Get Ready

Work With Sets of Numbers

It is helpful to be able to visualize numbers when solving problems.

A set of three different whole numbers is ordered from smallest to largest. The sum of the smallest and largest numbers is 13. The middle number is odd. The smallest number is 5. What are the three numbers?

Make a diagram to help solve this problem:

Draw a space for each number.
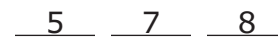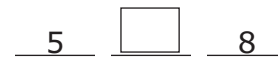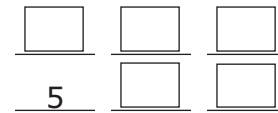
The smallest number is 5.

The sum of the smallest and largest numbers is 13.

So, the largest number is $13 - 5 = 8$.

Since the numbers are ordered from smallest to largest and the numbers are all different, the middle number is 6 or 7. The middle number must be odd. So, it must be 7.

The three numbers are 5, 7, and 8.

1. In a set of three different whole numbers, the largest number is 10. The sum of the smallest and largest number is 18. What are the three numbers?

2. The following numbers of cell phones were sold from Monday to Friday at a local phone store:
   32, 37, 24, 26, 33

   a) Arrange the numbers from smallest to largest.

   b) Subtract the smallest number from the largest number. What is the difference?

c) What is the sum of the five numbers?

3. In an international snowboarding Big Air competition, Canadian Neil Connolly finished sixth. Five judges gave him the following scores out of ten:
   8.0, 7.5, 7.0, 7.9, 8.1

   a) Arrange the scores in order from lowest to highest.

   b) In the competition, the highest and lowest scores are removed. Why do you think this is done? What is the sum of the remaining three scores?

Frequency Tables

A **frequency table** is used to organize survey or experimental data.

4. The number of siblings for each student in Kim's class is recorded below.

```
2 5 0 4 2 3
2 0 0 3 2 1
0 5 3 0 5 1
1 5 2 1 6 6
4 3 7 3 7 2
```

a) Organize the responses from the 30 students in the frequency table.

b) Circle the most likely number of siblings in a family. Box the least likely number of siblings in a family.

Number of Siblings	Tally	Frequency
0	ⷧⷧ	5
1		
2		
3		
4		
5		
6		
7		

5. Conduct a similar survey of the students in your class. Are the results similar to the given data? Explain.

Interpret Data in Tables

A table is a useful way to display and organize large quantities of data.

6. The following table shows the percent of Canada's Aboriginal people who live in each of the ten provinces.

Province	Percent	Province	Percent
Newfoundland and Labrador	1.9%	New Brunswick	1.7%
Nova Scotia	1.7%	Prince Edward Island	0.1%
Québec	8.1%	Ontario	19.3%
Manitoba	15.4%	Saskatche-wan	13.3%
Alberta	16.0%	British Columbia	17.4%

a) Circle the province in which the smallest percent of Aboriginal people live.

b) Underline the two provinces that contain the same percent of Canada's Aboriginal people.

c) What is the sum of the percents in the table?

d) The answer to part c) is less than 100%. The remaining Aboriginal people live in the three territories. What percent of Canada's Aboriginal people live in the three territories? Show your thinking.

12.1 Median and Mode

MathLinks 7, pp. 422–427

Key Ideas Review

Match each set of numbers in column B to a statement in column A. Each set can be used only once.

A	B
1. The mode is the most frequently occurring number in a set of data. _____	**a)** 4 6 ⑩ 11 12
2. If no number repeats, there is no mode._____	**b)** ①① ②②3
3. A bimodal number set has more than one mode. _____	**c)** 2 4 7 9 15
4. The median is the middle value in a set of data, after the numbers have been put in order. _____	**d)** 2 4 6 13 ⑮⑮
5. The median does not have to be a number in the set of data. For example, if there is an even set of numbers, then the median is the value halfway between the two middle numbers. _____	**e)** 10 20 30 40 ↑ 25

Practise and Apply

6. What are the median and mode of each set of data? Show your thinking.

a) 7, 4, 7, 2, 5

b) 18, 16, 12, 9, 14, 18

7. Determine the median and mode of each set of data. Show your thinking.

a) 3, 10, 12, 5, 11, 3, 9

b) 24, 17, 20, 19, 16

8. A shoe store restocks its shelves at the beginning of every week. The table shows how many pairs of shoes in each category were restocked this week.

Shoe Price	Number of Pairs Restocked
$5	7
$7	8
$8	6
$10	7
$12	5
$20	2

a) What is the mode? Show your thinking.

b) What is the median? Show your thinking.

9. Tia is analyzing her soccer team's performance. Her team scored the following goals during the first half of the season:
2, 4, 6, 2, 4, 7, 4, 5, 1, 0, 9

a) What is the mode for the goals scored? Show your thinking.

b) What is the median? Show your thinking.

10. This chart shows the ages of people at a movie theatre at 7 p.m.

Ages (Yrs)	Number of People
13	2
15	4
19	3
20	4
30	6

a) What is the mode of the ages? Show your thinking.

b) What is the median age? Show your thinking.

c) Show one way you can change the set of ages to get the same mode and median.

11. What is one possible set of five numbers that has the same mode and median?

12.2 Mean

MathLinks 7, pp. 428–433

Key Ideas Review

1. Circle the correct response to complete each statement.

a) To calculate the mean, (add/subtract) all of the numbers in a set of data and then (divide/multiply) by the number of numbers.

b) The mean (does/does not) have to be a number in the set of data.

2. To find the mean of 27, 8, 6, 9, 14, 37, add the numbers, then divide by

_____ .

Practise and Apply

3. What is the mean for each set of data? Show your work.

a) 2, 5, 8, 9, 6

b) 1.5, 1.8, 2.4, 1.9, 2.6, 1.8

c) 50, 65, 84, 42, 90, 110, 81, 78

4. Determine the mean for each set of data. Show your work.

a) 6, 15, 9, 10, 8, 6

b) 5.1, 2.7, 3.4, 2.5, 1.9, 1.8, 1.3, 1.3

c) 95, 105, 100, 90, 85, 102, 88

5. Eva records the length of time she listens to her MP3 player each day. What is the mean amount of time over these five days? Show your work. Listening time in minutes: 25, 30, 32, 45, 28

6. Jordan Junior High's boys' basketball team has the record for the highest number of steals in a basketball game. Their steals for the season are: 6, 3, 10, 4, 22, 8, 9, 15, 4

a) What is the mean number of steals? Show your work.

b) If they want their mean to increase by 1 steal, how many steals do they need to get during the next game? Show your thinking.

7. This year, Shantal used a graph to record the precipitation in her town each month.

Monthly Precipitation
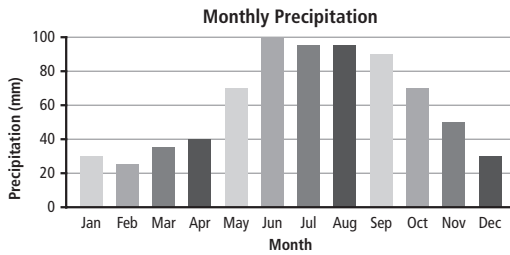
a) What is the total amount of precipitation for the year?

b) What is the mean monthly precipitation? Show your thinking.

c) How many months had less than the mean amount of precipitation?

8. For one month, Steve records the time he spends studying each week.

Week	Hours of Studying
1	3.5
2	4.0
3	5.0
4	4.5

a) What is the mean number of hours he studied each week? Show your work.

b) For one week, record how many hours a day you study.

Day	Hours of Studying
Monday	
Tuesday	
Wednesday	
Thursday	
Friday	

c) What is the mean number of hours you studied each day? Show your work.

d) If you study for 2 hours on the weekend, what will your mean be for the week? Show your work.

12.3 Range and Outliers

MathLinks 7, pp. 434–439

Key Ideas Review

Choose from the following terms to complete the sentences below.

| data set | highest | lowest | outliers | range | spread |

1. a) The _____ provides information about the

_____ of the data.

b) Range = _____ value − _____ value

2. a) _____ are values that are very different from the rest of the numbers in a set of data.

b) A _____ may have no outliers, or it may have one or more outliers.

Practise and Apply

3. What is the range of each set of data? Show your work.

a) 18, 10, 7, 6, 11, 4, 15, 3, 20

b) −1, 9, 5, −2, 11, 4, 6

c) 15, 9, 7, 10, 8, 18, 6, 19

4. Determine the range of each set of data. Show your work.

a) 5, −2, 3, 0, 7, −4

b) 22, 9, 11, 25, 18, 12, 20, 6

5. Circle the value(s) that appear to be outliers in each set of data.

a) 9, 15, 6, 150, 11, 10, 5

b) 25, 32, 1, 27, 35, 75, 30, 28

c) 1, 3, 6, 22, 5, 4, 2

6. In a Rubik's Cube contest, competitors are timed solving the puzzle. The following times were recorded, in seconds: 17.5, 16.4, 19.0, 18.0, 16.5, 17.2, 91.0, 19.5, 18.0, 16.7

a) What is the range? Show your work.
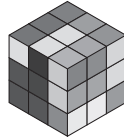
b) Which value may be an outlier?

7. Every year, Kim records the date when the ice breaks up on the lake in his town.

Year	Date (April)
1998	1
1999	1
2000	25
2001	7
2002	9
2003	15
2004	1
2005	7
2006	10
2007	1

a) Circle the latest day in April for the ice breakup.

b) Box the earliest day in April for the ice breakup.

c) What is the range?

8. The table shows record snowfall for several Canadian locations.

Location	Snowfall (cm)
Halifax, NS	31
Moncton, NB	52
Montreal, QC	41
Toronto, ON	48
Val Marie, SK	46
Terrace-Kitimat, BC	113

a) What is the range?

b) Circle the snowfall record that may be an outlier.

c) Why might this amount be so different from the others?

12.4 The Effects of Outliers

MathLinks 7, pp. 440–445

Key Ideas Review

1. Decide whether each of the following statements is true or false. Circle the word *True* or *False*. If the statement is false, rewrite it to make it true.

   a) **True/False** Outliers never affect measures of central tendency.

   _____

   _____

   b) **True/False** When a small set of data has an outlier, the outlier usually affects the mean more than the median.

   _____

   _____

   c) **True/False** It is always best to remove outliers from the data.

   _____

   _____

   _____

Practise and Apply

2. Marshal recorded the ages his relatives were when they got their driver's license: 16, 20, 35, 16, 16, 21, 16, 19, 17, 18

   a) What is the age range? Show your work.

   b) What are the median and mean? Show your work.

   c) Circle any possible outliers. Should the outlier be removed from the data? Explain why or why not.

3. The table shows the number of spoons of sugar contained in various beverages.

Beverage	Spoons of Sugar
Water	0
Vegetable juice	6
Sports drink	9
Soda pop	17
Super-sized pop	28

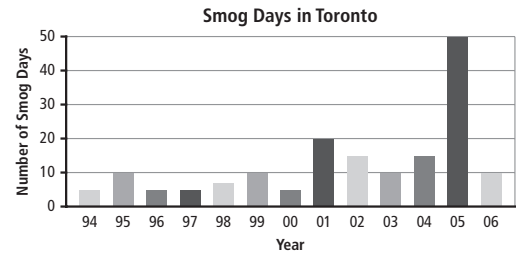   Circle any possible outliers. Should the outlier(s) be removed from the data? Explain why or why not.

4. Tyrone did a fitness test every month in gym class. His scores are as follows: 3.5, 4.0, 3.0, 5.0, 4.5, 0.5, 5.0, 4.5

a) What is the range? Show your work.

b) What are the median and mean? Show your thinking.

c) List any possible outliers. Should the outlier(s) be removed from the data? Explain why or why not.

d) How would removing the outlier affect the median and the mean? Show your thinking.

e) If Tyrone scores 1.0 on his next test, would this change your answer to part c)? Explain.

5. The city of Toronto created the following bar graph to track the number of smog days in the city over time.

Smog Days in Toronto

a) What is the range? Show your work.

b) What are the median and mean? Show your thinking.

c) List any possible outliers. Should the outlier(s) be removed from the data? Explain why or why not.

d) How would removing the outlier affect the median and the mean? Show your thinking.

12.5 Choose the Best Measure of Central Tendency

MathLinks 7, pp. 446–451

Key Ideas Review

1. Identify the best measure of central tendency for each example.

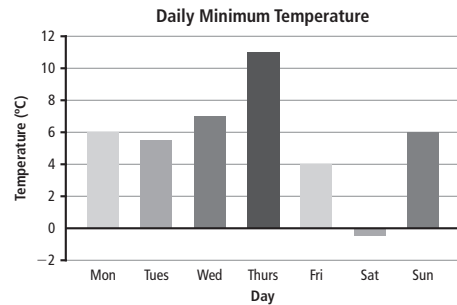   a) frequency of clothing choice:

   _____

   | 5 | 6 | 10 |

   b) technical performance scores:

   _____ or _____

1	2	3	4	5	6	7
5.9	5.8	5.8	5.8	5.9	5.7	5.9

   c) daily minimum temperature this week:

   _____

   Daily Minimum Temperature

Practise and Apply

2. Rachel's class is having a book drive to raise money. Everyone brings in old books to sell. The comic books are piled in seven stacks. They have the following numbers of comics: 4, 16, 17, 13, 4, 18, 15

   a) What are the mean, median, and mode of the stacks? Where necessary, round your answers to the nearest hundredth.

   b) Which measure of central tendency best represents the data? Explain why.

3. Juan scored the following marks out of 10 on quizzes for the last unit: 6, 7, 8, 5, 9, 10, 10, 2, 10, 8

a) What are the mean, median, and mode?

b) Which measure of central tendency best represents Juan's marks? Why?

c) What could be a reason for Juan's lowest mark?

4. Martina keeps track of tickets sold for each show at the theatre where she works. So far, her table shows the following data:

Show	Number of Tickets
Music Concert	288
Broadway Musical	300
Dance Troupe	250
Theatre Play	75
Baseball Game	288

a) What are the mean, median, and mode? Show your work.

b) Which measure of central tendency best describes this data set? Explain why.

5. Each class records the number of books students read during the month. The chart shows this month's data.

Class	7A	7B	8A	8B	9A	9B
Books	12	15	22	20	30	22

a) Which grade read the most books? Show your thinking.

b) What is the mean number of books read by each grade? Show your work.

c) Calculate the mean, median, and mode for all the classes together. Show your work. Where necessary, round your answers to the nearest hundredth.

d) Which measure of central tendency is closest to the total number of books read by one class? Explain why.

Link It Together

New product design often starts by researching existing products and how consumers use them. To support your business plan to create a new MP3 player, you are doing market research about the players already in use.

1. Survey ten people who own MP3 players. For each person, fill in all the data on the chart.

	Number of Songs	Number of Play Lists	Brand of Player
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

2. Analyze the data for Number of Songs and Number of Play Lists.

    a) What are the range, mean, median, and mode? Show your work.

    b) Circle any possible outliers. Should the outlier(s) be removed? Explain why or why not.

    c) For each set of data, highlight the best measure of central tendency. Explain your choices.

3. The Brand of Player data consists of names, not numbers. Can measures of central tendency be applied to such data? Explain why or why not.

Vocabulary Link

This diagram contains the clues to help you complete the crossword puzzle. Label each feature of this data set with a key term from Chapter 12, then complete the crossword puzzle.

2. _____

1. _____

5. _____

3. measures of central _____

6. _____

(15.6)

⑤   14   14   15   ⑯   17   18   20   22

⑰   **4.** _____