



# Preparing data

The fundamentals of data and spreadsheets in  Google Sheets

2 WEEKS

45 HOURS

11 LESSONS

In this module, we focus on developing **essential data** and **spreadsheet skills**, enabling us to **effectively work with data** to **draw meaningful insights** and **make informed decisions**. By exploring data in **Google Sheets**, we will learn how to **retrieve, manipulate, analyse**, and **visualise data**.

We'll use **real-world data** and **examples** related to the **United Nations Sustainable Development Goals** to contextualise the concepts and demonstrate the practical application of using spreadsheets to solve problems.

Through **hands-on exercises, case studies**, and **a project**, we will gain **proficiency in spreadsheet operations** and develop a **strong foundation for data-driven analysis** and **decision-making**.

## Module objectives

### Introduction to spreadsheets

Master the **foundations** of data and spreadsheets. Learn how to **work with spreadsheets effectively**. Gain a **fundamental understanding of data visualisation**.

### Data manipulation

Master the fundamentals of **manipulating** and **analysing** to **extract meaningful insights**. Learn how to identify and rectify data anomalies.

### Introduction to statistics

Master the fundamentals of statistics in the context of **spreadsheet analysis**. Learn how to **summarise data**. Gain a fundamental understanding of **samples** and **distributions**.

### Introduction to data modelling

Master **spreadsheet functions** and **control flow queries**. Learn how to **identify patterns** in data. Gain a fundamental understanding of **model accuracy** and **testing assumptions**.

## Learning activities

By engaging with different types of learning activities, you will develop a **deeper understanding** of preparing data in Google Sheets and build a range of skills that will help you succeed in your **coursework** and **beyond**.

**We learn by doing. We'll work on practical problem-solving and real-world projects.**

### Learn

Watch animated videos and read practical slide decks to learn spreadsheet concepts and operations.



16

Animated videos



22

Slide decks



22

Reference cards

### Apply

Practise spreadsheet operations with step-by-step guides and apply them to real-world scenarios.



53

Walk-throughs



2

Integrated project

This integrated project spans the entire module. Each week, we'll delve into a specific part of the project and you'll have to complete corresponding multiple-choice questions (MCQs) based on that week's learning. In this way, we build on our spreadsheet skills cumulatively!

### Assess

Test and track your data, spreadsheet, and problem solving proficiency.



38

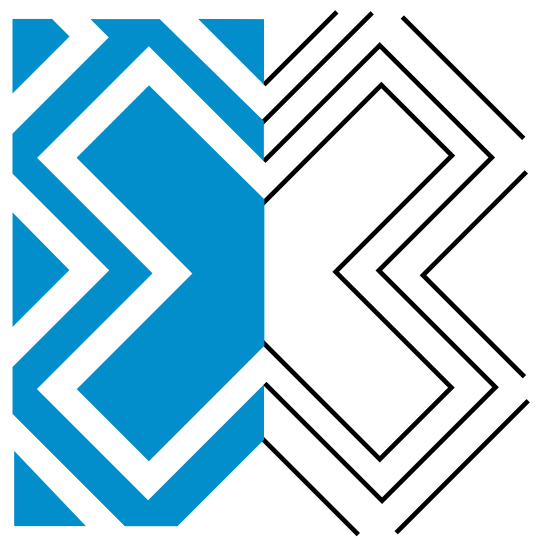
KQ assessments



3

MCQ assessments





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## Week 1

### Lesson: Data sources and access

In this lesson, we explore ways to **source the right data** and how to take **accountability** for it through data governance principles and ethics. We also look at **spreadsheets**, and more specifically **Google Sheets**, as a tool we can use to **access our data**.

- ✓ Understand how and why **sourcing appropriate data** is necessary to be able to create business value.
- ✓ Know how to **navigate Google Sheets** and **access data** through imports.
- ✓ Understand the various **principles** and **ethics** that **govern the collection and use of data**.

### Lesson: An introduction to using data

In this lesson, we will be **introduced to using data in spreadsheets** as we look into **why** it is necessary. By the end of this lesson, you will be able to identify the different **data types** in spreadsheets, know when and how to make data visible, as well as know how to use a few **functions** in spreadsheets.

- ✓ List the different **types of data** and be able to describe them.
- ✓ Know how to **select and format data** in Google Sheets.
- ✓ Know how to **use spreadsheet functions** and **formulas** to do row and column calculations in Google Sheets.

### Lesson: Data aggregations and descriptive statistics

In this lesson, we will learn about the different kinds of **descriptive statistics** and how to calculate them. By the end of this lesson, you will be able to **calculate central tendency** and spread as well as **use pivot tables** to summarise data.

- ✓ Understand what **descriptive statistics** are and be able to list and describe them.
- ✓ Know how to **calculate measures of central tendency and spread**.
- ✓ Know how to create and use **pivot tables** in Google Sheets to summarise data.

### Lesson: An introduction to data visualisation

In this lesson, we'll take a look at **what data visualisation is** and how to choose the most **appropriate** visualisation based on our data and the story we want to tell. By the end of this lesson, you will know how to **choose appropriate visualisations**, create them in Google Sheets, and be able to **interpret** and **analyse** them.

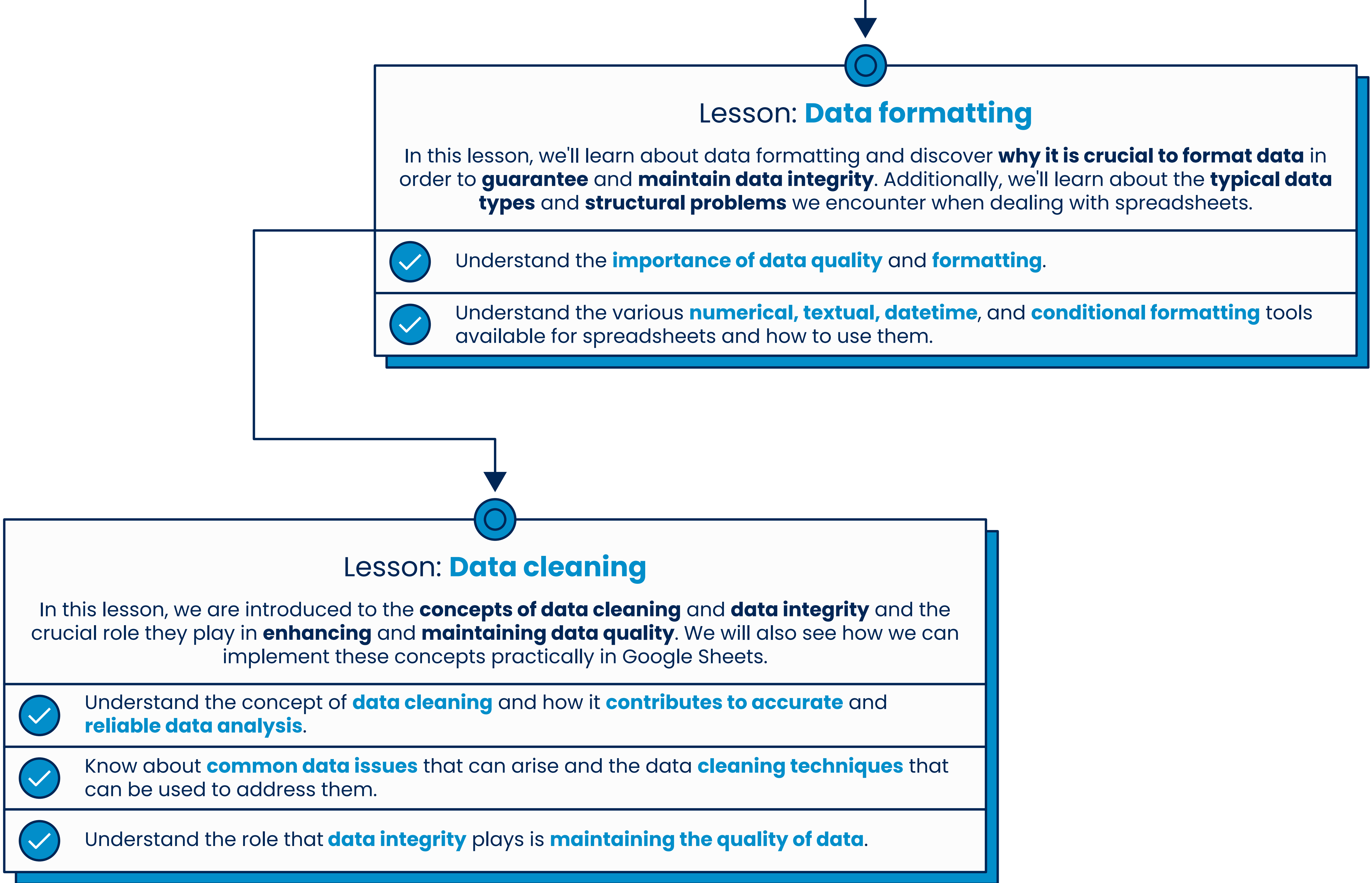
- ✓ Understand what **data visualisation** is and why it's important.
- ✓ List and describe the **different data visualisation categories**.
- ✓ Know how to **create data visualisations in Google Sheets**.

### Integrated project: Understanding the data

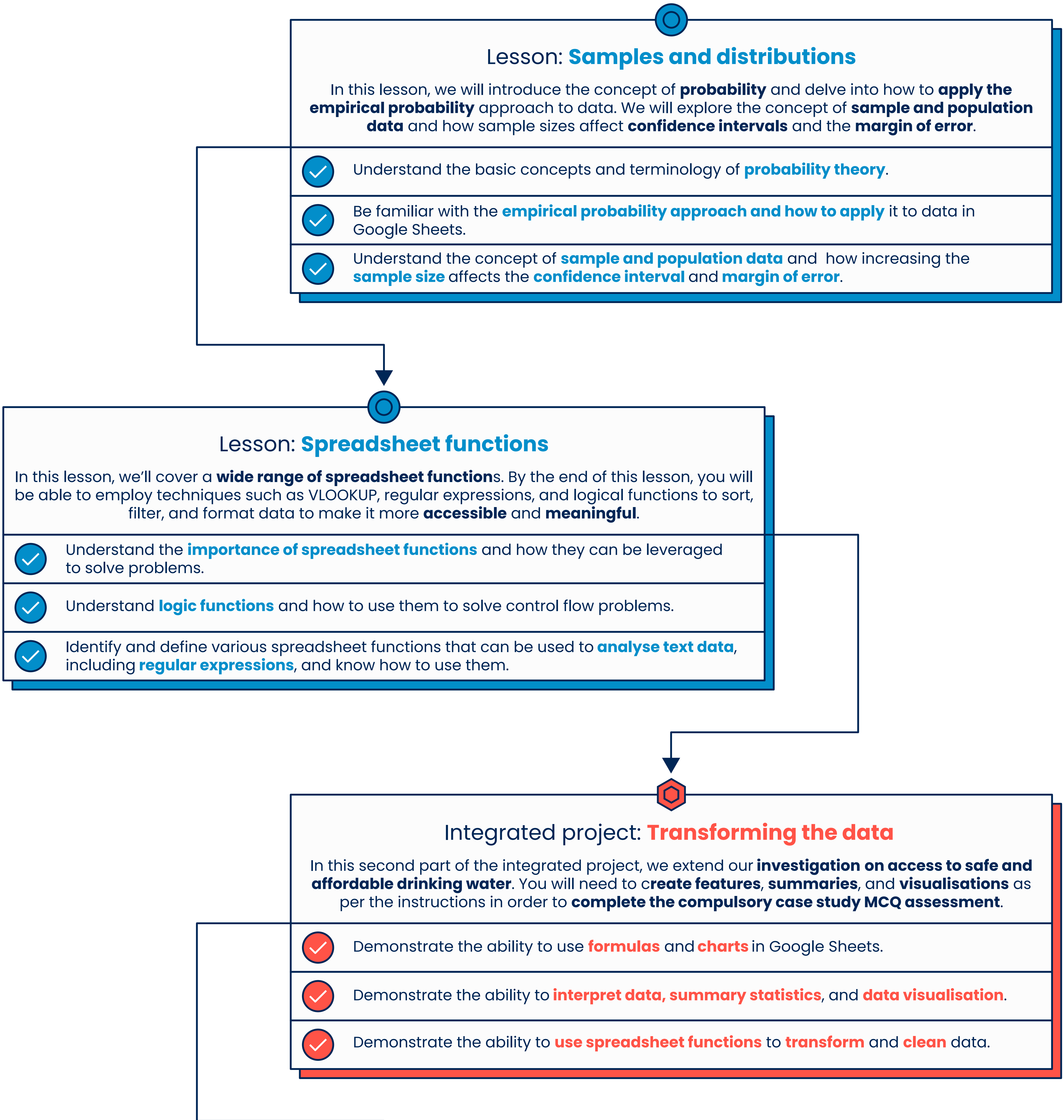
In this first part of the integrated project, we **investigate access to safe and affordable drinking water**. You will need to **create features, summaries**, and **visualisations** as per the instructions in order to **complete the compulsory case study MCQ assessment**.

- ✓ Demonstrate an understanding of **importing data** and **using formulas, functions**, and **charts** in Google Sheets.
- ✓ Demonstrate an understanding of **calculating summary statistics**, including the measures of central tendency and spread.
- ✓ Demonstrate the ability to **interpret data, summary statistics**, and **data visualisation**.





## Week 2





Lesson: **Identifying patterns**

In this lesson, we'll explore the **line of best fit**, **correlation coefficients**, **R-squared values** and **heatmaps**. By the end of this lesson, we will be able to use these tools to **interpret relationships**, **identify data patterns** and **make predictions**.

✓

Understand the concept of the **line of best fit** and its role in **identifying trends** and **relationships** between variables.

✓

Evaluate correlation coefficients to **determine the strength of the linear relationship** between two variables and **interpret the R-squared value** to evaluate goodness of fit.

✓

Utilise scatter plots, conditional formatting, and heatmaps to **visualise relationships** between variables, **identify patterns**, and **evaluate the line of best fit**.

Lesson: **Accuracy**

In this lesson, we'll learn about **model accuracy metrics** and how to use these to **assess our models**. We'll uncover common challenges to model accuracy, such as bias, variance, overfitting, and underfitting, and explore strategies to address these obstacles. Finally, we will learn how to use **polynomial trend lines** to find the best fit for our data. By the end of this lesson, you will be able to assess the accuracy of models and apply techniques to improve the fit of models to our data.

✓

Know how to **calculate** and **interpret residuals**, **residual plots**, and **accuracy metrics** for evaluating model performance.

✓

Understand **common challenges to model accuracy**, including **bias**, **variance**, **overfitting**, and **underfitting**, and learn **strategies to address them**.

✓

Understand and **evaluate polynomial trend lines** and explore how this relates to **overfitting** and **underfitting**.

Lesson: **Drawing and testing assumptions**

In this lesson, we will explore the **fundamental concepts of hypothesis testing** and its importance in statistical analysis. By the end of this lesson, you will be able to **formulate hypotheses** and test their **validity** using various statistical tests.

✓

Know how to **formulate** the **null** and **alternative hypotheses** and how **statistical significance** and **level of significance** can influence the results of a hypothesis test.

✓

Know how to **calculate** the **test statistic** and **critical value** for a **t-test**, **z-test**, and **Kolmogorov-Smirnov** test in Google Sheets, and how to use these metrics to reject or fail to reject a null hypothesis.

✓

Know the different **types of errors** in hypothesis testing.

MCQ: **Preparing data**

Test your knowledge of **the line of best**, **the line of best fit equation**, and **drawing and testing assumptions**.

✓

Demonstrate an understanding of **trend and relationships** in data and **interpreting** and **evaluating** model performance.

✓

Demonstrate an understanding of **hypothesis testing**.

Module summary

Throughout this module, we've embarked on a journey to **cultivate essential data and spreadsheet skills**. We've armed ourselves with the **expertise needed to efficiently work with data** and **derive meaningful insights**. Our exploration focused on spreadsheets, delving into data retrieval, manipulation, analysis, and visualisation to unlock their true potential.

By completing this module, we've not only become **proficient in spreadsheet operations** but also laid a **strong foundation** for **data-driven analysis** and **decision-making** that will be key in our data career path.

What's next?

We'll take these foundational skills forward as we **explore other data tools and technologies**, and expand on our capabilities in **data-driven analysis and decision-making**.

Remember, the data landscape is vast and ever-evolving. **Stay curious, keep practising**, and **apply the knowledge and skills you've gained in real-world scenarios**. Whether you're aiming to shape policies for sustainable development, streamline business strategies, or drive innovation, **your proficiency in handling data will always be a priceless asset**.

An illustration of two people, a man and a woman, celebrating the completion of a module. The man on the left is wearing an orange t-shirt and purple shorts, with his arms raised in a celebratory gesture. The woman on the right is wearing a blue long-sleeved shirt and purple pants, also with her arms raised. They are standing on a light blue circular platform with scattered red and blue confetti. The background is a solid light blue.

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