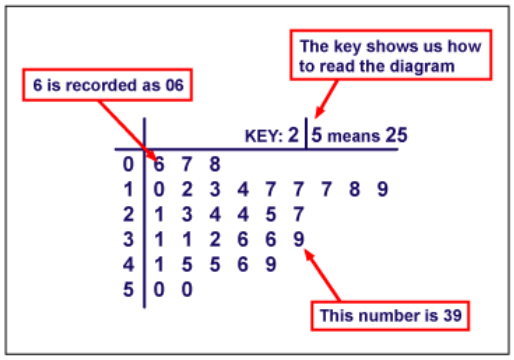
Week 2
Term 3
2022

HAWKER COLLEGE
Engage | Inspire | Achieve

EM2
Representing and comparing data

Goals



By the end of the week you should be able to:

- display numerical data as frequency distributions, dot plots, stem and leaf plots, and histograms (EMA04)
- recognise and identify outliers (EMA05)
- compare the suitability of different methods of data presentation in real-world contexts (EMA06)

Theoretical Components

Resources:
PDF file: Week 2 Notes and Exercises

Knowledge Checklist

- Frequency tables
- Histograms
- Stem and leaf plot
- Dot plot
- Numerical data and outliers

Order

1. Read through the notes and examples
2. Work through the exercises
3. Complete the Portfolio Task
4. Complete the reflection at the end of the booklet
5. Come and see your teacher and make sure you are up to date.

Practical Components

There are 3 Exercises in this booklet. Read any notes and worked examples before you begin.

Remember to regularly check Google Classroom for messages.

Portfolio Task

Complete the task at the end of the brief and submit your weekly work for checking. ☺

QFO

Quiz/Forum/Other

Remember to check hawkermaths.com for each week's learning brief.

Make sure you have joined Google Classroom. If you have not, see your teacher.

REPRESENTING NUMERICAL DATA - FREQUENCY TABLES AND HISTOGRAMS

Frequency tables are also useful when numerical data is collected. In the first column of the table the data is arranged from lowest to highest. Sometimes if the range of the data is large the data is grouped into intervals so that the table does not become too cumbersome.

Example

Kyle asked 25 students in his class: 'How many children are there in your family?'. The answers are recorded below.

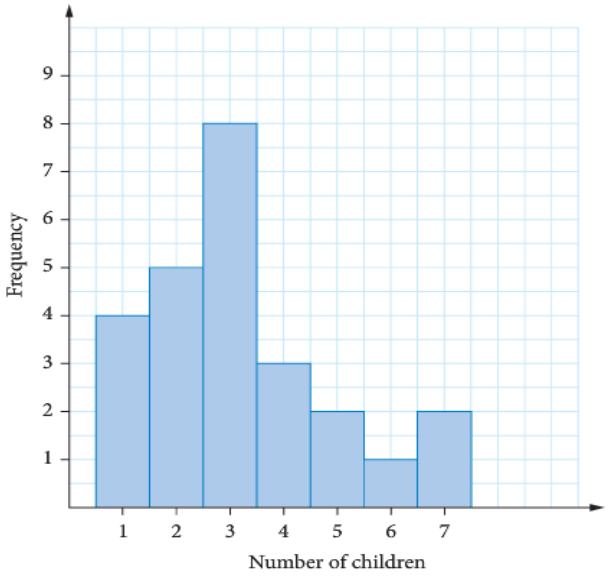
6, 7, 3, 3 ,2, 2, 5, 3, 3, 3, 3, 1, 7, 3, 2, 3, 2, 5, 4, 4, 1, 1, 2, 1, 4

The resulting frequency table is shown below.

Number of children	Tally	Frequency
1	𝍸	4
2	𝍸	5
3	𝍸 |||	8
4	|||	3
5	||	2
6	|	1
7	||	2

The resulting histogram becomes:

Number of Children per Family



Make sure the values on the horizontal axis are in the middle of each column and there are no spaces between the columns.

EXERCISE 1

Q1. Sue and Jason work in a fast-food shop. The number of hamburgers they sold each day between 12 noon and 2 pm in the month of August is recorded below.

17, 27, 28, 18, 18, 17, 19, 19, 25, 27, 17, 19, 20, 19, 21, 26, 28,
18, 19, 20, 17, 19, 20, 17, 19, 23, 24, 20, 18, 17, 20, 19, 27, 28

a) What is the lowest number they sold?

b) What is the highest number they sold?

c) Arrange the data in a frequency table.

Number of hamburgers sold	Tally	Frequency

Total _____

d) On how many days did they sell less than 20 hamburgers?

e) On what percentage of days in August did they sell more than 25 hamburgers. Round your answer to the nearest whole number.

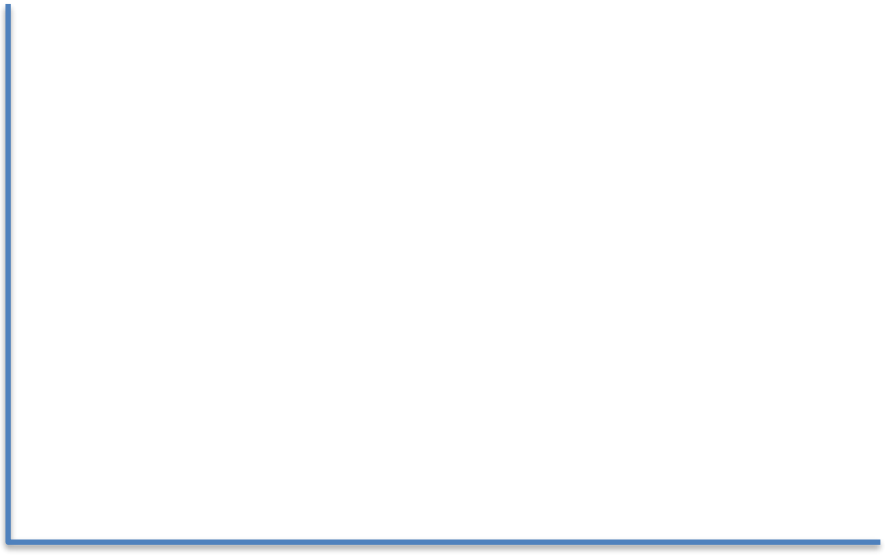
Q2. An insurance company recorded the ages of forty clients. The list is shown below.

84, 76, 39, 45, 38, 74, 66, 81, 49, 57, 59, 42, 31, 43, 71, 80, 40, 37, 73, 87, 77, 49, 53, 62, 62, 74, 84, 90, 31, 47, 52, 62, 79, 33, 31, 52, 46, 43, 55, 38

a) Complete the classed frequency table below.

Age	Tally	Frequency
31–40		
41–50		
51–60		
61–70		
71–80		
81–90		
Total		

b) Construct a frequency histogram to display the data.



c) Which age group has the most clients?

d) How many clients were 50 years old or less?

e) What percentage of clients were over 70 years old?

DOT PLOTS & STEM AND LEAF PLOTS

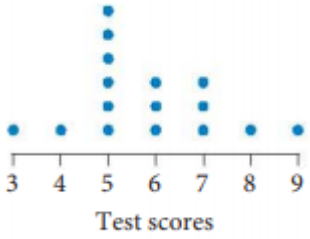
Numerical data can also be presented in other types of graphs. Two of these are **dot plots** and **stem and leaf plots**.
Dot plots are used for small sets of data that are close together.
Stem and leaf plots are used for larger data sets and keep all the detail of the data.

Example

Sixteen students completed a spelling test with ten words. Their scores were as follows.

7, 3, 5, 6, 6, 9, 7, 5, 6, 5, 5, 8, 5, 7, 5, 4.

To create a dot plot:
First identify the lowest and highest score.
Then create a scaled line with label to cover this range.
Then place a dot above the line for each score.



A stem and leaf plot is a display that organises data to show its shape and distribution. Data is split into a 'stem' and 'leaf'. The leaf is usually the last digit of the number and the other digits to the left of the leaf form the stem.

You will usually need to create an unordered stem and leaf plot first then an ordered one. An ordered stem and leaf plot makes it easier to find desired information.

Example

Sarah works for law enforcement and she is preparing data about crime in the local area. She recorded the number of malicious property damage reports to police per month during the last few years. Here are her results.

54, 41, 55, 49, 37, 38, 37, 48, 51, 44, 52, 44, 58, 70, 60, 46, 63, 54

45, 43, 46, 55, 55, 67, 49, 66, 90, 45, 66, 62, 51, 51, 53, 53, 38, 52

The unordered and ordered stem and leaf plots are shown below.

Stem	Leaf
3	7 8 7 8
4	1 9 8 4 4 6 5 3 6 9 5
5	4 5 1 2 8 4 5 5 1 1 3 3 2
6	0 3 7 6 6 2
7	0
8	
9	0

Key 3|7 is 37

Stem	Leaf
3	7 7 7 8
4	1 3 4 4 5 5 6 6 8 9 9
5	1 1 1 2 2 3 3 4 4 5 5 5 8
6	0 2 3 6 6 7
7	0
8	
9	0

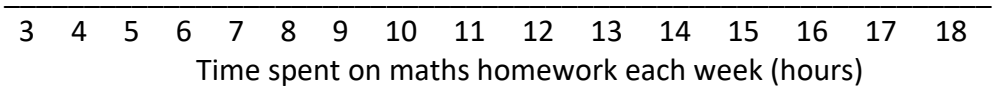
Key 3|7 is 37

EXERCISE 2

Q1. A class was surveyed to find out how many hours each student spent on maths homework each week. The results are shown below.

7	6	8	9	5	10	6	9	9	0	9	8
18	7	5	3	4	9	6	7	8	10	7	8

Draw a dot plot for this data.



Q2.

Lisa surveyed her group of friends about the amount of money they spent on fuel last week. The answers were rounded to the nearest dollar. This is the data she recorded.

$20	$28	$25	$26	$22	$26	$28	$28	$24	$22	$29	$28

a) Draw a dot plot for this data.

b) How many friends did Lisa survey?

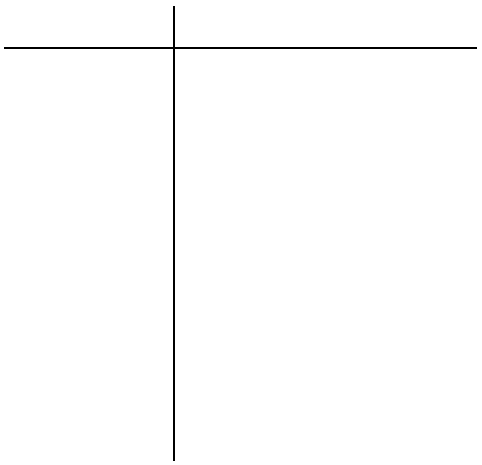
c) What was the most common amount of money spent on fuel?

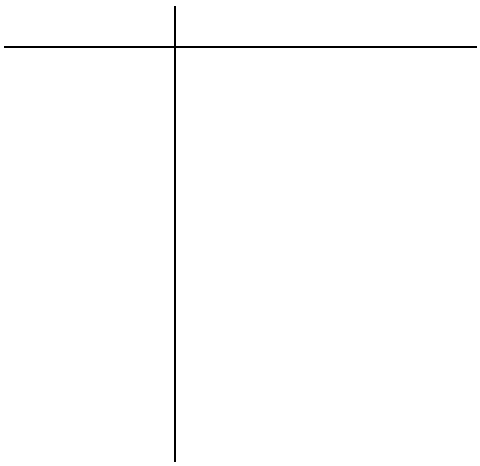
d) How many of Lisa's friends spent less than $26 on fuel last week?

Q3. The number of cars sold in a week at a large car dealership over a 20-week period is given below.

16	12	8	7	26	32	15	51	29	45
19	11	6	15	32	18	43	31	23	23

a) Construct an unordered stem and leaf plot then an ordered stem and leaf plot to show this information.





b) What was the greatest number of cars sold in a week in this period?

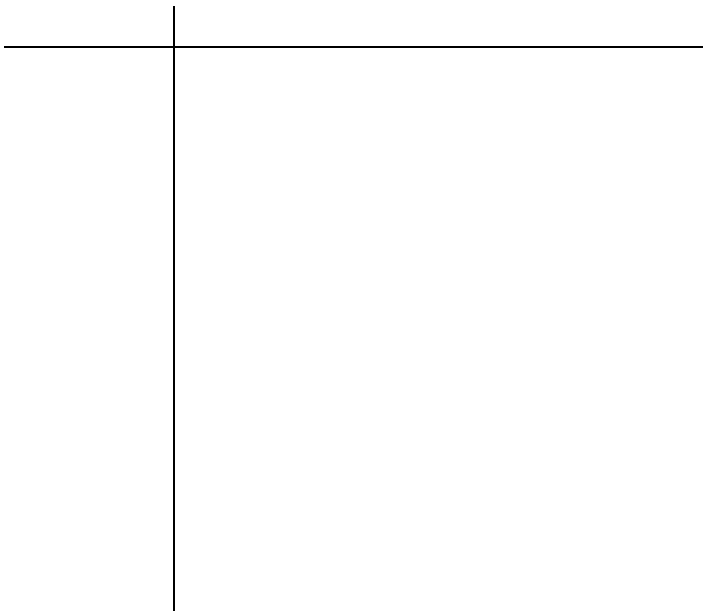
c) How many weeks did the car dealership sell between 10 and 30 cars?

Q4.

A security guard at Cengage Mall records all incidences of shoplifting monthly over a three-year period.

20	20	23	11	12	33	22	30	16	17	35	48
25	27	25	34	20	23	25	17	12	14	13	13
48	42	55	33	24	39	26	41	33	31	19	55

a) Show this information in an ordered stem and leaf plot.



b) How many months was the number of incidences in the thirties?

c) What percentage of the total months was this? Answer correct to the nearest whole percentage.

NUMERICAL DATA AND OUTLIERS

Sometimes with numerical data we have a number that is an **outlier**. An outlier is a score that is very different from the rest of the data. It can be either much bigger than the other scores or much smaller than the other scores. An outlier can make it difficult to graph the data. When we see a score that looks like an outlier, we should check to make sure that the score is reasonable because it could be a mistake or a wrongly recorded score.

Example

Peter asked eight friends about the amount of pocket money they received each week. The results were:

$20 $32 $32 $40 $18 $32 $18 $175

To identify if there is an outlier, we need to write the data in order.

18 18 20 32 32 32 40 175

Choose the score that is either much bigger or much smaller than the other scores.
The outlier here is $175 because it is much bigger than the other scores.

EXERCISE 3

Q1. For each set of data, identify the outlier. First arrange the numbers in order.

a) 12 15 28 19 15 14 16

b) 32 35 12 40 36 29 38 30

c) 7 5 6 8 7 1 8 6 9

Q2. The results on a Maths test for a Year 11 class are as follows.

55, 52, 50, 45, 55, 45, 60, 58, 75, 45, 49, 59, 58, 59, 56, 49, 31, 52

a) Place these results in order from highest to lowest.

b) What are the outliers in this data set?

Q3. Katrina went to the Census At School website and downloaded a sample of the heights of 25 Year 11 males in centimetres. This is the data.

175	176	185	176	125	184	197	161	186	169
171	172	182	165	179	180	167	169	198	167
170	180	182	173	220					

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

b) What are the outliers for this data?

c) For each outlier, decide if it is reasonable or if it is likely to be a wrongly recorded height. Explain your answer.

WEEK 2 PORTFOLIO TASK

1. Complete the table below, describing the most appropriate graphical display when given a data set.

Display	Type of data - categorical or numerical	Size of data set - small or large
Frequency table		
Bar or column chart		
Histogram		
Dot plot		
Stem and leaf plot		

2. Use your table above to help answer the following problem:

The Cengage High School Principal thought that too many cars were speeding through the school zone at the end of the day when the speed limit is 40 km/h. One day, the police set up in the school zone and recorded the speeds of all the cars for a period of 1 hour after school.

What type of data is this? What would be the best way to organise and present this data?

Explain.

MARKING RUBRIC

CRITERIA	EXPECTATIONS	POSS	MULT	GIVEN	TOTAL
Practical	Student completes practical work of the brief to an acceptable standard set by the teacher.	**2**	**3**		**/6**
Portfolio Task	Student completes the portfolio task of the brief to an acceptable standard set by the teacher.	**2**	**2**		**/4**
Communication and Reasoning	Student responses are accurate and appropriate in presentation of mathematical ideas in different contexts, with clear and logical working out shown.	**4**	**-**		**/4**
Knowledge and Application	Student submitted work selects and applies appropriate mathematical modelling and problem solving techniques to solve practical problems, and demonstrates proficiency in the use of mathematical facts, techniques and formulae.	**4**	**-**		**/4**
	Submission Guidelines				
Timeliness	Student submits the exercises and portfolio task by the set deadline. See scoring guidelines for specific details.	**2**	**-**		**/2**
		FINAL			**/20**

Student Reflection:

How did you go with this week's work?

What was interesting?

What did you find easy?

What do you need to work on?