

Statistics

Name: _____

Date: _____

Concepts

- Measures of Dispersion (theory)
- Measures of Position (theory)
- Methods Used to Collect Data
- Range
- Sampling Methods
- Sources of Bias
- Tables in Statistics - Secondary 1 and 2
- The Mean
- Types of Graphs in Statistics - Secondary 1 and 2
- Types of Statistical Variables

Measures of Dispersion

1. Two snow-clearing crews each cleared driveways on five December mornings.

Crew A	18	19	20	21	22
Crew B	8	14	20	25	33

- a) Show that the two crews have the same mean.
- b) Calculate the range of each crew's results.
- c) In one sentence, say what the range tells the supervisor that the mean does not.

Measures of Position

2. Seven sunflowers in a community garden were measured, in centimetres:

145, 118, 132, 151, 118, 139, 127.

- a) Write the seven heights in order, from shortest to tallest.
- b) Give the minimum and the maximum of the distribution.
- c) Marie-Ève's sunflower measures 139 cm. Counting from the shortest, what position does it occupy?
- d) Explain why the data must be put in order before part c) can be answered.

Methods Used to Collect Data

3. For each situation, state which data collection method was used — a *census*, a *poll* (survey) or a *study* — and justify your choice in one sentence.

- a) A high school records the transport used by every one of its 640 students to find how many take the bus.
- b) A biologist sits beside a bike path and notes the colour of every helmet that passes between 8:00 and 9:00.
- c) A radio station telephones 300 of its listeners to ask them their favourite kind of music.

Range

4. A weather station recorded these midday temperatures during one week in January:

$$-6^{\circ}\text{C}, \quad -2^{\circ}\text{C}, \quad 1^{\circ}\text{C}, \quad -9^{\circ}\text{C}, \quad 3^{\circ}\text{C}, \quad 0^{\circ}\text{C}, \quad -4^{\circ}\text{C}.$$

- a) Calculate the range of these seven readings and say what it means here.
- b) The following Monday the station recorded -11°C . By how much does the range of the eight readings change?

Sampling Methods

5. A school of 480 students wants a sample of 60 students.

- a) The 480 names are written on identical slips, mixed in a box, and 60 slips are drawn. Name the sampling method used.
- b) The alphabetical list of the 480 students is used, a starting name is drawn at random, and then every 8th name after it is taken. Name the sampling method used, and show where the number 8 comes from.
- c) State the population and the sample in b).
- d) A third plan is to question the first 60 students who walk through the door on Monday morning. Explain why this plan does not give a representative sample.

Sources of Bias

6. Each of these three survey plans contains one source of bias. Name the source in each case, then rewrite question a) so that it is neutral.

- a) “Don’t you agree that our embarrassing, run-down skatepark should finally be rebuilt?”
- b) To find out what students think of the cafeteria food, a reporter questions only the students standing in the cafeteria line.
- c) Students are asked what they think of their gym teacher, while the gym teacher stands beside the interviewer.

Tables in Statistics - Secondary 1 and 2

7. Twenty-four students were asked how many brothers and sisters they have:

0, 1, 2, 1, 3, 0, 1, 2, 4, 1, 0, 2, 1, 1, 3, 2, 0, 1, 2, 5, 1, 0, 2, 1.

- a) Build a frequency table for this data.
- b) Check your table by adding the frequencies.
- c) Give the range of the distribution.

The Mean

8. A class collected returnable bottles for seven days:

12, 9, 15, 8, 11, 14, 15.

- a) Calculate the mean number of bottles collected per day.
- b) On how many days did the class collect more than the mean?
- c) If the class kept up this mean, how many bottles would it collect in 30 days?

Types of Graphs in Statistics - Secondary 1 and 2

9. For each situation, choose the most suitable graph — a *bar graph*, a *broken-line graph* or a *circle graph* — and justify your choice in one sentence.
- a) Showing how the 24 students of a class split among the four workshops offered, so that each workshop's share of the class is visible.
 - b) Showing the temperature inside a greenhouse, recorded every hour from 6:00 to 18:00.
 - c) Comparing the number of medals won by five different clubs at the same tournament.

Types of Statistical Variables

10. Say whether each variable is *qualitative* or *quantitative*, and for the quantitative ones say whether they are *discrete* or *continuous*.

- a) The brand of skates a player wears.
- b) The number of goals scored in a game.
- c) The mass, in kilograms, of a student's backpack.
- d) The T-shirt size ordered (S, M, L, XL).
- e) The time, in seconds, taken to run 100 m.

Synthesis — drawing on several sheets in this topic

11. The student council of a school of 600 students wants to report the mean time students spend travelling to school. Two members stood at the front door from 7:50 to 8:00 one morning and questioned the first eight students who arrived. The times, in minutes, were

10, 25, 15, 20, 5, 30, 12, 23.

- a) Calculate the mean and the range of the eight times.
- b) These eight students were not chosen by any sampling method — they simply happened to be there. Give two reasons why the mean of these eight times is likely to be wrong for the whole school.
- c) The council decides to start again with a systematic sample of 40 students taken from the complete list of the 600. Say exactly what it must do, and show where your interval comes from.

Want the harder problems and the worked solutions?

The *Challenge Problems* set and the *Answer Keys* for Statistics — with the reasoning written out in full — are available at tutorinmontreal.ca.