

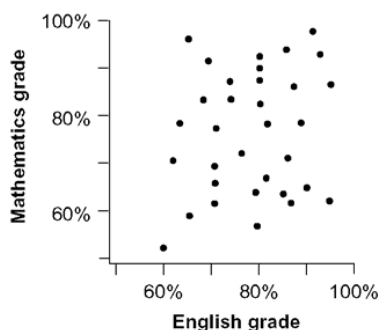
## MAP 4C Review: Statistics

There will be some **multiple choice questions** on your test covering the following definitions/concepts:

- Correlation coefficient
- One-variable and two-variable data sets
- Principles of Proper Surveying
- Interpolation and Extrapolation
- Influential points and outliers
- Types of Survey questions

### Additional Questions

1. An education researcher recorded students' grades in English and mathematics, and displayed the data in a scatter plot.



- a) Explain why a scatter plot was used to display the data.
- b) What do you know about each person?
- c) Pose a question that would require two-variable data analysis.
2. Classify the strength of the correlation given the following correlation coefficients.
- a)  $r = -0.9$
- b)  $r = 0.75$
3. Would the correlation coefficient be positive, negative, or zero for each situation? Consider the first quantity to be the independent variable in each case. Explain your answer.
- a) number of minutes with the tap running versus volume of water in a bath tub
- b) height versus grade of a science test
- c) number of songs stored versus amount of storage space remaining on the MP3 player
4. A survey included this question:  
“What is your favourite CFL team?  
A Calgary Stampeders  
B Hamilton Tiger-Cats  
C Toronto Argonauts  
D Other: \_\_\_\_\_”
- What is the problem with this question and how could it be improved?

5. Tankless or on-demand water heaters can be used to replace traditional hot water tanks. They use much less energy and take up less space. A manufacturer's Web site shows this table comparing the number of litres per minute of hot water with the power of the available heaters, in kilowatts.

Electricity (kW)	Hot Water (L/min)
12	5.2
15	6.1
20	8.3
24	10.3
29	12.5
36	15.5

- Determine an equation for the line of best fit of the data using Desmos.
  - Classify the correlation and indicate whether the line of best fit is appropriate.
  - Use the equation you found to predict the number of litres per minute of hot water for a heater with 23kW of power.
  - Use the equation you found to predict the power in kW required to provide 9.2L/min of hot water.
6. The price of entrance and the number of attendees at a theme park over several years is shown.
- Use Desmos to find the equation of the line of best fit for the relationship between Entrance fee and Number of Attendees (as in, is there a relationship between the entrance fee and the number of attendees to the park?).
  - Discuss whether a cause and effect relationship exists.

Year	Entrance Fee (\$)	Number of Attendees (100 000s)
2000	9.95	15.1
2001	10.75	16.5
2002	11.50	17.0
2003	12.00	16.5
2004	12.00	18.5
2005	12.75	18.0
2006	14.00	16.0
2007	14.50	16.0

7. Calculate the per capita value for each situation to two decimal places.
- Number of new cars sold in Ontario in 2007: 312 000.  
Ontario's population: 12 900 000.
  - Gross federal government debt in 2007: \$618 790 000 000.  
Canada's population: 33 100 000.

8. The marks, out of 50, on a math quiz are shown in the table.

Student	Mark	Student	Mark
Charlie	41	Zachary	44
Desmond	37	Omar	40
Robin	32	Jaqueline	35
Aaron	28	Sheena	38
Shannon	46	Darcy	27
Stacey	31		

c) Determine the percentile rank of each student.

i) Robin

ii) Omar

d) Which student is in each percentile?

i) 50th percentile

ii) 90th percentile

9. The final mark for a term project is determined using these weights: presentation 40%, research paper 60%. Determine the final project mark for each student.

Student	Presentation (Out of 50)	Research Paper (Out of 80)
Vanessa	39	70
Nathan	40	66
Claude	33	75
Mallory	35	63

10. Calculate the percent change for each situation.

e) Volume decreased from 7.9 L to 5.2 L.

f) Voter turnout increased from 6512 to 14 370.

11. A provincial survey was sent to randomly selected homes across Ontario. However, only 5% of the respondents were rural residents, who make up 15% of Ontario's population.

a) What type of bias does this represent?

b) What could be done to improve the response rate from rural residents?

12. Identify the bias in each situation. Suggest how to eliminate the bias.

a) A survey question asks, "Do you agree that the provincial government should invest more in infrastructure to keep our highways in great condition?"

b) Randomly selected students were asked to take part in a 15-min interview on post-secondary education. Only about 8% of the selected students agreed to participate.

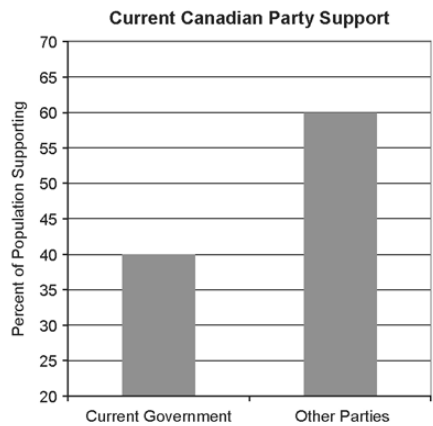
c) A researcher interviewed 50 people in a shopping mall about credit card use.

d) A police officer noticed that his radar gun was registering unusually high readings for passing cars. He tested it and found it needed to be calibrated.

13. An educational researcher discovers that levels of math anxiety are negatively correlated with attendance in math class. The researcher theorizes that poor attendance causes math anxiety. Suggest an alternate interpretation of the evidence.

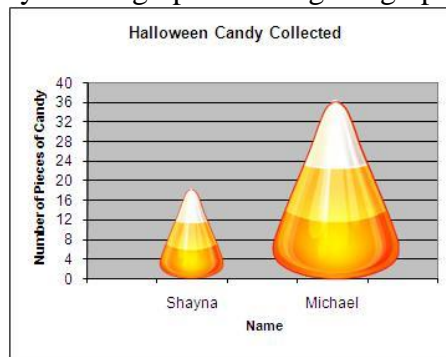
14. A student's term mark is 80. The term mark counts for 70% of the final mark. What mark must the student achieve on the exam to earn a final mark of 85?

15. A magazine presented the results of a political poll on the support for different political parties in the graph shown.



- a) What does the graph imply?
- b) What is the problem with this graph?
- c) Create a graph which better represents the data.
- d) What additional information is needed to determine which political party has the most support?

16. Michael created the following graph to compare the Halloween candy he collected when he went out with his friends compared to what his sister Shayna collected when her mom took her trick or treating. Comment on the validity of this graph. Is it a good graph or a bad graph and why?



17. For each of the following scenarios, identify the most likely type of causal relationship as cause and effect, common cause factor, accidental, presumed, or reverse cause and effect. Explain your answer.

- a. A higher number of ice cream sales on the beach corresponds to a higher number of shark attacks on swimmers.
- b. A higher term mark corresponds with a higher exam mark.
- c. As the number of stoplights installed in a town increases, the number of accidents increases.