

Creating and Analyzing a Survey

Goal Collect, organize, and display the results of a survey.

Trudy wants to know about TV-watching habits of students in her school. She wrote a question for a survey.

1. How often do you watch TV?
 - a) never
 - b) once or twice a week
 - c) three times a week
 - d) more than three times a week
 - e) every day

1. What is another survey question Trudy could ask?

Suggested answer:

Question 2: What time of day do you watch TV?

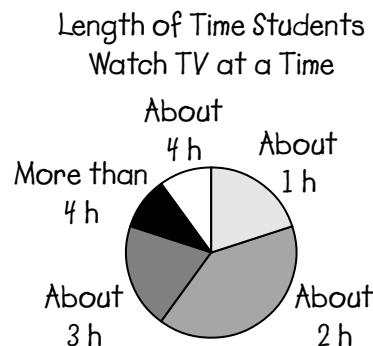
- a) morning
- b) midday
- c) afternoon
- d) evening
- e) late at night

2. Trudy asked the students in her school for how long they watch TV at any one time. She recorded the results in a tally chart.

About 1 h	About 2 h	About 3 h	About 4 h	More than 4 h
	++++			

Sketch a graph to display the results.

Suggested answer:



3. Explain why you chose the kind of graph you did.

Suggested answer: I chose a circle graph because I wanted to show how the possible answers for the survey question compared to each other and to the whole. The circle represents the total number of students surveyed.

At-Home Help

A **survey** is a list of questions to ask a group of people. The purpose of a survey is to learn specific information about a topic.

Remember to survey an appropriate group of people and a large enough number of people.

Survey questions should be worded so that you can get meaningful answers from people.

Do not use questions that give “yes” or “no” answers.

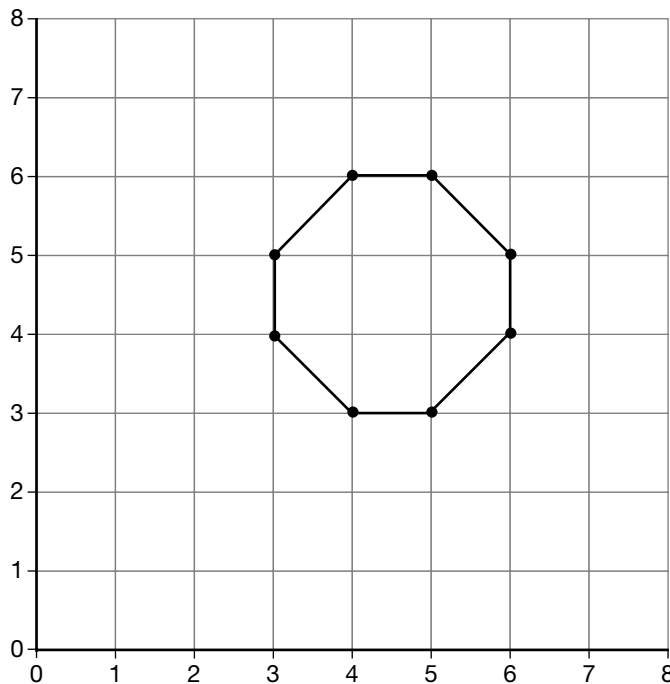
Survey results are usually collected using tally charts. You can display survey results on a graph.

Plotting Coordinate Pairs

Goal Plot points on a grid and locate them using coordinate pairs.

Yuri is plotting the shape of a stop sign he saw on a street.

- Plot the points $(3, 4)$, $(3, 5)$, $(4, 6)$, and $(5, 6)$ on the grid. Connect the points in order.

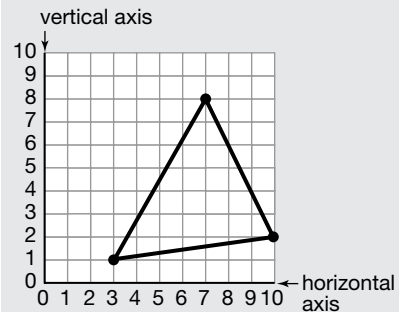


- Draw the rest of the sign on the grid above.
- What coordinate pairs did you use to complete the sign?
 $(6, 5)$, $(6, 4)$, $(5, 3)$, and $(4, 3)$
- What shape is the sign?
an octagon

At-Home Help

A **coordinate grid** is a grid with each horizontal line and vertical line numbered in order. A **coordinate pair** identifies a location on a coordinate grid. Each pair describes where a vertical line and a horizontal line meet. The coordinate from the horizontal axis is always written first.

For example, the vertices of the triangle below have coordinates $(3, 1)$, $(7, 8)$, and $(10, 2)$.



Line Graphs

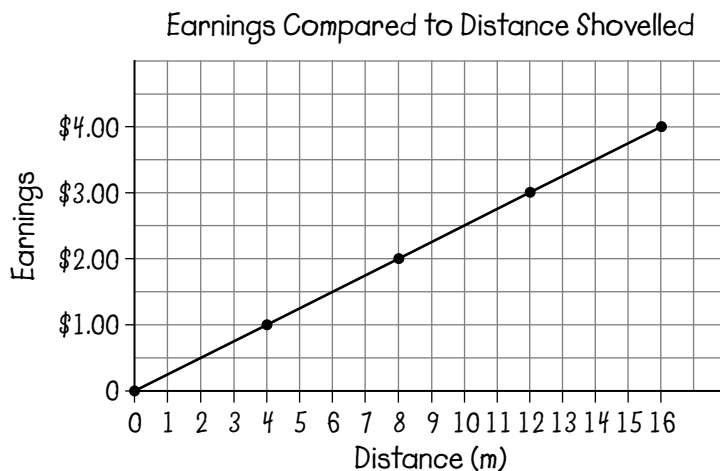
Goal Create and interpret line graphs.

1. Sui earns money shovelling snow from his neighbour's sidewalk. He wants to know the length of sidewalk he must shovel to earn \$5.00. He recorded the distance he shovelled and how much he earned.

Distance (m)	4	8	12	16
Earnings	\$1.00	\$2.00	\$3.00	\$4.00

- a) Use the data in the table to create a graph.

Suggested answer:



- b) Describe how your graph appears.

Suggested answer: The graph is a straight line that shows earnings going up with distance.

- c) Estimate how much Sui earns for a distance of 8.3 m.

about \$2.10

- d) Predict the distance Sui must shovel to earn \$5.00. Explain your reasoning.

20 m

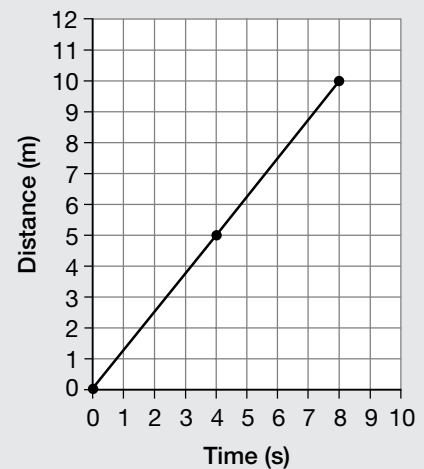
Suggested answer: Sui earns \$2.00 when he shovels 8 m. He earns \$3.00 when he shovels 12 m. So to earn \$5.00, he must shovel $8\text{ m} + 12\text{ m} = 20\text{ m}$.

At-Home Help

A **line graph** is a graph of a line through points. This type of graph shows how the change in one value is related to a change in another value.

For example, the graph below is a line graph showing the distance a bicycle travels over time.

Distance Bicycle Travels Over Time



To predict how far the bicycle will travel in 20 s, you can either extend the graph or use estimation. It takes 4 s for the bicycle to travel 5 m. So in 20 s the bicycle will travel about 25 m.

Scatter Plots

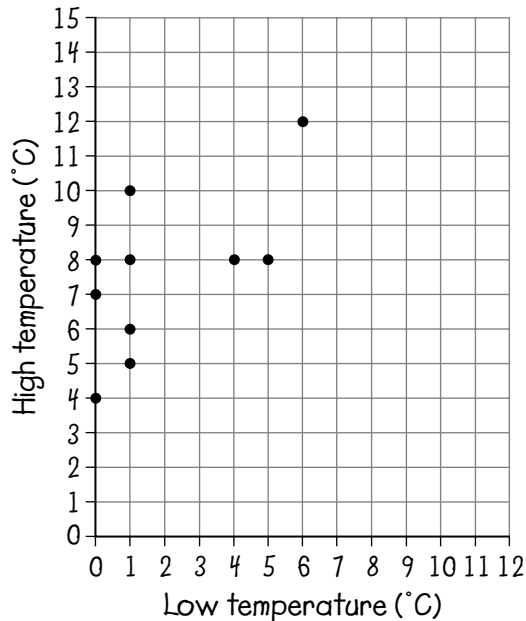
Goal Create and interpret scatter plots.

The table below shows the low and high daily temperatures in Victoria, British Columbia, for two weeks.

Day	Low temperature (°C)	High temperature (°C)	Day	Low temperature (°C)	High temperature (°C)
Dec. 19	6	12	Dec. 26	5	8
Dec. 20	1	10	Dec. 27	1	8
Dec. 21	1	10	Dec. 28	0	7
Dec. 22	0	8	Dec. 29	1	5
Dec. 23	0	7	Dec. 30	4	8
Dec. 24	4	8	Dec. 31	1	6
Dec. 25	5	8	Jan. 1	0	4

1. Compare the high and low temperatures. Use a scatter plot. High Temperatures Compared to Low Temperatures

Suggested answer:



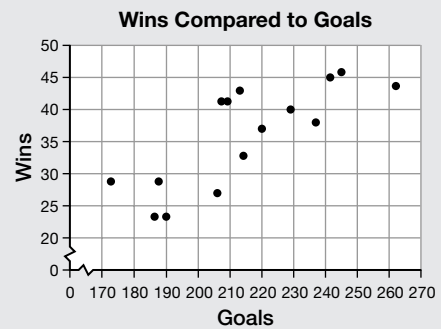
2. Describe how the points appear on the scatter plot. Identify the most common low and high temperatures.

Suggested answer: Most of the points are near the middle left of the scatter plot. The most common low temperature is 1°C because it appears five times in the data. The most common high temperature is 8°C because it appears six times in the data.

At-Home Help

A **scatter plot** is a graph made by plotting coordinate pairs to show if one set of data can be used to make predictions about another set of data.

For example, the goals and wins of several hockey teams are plotted on the scatter plot below.



Each point on this scatter plot is determined using the goals for the first coordinate and the wins for the second coordinate. If a team scored 262 goals and had 43 wins, you would plot the point (262, 43) on the scatter plot.

Mean and Median

Goal Use mean and median to compare sets of data.

- Determine the mean and median of each set of numbers.
 - 8, 0, 2, 7, 1, 7, 3 mean: 4 median: 3
 - 2, 3, 6, 0, 0, 1, 1 mean: 1.9 median: 1
 - 7, 0, 9, 0 mean: 4 median: 3.5
 - 18, 11, 22, 9, 5, 0 mean: 9.2 median: 10
- Zoë recorded how long each of her friends walked on two days.

Student	Time on day 1 (min)	Time on day 2 (min)
Clara	20	25
Jose	10	9
Tia	15	18
Nicolas	8	20
Mario	18	19
Tim	5	17
Leah	12	8

- Determine the median time for each day.

Day 1 mean: 12.7 min, median: 12 min
Day 2 mean: 16.6 min, median: 18 min
 - On which day did the most walking occur?
day 2
- Sara said that the median does not have to be one of the numbers in a set. Is her statement correct? Explain.

Suggested answer: Yes. If the median is not in a set of numbers, it must be between the two numbers in the middle. The median cannot be less than the least value in a set. Also, the median cannot be greater than the greatest value in a set.

At-Home Help

The **median** is the middle number in a set of numbers arranged in order.

For example, the median of 4, 5, 2, 3, 4 is 4.

2 3 **4** 4 5

If the set has an even number of items, the median is halfway between the two middle numbers.

For example, in the set 3, 2, 7, 8, 9, 11, the median is halfway between 7 and 8.

2 3 7 8 9 11
 7.5

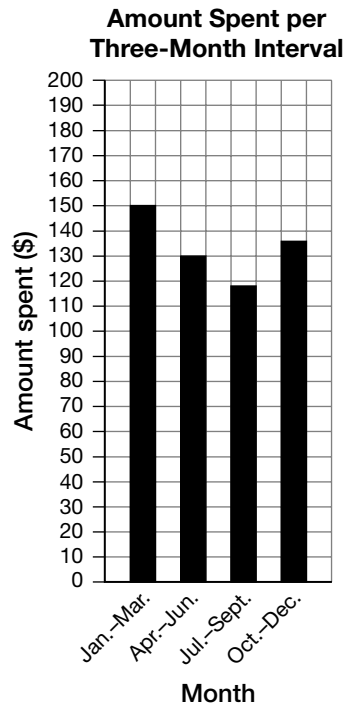
The **mean** is the sum of a set of numbers divided by the number of numbers in the set. For example, the mean of 3, 4, 5, 2, 2, 3, 2 is $21 \div 7 = 3$.

Changing the Intervals on a Graph

Goal Describe how changing the number of intervals changes a graph.

Jinji recorded how much his family spent at restaurants during the last year. He sketched a graph of his data.

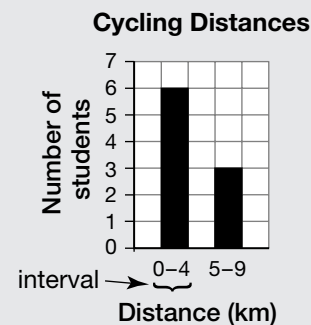
Month	Amount
Jan.	\$40
Feb.	\$80
Mar.	\$30
Apr.	\$64
May	\$31
Jun.	\$35
Jul.	\$45
Aug.	\$46
Sept.	\$28
Oct.	\$48
Nov.	\$30
Dec.	\$60



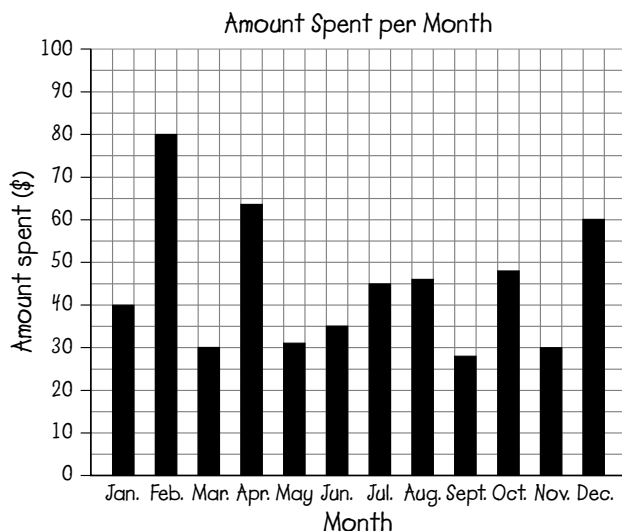
At-Home Help

An **interval** is the distance between two endpoints on a graph scale. All intervals should be the same size.

For example: Six students cycled between 0 and 4 km, and three students cycled between 5 and 9 km. The intervals on the graph are 0–4 and 5–9.



1. Graph Jinji's data.
Use one-month intervals.



2. Describe the difference between Jinji's graph and your graph.

Suggested answer:

On my graph, three of the bars are about the same height.

On my graph, you can see the amount spent each month.

The amount spent each month cannot be determined from Jinji's graph.

Changing the Scale on a Graph

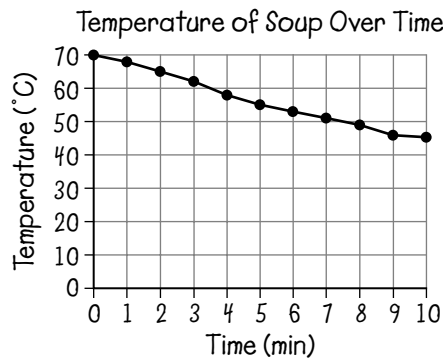
Goal Describe how changing the scale changes a line graph.

Charmaine wants to know how fast a bowl of hot soup cools. She measured the temperature of the soup every minute.

Time (min)	0	1	2	3	4	5	6	7	8	9	10
Temperature (°C)	70	68	65	62	58	55	53	51	49	46	45

1. Sketch a line graph of Charmaine's data.

Suggested answer:



2. What scale did you use for the vertical axis?

Suggested answer: 0–70°C increasing by 10°C

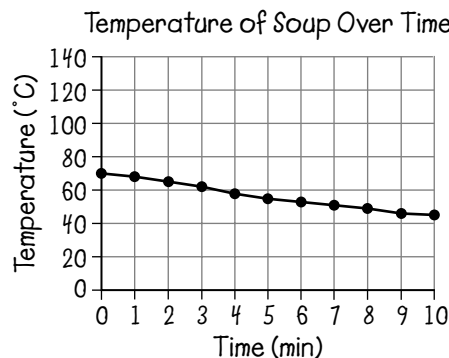
What scale did you use for the horizontal axis?

Suggested answer: 0–10 min increasing by 1 min

3. Predict how your graph in Question 1 would change if you doubled the value of each unit on the scale of the vertical axis. Sketch the line graph to check your prediction.

The graph will not go down as suddenly as in Question 1.

Suggested answer:



At-Home Help

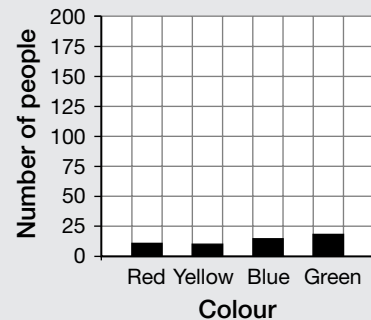
The **scale** of a bar or line graph refers to the numbers on the vertical and horizontal axes.

The scale of a graph can affect the appearance of data.

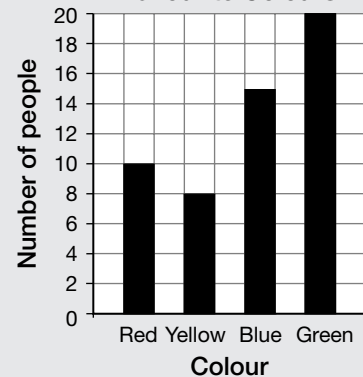
For example: On the first graph, the scale of the vertical axis goes from 0 to 200. There isn't much difference between the bars.

On the second graph, the scale of the vertical axis goes from 0 to 20. There is an obvious difference between the bars.

Favourite Colours



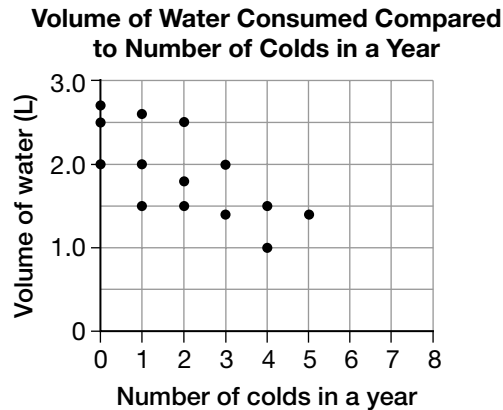
Favourite Colours



Communicate About Conclusions from Data Displays

Goal Use data presented in tables, charts, and graphs to create an argument.

1. A newspaper printed this scatter plot with the headline “Drinking More Water Means Fewer Colds.”



Write a letter to the editor about the headline and the scatter plot. Use the Communication Checklist

Suggested answer:

Dear Editor, The points at the top left of the scatter plot show that the people who drank 1.5 L of water or more had fewer colds. The points at the bottom right show that the people who drank less than 1.5 L of water had more colds. The problem with these conclusions is that people who drank 2.0 L or 1.5 L of water had anywhere from 1 to 4 colds. Also, there are not enough data points so you can't draw accurate conclusions. There are many factors that affect a person getting a cold. You can't conclude that there is a clear relationship between volume of water drunk and number of colds from the scatter plot.

At-Home Help

To determine if a conclusion drawn about a table, chart, or graph is true

- carefully check the scale and intervals on the graph
- look at what types of data are being compared, for example, temperature compared to time
- ask yourself if there is a clear relationship between the types of data

For example, comparing the heights of Grade 6 students to the distance they walk to school makes no sense. Comparing the heights of Grade 6 students to the length of one stride makes sense.

When creating an argument, use the Communication Checklist to help you state your observations and conclusions.

Communication Checklist

- Did you explain your thinking?
- Did you include enough detail?
- Did you use correct math language?
- Does your argument make sense?

Constructing Graphic Organizers

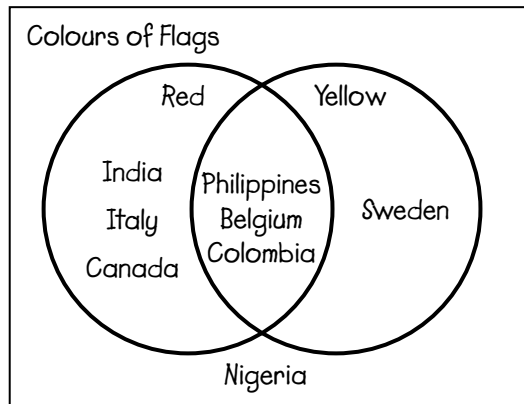
Goal

Use Venn diagrams and Carroll diagrams to describe relationships between two sets of data.

Monique wants to know if many countries have both yellow and red on their flags.

Country	Colours on flag
Nigeria	green, white
India	orange, white, red, blue
Philippines	yellow, red, white, blue
Belgium	black, yellow, red
Sweden	blue, yellow
Italy	green, white, red
Canada	red, white
Colombia	yellow, blue, red

- Draw a Venn diagram to sort the countries by flag colour.



- Which countries have both yellow and red on their flags?
Philippines, Belgium, and Colombia
- Which country does not have yellow or red?
Nigeria

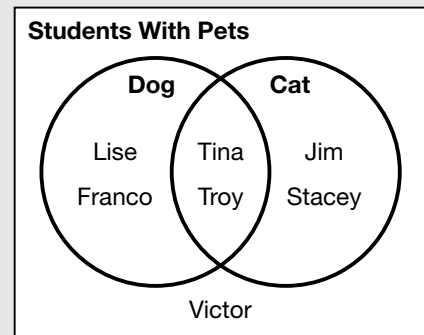
- Use the data in the chart above to complete the Carroll diagram.

	1 or 2 colours	More than 2 colours
Red	Canada	India, Philippines, Belgium, Italy, Colombia
Yellow	Sweden	Philippines, Belgium, Colombia

At-Home Help

A **Venn diagram** is a drawing with circles inside a rectangle. This type of diagram is helpful when sorting items in a set.

For example, in the Venn diagram below, one circle represents “Dog” and the other circle represents “Cat.” Students who have both a dog and a cat are listed where the circles overlap. Since Victor does not have a dog or a cat, his name is listed outside the circles but inside the rectangle.



A **Carroll diagram** is a chart that shows relationships using rows and columns.

For example, a Carroll diagram for the data shown in the Venn diagram above would be

	Boy	Girl
Dog	Franco, Troy	Lise, Tina
Cat	Jim, Troy	Stacey, Tina

Test Yourself Page 1

Circle the correct answer.

1. Mia surveyed 20 students to find out how many hours they surf the Internet each week.

Survey results				
2	5	4	10	5
8	1	3	4	6
7	5	2	3	6
9	3	4	6	7

Which tally chart best represents Mia's data?

A.

Hours	Number of students
0-2 h	
3-4 h	+++
5-6 h	+++
7-8 h	
9-10 h	

C.

Hours	Number of students
0-2 h	
3-4 h	+++
5-6 h	+++
7-8 h	
9-10 h	

B.

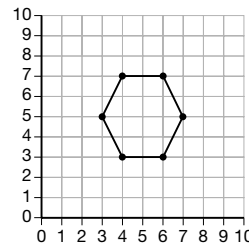
Hours	Number of students
0-5 h	+++ +++
6-10 h	+++

D.

Hours	Number of students
0-5 h	+++ +++
6-10 h	+++ +++

2. Which coordinates describe the shape to the right?

- A. (3, 4), (5, 7), (3, 6), (5, 3), (7, 4), and (7, 6)
B. (4, 3), (7, 5), (6, 3), (3, 5), (4, 7), and (6, 7)
 C. (4, 4), (6, 4), (7, 5), (3, 5), (4, 8), and (6, 8)
 D. (4, 4), (4, 6), (5, 7), (5, 3), (8, 4), and (8, 6)



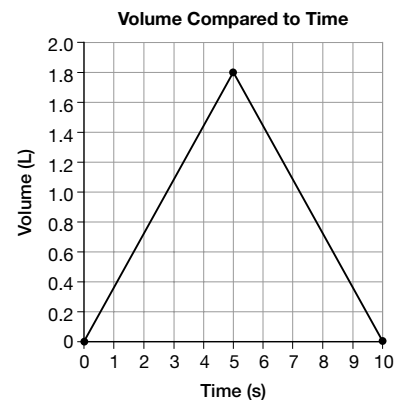
Denise filled a water pitcher with water and then emptied it. Use the line graph to answer Questions 3 and 4.

3. During which time interval is the pitcher being filled?

- A. 0-4 s C. 5-10 s
B. 0-5 s D. 6-10 s

4. About how long did it take to fill the pitcher with 1 L of water?

- A. about 1 s B. about 2 s
C. about 3 s D. about 4 s



Test Yourself Page 2

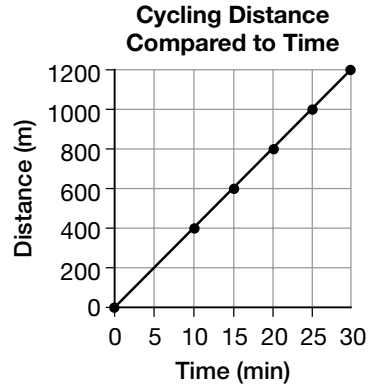
5. What is the mean and median of this set of numbers?
5, 13, 9, 15, 8

- A. 10 and 13 B. 5 and 9 C. 10 and 11 **D. 10 and 9**

6. Katrina timed the distance she cycled each day.

What would the graph look like if she decreased the value of each unit on the vertical scale?

- A. The graph would look more flat.
B. The graph would go down more suddenly.
C. The graph would go up more suddenly.
D. The graph would look the same.



7. Clive made a Carroll diagram to sort the numbers from 1 to 20. What labels are missing in each column?

	?	?
Less than or equal to 10	4, 8	1, 2, 3, 5, 6, 7, 9, 10
Greater than 10	12, 16, 20	11, 13, 14, 15, 17, 18, 19

- A. Even numbers, Odd numbers
B. Multiples of 2, Not multiples of 2
C. Multiples of 3, Not multiples of 3
D. Multiples of 4, Not multiples of 4

8. Teresa boiled some water for tea, then poured the tea and let it cool down. When did Teresa stop heating the water?

- A. from 0 min to 10 min**
B. at 10 min
C. from 10 min to 30 min
D. from 0 min to 30 min

