Year 10 · Statistics: Reading Between the Data

Name: _____ Date: _____

Hi! This sheet helps you interpret data like a real statistician, comparing groups fairly, predicting from scatter plots, and spotting graphs that try to fool you. Take your time and always explain your thinking in context.

Warm-up

1. A scatter plot at a Mission Bay dairy shows daily temperature (from 15°C to 28°C) against ice-cream sales. If you use the graph to predict sales at 22°C, is that interpolation or extrapolation?

2. Using the same graph, you predict sales at 34°C. Is that interpolation or extrapolation, and why should you be cautious?

3. A line of best fit for that dairy is: sales = 12 × temperature + 30. Predict the number of ice creams sold at 20°C.

4. In the 75%-to-50% comparison rule, which value of Group A and which value of Group B do we compare?

Practice

5. Box plots compare Year 10 student heights at School A and School B. School A: min 150, Q1 158, median 163, Q3 168, max 178 (cm). School B: min 160, Q1 167, median 172, Q3 178, max 188 (cm). Using the 75%-to-50% rule, can you claim that School B students tend to be taller back in the population?

6. A news website shows a bar chart of two companies' yearly profit: Kea Ltd $42 million and Tui Ltd $45 million. The bar for Tui looks about twice as tall as Kea's. Explain how the graph misrepresents the data and how it should be fixed.

7. A study of kauri trees relates trunk circumference to age. The line of best fit is: age = 0.8 × circumference + 5, where circumference ranges from 50 cm to 200 cm. (a) Predict the age of a tree with circumference 120 cm. (b) Would you trust a prediction for a 400 cm tree?

8. A survey of 30 students at one Avondale school found 60% preferred rugby to football. A newspaper headline says: 'New Zealand teenagers prefer rugby.' Comment on this claim, taking uncertainty into account.

9. Two Year 10 classes sit the same maths test (out of 100). Class A: Q1 55, median 62, Q3 70. Class B: Q1 50, median 65, Q3 72. Using the 75%-to-50% rule, can you claim Class B tends to score higher in the population?

10. A pictogram about recycling shows one rubbish-bin symbol = 100 kg, but the bin drawn for 2023 is made twice as wide AND twice as tall as the 2022 bin to show 200 kg. Why does this mislead readers?

Challenge

11. A scatter plot relates weekly study hours (0 to 15 hours) to test score for Year 10 students. It shows a moderate positive relationship with line of best fit: score = 4 × hours + 40. (a) Predict the score for a student who studies 8 hours. (b) A student claims: 'If I study 30 hours, this predicts a score of 160, so I'm guaranteed top marks.' Give two reasons this reasoning is flawed.

12. A researcher wants to investigate: 'Do Year 10 students at Avondale schools who play a sport tend to have faster reaction times than those who don't?' She measures reaction times (seconds) for a sample of each group. Sport group: Q1 0.24, median 0.27, Q3 0.30. Non-sport group: Q1 0.29, median 0.33, Q3 0.37. (a) Apply the 75%-to-50% rule to compare the groups (remember: smaller time = faster). (b) Explain what elements of chance mean for how confident she can be.