Secondary 5 Mathematics · Practice Worksheet · tutorinmontreal.ca

Statistics

Name: _____ Date: _____

Concepts

- Statistics
- The Standard Score (Z-score)
- Voting Procedures

Statistics

1. The student council of a school of 1400 students wants to know how many hours its students sleep on a school night. It sorts the students by grade level and then draws, at random, 5% of the students of each grade.

a) Identify the population and give the size of the sample.

b) Name the sampling method used and state what it is designed to protect against.

c) Is the variable studied qualitative or quantitative? If quantitative, is it discrete or continuous?

d) The council reports only the mean, 7.2 hours. Name one measure of dispersion it should also report, and say what that measure would add.

The Standard Score (Z-score)

2. On a physics test the results have a mean of 68 and a standard deviation of 9.

a) Find the z-score of a student who obtained 81.5.

b) Find the z-score of a student who obtained 59.

c) What result corresponds to a z-score of 2.4?

3. A scholarship committee keeps, for each candidate, only that candidate's best standardized result. The two subjects concerned have the following statistics: chemistry, mean 65 and standard deviation 6; history, mean 76 and standard deviation 4.8. Marilou obtained 74 in chemistry and 82 in history; Théo obtained 71 in chemistry and 85 in history. Which candidate does the committee retain, and on the strength of which subject?

Voting Procedures

4. The 40 members of a housing cooperative rank three proposed logos, X, Y and Z. The 40 ballots take only three forms: 15 members rank $X \succ Y \succ Z$, 13 rank $Y \succ Z \succ X$, and 12 rank $Z \succ Y \succ X$.

a) Which logo wins under the plurality (relative majority) procedure?

b) Does any logo obtain an absolute majority? Justify.

c) The by-laws call for a runoff between the two logos with the most first-place votes. Who wins the runoff?

5. Sixty members of a music club must choose one act for the spring show among Fanfare (F), Groove (G) and Harmonie (H). Each member writes down a favourite and also ticks every act he or she would find acceptable.

Number of members	24	20	16
Favourite	F	G	H
Acts approved	F, H	G	H, G

a) Which act wins under the plurality procedure?

b) Which act wins under approval voting?

c) Explain what the club learns from the difference between the two results.

Synthesis — drawing on several sheets in this topic

6. Three finalists take part in a competition made up of two events. Across all competitors, event 1 has a mean of 60 and a standard deviation of 12, while event 2 has a mean of 45 and a standard deviation of 4. The finalists' raw results are:

Finalist	Event 1	Event 2
Amélie	78	47
Bruno	72	51
Chloé	84	45

a) Rank the finalists by the sum of their raw results.

b) Rank them by the sum of their z-scores.

c) The jury instead ranks the finalists within each event and awards 2, 1 and 0 points as in a Borda count. What does this third procedure give?

d) Which method would you recommend to the jury? Justify with a mathematical argument.