PDM4-1 Gathering Data

REMINDER: Data you collect yourself is called **primary** (or **first-hand**) data.
Data collected by someone else is called **secondary** (or **second-hand**) data.

1. How would you collect the primary data? Write the letter for your choice.

A. survey **B.** observation **C.** measurement

a) How does the temperature of a cup of heated water change over time? _____

b) What are your classmates' favourite movies? _____

c) How far can the students in your class jump? _____

d) How many students in your class have brown hair? _____

e) Do you think it will rain in the next 20 minutes? _____

2. Would you use primary or secondary data to answer the question?

a) What is the average temperature where you live? _____

b) How old are the students in your class? _____

c) How many medals has Canada won in the last five Olympics? _____

d) Which city gets more hours of sunlight, Calgary or Winnipeg? _____

e) How do most students in your class get to school? _____

f) How do most students in Canada get to school? _____

3. How is the data in Question 2 collected?

A. survey **B.** observation **C.** measurement

a) _____ b) _____ c) _____ d) _____ e) _____ f) _____

4. Are all possible responses given? If not, add an "other" category.

a) What is your favourite sport?

☐ hockey ☐ volleyball ☐ basketball

b) What is your favourite season?

☐ spring ☐ summer ☐ fall ☐ winter

c) What is your favourite colour?

☐ blue ☐ red ☐ yellow

d) What is your favourite primary colour?

☐ blue ☐ red ☐ yellow

5. Would everyone know the answer to the question? Write "yes" or "no" to answer.

a) What's your favourite colour? _____

b) On what day of the week were you born? _____

c) When is your birthday? _____

d) What's your eyeglass prescription? _____

6. Add a category so that everyone can answer the question.

a) What is your favourite pizza topping?

☐ pepperoni ☐ pineapple ☐ mushroom ☐ _____

b) In which season were you born?

☐ winter ☐ spring ☐ summer ☐ _____

c) Which of these colours do you like best?

☐ red ☐ yellow ☐ blue ☐ green ☐ _____

d) How tall are you?

☐ under 1.2 m ☐ 1.2 to 1.3 m ☐ 1.3 to 1.4 m ☐ 1.4 to 1.5 m ☐ _____

7. a) Write a survey question to ask students in your class.

_____

_____

b) Write the possible responses to your question.

☐ _____ ☐ _____

☐ _____ ☐ _____

☐ _____ ☐ _____

8. a) Write a question that you will need secondary data to answer.

_____

_____

_____

b) Why can't you collect the data yourself?

_____

_____

_____

PDM4-2 Pictographs

A **scale** shows what the symbol means on a pictograph.
10 students eat lunch at home and 20 students eat lunch at school.
Both pictographs show the same data, but they use different scales.

Lunch Location

At home	1
At school	2

1 = 10 students ← scale → 1 = 5 students

Lunch Location

At home	2
At school	4

1. Look at the scale and multiply to find what the group of symbols means.

a) 1 = 5 people

4 = _____ people

7 = _____ people

b) 1 = 7 flowers

3 = _____ flowers

6 = _____ flowers

2. □ = 5 boxes. Draw symbols to show the number.

a) 15 boxes =

b) 30 boxes =

c) 5 boxes =

3. a) Use the pictograph to fill in the table.

Flowers in Evan's Garden 1 = 5 flowers

Roses	4
Pansies	2
Marigolds	6

Type of Flower	Number of Flowers
Roses	
Pansies	
Marigolds	

b) Use the data in part a) to draw a pictograph with the new scale.

Flowers in Evan's Garden 1 = 10 flowers

Roses	
Pansies	
Marigolds	

c) How many flowers does Evan have in total? _____

d) Evan used the flowers to plant 5 identical flower beds. How many of each type of flower does he have in each bed?

Roses: _____ Pansies: _____ Marigolds: _____

Half a symbol means half the number. Example: If ☺ = 4, then ☹ = 4 ÷ 2 = 2.

4. The first row shows what ☺ means. What does ☹ mean? Fill in the table.

☺	10	20	8	50	30	6	12
☹							

5. The first row shows what one symbol means. What does each group of symbols mean?

a)

☆	2	10	100
☆☹			
☆☆☆☹			
☆☆☆☆☆☹			

b)

웃	8	20	12
웃웃☹			
웃웃웃웃☹			
웃웃웃웃웃웃☹			

6. a) Use the pictograph to fill in the table.

How Students Get to School

Car	웃웃웃
Bus	웃웃웃웃웃웃웃☹
Bike	웃웃☹
Walk	웃웃웃웃웃웃

웃 = 10 students

Mode of Transportation	Number of Students
Car	
Bus	
Bike	
Walk	

b) How many students were surveyed? _____

c) How many times as many students walk as take a car? _____

d) How many more students take the bus than walk? _____

e) Fill in the Carroll diagram with the number of students whose transportation to school is in each category.

	Has an Engine	**Does Not Have an Engine**
Has Wheels		
Does Not Have Wheels		

BONUS ▶ Name a means of transportation that has an engine but no wheels.

_____

PDM4-3 Creating Pictographs

1. a) Count the tallies and draw a pictograph with the given scale.

Plant

Roses: 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 = _____ roses

Pansies: 𝍸 𝍸 𝍸 𝍸 𝍸 = _____ pansies

Dandelions: 𝍸 𝍸 = _____ dandelions

i) ◯ = 5 flowers

Roses	**Pansies**	**Dandelions**

ii) ◯ = 10 flowers

Roses	**Pansies**	**Dandelions**

b) How many times as many roses as dandelions are there? _____

c) Choose a title for the pictographs.

_____

2. The first line shows the data. Circle the scale that works best for the data.

a) 12, 4, 18, 6

♡ = 2
♡ = 3
♡ = 5
♡ = 10

b) 30, 90, 60, 105

♡ = 2
♡ = 3
♡ = 5
♡ = 10

c) 9, 12, 6, 27

♡ = 2
♡ = 3
♡ = 5
♡ = 10

d) 25, 10, 35, 15

♡ = 2
♡ = 3
♡ = 5
♡ = 10

3. In Question 2.b), what would be your second choice for the scale? Explain.

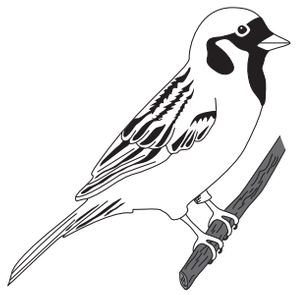
_____

_____

_____

4. A birdwatcher made a tally of the birds she saw on her trip.
Create a pictograph of the data.

a) Tally the data.



Bird		
Robins:	𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸	_____
Jays:	𝍸 𝍸 𝍸 𝍸 𝍸	_____
Sparrows:	𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸	_____
Finches:	𝍸 𝍸 𝍸	_____

b) Fill in the title and labels on the pictograph.

c) Choose a symbol and a scale.

d) Complete the pictograph.

Title: _____

Scale: _____ = _____ birds

Bird

e) Order the birds from most to least common.

_____ _____ _____ _____

f) How many birds were seen in total? _____

g) Which two types of birds together make up half the birds seen? _____

h) Which type of bird was seen exactly twice as often as another type? _____

i) How many more sparrows than finches were seen? _____

j) How many more sparrows and robins were seen than jays and finches? _____

k) Make up your own question from the pictograph. Write the answer.

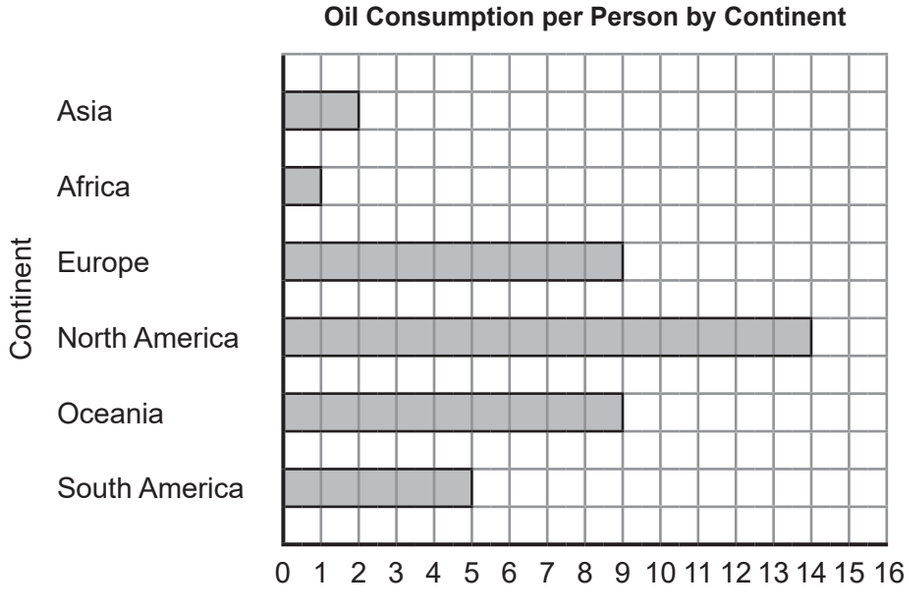
_____

_____

_____

PDM4-4 Bar Graphs

1. The bar graph shows approximately how many barrels of oil are used per person, each year, on every continent.



a) Which continent uses the least oil per person? _____

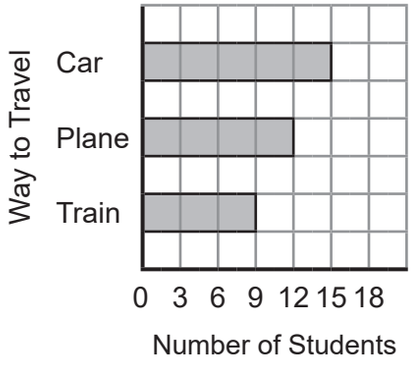
b) Which continent uses the most oil per person?_____

c) How many times as much oil does Asia use as Africa? _____

d) Which two continents use the same amount of oil? _____

e) How many barrels of oil per person per year does Europe use? _____

2. Rick asked his classmates if they liked travelling by car, plane, or train the most. He showed the answers in a bar graph.



a) What number does the scale count by? _____

b) How many students prefer to travel by train? _____

c) How many more students prefer the car to the plane? _____

d) How many students were surveyed altogether? _____

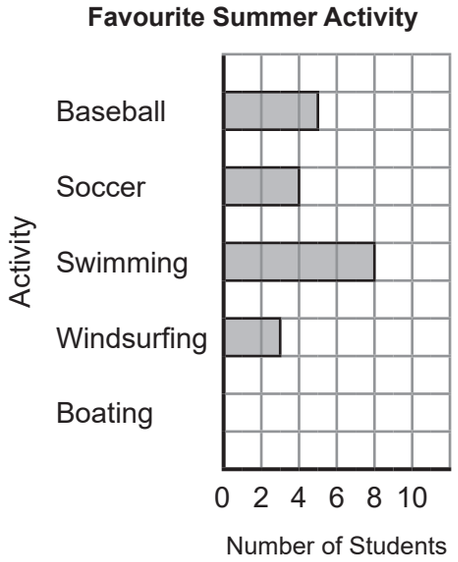
BONUS ▶ Could a bar on this graph end in the middle of a block? Explain.

_____

_____

A bar can end between two numbers on a bar graph.

3. Students voted for their favourite summer activity. The bar graph shows the results.



a) Fill in the table.

Favourite Activity	Number of Students
Baseball	*5*
Soccer	
Swimming	
Windsurfing	

b) 9 students picked boating. Add this to the table. Add the bar for boating to the bar graph.

c) Fill in the blank.

i) _____ times as many students picked boating as windsurfing.

ii) _____ times as many students picked swimming as soccer.

iii) _____ students picked water activities.

iv) _____ times as many students chose water activities as soccer.

v) _____ was the most popular activity.

vi) _____ was the least popular activity.

vii) How many students were surveyed? _____

BONUS ▶

d) Kyle thinks that the bar for swimming is 2 blocks longer than the bar for soccer, so 2 more students voted for swimming. Is he correct? Explain.

_____

_____

_____

e) On Sports Day, the class can choose three of these activities. Which three should they choose? Explain.

_____

_____

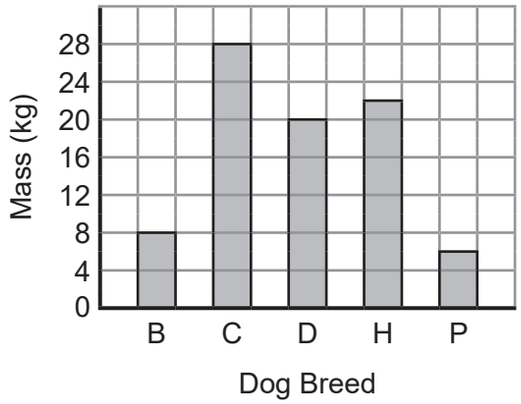
PDM4-5 Creating Bar Graphs

1. Sara is researching different dog breeds.

a) Fill in the table using Bar Graph 1.

Dog Breed	Mass (kg)
Beagle (B)	
Collie (C)	
Dalmatian (D)	
Husky (H)	
Pug (P)	

Bar Graph 1
Dog Breeds and Masses



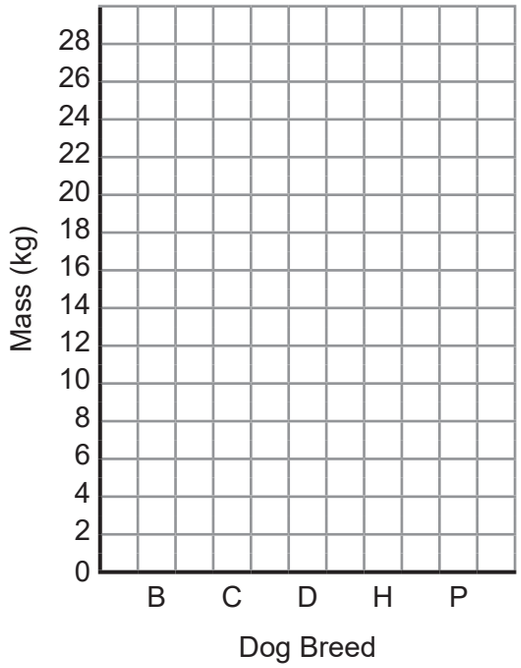
b) What number does the scale skip count by? _____

c) Are there bars that end between the numbers? _____

d) How many blocks long is the tallest bar? _____

e) Use the table to complete Bar Graph 2 with a scale that skip counts by 2 to show the same information.

Bar Graph 2
Dog Breeds and Masses



f) Are there bars that end between the numbers? _____

g) Which graph takes more space? _____

h) Use the graphs to find out which dog breed has a mass 8 kg greater than a dalmatian.

_____

Which graph makes this easier to answer? _____

i) Use the graphs to find out which breed weighs 22 kg less than a collie.

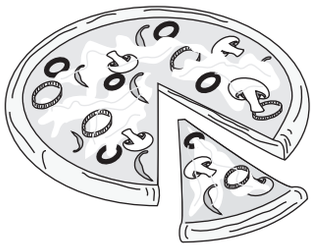
_____

Which graph makes this easier to answer? _____

j) How much would 2 beagles, 1 collie, 1 dalmation, 2 huskies, and 3 pugs weigh altogether? _____

2. Tasha surveyed her grade about their favourite pizza. She gave students four choices.

a) Here are the results of Tasha's survey. Tally the data.



Plain cheese: 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 _____

Pepperoni: 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 _____

Hawaiian: 𝍸 𝍸 𝍸 _____

Vegetarian: 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 _____

b) Fill in the title and axis labels on the bar graph.

c) Choose a number to count by. Fill in the numbers on the axis.

d) Complete the bar graph.

Title: _____

_____

Plain Cheese									
Pepperoni									
Hawaiian									
Vegetarian									

0 ___ ___ ___ ___ ___ ___ ___ ___ ___

_____

e) Write the pizzas in order from most to least popular.

_____ _____ _____ _____

f) How many students were surveyed altogether? _____

g) How many times as many people preferred vegetarian to Hawaiian? _____

h) How many times as many people preferred plain cheese to Hawaiian? _____

BONUS ▶ Tasha uses the information in Question 2 to buy pizzas for her grade.

a) If 1 pizza can feed 5 people, how many pizzas should she buy? _____

b) How many of each type of pizza should she buy?

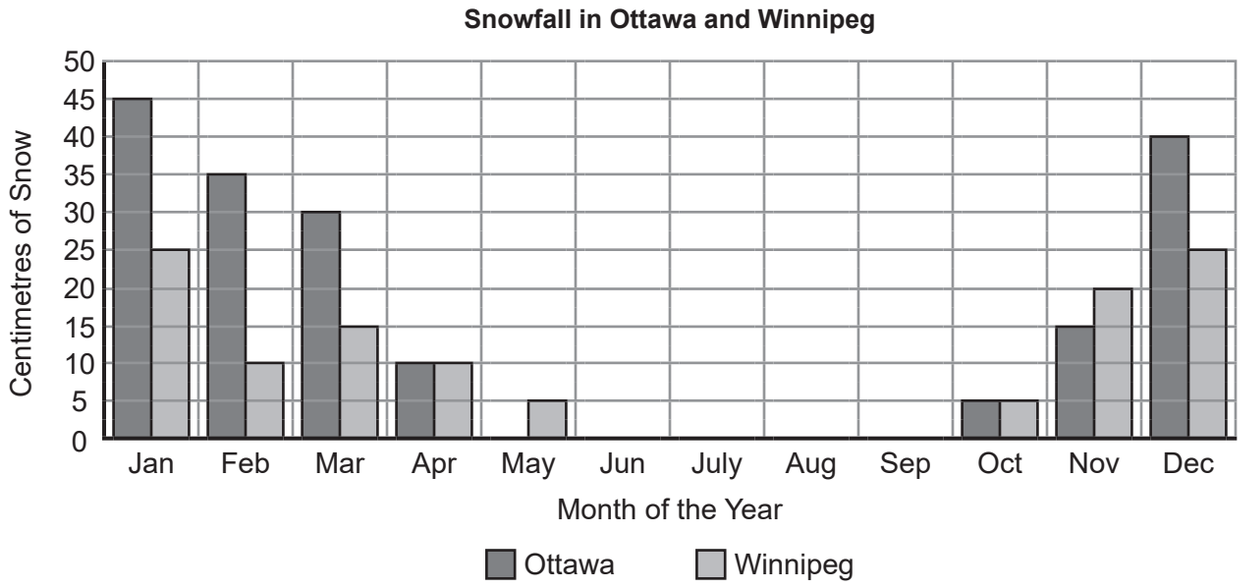
Plain: _____ Pepperoni: _____ Hawaiian: _____ Vegetarian: _____

c) If 1 pizza can feed 8 people, how many of each type should she buy?

Plain: _____ Pepperoni: _____ Hawaiian: _____ Vegetarian: _____

PDM4-6 Double Bar Graphs

1. The double bar graph compares the average monthly snowfall in Ottawa and Winnipeg.



a) In which months of the year does Winnipeg get more snow than Ottawa? _____

b) Which city gets more snow overall? _____

c) How much more snow does it get? _____

d) In which months does Ottawa get at least twice as much snow as Winnipeg?

_____

e) Which city has a longer winter? Explain.

_____

_____

_____

2. Would the comparison be suitable for a double bar graph? Explain.

a) Compare the heights to weights of students by age.

_____

_____

_____

b) Compare favourite movies of Grade 1 and Grade 6 students.

_____

_____

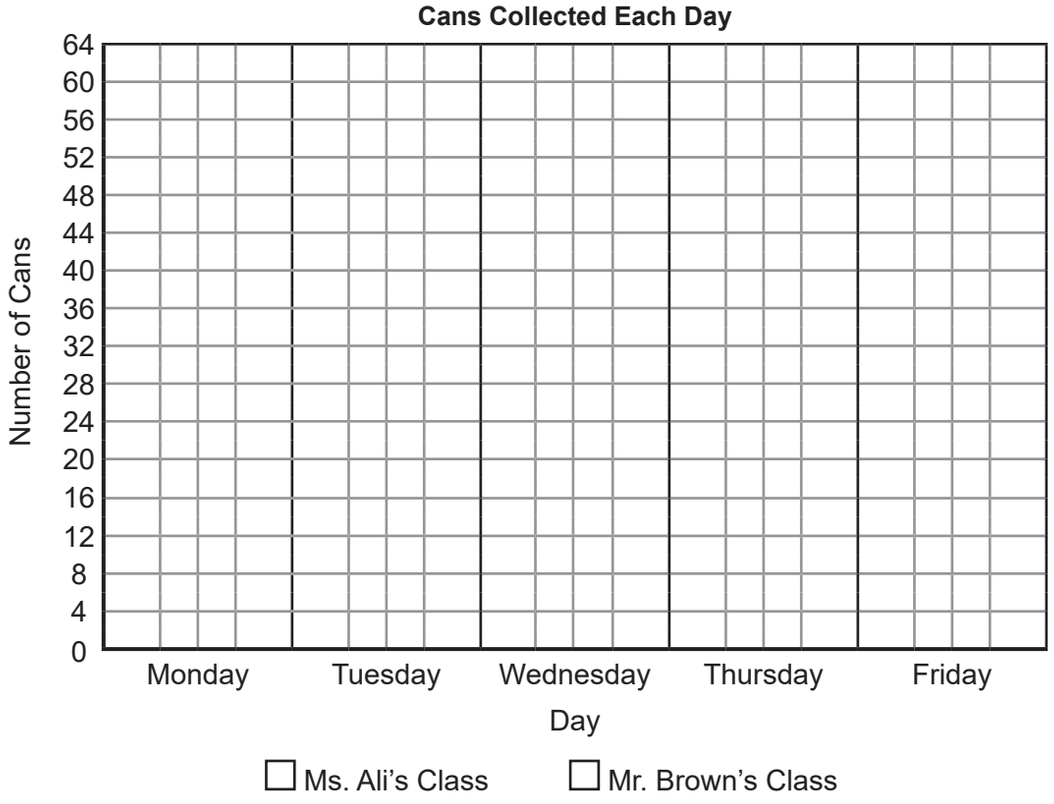
_____

3. Two Grade 4 classes challenged each other to collect food for a food bank for a week. Both classes kept track of how many cans were brought in each day.

	Monday	Tuesday	Wednesday	Thursday	Friday
Ms. Ali's class	6	12	18	34	60
Mr. Brown's class	30	22	26	20	32

a) Choose a colour to use for Ms. Ali's class, and colour in the box next to her name. Then use that colour to show the data in the double bar graph.

b) Choose a different colour for Mr. Brown's class. Add the data to the double bar graph.



c) Which class collected the most cans of food? _____

d) In one class, a parent volunteered to help by collecting cans of food at home and bringing them by car at the end of the week.

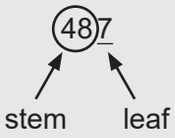
In which class do you think this happened? _____

e) On which day did Mr. Brown's class bring 5 times as much food as Ms. Ali's? _____

f) On which day did Ms. Ali's class bring almost twice as much food as Mr. Brown's? _____

PDM4-7 Stem and Leaf Plots

The **leaf** of a number is its right-most digit.
The **stem** is all its digits except the right-most digit.
The stem of a one-digit number is 0 since there are no digits except the right-most one.



1. Underline the leaf.

a) 1 2 3 b) 3 1 c) 7 2 d) 4 e) 3 8

f) 9 0 g) 8 0 1 h) 4 4 4 i) 3 2 2 9 5 j) 4 3 4 1

2. Circle the stem.

a) (0) 5 b) 3 7 c) 1 2 3 d) 3 1 e) 5 9 8 7 3

f) 1 8 g) 6 h) 1 0 i) 4 3 2 1 j) 9 0 0 0

3. Underline the leaf and circle the stem.

a) 8 b) 8 3 c) 8 3 1 d) 8 3 1 0 e) 4 0 7 1

f) 6 8 9 g) 9 0 7 h) 8 9 9 i) 3 j) 6 2 4 5 9

4. Write a number with leaf 0: _____. Write a number with stem 0: _____.

5. Underline the numbers that have the same stem.

a) 78, 74, 94 b) 89, 90, 91 c) 77, 67, 76

d) 371, 379, 391 e) 263, 26, 265 f) 39, 390, 394

g) 5782, 578, 574 h) 34, 341, 3, 340 i) 291, 287, 28, 29

6. Circle the stems. Then write the stems from smallest to largest.

a) 13 9 8 24 64 18 25 b) 26 29 48 53 27 9 44 c) 99 134 136 128 104 97

____, ____, ____, ____ ____, ____, ____, ____ ____, ____, ____, ____

BONUS ▶ a) Do numbers with the same stem have the same number of digits? Explain.

_____

_____

b) Do numbers with the same leaf have the same number of digits? Explain.

_____

_____

To build a stem and leaf plot for the data set 38, 29, 26, 42, 43, 34:

Step 1: Find the stems. The stems are 2, 3, and 4.

Step 2: Write the stems from smallest to largest.

Stem	Leaf
2	
3	
4	

Step 3: Write the leaves for each stem in the leaf column.

Stem	Leaf
2	9 6
3	8 4
4	2 3

Step 4: Order the leaves by row from smallest to largest.

Stem	Leaf
2	6 9
3	4 8
4	2 3

7. Put the leaves in the correct order. Then list the data from smallest to largest.

a)

Stem	Leaf
2	4 1
3	8 6 5
4	3 2

→

Stem	Leaf
2	*1 4*

____, ____, ____, ____, ____, ____, ____

b)

Stem	Leaf
0	4
1	9 5
2	3 8 0

→

Stem	Leaf

____, ____, ____, ____, ____, ____

c)

Stem	Leaf
8	3 0
9	0 7 2
10	6

→

Stem	Leaf

____, ____, ____, ____, ____, ____

d)

Stem	Leaf
9	2 1 8
10	4 2 4
11	5 0

→

Stem	Leaf

____, ____, ____, ____, ____, ____, ____, ____

8. Create a stem and leaf plot from the data.

a) 9, 7, 12, 19, 10

Stem	Leaf

→

Stem	Leaf

b) 99, 98, 102, 99, 101

Stem	Leaf

→

Stem	Leaf

9. Anna and some friends ran a 5 km race. Their recorded times were 26, 32, 38, 29, and 40.

a) What unit of measurement do you think they used: seconds, minutes, hours, or days? _____

b) Make a stem and leaf plot of the data.

PDM4-8 Range, Median, and Mode

The **range** of a data set is the difference between the largest and the smallest data values.
Example: The range of 3, 7, 9, 4 is $9 - 3 = 6$.

1. Find the range of the data set.

a) 6, 9, 4, 12, 5

_____ − _____ = _____

b) 7, 4, 8, 6, 11, 9

_____ − _____ = _____

c) 42, 39, 36, 41, 41

_____ − _____ = _____

The **median** of a data set is the middle number when the data is arranged in order.
To find the median, put the data in order. Cross out from either end until you reach the middle.
Example:

~~2~~ ~~3~~ (6) ~~7~~ ~~11~~

The median is 6.

2. Circle the median of the data set.

a) 1, 5, 12, 31, 42

b) 3, 4, 6, 8, 11, 13, 13

c) 2, 2, 8

d) 21, 123, 144, 167, 932

If there are two middle numbers, the median is halfway between the two numbers.
Example:

4 6 (7 9) 10 11

The median is 8 because $9 - 8 = 8 - 7$, so 8 is halfway between 7 and 9.

3. Find the number that is halfway between the given numbers.

a) 6 and 8 _____

b) 13 and 15 _____

c) 40 and 44 _____

d) 10 and 20 _____

e) 35 and 45 _____

f) 63 and 73 _____

4. Circle the middle number or numbers. Find the median.

a) 2, 4, 6, 7, 8

_____

b) 2, 3, 3, 8

_____

c) 7, 9, 13, 14, 26

_____

d) 3, 4, 6, 10, 11, 17

_____

e) 1, 2, 5, 7, 13, 21, 27, 30

_____

f) 28, 31, 35, 38, 42, 44, 56, 60

_____

g) 123, 220, 248, 475, 563

_____

BONUS ▶ 1125, 1253, 1358, 1360, 1454, 1698

_____

5. Find the highest and lowest value in the stem and leaf plot. Find the range.

a)

Stem	Leaf
2	2 7
3	4 4 6
4	1 7

Highest value: _____

Lowest value: _____

Range: _____ − _____ = _____

b)

Stem	Leaf
0	2 7
1	3 3 4 8
2	0 1 2 4

Highest value: _____

Lowest value: _____

Range: _____ − _____ = _____

c)

Stem	Leaf
8	5 6 7 9
9	0 1 2 2 2 2
10	6

Highest value: _____

Lowest value: _____

Range: _____ − _____ = _____

d)

Stem	Leaf
9	1 2 3 8
10	2 2 3 4 5 5
11	0 1 2

Highest value: _____

Lowest value: _____

Range: _____ − _____ = _____

Neka finds the median from a stem and leaf plot by crossing out the leaves of the highest and lowest values until only one or two leaves remain.

Stem	Leaf
2	5
3	6 7 9
4	3 7

→

Stem	Leaf
2	~~5~~
3	6 7 9
4	3 ~~7~~

→

Stem	Leaf
2	~~5~~
3	~~6~~ (7 9)
4	~~3 7~~

The median is halfway between 37 and 39. The median is 38.

6. Find the medians for the stem and leaf plots in Question 5.

a) _____ b) _____ c) _____ d) _____

The **mode** of a data set is the most common data value.
Example: The mode of 3, 7, 3, 9, 4, 7, 4, 4, 5 is 4.

A data set can have more than one mode.
Example: The modes of 2, 2, 3, 3, 3, 4, 4, 4, 5, 5, 6 are 3 and 4.

7. Find the mode or modes of the stem and leaf plots in Question 5.

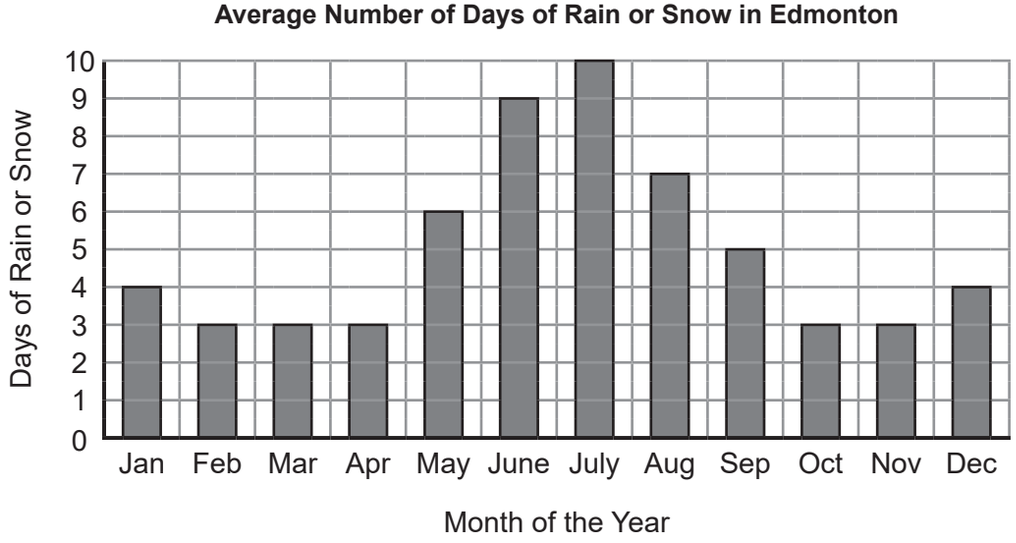
a) _____ b) _____ c) _____ d) _____

BONUS ▶ a) Give an example of a set of data where the mode is greater than the median. _____

b) Give an example of a set of data where the mode is less than the median. _____

PDM4-9 Describing Graphs

1. The graph shows the average number of days of rain or snow each month in Edmonton.



a) Fill in the chart from the graph.

Month	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec
Days												

b) Find the range of the data.

_____

c) Find the mode of the data.

_____

d) Find the median of the data.

_____

e) Sally says that you can see from the graph that in most months of the year there are 10 days of rain or snow. Is she correct? Explain.

_____

_____

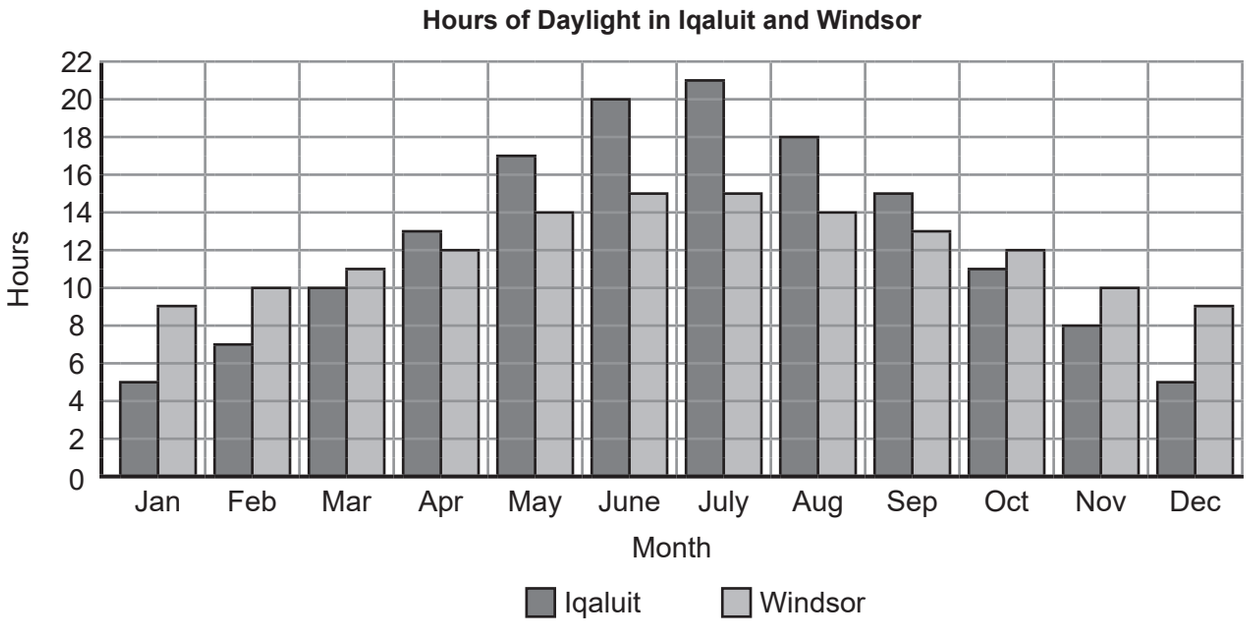
f) Which season has the most rain or snow? _____

BONUS ▶ Jane says that Edmonton usually has about 3 days of rain or snow per month. David says that Edmonton usually has about 4 days of rain per month. Explain why they are both correct.

_____

_____

2. The graph compares hours of daylight in Iqaluit and Windsor.



a) Make a stem and leaf plot for the data.

i) Daylight hours in Iqaluit

Stem	Leaf

→

Stem	Leaf

ii) Daylight hours in Windsor

Stem	Leaf

→

Stem	Leaf

b) Find the range in daylight hours in Iqaluit. _____ − _____ = _____

c) Find the range in daylight hours in Windsor. _____ − _____ = _____

d) What is the median number of daylight hours in Iqaluit? _____

e) What is the median number of daylight hours in Windsor? _____

3. Use the graph and your work in Question 2 to answer the question.

a) What is the same about daylight hours in Iqaluit and Windsor and what is different?

_____

_____

b) Name one thing you would like and one thing you wouldn't like about living in Iqaluit and in Windsor.

_____

_____