

7.1

Choosing an Appropriate Graph

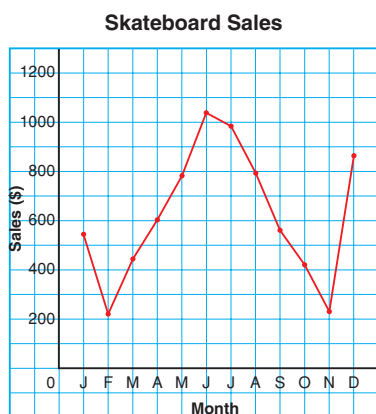
Focus

Identify the advantages and disadvantages of different types of graphs.

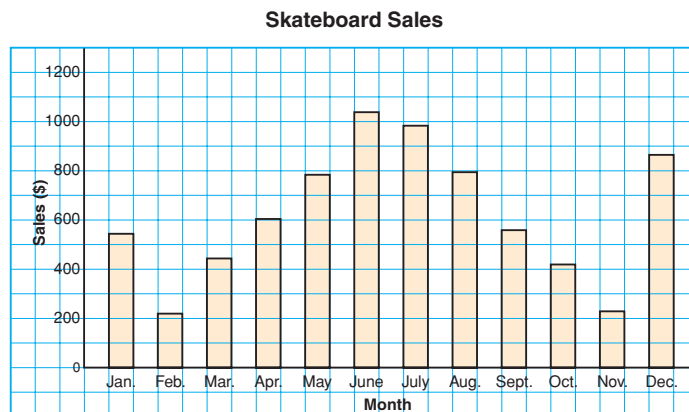
Investigate

Work with a partner.
All these graphs represent
the same data.

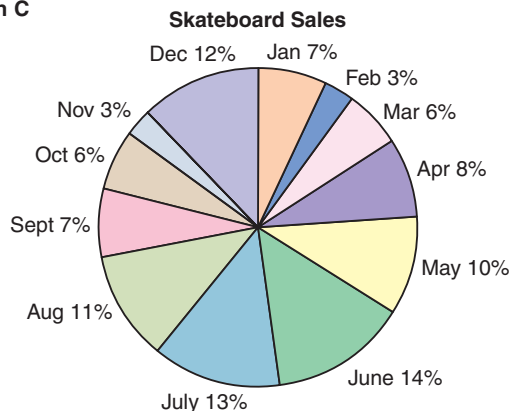
Graph B



Graph A



Graph C



What do you know from each graph?

Which graph is most helpful in answering each question below?

- Which two months had the greatest skateboard sales?
- What is the range in skateboard sales?
- What percent of total skateboard sales occurred in May?

Reflect & Share

Compare your answers with those of another pair of classmates.
What are the advantages and disadvantages of each type of graph?
What can you find out from the bar graph or line graph that you cannot find out from the circle graph?

Connect

Each type of graph has its strengths and limitations.

Line Graphs

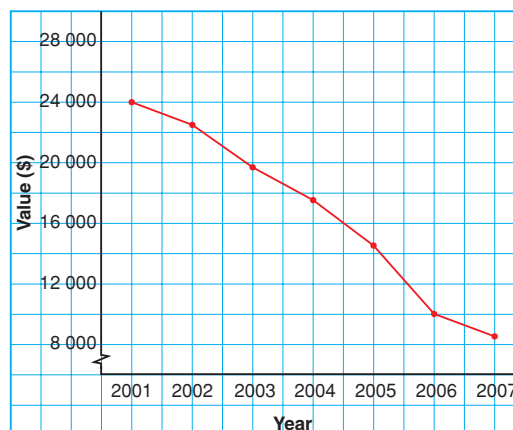
A **line graph** displays data that change over time.

On a line graph, line segments join adjacent data points.

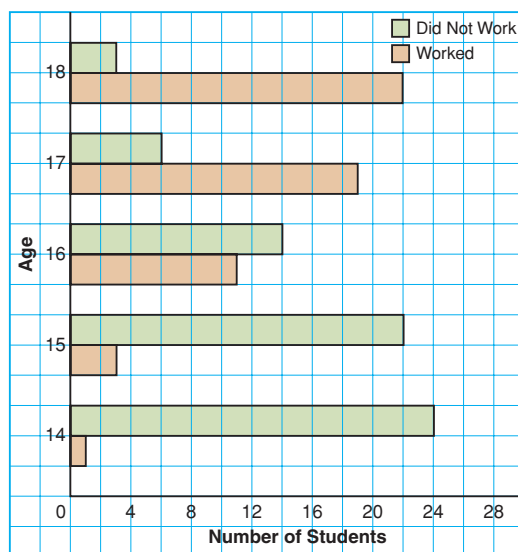
A line graph:

- is easy to draw and to read
- can have a zigzag symbol on the vertical axis when the data start at a large number
- is best used to show data gathered over time
- can be used to estimate values between data points and beyond data points.
(This should be done carefully as the trend may not continue.)

Value of Car



Students with Part-Time Jobs, Ages 14–18



Double Bar Graphs

A **double bar graph** displays two sets of data that can be counted.

The lengths of the bars are used to represent and to compare data.

A double bar graph:

- is easy to draw and to read
- can be used to directly compare two sets of data
- can only be used to show discrete data
- may be difficult to read accurately depending on the scale used

Discrete data can be counted.

Example 1

Three students surveyed Grade 8 students in their school.

They asked: "How many times did you use a vending machine last week:

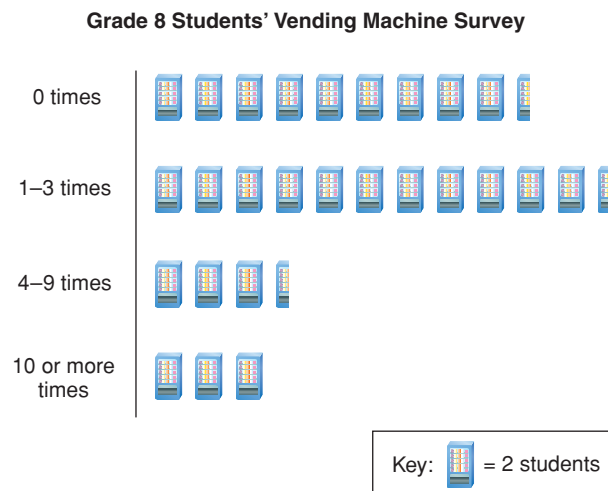
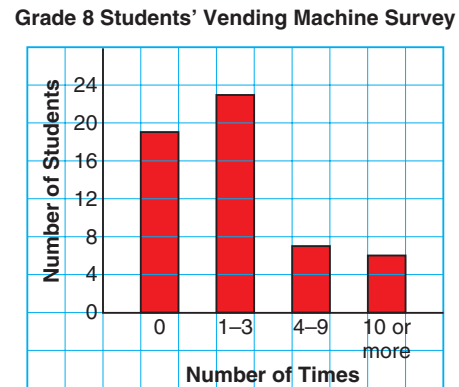
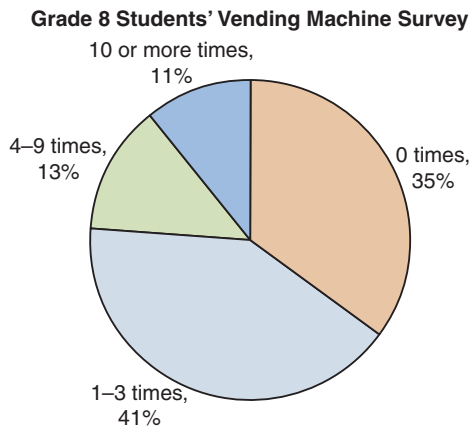
0 times, 1–3 times, 4–9 times, or 10 or more times?"

Amrit displayed the results on a circle graph.

Fred used a bar graph. Stella used a pictograph.

a) What are the strengths and limitations of each graph?

b) Which graph is appropriate? Justify your answer.



A Solution

a)	Type of Graph	Strengths	Limitations
	Circle Graph	<ul style="list-style-type: none"> Shows parts of the whole. Each response is shown as a percent of the number of students who responded. The sizes of the sectors can be used to compare responses. 	<ul style="list-style-type: none"> The graph does not show the number of students who chose each response. The total number of students cannot be calculated. Difficult to draw accurately
	Bar Graph	<ul style="list-style-type: none"> The heights of the bars can be used to compare responses. The scale on the vertical axis is: 1 grid square represents 4 students. The scale can be used to calculate the total number of students who responded. Easy to draw 	<ul style="list-style-type: none"> Some people may find this graph difficult to read accurately because none of the bars end on a grid line. The graph does not show the percent of the students who chose each response.
	Pictograph	<ul style="list-style-type: none"> The lengths of the rows of symbols give immediate comparison of responses. The graph is visually appealing. The key is 1 symbol equals 2 students. The key can be used to calculate the total number of students who responded. One-half of a symbol represents 1 student. 	<ul style="list-style-type: none"> There are a lot of symbols on the graph. For example, there are $11\frac{1}{2}$ symbols for 1–3 times. This makes the graph more difficult to read. It might be difficult to draw so many vending machine symbols all of the same size. The graph does not show the percent of the students who chose each response.

- b) To decide which graph is appropriate, we need to know what the students want to display.

For example, if they want to display the fraction of Grade 8 students who did not use a vending machine, then the circle graph is appropriate. The size of that sector can be compared to the whole graph.

If the students want to display the number of students who did not use a vending machine, then the bar graph or pictograph is appropriate. The height of the bar or the key can be used to find the number of students.

Example 2

This table shows the favourite types of video games of the Grade 8 students at L'école Orléans.

Type	Number of Students
Action	15
Role Playing	10
Arcade	4
Strategy	7
Simulation	11
Other	3

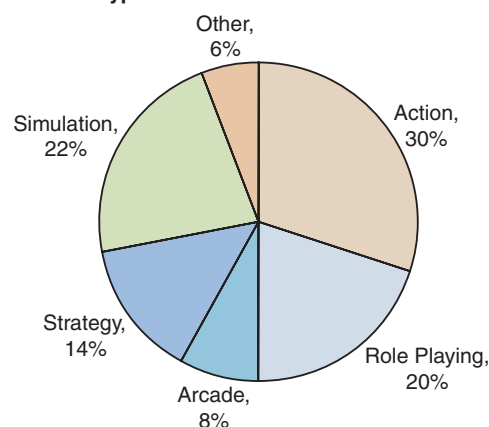
- Graph these data. Justify your choice of graph.
- What are the advantages and disadvantages of the graph you drew?

A Solution

- The circle graph can display these data. The total number of students is the whole. Each sector represents the percent of students who chose each type of game.

Type	Number of Students	Fraction	Percent (%)
Action	15	$\frac{15}{50} = \frac{3}{10}$	30
Role Playing	10	$\frac{10}{50} = \frac{1}{5}$	20
Arcade	4	$\frac{4}{50} = \frac{2}{25}$	8
Strategy	7	$\frac{7}{50}$	14
Simulation	11	$\frac{11}{50}$	22
Other	3	$\frac{3}{50}$	6

Favourite Types of Video Games of Grade 8 Students



- Advantages:** The circle graph shows the percent of Grade 8 students who chose each type of video game. The size of each sector can be compared to the whole and to other sectors to make conclusions; such as, action video games were most popular with these Grade 8 students.

Disadvantages: The circle graph does not show the number of students who chose each type of game and the number of students who were surveyed.

In a circle graph, the original data are lost.

A circle graph may be difficult to draw accurately because some calculations may involve approximations.

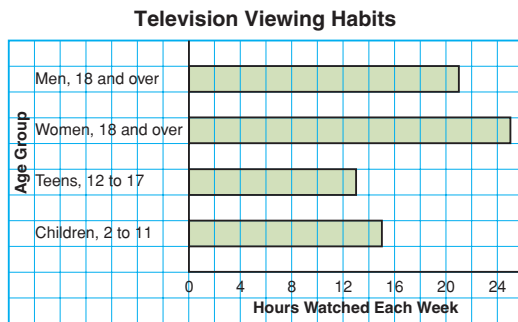
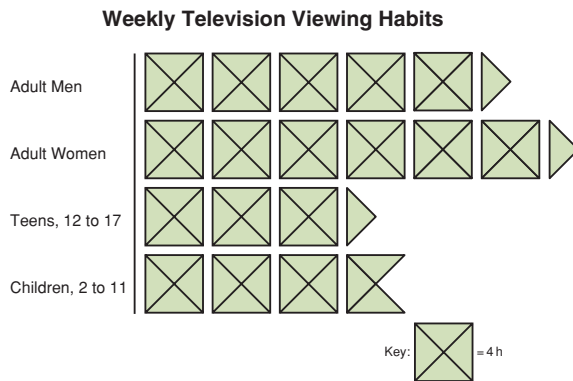
Discuss the ideas

1. Can more than one type of graph be appropriate to display a set of data?
2. In *Example 2*, which other types of graphs could you draw?

Practice

Check

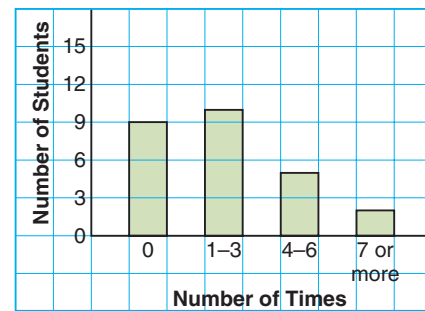
3. Each graph below shows how much time Canadians spend watching TV each week.



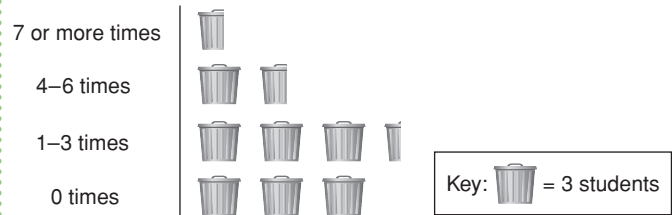
- a) List 3 things you know from the bar graph.
- b) List 3 things you know from the pictograph.
- c) Which graph is more appropriate to display the data? Justify your choice.

4. Each graph below shows the number of times students in a Grade 8 class littered last week.

Number of Times Grade 8 Students Littered



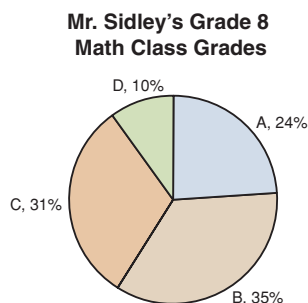
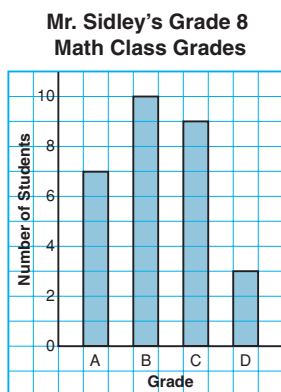
Number of Times Grade 8 Students Littered



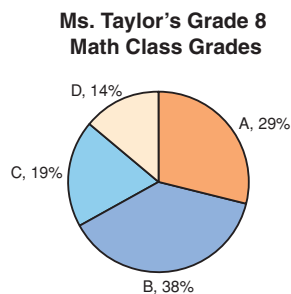
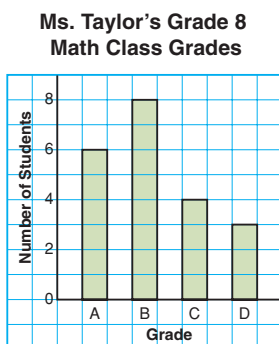
- a) What are the strengths of each graph?
- b) What are the limitations of each graph?
- c) Which graph is more appropriate to display these data? Justify your choice.
- d) Should you use a line graph or a circle graph to display these data? Why or why not?

Apply

5. These graphs show the final grades for Mr. Sidley's Grade 8 math class.



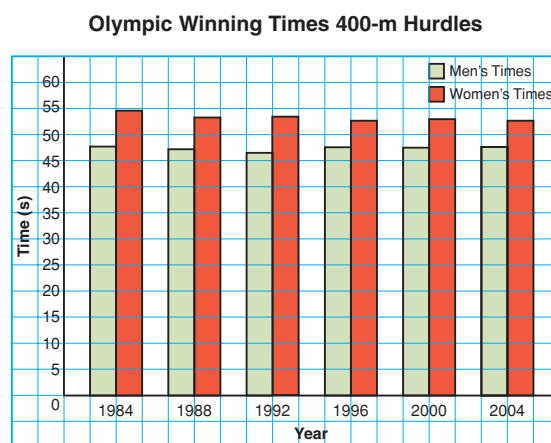
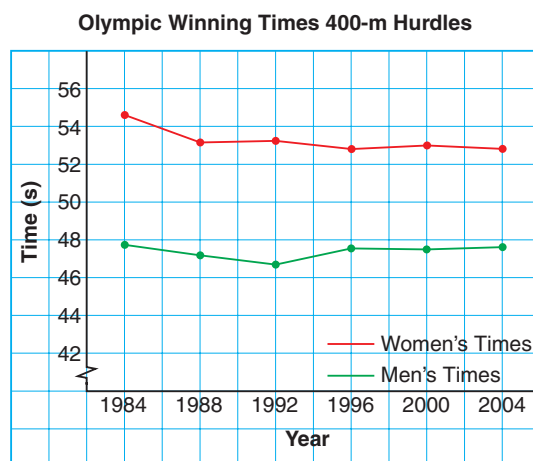
- List 3 things you know from the bar graph.
- List 3 things you know from the circle graph.
- Which graph best shows the number of students who got B as a final grade? Justify your choice.
- These graphs show the final grades for Ms. Taylor's Grade 8 math class.



Which graphs should Mr. Sidley use to show his class has the higher grades? Explain.

- Which class do you think did better? Why do you think so?

6. a) What data does each graph below show?



- What is an advantage of each graph?
- What is a disadvantage of each graph?
- Which graph would you choose in each case? Explain your choice.
 - You want to show how the times changed over time.
 - You want to show the differences between the times for each year.

7. Describe data that could be best represented by each graph below. Explain why you chose each type of data.
- line graph
 - bar graph
 - double bar graph
 - pictograph
 - circle graph

8. **Assessment Focus** Nina owns a shoe store. These tables show data about the shoe store.

Table A

Sizes of Shoes Sold in May

Size	Number of Pairs Sold
6	60
7	239
8	217
9	156
10	61
11	43
12	36

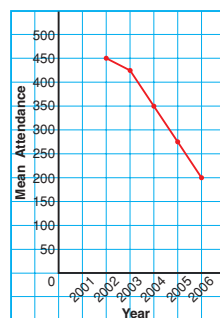
Table B

Yearly Sales

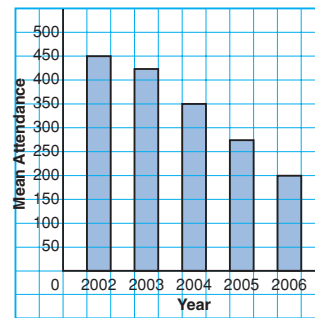
Year	Sales (\$)
2000	579 000
2001	621 000
2002	598 000
2003	634 000
2004	657 000
2005	642 000
2006	675 000

- a) Which data would be best represented with a line graph? Justify your choice.
- b) Which type of graph would be suitable for the other table? Explain.
9. Each graph shows the mean home-game attendance of the school's soccer team over the past 5 years.

Mean Home-Game Attendance of Soccer Team



Mean Home-Game Attendance of Soccer Team



- a) What are the strengths of each graph?
- b) What are the limitations of each graph?
- c) Which type of graph is more appropriate to display these data? Justify your choice.
- d) Could you use a circle graph to display these data? Why or why not?
10. This table shows the number of people employed by the construction industry in Canada from 2002 to 2006.
- a) Graph these data. Justify your choice of graph.
- b) What are the advantages and disadvantages of the graph you drew?

Number of People Employed in the Construction Industry

Year	Number of People (thousands)
2002	865.2
2003	906.0
2004	951.7
2005	1019.5
2006	1069.7

- 11.** This table shows the Canadian Aboriginal population, by province and territory, in 2001.

Canadian Aboriginal Population, 2001	
Province or Territory	Population
Newfoundland and Labrador	18 780
Prince Edward Island	1 345
Nova Scotia	17 015
New Brunswick	16 990
Quebec	79 400
Ontario	188 315
Manitoba	150 040
Saskatchewan	130 185
Alberta	156 220
British Columbia	170 025
Yukon	6 540
Northwest Territories	18 730
Nunavut	22 720

- a) Graph these data. Justify your choice of graph.
- b) What are the advantages and disadvantages of the graph you drew?
- 12. Take It Further** Over a 2-month period, Dinah collected these data about her family.
- i) How many times each week her dad fell asleep while watching television

- ii) How many times her dad cooked dinner and how many times her mom cooked dinner each week
- iii) How many hours a day her brother spent playing video games, doing homework, chatting on-line, doing chores, and eating
- iv) The weekly height of a tomato plant in the garden

Dinah wants to display these data for a school project. Which type of graph would you suggest for each data set? Justify your choices.

- 13. Take It Further** Madan measured the mass of his guinea pig every 5 months, until the pet was 25 months old. The data are shown in the table.

Age (months)	Mass (g)
5	200
10	350
15	480
20	510
25	520

- a) Graph these data. Justify your choice of graph.
- b) What are the advantages and disadvantages of the graph you drew?
- c) Use your graph to predict the mass of the guinea pig at 8 months and at 30 months.

Reflect

Suppose you are given a data set.

How do you choose the most appropriate type of graph to illustrate these data?