Solutions

1. Use examples to describe similarities and/or differences between the two types of data.
   a) continuous versus discrete
   b) ordinal versus nominal
   c) numerical versus categorical

a) Continuous data is measured (length, temperature etc). It can always be given to a greater degree of accuracy if desired (as long as you have the necessary equipment). Discrete data is counted (number of goals in a game, students in a class etc)

b) These are both qualitative (not numerical). Ordinal data can be ranked (ordered) where as nominal can not. Think of ranking a cola taste test compared to type of cola preferred.

c) Numerical is quantitative and is either continuous or discrete. Categorical is qualitative. Think of number of sports played this year compared to sports you like.

2. List the different types of data.

a)

	A	B	C	D	E	F
1	Province	Height	Armspan	Handedness	Eye Colour	Fav Sport
2	Ontario	156.5	122	Right	Green	Dancing
3	Ontario	156	139	Right	Blue	Swimming
4	Ontario	163.5	163	Right	Brown	Hockey
5	.	.	.	.	.	.
6	.	.	.	.	.	.

b)

	A	B	C	D	E	F
1	Province	Number of Languages Spoken	Reaction Time	Mode of Travel	Travel Time	Number of Siblings at Home
2	Ontario	1	0.33	Bus	15	2
3	Ontario	2	0.485	Walk	10	3
4	Ontario	1	0.28	Car	25	1
5	.	.	.	.	.	.

Continuous, numerical data:
- Arm Span
- Height.

Categorical, nominal data:
- Province
- Handedness
- Eye Colour
- Favourite Sport

Continuous, numerical data:
- Reaction Time
- Travel Time.

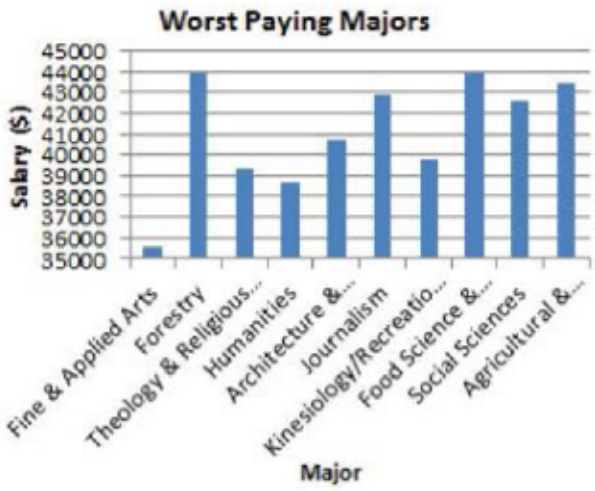
Discrete data:
- Number of Languages Spoken
- Number of Siblings.

Categorical, nominal data:
- Province
- Mode of Travel

3. In 2012, the Council of Ontario Universities published a report showing the average annual salary for different university majors two years after graduation. The table shows the 10 lowest paid majors. Create a graph that unfairly shows how poorly someone with a major in Fine and Applied Arts will be paid.

Rank	Major	Salary
1	Fine & Applied Arts	$35 539
2	Humanities	$38 696
3	Theology & Religious Vocations	$39 333
4	Kinesiology/Recreation/ Phys-Ed	$39 779
5	Architecture & Landscape Architecture	$40 733
6	Social Sciences	$42 585
7	Journalism	$42 901
8	Agricultural & Biological Services	$43 466
9	Forestry	$43 889
10	Food Science & Nutrition	$43 952

Source: 2012 Grad Survey, Council of Ontario Universities



Graph is unfair because "Salary" doesn't start at zero. It makes it **look like** there is a bigger differential than there really is.

4. A teacher creates a new blog about mathematics and statistics. She collects data showing the number of pageviews in the first few months.

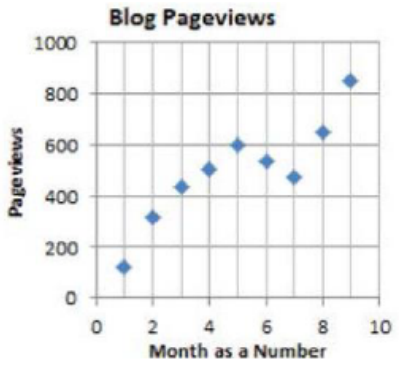
Month	Pageviews
Jan	120
Feb	315
Mar	434
Apr	502
May	596
Jun	537
Jul	472
Aug	645
Sept	848

a) Create a graph of the data.

b) What is the general trend for the traffic on this blog?

c) The graph shows a dip in pageviews. Suggest reasons why this might happen.

d) Predict the number of pageviews expected in December.



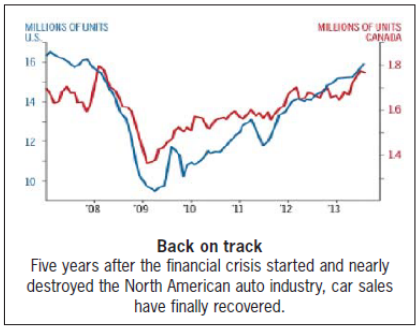
Month numbers are January = 1, February = 2 etc.

b) The trend is that, generally, there are more page views than the previous month.

c) A possible reason for a dip in June and July is there is less new info around exam time in June and school is out in July.

d) A prediction for December could go either way! The trend is the numbers are getting bigger (predict 1050ish), but the trend is also that there are less views when schools are out (700ish).

5. Consider the headline and graph from *Maclean's*:

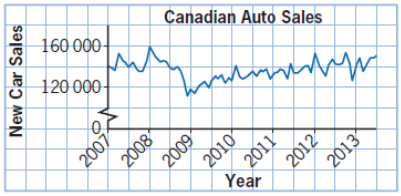


Back on track
Five years after the financial crisis started and nearly destroyed the North American auto industry, car sales have finally recovered.

Source: "Chart of the Week," *Maclean's*, September 30 2013, p. 36

a) The graph uses real data. How have the data been presented to increase impact of the statement?

b) This graph shows the same data. What is it about the original statement that this graph does not show as well?

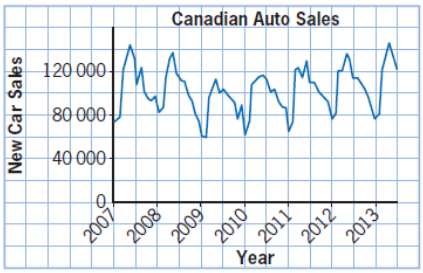


Source: CANSIM Table 079-0003, Statistics Canada, April 11, 2014

a) There are different scales on the y-axis for the US and Canada which misrepresents the data. If the Canadian axis was the same as the US scale it would appear fairly flat and therefore less varied.

b) The second graph does not show a dramatic drop or a big subsequent recovery.

6. **Thinking** The graph in #5 shows the seasonal adjusted data. This graph shows the actual number of sales.



Source: CANSIM Table 079-0003, Statistics Canada, April 11, 2014

Literacy Link

When data are *seasonally adjusted*, they are changed so that fluctuations due to seasonal factors are removed. For example, some farm workers will be unemployed during the winter months, so unemployment rates will be higher in the winter.

a) Why do you think *Maclean's* chose to show seasonally adjusted data?

b) Why do you think auto sales are compared to the same month in the previous year rather than to the previous month?

a) Using seasonally adjusted data gives the true picture and allows you to evaluate the data without the picture being hidden by seasonal figures.

b) Sales are compared to the same month for the previous year, as this allows you to analyse the data based upon weather patterns. Fewer people buy new cars in the winter. It is similar to using seasonally adjusted data.