wants to find out how many students own a pet. She says, "I will stratify my sample by whether each student owns a pet." [2 marks]

Explain why Jo's plan does not work.

D Exam-style questions

D1 Raj wants to know how long the 600 staff in his office spend travelling to work. He takes a stratified sample by gender: he works out how many men and women he needs, then asks the first ones through the office door in the morning. Assess Raj's plan. You must give a conclusion. [3 marks]

- D2** Lena says, "I use a stratified sample because it lets me compare the year groups." [2 marks]

Explain why this is not the reason for using a stratified sample.

- D3** The table shows the members of a cycling club. Mel takes a stratified sample of 50 members by gender and age group.

	Under 18	18 to 49	50 and over
Female	25	96	70
Male	77	103	114

- (a) How many female members aged 18 to 49 are in her sample? [2 marks]

Answer

- (b) Mel rounds all six numbers and gets a total of 51. Explain why, and give the numbers she should use. [2 marks]

Total for D3: 4 marks

E Extension

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

- E1** A youth centre has two groups, A and B. Group B has 260 more members than group A. A stratified sample by group has 18 from group A and 27 from group B. How many members does the centre have? [3 marks]

Answer

Extension hints

Cover these with paper. Uncover one at a time.

- E1** **Hint 1** The sample is split in the same ratio as the groups.
Hint 2 $18 : 27 = 2 : 3$, so group B is 1 part bigger than group A.
Hint 3 One part is 260 members, so the groups are 2×260 and 3×260 .

How did it go?

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

I can work out how many to take from each group and round to whole numbers. ○ ○ ○

I can check the total of a stratified sample and adjust it. ○ ○ ○

I can choose sensible groups and choose the members of each group at random. ○ ○ ○