Year 10 · Statistics: Sampling Smarter, Inferring Better

Name: _____ Date: _____

Hi! This sheet helps you think about how we collect good data through sampling, why random samples matter, and when to use the mean or median. Take your time and show your reasoning, statisticians explain their thinking!

Warm-up

1. What is the difference between a census and a sample?

2. In simple random sampling, what is true about each item's chance of being chosen?

3. A survey measures the height (in cm) of students, a numerical variable. What is the smallest sample size recommended for a reliable inference?

4. Name one problem that biased sampling can cause.

Practice

5. Mere wants to know the favourite lunch food of students at Avondale College (about 1,900 students). Should she use a census or a sample? Explain.

6. A student surveys only her netball team about how many hours of sport students play each week, then claims her result represents the whole school. Why is this biased, and how could she fix it?

7. Explain how you could use technology (such as a random number generator) to choose a simple random sample of 30 students from a roll of 450 students.

8. For measuring students' reaction times (a numerical variable), why is a sample of 30 considered enough, but for finding what percentage of students prefer a certain phone brand (a categorical variable) about 1,000 is recommended?

9. The weekly pocket money of 9 students (in $) is: 5, 8, 10, 10, 12, 15, 20, 25, 90. Find the mean and the median. Which is the better measure of the typical amount, and why?

10. A statistical question asks: 'What is the typical time Year 10 students take to travel to Vertex Academy?' Most students take 5–20 minutes, but a few travel over an hour. Would the mean or median better answer this question? Explain.

Challenge

11. A local café owner wants to know what proportion of Avondale residents would buy a new plant-based menu. She surveys 40 customers who are already in her café on a Sunday morning. Identify TWO sources of bias, and describe a better sampling plan including a suitable sample size.

12. Two random samples of daily rainfall (in mm) are taken in Auckland. Sample A: 0, 0, 2, 3, 5, 5, 8, 12, 15 (9 days). Sample B is the same but adds one very wet day of 60 mm (10 days). Calculate the mean and median for each sample. Explain what happens to each measure and what this shows about choosing a measure of central tendency.