Secondary 2 Mathematics · Practice Worksheet · tutorinmontreal.ca

# 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.** A dépanneur counted its customers during the first hour of business on seven days, for three different weeks.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Week 1 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| Week 2 | 10 | 16 | 17 | 17 | 17 | 18 | 24 |
| Week 3 | 16 | 17 | 17 | 17 | 17 | 17 | 18 |

**a)** Calculate the range of each week, then order the three weeks from the most spread out to the least spread out.

**b)** Five of Week 2's seven days differ by no more than 2 customers, yet Week 2 has the largest range. Explain how that can happen.

**c)** In Week 1, which values could you replace by a different number without changing the range, and which could you not? Justify.

### Measures of Position

**2.** Nine riders took part in a skatepark contest. Their scores, in the order the riders competed, were

$$62, \quad 78, \quad 55, \quad 91, \quad 70, \quad 84, \quad 78, \quad 46, \quad 66.$$

**a)** Give the minimum and the maximum score, and the range.

**b)** Kenza scored 84. What position does she occupy counting from the highest score? And counting from the lowest?

**c)** Add your two answers to b). Explain why that total is 10 for every rider whose score no one else obtained.

**d)** Two riders both scored 78. What position do they occupy, and what position does the rider who scored 70 then occupy?

### Methods Used to Collect Data

**3.** For each investigation, name the data collection method used — a *census*, a *poll* (survey) or a *study* — and state what the population is.

**a)** A maple-syrup producer weighs every one of the 84 buckets emptied on Tuesday, to find the total mass collected that day.

**b)** A city telephones 400 of its 21 000 households to ask whether they would use a bike path along Rue Sainte-Anne.

**c)** A biology class counts the maple keys lying in each of 30 squares of 1 $m^2$ chosen at random in a park, to estimate how many the park holds.

For the investigation that used a poll, name the sample and give its size.

### Range

**4.** A hockey team's goals scored in its 30 games are summarised below.

| Goals scored | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|---|
| Number of games | 2 | 5 | 8 | 7 | 4 | 3 | 1 |

**a)** Check that the table really describes 30 games.

**b)** Give the range of the number of goals scored.

**c)** Lucas answers "the range is $8 - 1 = 7$". Say which row he used and explain what his 7 actually measures.

**d)** In game 31 the team scores 4 goals. Does the range change? Justify.

### Sampling Methods

**5.** A festival has 1200 volunteers: 480 in setup, 300 in the kitchen and 420 in security. The organizers want a sample of 80 volunteers in which each team keeps its share of the whole.

**a)** Name this sampling method, and find how many volunteers must be drawn from each team. Check your three numbers.

**b)** Describe precisely how the setup volunteers in the sample should be chosen.

**c)** Instead, the organizers take the alphabetical list of the 1200 volunteers, draw a starting name at random and then take every 15th name after it. Name that method and show that it also produces 80 volunteers.

### Sources of Bias

**6.** Each survey plan below contains one source of bias. Name the source in each case — the *choice of the sample*, the *wording of the question* or the *conditions of the interview* — and justify it in one sentence.

**a)** To find out how often the people of a neighbourhood use the public pool, an interviewer questions people as they leave the pool on Saturday afternoon.

**b)** "Do you support the new bike path, which will make the street safer for children?"

**c)** A questionnaire about how much money students spend at lunch must be signed with the student's name and handed back to the class teacher.

Then rewrite question b) so that it is neutral.

**Tables in Statistics - Secondary 1 and 2**

**7.** A bubble-tea shop recorded the flavour ordered by 250 customers.

| Flavour | Mango | Taro | Matcha | Strawberry | Other |
|---|---|---|---|---|---|
| Number of customers | 75 | 60 | 40 | ? | 25 |

**a)** Find the missing frequency.

**b)** Add a row giving each flavour's relative frequency as a percentage.

**c)** Add your five percentages. Explain why that sum is a check on your work, and what it would mean if the sum came to 103%.

### The Mean

**8.** Forty students were asked how many books they read over the summer.

| Number of books | 0 | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| Number of students | 5 | 9 | 10 | 8 | 5 | 3 |

**a)** Check that 40 students are described, then find the total number of books read by the group.

**b)** Calculate the mean number of books read per student.

**c)** Anaïs calculates $\frac{0+1+2+3+4+5}{6} = 2.5$ instead. Explain what is wrong with her calculation.

**Types of Graphs in Statistics - Secondary 1 and 2**

**9.** Ninety students said how they usually get to school.

| Means of transport | Bus | On foot | Car | Bicycle |
|---|---|---|---|---|
| Number of students | 36 | 27 | 18 | 9 |

**a)** Give each means of transport as a percentage of the 90 students.

**b)** The data is to be shown in a circle graph. Calculate the central angle of each sector, and check your four angles.

**c)** Which graph would you use instead to compare the four counts directly? And which one to show how the number of bus users changed from September to June?

### Types of Statistical Variables

**10.** A ski club collects the following information about each of its members: the number of runs completed in a day, the time spent on the slopes (in hours), the type of pass (day, season or student), and the region the member comes from.

**a)** For each of the four variables, say whether it is *qualitative* or *quantitative*, and for the quantitative ones whether they are *discrete* or *continuous*.

**b)** Give a plausible value for each variable.

**c)** Which of the four variables can take the value 3.5, and which cannot? Explain.

**Synthesis — drawing on several sheets in this topic**

**11.** A school canteen recorded the number of sandwiches sold on each of 20 days.

| Sandwiches sold | 20 | 22 | 24 | 26 | 28 |
|---|---|---|---|---|---|
| Number of days | 3 | 4 | 6 | 4 | 3 |

**a)** Check that 20 days are described, then calculate the mean number of sandwiches sold per day.

**b)** Give the range of the distribution.

**c)** On how many days did the canteen sell more than the mean?

**d)** Which type of graph suits this table, and which type would suit a display of the sales day by day over the 20 days? Justify each choice.