Secondary 3 Mathematics · Practice Worksheet · tutorinmontreal.ca

Statistics

Name: _____ Date: _____

Concepts

- Box and Whisker Plots
- Measures of Central Tendency
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- Measures of Position (theory)
- Sampling Methods
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- The Mean
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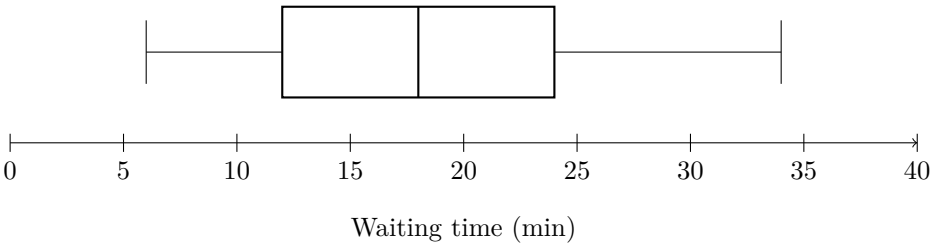
- The Mode
- The Quartiles

Box and Whisker Plots

1. The box-and-whisker plot below summarizes the waiting time at a ski hill's chairlift, recorded on many afternoons of the season.



a) Give the five-number summary of the distribution.

b) Calculate the range and the interquartile range.

c) About what percentage of the afternoons had a wait longer than 24 minutes?

d) Each of the four parts of the plot holds about the same number of afternoons. Which quarter of the afternoons is the most spread out, and how can you tell from the picture?

Measures of Central Tendency

2. Nine second-hand bicycles were sold at a neighbourhood swap. The prices paid, in dollars, were

$$60, \quad 75, \quad 75, \quad 90, \quad 110, \quad 120, \quad 140, \quad 150, \quad 620.$$

a) Calculate the mean price.

b) Give the median price.

c) Give the mode.

d) Which of the three best describes what a buyer typically paid that day? Justify your choice.

Measures of Dispersion

3. Two school bus routes were timed on seven mornings. The table gives how many minutes late each bus arrived.

Route 12	2	4	5	6	7	8	20
Route 19	2	3	5	9	13	17	20

a) Show that the two routes have the same range.

b) Calculate the interquartile range of each route.

c) In one sentence, say what the interquartile range tells the transport office that the range does not.

Measures of Position

4. Eleven swimmers were timed over 50 m. Their times, in seconds, in order, were

$$31,\ 33,\ 34,\ 36,\ 37,\ 39,\ 40,\ 42,\ 45,\ 48,\ 55.$$

a) Give the minimum and the maximum of the distribution.

b) Give the three quartiles.

c) Zoé swam in 42 s. Between which two of those values does her time sit, and what does that say about her place in the group?

d) The quartiles are called measures of *position* rather than measures of dispersion. Explain the difference.

Sampling Methods

5. A regional sports federation has 4500 registered players: 1800 in soccer, 1500 in hockey and 1200 in basketball. It wants to question 150 of them.

a) The federation wants each sport represented in the same proportion as in the whole membership. How many players should be drawn from each sport? Show your work and check your three numbers.

b) Name the sampling method used in a).

c) Instead, the federation lists all 4500 players, draws a random starting name among the first 30, and then takes every 30th name after it. Name that method and state how many players it selects.

Scatter Plots

6. Eight students recorded how long they practised a piece of music and how many mistakes they then made when they played it.

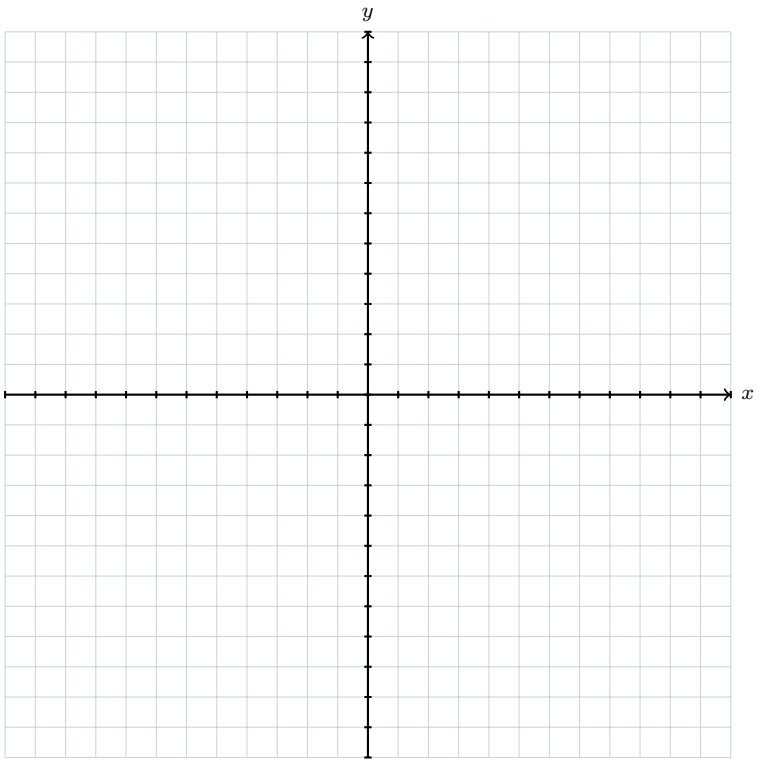
Practice (min)	5	10	15	20	25	30	35	40
Number of mistakes	11	10	9	7	6	5	3	2

On the grid below, let one square along the horizontal axis stand for 5 minutes of practice and one square along the vertical axis stand for 1 mistake. Every point belongs in the quarter above and to the right of the origin.

a) Draw the scatter plot of the eight pairs.

b) Describe the association: is it positive or negative, and is it strong or weak? Justify from the shape of your plot.

c) Using the trend of your points, estimate the number of mistakes for a student who practised 45 minutes, and say why that is only an estimate.



Tables in Statistics - Secondary 3

7. Twenty students recorded how many times they used the city bike-share in one week:

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

a) Build a table showing, for each value, the frequency and the relative frequency as a percentage.

b) Check your table two ways.

c) Give the mode and the range of the distribution.

d) What percentage of the students used the bike-share at least three times?

The Mean

8. At a robotics competition, the 12 members of team A scored a mean of 15 points each, and the 8 members of team B a mean of 20 points each.

a) How many points did each team score in total?

b) Calculate the mean score of all 20 competitors.

c) Explain why the answer to b) is not $\frac{15+20}{2} = 17.5$ points.

The Median

9. Ten pairs of second-hand skis were sold online. The prices, in dollars, were recorded in the order the sales happened:

$$145,\ 90,\ 210,\ 120,\ 175,\ 90,\ 160,\ 135,\ 200,\ 115.$$

a) Write the ten prices in order.

b) Find the median price.

c) Étienne answers \$132.50. Show exactly what he did, and say why it is wrong.

d) Find the mean price and explain why it is not equal to the median here.

The Mode

10. A bubble-tea shop asked 60 customers for their favourite flavour.

Flavour	Mango	Taro	Matcha	Lychee
Number of customers	18	11	25	6

a) Name the mode of this distribution.

b) Explain why neither a mean nor a median can be calculated here.

c) The owner may drop one flavour. Which does the data support dropping? Say also one thing the mode does *not* tell her.

The Quartiles

11. Twelve students were asked how many minutes their trip to school takes. The answers, in the order given, were

$$26,\ 12,\ 34,\ 20,\ 45,\ 18,\ 30,\ 24,\ 38,\ 16,\ 28,\ 22.$$

a) Write the twelve times in order.

b) Find Q_1, Q_2 and Q_3.

c) Calculate the interquartile range and the range.

d) How many of the twelve students have a trip between Q_1 and Q_3? Say what the interquartile range means for this group.

Synthesis — drawing on several sheets in this topic

12. Eleven classes took part in a food drive. The amounts they raised, in dollars, were

$$40,\ 55,\ 40,\ 72,\ 65,\ 90,\ 50,\ 40,\ 75,\ 60,\ 260.$$

a) Find the mean, the median and the mode.

b) Find Q_1, Q_3, the interquartile range and the range.

c) Which single number best describes what a typical class raised? Explain why the mean is misleading here, supporting your answer with a count.

d) Between which two amounts does the middle half of the classes lie, and what does comparing that width with the range show?