

# Statistics Through Science

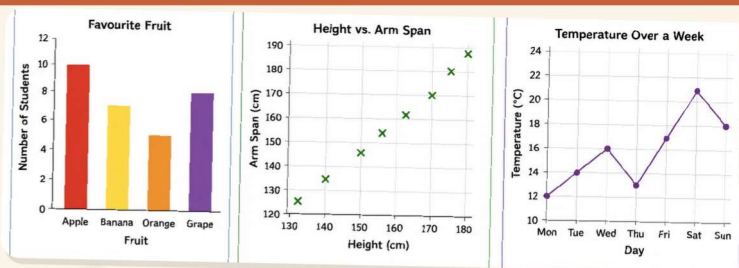
Data handling, graphs & drawing conclusions



## 1. How do we choose the right type of graph for our data?

Bar charts suit separate categories; **line graphs** suit data that changes continuously, like over time.

- Scatter graphs can show the relationship between two variables.
- The right graph makes a pattern much easier to see.



## 3. Why do scientists take repeat readings and use an average?

Taking **repeat readings** and calculating a **mean average** makes results more reliable.

- A single reading could be affected by a mistake or unusual conditions.
- Averaging several readings reduces the effect of any one unusual result.

| Reading # | Trial 1 | Trial 2 | Trial 3 | Trial 4 | Trial 5 | Average |
|-----------|---------|---------|---------|---------|---------|---------|
| Reading 1 | 23.4    | 23.6    | 23.5    | 23.3    | 23.7    | 23.5    |
| Reading 2 | 24.1    | 24.0    | 24.2    | 23.9    | 24.1    | 24.1    |
| Reading 3 | 22.8    | 22.9    | 23.0    | 22.7    | 22.9    | 22.9    |
| Reading 4 | 25.0    | 24.8    | 25.1    | 24.9    | 25.2    | 25.0    |

## 2. How do we identify and explain anomalies in our results?

An **anomaly** is a result that doesn't fit the pattern of the rest of the data.

- Scientists check for measurement or recording errors before trusting an anomaly.
- Repeating a measurement helps confirm whether a result is really anomalous.

## 4. How do we use evidence from data to support or refute an idea?

A good conclusion uses our **data as evidence** to say whether our prediction was supported or not.

- We refer to specific numbers or the pattern in our graph, not just a guess.
- Scientists must be ready to change their ideas if evidence disagrees with them.

## 5. Greater Depth: how do scientists decide if a pattern in data is meaningful?

A pattern is more convincing when it appears consistently across many results, not just one or two.

- More data, and repeating a test, makes a conclusion more trustworthy.
- Scientists compare their evidence with other studies to check their conclusions.



### FULL WRITE-UP

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### KEY VOCABULARY

line graph   scatter graph   anomaly   mean average   repeat reading   reliable  
evidence   support / refute   conclusion

### SKILLS I'LL USE

- Choose & draw the right graph type
- Calculate a mean average
- Identify anomalies in data
- Report findings using scientific evidence
- GD: judge how trustworthy a conclusion is