

Name _____

Date _____

6.2 Taking a sample — worksheet

Choose a sampling method, understand how sample size affects how much you can trust a result, and recognise bias. · 75 questions · Show your working.

Remember

- The **population** is everyone you want to know about; the **sample** is who you actually ask.
- A **census** asks everyone — most reliable, rarely practical.
- A larger **sample size** generally gives a more reliable result, because one unusual answer matters less.
- A larger sample **does not** fix bias. Bias is about who is chosen, not how many.
- **Random**: everyone has an equal chance. **Systematic**: a fixed rule such as every 10th.
- **Convenience**: whoever is nearest — usually biased.
- Ask where you are sampling from: a bus stop samples bus users, a football club samples football fans.
- To estimate a whole population, find the proportion in the sample and apply it: 24 out of 60 is 0.4, so $0.4 \times 900 = 360$.
- Always state your sample size when you report a result — it tells the reader how much to trust it.

A · Fluency — Sampling fractions, percentages and estimates.

- 1 A sample of 10 is taken from a school of 500 learners. What percentage of the population is sampled?

- 2 A sample of 25 is taken from a town survey of 1000 households. What percentage of the population is sampled?

- 3 A sample of 50 is taken from a club with 200 members. What percentage of the population is sampled?

- 4 A sample of 30 is taken from a year group of 600. What percentage of the population is sampled?

- 5 A sample of 40 is taken from a company with 800 staff. What percentage of the population is sampled?

- 6 A sample of 20 people is chosen from 200. One person in how many is chosen?

- 7 A sample of 15 people is chosen from 300. One person in how many is chosen?

- 8 A sample of 45 people is chosen from 900. One person in how many is chosen?

- 9 A sample of 32 people is chosen from 160. One person in how many is chosen?
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- 10 A sample of 18 people is chosen from 360. One person in how many is chosen?
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- 11 What kind of sampling is **asking every tenth person on a list**?
- ☐ random
 - ☐ systematic
 - ☐ convenience
- 12 What kind of sampling is **drawing names out of a hat**?
- ☐ random
 - ☐ systematic
 - ☐ convenience
- 13 What kind of sampling is **asking your own friends**?
- ☐ random
 - ☐ systematic
 - ☐ convenience
- 14 What kind of sampling is **giving every learner a number and using a random number generator**?
- ☐ random
 - ☐ systematic
 - ☐ convenience
- 15 What kind of sampling is **asking the first 20 people who walk past the school gate**?
- ☐ random
 - ☐ systematic
 - ☐ convenience
- 16 What kind of sampling is **choosing every 5th name on the register**?
- ☐ random
 - ☐ systematic
 - ☐ convenience
- 17 A fair dice is rolled 60 times. If each number is equally likely, about how many 1s would you expect?
-
- 18 In a sample of 120, 30 people said yes. What percentage said yes?
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- 19 In a sample of 200, 50 people said yes. What percentage said yes?
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- 20 In a sample of 80, 20 people said yes. What percentage said yes?
-
- 21 In a sample of 150, 60 people said yes. What percentage said yes?
-
- 22 In a sample of 250, 100 people said yes. What percentage said yes?
-
- 23 In a sample of 60, 15 people said yes. What percentage said yes?
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- 24** In a sample of 90, 45 people said yes. What percentage said yes?

- 25** In a sample of 400, 100 people said yes. What percentage said yes?

- 26** In a sample of 50 people, 20 said yes. Estimate how many of the whole population of 500 would say yes.

- 27** In a sample of 40 people, 10 said yes. Estimate how many of the whole population of 400 would say yes.

- 28** In a sample of 25 people, 15 said yes. Estimate how many of the whole population of 250 would say yes.

- 29** In a sample of 60 people, 24 said yes. Estimate how many of the whole population of 300 would say yes.

- 30** In a sample of 30 people, 18 said yes. Estimate how many of the whole population of 600 would say yes.

- 31** In a sample of 20 people, 9 said yes. Estimate how many of the whole population of 200 would say yes.

- 32** A sample of 30 is taken from a population of 300. What fraction of the population is that? Give the denominator when the fraction is written as 1 over a number.

- 33** A sample of 45 is taken from a population of 450. What fraction of the population is that? Give the denominator when the fraction is written as 1 over a number.

- 34** A sample of 12 is taken from a population of 240. What fraction of the population is that? Give the denominator when the fraction is written as 1 over a number.

- 35** A sample of 36 is taken from a population of 720. What fraction of the population is that? Give the denominator when the fraction is written as 1 over a number.

- 36** A sample of 24 is taken from a population of 120. What fraction of the population is that? Give the denominator when the fraction is written as 1 over a number.

- 37** A survey samples 5% of a population of 400. How many people are in the sample?

- 38** A survey samples 10% of a population of 350. How many people are in the sample?

- 39** A survey samples 25% of a population of 160. How many people are in the sample?

- 40** A survey samples 20% of a population of 450. How many people are in the sample?

- 41** A survey samples 2% of a population of 5500. How many people are in the sample?

- 42 A survey samples 50% of a population of 84. How many people are in the sample?

B · Reasoning — Sample size, bias and what they do and do not fix.

- 43 What is a population, in statistics?
- ☐ Everyone in a country
 - ☐ Every member of the group being studied
 - ☐ The people you actually ask
 - ☐ The largest group in the data
- 44 Why take a sample instead of asking everyone?
- ☐ Samples give better answers
 - ☐ Asking everyone is often too slow, too expensive or impossible
 - ☐ Samples are always accurate
 - ☐ There is no good reason
- 45 What happens to the reliability of a result as the sample gets larger?
- ☐ It gets worse
 - ☐ It generally gets better
 - ☐ It does not change
 - ☐ It becomes exact
- 46 A sample of 5 learners is used to describe a school of 800. What is the main problem?
- ☐ The sample is too large
 - ☐ The sample is far too small to represent the school
 - ☐ The learners might lie
 - ☐ Nothing is wrong
- 47 What does it mean for a sample to be biased?
- ☐ It is too small
 - ☐ Some members of the population are more likely to be chosen than others
 - ☐ The data is wrong
 - ☐ The question is hard
- 48 You survey favourite sports by asking members of the football club. What is wrong?
- ☐ Nothing
 - ☐ The sample is biased towards people who like football
 - ☐ The sample is too large
 - ☐ Football is not a sport
- 49 You survey how people travel to work by standing at a bus stop. What is wrong?
- ☐ Nothing
 - ☐ Everyone you ask is already a bus user
 - ☐ It is too slow
 - ☐ Travel is continuous data
- 50 Which sample is most likely to represent a whole school fairly?
- ☐ The first 30 learners to arrive
 - ☐ 30 learners chosen at random from the register
 - ☐ 30 learners from one class
 - ☐ Your 30 friends

- 51** Does doubling the sample size remove bias?
☐ Yes
☐ No
- 52** Is a census a sample?
☐ Yes
☐ No
- 53** Can a small sample ever give the right answer?
☐ Yes
☐ No
- 54** Two learners survey the same question. Ana asks 20 people and Ben asks 200. Whose result should you trust more, and why?
☐ Ana's, because it was quicker
☐ Ben's, because a larger sample is less affected by unusual answers
☐ Ana's, because small samples are more accurate
☐ Neither — sample size does not matter

C · Challenge — Scaling a sample up to a population.

- 55** A school has 750 learners. A sample of 1 in 25 is taken. How many learners are in the sample?

- 56** A sample of 45 is taken from a population of 900. What percentage of the population is that?

- 57** In a sample of 80 people, 60% said yes. How many people said yes?

- 58** A sample of 200 finds 35% own a bicycle. Estimate how many of the 3000 people in the town own one.

- 59** A sample of 60 learners contains 24 who play an instrument. Estimate the number in a school of 900.

- 60** You want a sample of 5% from a population of 1400. How many people should you ask?

- 61** A club has 240 members. You take every 8th name. How large is your sample?

- 62** A survey of shoppers is carried out only on a weekday morning. Name the problem this creates in one word.

- 63** A sample of 10 gives 70% yes. A sample of 500 gives 52% yes. Which estimate is more trustworthy?
- ☐ The 70%, because it is a bigger percentage
 - ☐ The 52%, because it came from a much larger sample
 - ☐ Both equally
 - ☐ Neither

D · Word problems — Sampling in the real world.

- 64** A town has 5000 residents. A survey samples 2%. How many people are surveyed?

- 65** A factory makes 2000 bulbs a day and tests 1 in 40. How many bulbs are tested?

- 66** In a taste test, 18 of 30 people preferred brand A. What percentage preferred brand A?

- 67** A survey of 400 households finds 300 have internet. What percentage is that?

- 68** A sample of 50 fish from a lake contains 8 trout. Estimate the number of trout in a population of 2000 fish.

- 69** A quality check tests 1 in 20 of the 600 items made. How many items are tested?

- 70** A school of 1200 surveys 1 in 15 learners. How large is the sample?

- 71** Of 250 people asked, 40% walk to work. How many people is that?

- 72** A poll of 800 voters finds 456 support a plan. What percentage is that?

- 73** A farmer weighs 25 of 500 sheep. What percentage of the flock is weighed?

- 74** A researcher surveys online only. Which group is likely to be left out?
- ☐ Young people
 - ☐ People without internet access
 - ☐ People who like surveys
 - ☐ Nobody
- 75** A TV show asks viewers to phone in with their opinion. Why might the result be misleading?
- ☐ The phone lines are slow
 - ☐ Only people who feel strongly and watch that show will call
 - ☐ Too many people call
 - ☐ Phoning is expensive