2.1 Bar Graphs

Reading Graphs

Axes:

- The HORIZONTAL axis runs LEFT to RIGHT.
- In math, this horizontal axis is referred to as the x-axis.
- The VERTICAL axis runs UP and DOWN.
- In math, this vertical axis is referred to as the y-axis.
- All axes should have a TITLE and a unit of measurement.

Legends:

- A *bar* graph may compare more than one data set on the same x and y axis.
- If this occurs, a LEGEND will indicate the different data using colour, shading, or symbols.

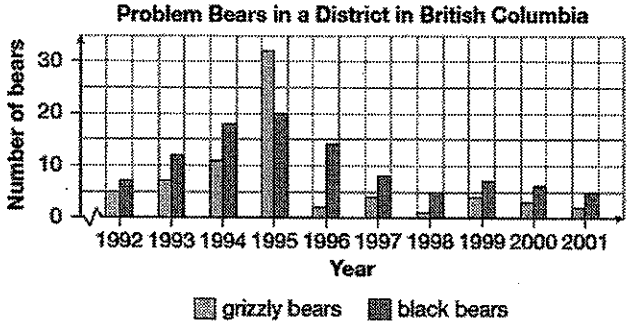
Trends:

- A trend is a relationship between two variables.
- Trends are usually described using words such as increasing/decreasing.

Ranges:

- A range is used to measure a trend or compare two variables.
- It is the difference between the lowest and highest number in a set of data.

Example:



1. A. What is being measured on the x-axis? B. What unit is being used?
   A. TIME B. YEARS
2. A. What is being measured on the y-axis? B. What unit is being used?
   A. NUMBER OF BEARS B. NUMBER
3. A. What are the two groups of data indicated on this graph? B. What sort of legend is being used to distinguish between these two different data sets?
   A. Grizzly Bears and Black Bears.
   B. Light vs. Dark Shading
4. Describe the trends that you see with respect to Problem Black Bears.
   Increasing to 1995 then decreasing to 2001.
5. What is the range that is observed for Problem Grizzly Bears?
   Lowest = 1
   Highest = 32
   Range = 32 - 1 = 31

Drawing Graphs

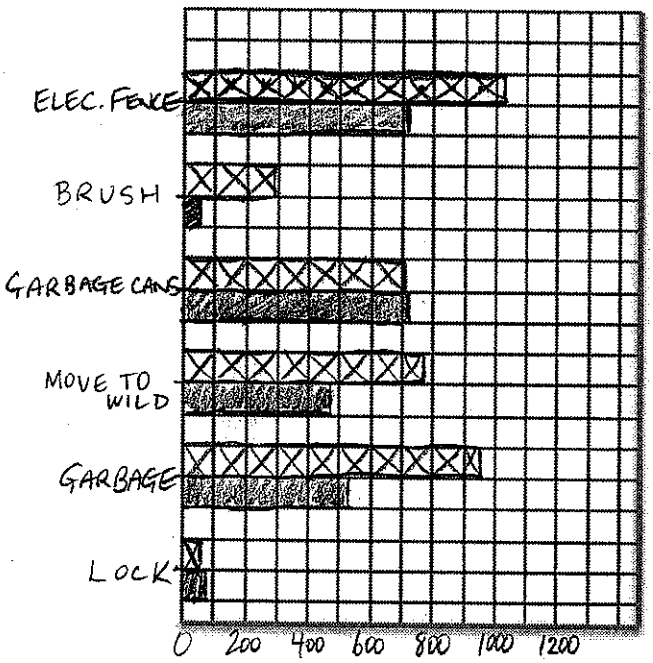
Example:

Two towns (the aptly names Town 1 and Town 2) are trying to decide how to best protect bears while keeping their community safe. Using the data provided in the table below, create a graph that will help the towns make a decision.

Bear Smart Program		
Suggestion	Votes: Town 1	Votes: Town 2
use safe electric fence around landfill	1020	711
remove brush in town	294	47
use bear-proof garbage cans	701	710
move problem bears to the wild	773	479
put out garbage on pickup day only	948	518
lock commercial garbage bins	60	76

Steps:

1. Determine the maximum value of the range (ie. What is the highest number of votes you see on the table?): 1020. Set the minimum value of the range to 0. Use this to help you determine the scale for the horizontal (x) axis of your graph. Record this scale on the graph and label the x-axis. Scale = 100
2. Record (label) the Suggestions on the vertical axis of your graph (the order does not matter, but you may as well follow the order given in the table).
3. Create a legend to differentiate between Town 1 and Town 2.
4. Give your Bar Graph a title.
5. Complete the Bar Graph using the information provided in the table.



Legend:
Town 1: ☒
Town 2: ▨

p. 30-31 # 1-7
p. 34-35 # 1-4

2.2 Histograms

Histogram:

- a graph that organizes data into INTERVALS of EQUAL size.
- the touching bars represent the FREQUENCY of each interval.

Intervals:

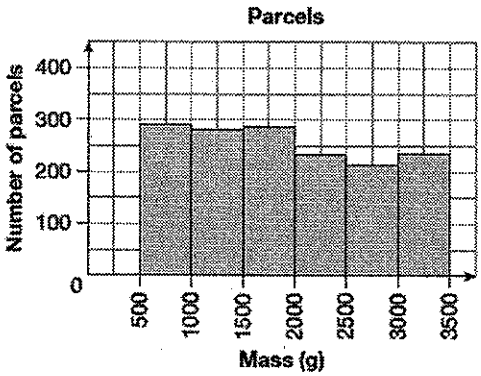
- Specific sections of data
- Usually separated by a numerical value
- Includes numbers that are greater than the lesser value and up to (and including) the greater value.
- Example: the interval 100-350 would include the number 101 through to 350 (but not the number 100).

Frequency Table:

- a table that indicates the number of items in each interval.

Example 1:

Mass (g) (over–including)	Number of parcels
500–1000	292
1000–1500	282
1500–2000	287
2000–2500	233
2500–3000	214
3000–3500	236



1. What does the horizontal (x) axis in this histogram represent? mass (g)
2. What does the <u>width</u> of each interval (bar) represent with respect to grams? 500 g
3. What does the vertical (*y*) axis in this histogram represent? number of parcels
4. Are you able to find the <u>exact</u> <u>mass</u> of any parcel from this histogram? no
5. In general, ~~what~~ does the histogram tell you about the mass? It tells you that there are about 250 parcels in each 500g interval.
6. What is the least possible mass as represented by this histogram? What is the greatest possible mass? 501 g 3500 g

Example 2:

The following table shows information from 32 different potato farms. Each number represents the number of acres farmers at each farm are utilizing to grow potatoes.

139	61	358	169
126	350	62	159
502	290	150	74
61	462	59	122
187	72	76	66
123	66	150	191
130	145	150	231
398	836	208	420

1. Organize the data into <u>intervals</u>.

2. To determine the amount of intervals to use, find the range as indicated by the data in the table (ie. Find the lowest number and the highest number and determine the *difference*). Lowest: 59 Highest: 836

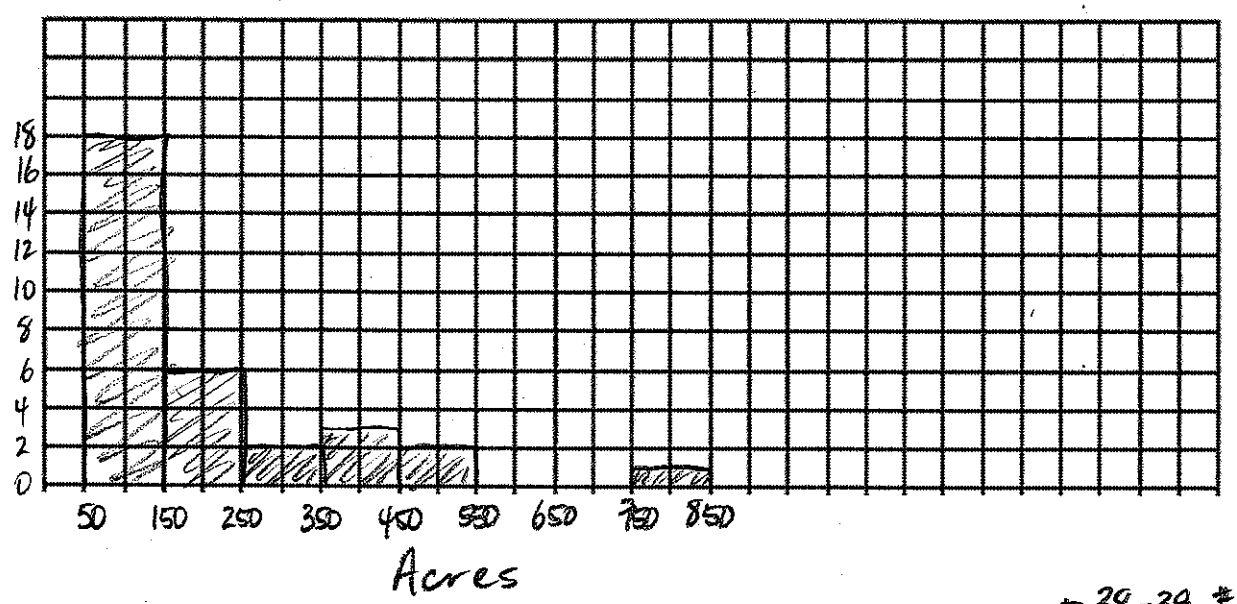
836 - 59 = 777

3. Use a width of <u>100</u> for each interval. Divide your range by this number and round <u>up</u> to determine how many intervals to create. 777 ÷ 100 = 7.77 = 8 intervals

4. Create a frequency table.

Acres (interval)	50-150	150-250	250-350	350-450	450-550	550-650	650-750	750-850
Frequency	18	6	2	3	2	0	0	1

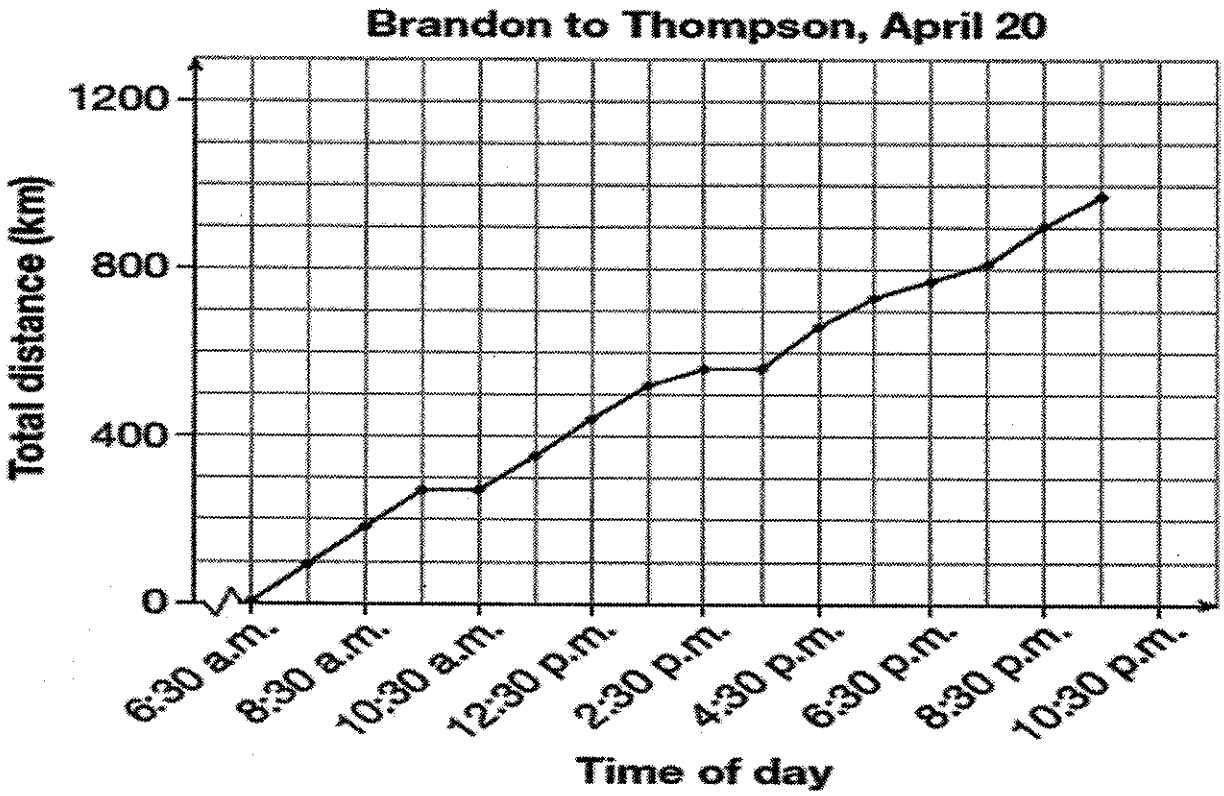
5. Create a histogram using your frequency table (be sure to label the axes appropriately).



p-38-39 #1-4

2.3 Line Graphs

Reading Line Graphs: Using the following graph that shows driving distance over a day, answer the questions below:



1. In general, what happens to the total distance driven as time increases?

   It increases.

2. What must be occurring between 9:30-10:30 am? When does this happen again?

   Stopping somewhere. $2^{30} - 3^{30}$ pm

3. In total, how far has the car driven by 12:30 pm?

   ~450 km

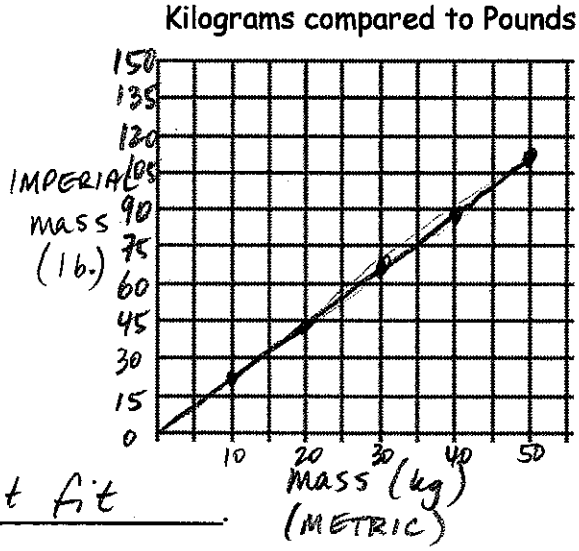
4. How long did the entire trip take?

   6^{30} am to 9^{30} pm = 15 hrs.

Example 2:

Using the data table provided below, create a graph to show the mass in kilograms and pounds (Hint: place kg on the x-axis and lbs. on the y-axis):

Metric and Imperial Mass
10 kg ≐ 22.05 lb
20 kg ≐ 44.09 lb
30 kg ≐ 66.14 lb
40 kg ≐ 88.18 lb
50 kg ≐ 110.23 lb



Connect the points using a line of best fit.

Trends:

- As the mass in kilograms increases, the mass in pounds increases.
- The points lie in a straight line while moving UP to the right.

1. Use the graph to convert 7 kg to pounds.

   ~ 17 lbs

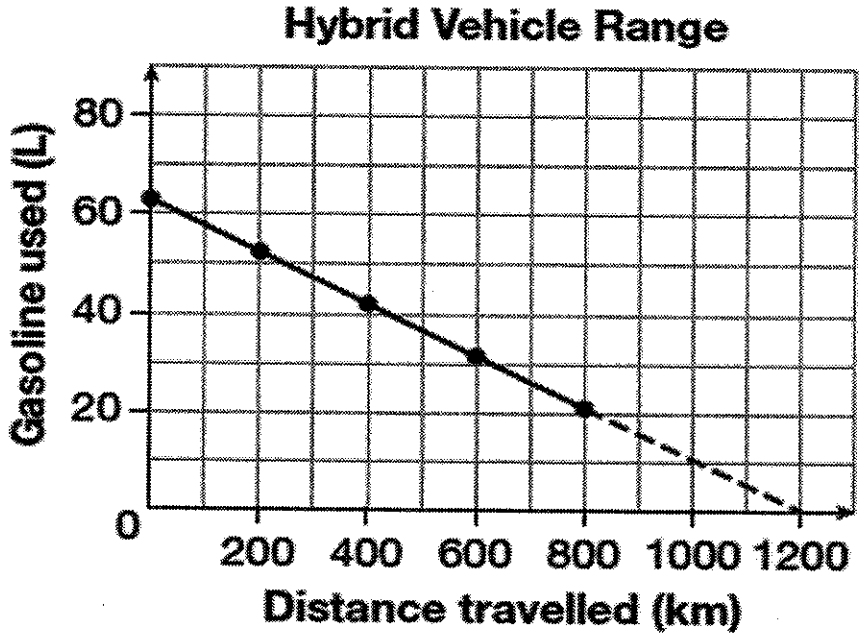
2. Use the graph to convert a 54 lb. to kilograms.

   ~ 25 kg

To estimate a value BETWEEN known points on a graph is known as INTERPOLATION
Shown above by the line of best fit!

Example 3:

Shawna created the following graph about the fuel economy of her new hybrid car:



1. Approximately how much gas does the car hold?

   ~ 62 L

2. What trend does the graph show?

   as the car drives, gas is used.

3. If Shawna does not buy any more gas, approximately how far can she go on a full tank?

   ~ 1200 km

To estimate a value OUTSIDE known points on a graph is called EXTRAPOLATION
Shown above by the dotted line!

p. 42-43 # 1-5
p. 45 # 1-3

2.5 Circle Graphs

Circle Graphs

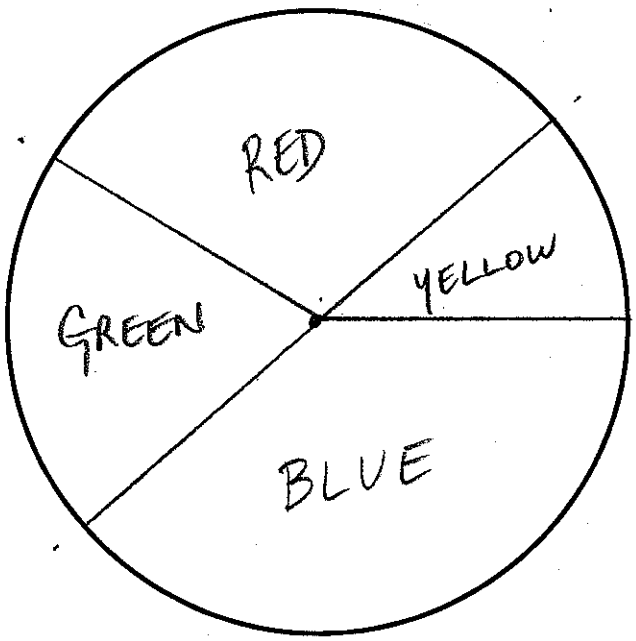
- Used to represent portions of a single type of data.
- To create the portions, we must find the percentage each portion represents of the total data
- The percentage is then converted to a degree and drawn within a circle (like a piece of pie...mmmmm...).
- The number of degrees in a circle = 360°.

Example 1:

Two classes of 60 students were asked to pick their favourite colour out of the choices listed in the table below. The table indicates the results. Create a circle graph that is representative of this information.

Colour	Number of Students	Percent	Part of Circle
Red	18	$\frac{18}{60} = 0.3 = 30\%$	$0.3 \times 360° = 108°$
Yellow	7	$\frac{7}{60} = 0.117 = 11.7\%$	$0.117 \times 360° = 42°$
Blue	23	$\frac{23}{60} = 0.383 = 38.3\%$	$0.383 \times 360° = 138°$
Green	12	$\frac{12}{60} = 0.2 = 20\%$	$0.2 \times 360° = 72°$

TOTAL = 60



Example 2:

Nellie works at a bakery. In every 8 hour shift she spends the following amounts of time doing different activities:

- Baking: 4.5 hours
- Two 15-minute breaks
- Cleaning: 2.25 hours
- Lunch: 0.75 hour

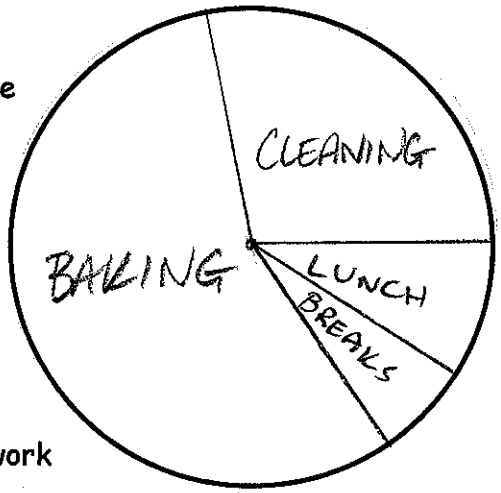
Create a circle graph of this data.

Activity	Hours	Percent	Angle Measure
Baking	4.5	$\frac{4.5}{8} = 0.5625 = 56.25\%$	$0.5625 \times 360^\circ = 203^\circ$
Cleaning	2.25	$\frac{2.25}{8} = 0.28125 = 28.125\%$	$0.28125 \times 360^\circ = 101^\circ$
Breaks	0.5	$\frac{0.5}{8} = 0.0625 = 6.25\%$	$0.0625 \times 360^\circ = 23^\circ$
Lunch	0.75	$\frac{0.75}{8} = 0.09375 = 9.375\%$	$0.09375 \times 360^\circ = 34^\circ$
Total	8		$\approx 360^\circ$

Questions

1. A. Using the chart, what percent of the time does Nellie spend not baking?

$$\begin{array}{r} 28.125 \\ + \ 6.25 \\ + \ 9.375 \end{array} = \boxed{43.75\%}$$



B. How much time does she spend not baking during a 40-hour work week?

$0.4375 \times 40 = \boxed{17.5 \text{ hrs}}$

2. How much time does she spend on breaks in a 40-hour work week? (incl. lunch)

$0.5 \times 5 = 2.5$ hrs.

3. If Nellie makes $10.50/hour, how much would she make in 4 weeks if she does not get paid for her breaks? (incl

$37.5 \text{ hrs} \times 4 = 150 \text{ hrs.}$

$\times \ \$10.50$

$\boxed{\$1575.00}$

p. 48-49 #1-4

p. 58-59 #1-3

p. 60 #1-3