Reflect

R1. Consider the information in the table regarding two data sets. Compare their spreads.

	Data Set 1	Data Set 2
Median	56.3	57.1
Min	32.1	24.2
Max	65.9	71.1
Q1	43.2	34.5
Q3	60.2	63.2

R2. What problems can occur if the range is used to measure the spread of a set of data?

R3. What information does the interquartile range provide?

Practise

Choose the best answer for #4 and #5.

1. Calculate the percentile rank for each student's quiz result in a grade 12 math class.

Mark	Frequency
4.0	2
5.0	6
6.0	8
7.0	13
8.0	4
9.0	3
10.0	2

2. What is the range of the data set?

23 56 45 65 59
55 62 54 85 25

3. Calculate the median, range, Q1, Q3, and interquartile range of each set of data. Identify any outliers.

a) 39 51 35 22 28 67 57
42 56 74 51 87 99 48
36 28 57 23 53 74

b) 245 264 222 213 243
215 467 264 276 199
127 216 233

c) 5 7 9 4 5 7 3 2 6
2 8 5 9 1 3 3 0 4
6 8 5 9 2 3 4 5 0
4 2 4 6 2 5 6

d) 6213 7985 3426 5134
7659 3462 5348 6213
5968 7659 3567

4. If each number in a set is increased by two, which of the measures of spread would remain unchanged?

A the range

B the interquartile range

C the percentiles

D all of the above

5. Which is an incorrect statement about the interquartile range?

A It contains the middle 50% of the data.

B An outlier lies more than 1.5 times the IQR from Q1 or Q3.

C To calculate the interquartile range, subtract Q3 – Q1.

D The median always lies at the middle of the interquartile range.

Apply

Use the table for #6 to #8.

The infant mortality rate represents the number of children, per thousand, who die before the age of one year.

Infant Mortality Rates by Province and Territory					
	2007	2008	2009	2010	2011
Newfoundland and Labrador	7.5	5.1	6.3	5.3	6.3
Prince Edward Island	5.0	2.0	3.4	3.6	4.2
Nova Scotia	3.3	3.5	3.4	4.6	4.9
New Brunswick	4.3	3.2	5.8	3.4	3.5
Québec	4.5	4.3	4.4	5.0	4.3
Ontario	5.2	5.3	5.0	5.0	4.6
Manitoba	7.3	6.5	6.3	6.7	7.7
Saskatchewan	5.8	6.2	6.7	5.9	6.7
Alberta	6.0	6.2	5.5	5.9	5.3
British Columbia	4.0	3.7	3.6	3.8	3.8
Yukon	8.5	5.4	7.8	5.2	0.0
Northwest Territories	4.1	9.7	15.5	1.4	7.2
Nunavut	15.1	16.1	14.8	14.5	26.3
Canada	5.1	5.1	4.9	5.0	4.8

Source: Infant mortality rates, by province and territory (both sexes), Statistics Canada.

6. a) Rank the provinces in ascending order by their 2011 infant mortality rates.

b) Determine the percentile ranks for five provinces or territories of your choice.

7. a) Determine the median and interquartile range for the infant mortality rate in each year.

b) Compare these measures across the years.

c) Why would the medians not be the same as the mortality rate for all of Canada?

8. a) Are the 2011 mortality rates for Yukon and Nunavut outliers?

b) Explain the variability of the mortality rates in Yukon, Northwest Territories, and Nunavut as compared to Ontario.

9. Application The table shows the size of each age group in Canada in 2009 and 2013.

Population of Canada by Age Group		
Age Group (years)	2009	2013
All Ages	33 628 571	35 158 304
0 to 10	3 626 272	3 804 924
10 to 20	4 253 528	4 048 205
20 to 30	4 608 623	4 855 939
30 to 40	4 534 301	4 762 084
40 to 50	5 251 373	4 940 356
50 to 60	4 798 598	5 256 870
60 to 70	3 299 618	3 857 403
70 to 80	1 994 853	2 202 364
80 to 90	1 075 522	1 181 124
90 to 100	180 409	242 124
100 or over	5 474	6 911

Source: Estimates of population, by age group and sex for July 1, Canada, provinces and territories, annual, Statistics Canada.

a) Rank the age groups in ascending order by size for each year. Calculate the percentile rank for three different age groups in each year.

b) Describe the changes in population breakdown from 2009 to 2013.

10. Communication The table shows the average net worth of Canadian families, as a percent of total, in 1999 and 2005.

	Net Worth (% of total)	
Quintile	1999	2005
1st	0.1	0.1
2nd	2.5	2.3
3rd	8.8	8.4
4th	20.1	20.2
5th	68.5	69.2

Source: Drummond, Don and David Tulk, "Lifestyles of the Rich and Unequal: An Investigation Into Wealth Inequality in Canada," TD Economics Special Report, December 13, 2006.

a) Describe what is meant by quintile.

b) Describe the change in distribution of incomes from 1999 to 2005.

Achievement Check

11. A consumers group recently tested 100 compact fluorescent light bulbs and recorded their lifetimes. The chart shows the results.

Lifetime (h)	Frequency
5000–6000	7
6000–7000	12
7000–8000	34
8000–9000	27
9000–10 000	10
10 000–11 000	8
11 000–12 000	2

a) Make a box and whisker plot of the data.

b) Make a histogram of the data and mark the quartiles on it.

c) Describe the middle 50% of the data.

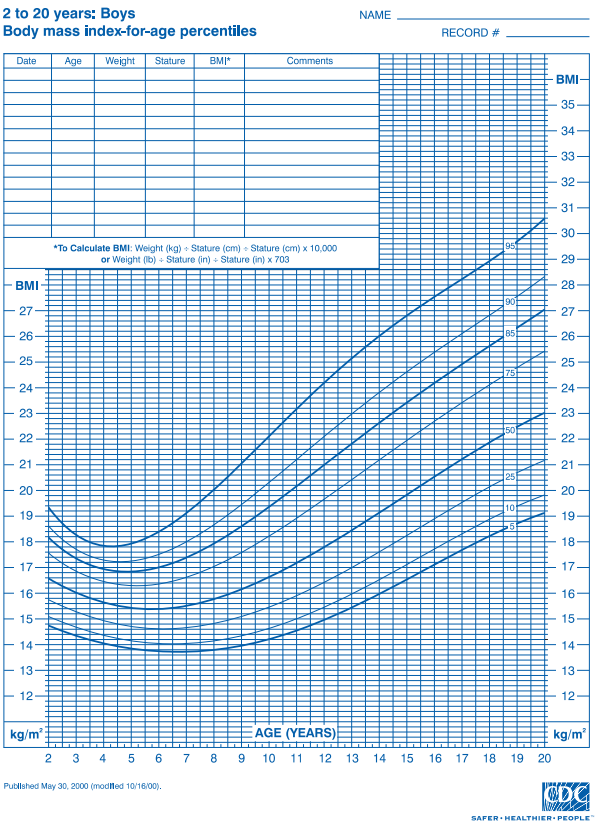
d) Identify any outliers.

12. Agencies track airline flight delays to help consumers compare airlines. The table outlines the number of delayed flights per month for one major airline. Determine whether December's results are an outlier. If so, what might have caused it?

Month	Number of Delayed Flights
Jan	288
Feb	295
Mar	274
Apr	280
May	246
Jun	251
Jul	218
Aug	221
Sep	246
Oct	264
Nov	257
Dec	459

Extend

13. Your teacher will provide you with a file that shows the percentiles for body mass index of boys ages 2 to 20.



Source: National Center for Health Statistics and National Center for Chronic Disease Prevention and Health Promotion, "2 to 20 years: Boys Body mass index–for–age–percentiles," CDC, May 30, 2000.

a) Describe how to use this chart.

b) Make an accompanying table listing the body mass index values for ages 2, 10, and 20, organized by percentiles.

14. An alternate method of calculating Q1 and Q3 is to use the midpoints of the median and the minimum value and the median and the maximum value, respectively. Use any set of data in the questions above to verify that this method works.