Rosary School \ Marj El Hamam

Worksheet (1)

Name: …………………………

Date: / 8 / 2025

Subject: **(Unit10: Charts and diagrams Grade7)**

Grade: 8 (A , B , C , D)

The **mean, median and mode** in maths are averages.

Mean:

Find the total of the values and divide the total by the number of values.

$$\text{mean} = \frac{\text{total}}{\text{number of values}}$$

Median:

Arrange the values in numerical order, ascending or descending, and find the middle value.

Mode:

Find the most frequently occurring item in the data set.

The range is a measure of how spread out a set of data is.

To calculate the range we find the difference between the highest value and the lowest value.

$$\text{Range} = \text{highest value} - \text{lowest value}$$

E.g. Work out the range

5   8   10   11   13

$$\text{Range} = \text{highest value} - \text{lowest value} = 13 - 5 = 8$$

Averages from frequency tables

We use frequency tables to find descriptive statistics. These are values which help describe the set of data such as the mean, median and mode of a set of data.

For example,

A frequency table showing the ages of 25 students on a college course.

Age	Frequency
18	15
19	6
20	4
	Total = 25

The **mode** is 18

The mean can be calculated using the total of all the values, divided by the total of the frequencies, n.

$$mean = \frac{total}{n} = \frac{(18\times15)+(19\times6)+(20\times4)}{25} = \frac{464}{25} = 18.56$$

Worked example

Jack asked students in his class how many pets they had.
Here are his results. Work out the mean.

Number of pets	Frequency	Total number of pets
0	7	0 × 7 = 0
1	8	1 × 8 = 8
2	6	2 × 6 = 12
3	3	3 × 3 = 9
4	1	4 × 1 = 4
Total	25	33

Add a column to the table to work out the total numbers of pets.

Work out the total frequency (number of people in the survey) and the total number of pets.

mean = 33 ÷ 25 = 1.32

mean = total number of pets ÷ number of people

Q3 page 222

3 Real / STEM In science, a primary school class grew pea plants and then counted the numbers of peas in a pod.

a What is the modal number of peas in a pod?

b What is the range?

c Work out the mean number of peas in a pod.

Number of peas	Frequency
0	2
1	2
2	9
3	7
4	6
5	11
6	3

Q5 page 222

5 This **two-way table** shows the numbers of tickets sold at a cinema.

	Standard seats	Luxury seats	Total
Adult	39	33	72
Child	15	9	
Total	54		

a Work out the total number of luxury seat tickets sold.

b How many child tickets were sold?

c How many tickets were sold altogether?

d What fraction of the tickets sold were for children?

Q5 hint

A **two-way table** divides data into groups in rows across the table and in columns down the table. You can calculate the totals across and down.

3

Q6 page 222

6 The table shows the numbers of members of a photography club.

	Beginners	Intermediate	Advanced	Total
Men	33	36		90
Women			38	110
Total	65			

a Copy and complete the table.

b How many men are in the advanced group?

c How many men are above beginner level?

d Which level has the greatest difference in numbers of men and women?

e What percentage of the total membership is women at advanced level?

Stem & leaf diagrams

What is a stem-and-leaf diagram?

- A **stem-and-leaf diagram** is a simple way to display an **ordered list** of data using **digits**
- Two-digit numbers are split into a tens digit (the **stem**) and a units digit (the **leaf**)
    - 25 becomes 2 | 5
    - The stem is written **vertically** and the leaves are written **horizontally** (in order)

- The following diagram shows the ages below
    - 11, 18, 20, 21, 25, 28, 29, 35, 36, 40

	Age
1	1 8
2	0 1 5 8 9
3	5 6
4	0

Key: 1|8 means 18 years old

What is the key on a stem-and-leaf diagram?

- The **key** shows how values are **formed** from digits
    - It should include **units**

To set up a stem and leaf diagram we need to:

- Organise the data into **ascending order**, smallest to largest;

- Determine how the numbers are split into 2 parts by writing a **key** for the stem and leaf diagram;

- Write the values for the 'stem' into the stem and leaf diagram;

- Write the values for the 'leaf' into the stem and leaf diagram.

Note: A stem and leaf diagram must have a **key** (sometimes referred to as a **legend**). This explains how to convert the digits in the stem and leaf diagram into a single data point. Remember to include any units in the key if appropriate.

Key : 2	0 means 20
Stem	**Leaf**
0	1 4
1	3 6 6 7
2	0 2 5
3	6 7 7 7 8
4	0 1 3

We can use stem and leaf diagrams to calculate averages like the median, the mode and the mean, and to calculate measures of spread like the range and the interquartile range.

How do I find the median from a stem-and-leaf diagram?

- The **median** is the **middle** number
    - Data values are already in **order**
    - You can cross out numbers from the beginning and end until they meet in the middle
        - Remember that the **highest** number will be at the **end** of the last stem
        - If two numbers remain in the middle, find the **midpoint** between them

6

Worked example

Here are the heights of some tomato seedlings (in cm).

2.8, 3.4, 4.5, 4.1, 4.3, 2.7, 1.6, 3.2, 1.9, 2.5

Construct a stem and leaf diagram for this data.

```
1 | 6, 9
2 | 8, 7, 5
3 | 4, 2
4 | 5, 1, 3
```

Decide on a stem. For decimals use the whole-number part. Write in the leaves as you work along the data list.

```
1 | 6, 9
2 | 5, 7, 8
3 | 2, 4
4 | 1, 3, 5
```

Write out your diagram again, putting the leaves in order.

Key: 1 | 6 means 1.6 cm

Give your diagram a key.

Q4 page 225

4 The stem and leaf diagram shows the heights of Year 8 students, measured to the nearest centimetre.

```
14 | 6, 9
15 | 1, 1, 2, 3, 5, 5, 5, 6
16 | 2, 3, 4, 5, 5, 5, 7, 9, 9
17 | 0, 2, 4
```

Key: 14 | 6 means 146 cm

Find

a the mode   **b** the range   **c** the median.

3 The numbers of visitors each day to a stately home were

61, 52, 65, 77, 79, 84, 86, 91, 85, 70, 64,

53, 77, 56, 68, 73, 92, 85, 87, 78, 90

a Construct a **stem and leaf diagram** for this data.

b **Problem-solving** Use your diagram to answer these questions.

i On how many days was the stately home open?

ii On how many days were there more than 70 visitors?

The manager calculates that the house needs at least 65 visitors each day to make a profit.

iii On what percentage of days did it make a profit?

Dual stem and leaf diagram

Comparing data sets is simplified by using a **dual stem and leaf diagram** which have two sets of data represented back to back.

For example, here are two sets of data showing test scores of 20 males and 20 females.

Female						
0	6	7				
1	2	4	8	8	9	
2	4	5	5	5	6	6
3	0	1	2	3	3	3	6
4						

Key : 1 | 2 means 12

Male						
0	1	4	5			
1	0	2	3	4	4	8
2	2	7	7	9		
3	0	0	0	3	6	8
4	0					

Key : 1 | 0 means 10
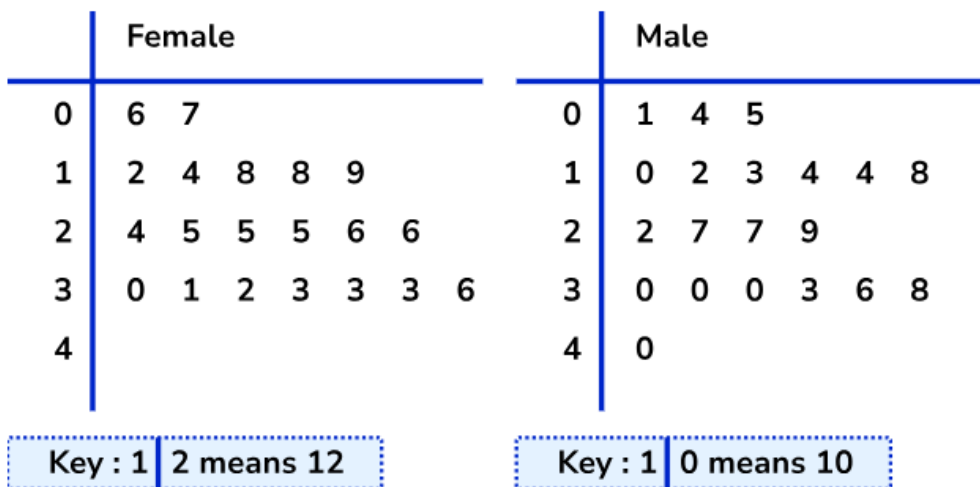
By combining them together to form one dual stem and leaf diagram, we can directly compare the two sets of data.

Female						Stem	Male					
				7	6	0	1	4	5			
	9	8	8	4	2	1	0	2	3	4	4	8
	6	6	5	5	5	4	2	2	7	7	9	
5	3	3	3	2	1	0	3	0	0	0	3	6	8
						4	0					

Key : 3 | 1 | 4 represents
13 Female
14 Male

9
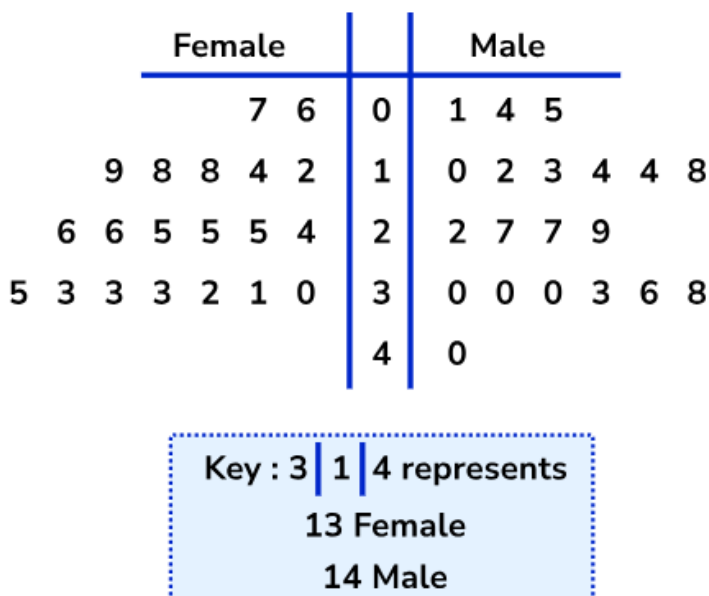
6 Real At the end of a secretarial course, students were tested on their typing speeds for
- number of words per minute typing their own text (Composition)
- number of words per minute when typing words spoken to them (Transcription).

This back-to-back stem and leaf diagram shows their results.

Transcription		Composition
Transcription		**Composition**
9, 6, 5	2	1, 3, 4, 5, 7
9, 7, 6, 3	3	0, 2, 2, 3, 3, 4, 4, 5, 7, 8, 8, 9
8, 8, 7, 7, 7, 6, 5, 5, 4, 3, 0	4	1, 6, 7
4, 2	5	

Key: 5 | 2 means 25 words per min

Key: 2 | 1 means 21 words per min

a The course leader says, 'Most of the transcription scores are between 40 and 49.'
Write a sentence like this for the composition scores.

b Work out the median and range for
  i composition
  ii transcription.

c Write two sentences comparing the median and the range for composition and transcription.

Q6 hint

The circled value is 52.

Worked example

Draw a pie chart to show this data about the tracks on a classical CD.

Track	Frequency
Opera	6
Orchestra	4
Piano	2

Total number of tracks = 6 + 4 + 2 = 12

> The total number of tracks is the total frequency.

$$\div 12 \left(\begin{array}{l} \text{12 tracks is } 360° \\ \text{1 track is } 30° \end{array} \right) \div 12$$

> Work out the angle for one track.

$$\text{Opera} \times 6 \left(\begin{array}{l} \text{1 track is } 30° \\ \text{6 tracks are } 180° \end{array} \right) \times 6$$

> Work out the angle for each type of music.

Orchestra   4 × 30° = 120°

Piano   2 × 30° = 60°

Check: 180° + 120° + 60° = 360°

> Check that the angles add up to 360°.

Opera · Piano · Orchestra
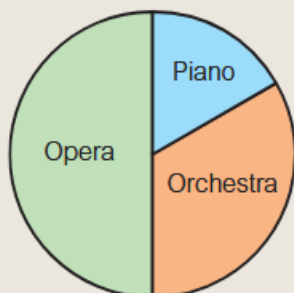
Tracks on CD

> Draw the pie chart. Label each sector or make a key (you do not have to label the angles).
> Give your pie chart a title.

Key point

A **pie chart** is a circle divided into slices called **sectors**.
The whole circle represents a set of data.
Each sector represents a fraction of the data.

Q4 page 228

4 The table shows the numbers of woodwind, string and percussion instruments in a school orchestra.

| Instrument	Frequency	Angle
Woodwind	12	
String	9	
Percussion	3	

a Work out the total number of musicians.

b Copy and complete: one musician is $360° \div \square = \square°$

c Work out the angles for woodwind, string and percussion instruments. Check that the angles add up to 360°.

d Draw a pie chart.

Q4d hint

Draw a circle. Draw in a radius. Then use a protractor to draw the angles. Label the sectors.

Q6 page 237
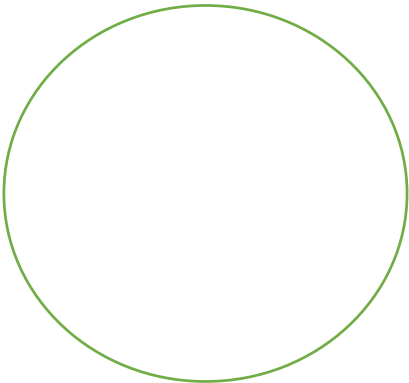
6 The pie charts show how Dana and Karen spent their money one day.

a Who spent the bigger proportion of money on clothes?

b What fraction of her money did Dana spend on music?

c Dana had $40. How much did she spend on music?

d What fraction of her money did Karen spend on food?

e Karen had $30. How much did she spend on food?

f Copy and complete the table to show the amounts Dana and Karen spent on music, clothes and food.
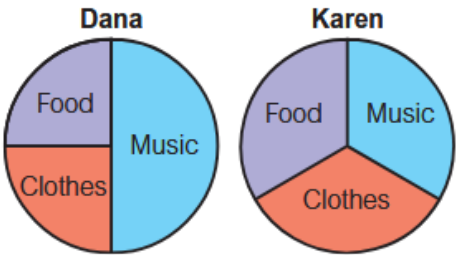
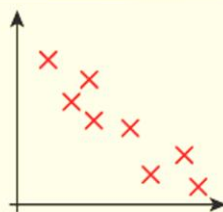|	Music	Clothes	Food
Dana			
Karen			

What are scatter graphs?

Scatter graphs are a statistical diagram which gives a visual representation of **bivariate data** (two variables) and can be used to identify a possible **relationship** between the data. A scatter graph can also be referred to as a scatter diagram or scatter plot.
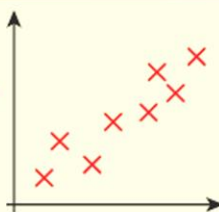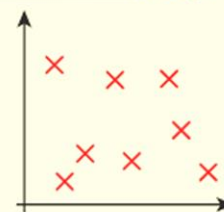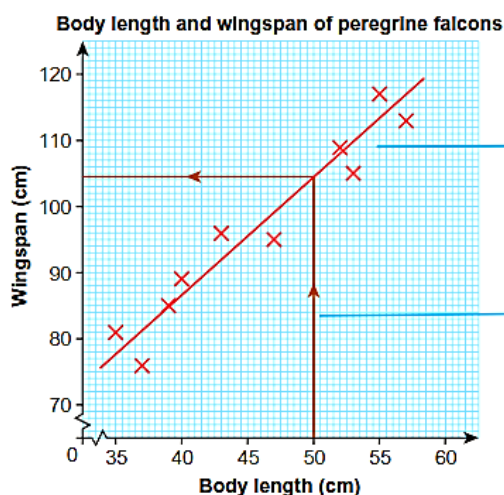
Worked example

The scatter graph shows the body length and wingspan of 10 peregrine falcons.

a Draw a line of best fit on the scatter graph.

Body length and wingspan of peregrine falcons

Use a transparent ruler to draw your **line of best fit**. Try it in different positions until you have approximately the same number of points on each side of the line. The line can pass through some of the points.

Draw a line from 50 cm body length to the line of best fit. Draw a line across and read off the wingspan.

b Use your line of best fit to estimate the wingspan of a peregrine falcon with a body length of 50 cm.

104 cm

13

Q3 page 233

3 **STEM / Reasoning** This **scatter graph** shows the heights
of 20 trees in a conservation area, and the diameter of
their trunks 1 m above the ground.
a Describe the **correlation** shown by this scatter graph.
b Write down the height of the tree that had a trunk
diameter of 6 cm.
c Write down the trunk diameter of the trees that had a
height of 26 m.
d Nisha believes that one of the points has been plotted
incorrectly. Which point do you think this is?
Give a reason for your answer.

e) Draw a line of best fit on the scatter graph.

Tree sizes
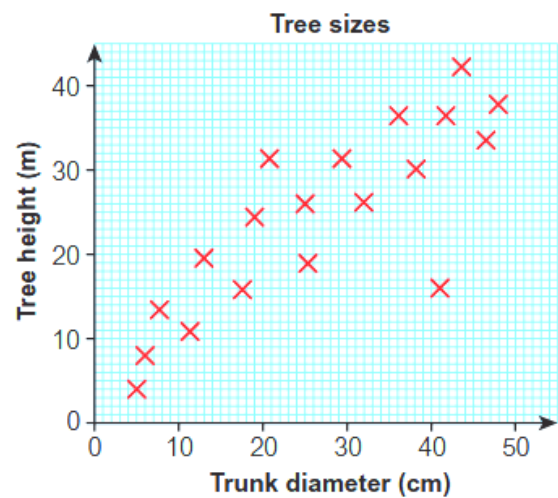
Key point

An **outlier** is a value that doesn't
follow the trend or pattern of the rest
of the data.

7 STEM / Modelling To test how a copper tank would expand in high temperatures in a power station, a copper bar 10 m long was heated. Its length was recorded at different temperatures. The results were plotted on this scatter graph.

a Describe the correlation shown by the graph.
b What happens to the length of the copper bar as the temperature increases?
c Use the line of best fit to predict the length of the bar at
  i 20 °C
  ii 110 °C.
d Using your answers from part **c**, estimate how much the bar would increase in length when heated from room temperature (20 °C) to 110 °C.

Expansion of copper bar when heated
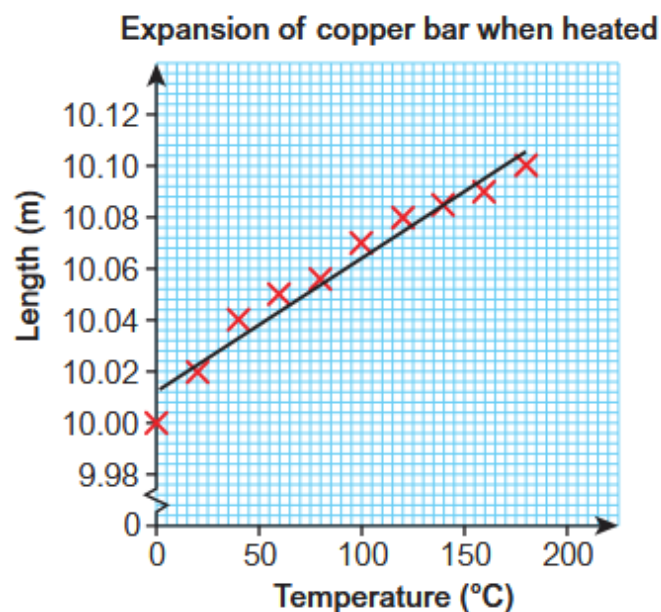
Best Wishes

Teacher : Sally Serkisian