Year 4 – Data logging

Unit introduction

In this unit, pupils will consider how and why data is collected over time. Pupils will consider the senses that humans use to experience the environment and how computers can use special input devices called sensors to monitor the environment. Pupils will collect data as well as access data captured over long periods of time. They will look at data points, data sets, and logging intervals. Pupils will spend time using a computer to review and analyse data. Towards the end of the unit, pupils will pose questions and then use data loggers to automatically collect the data needed to answer those questions.

Note: Your school may not have the same data loggers as those used in this unit, or may not have any data loggers at all. If you don't have access to data loggers, a lot of the activities can be completed using tablet computers and apps such as Google Science Journal. Whichever data logging solution you have available, you should be able to address the learning objectives in the unit.

Overview of lessons

Lesson	Brief overview	Learning objectives
1 Answering questions	This lesson will set the scene for the unit of work. Pupils will consider what data can be collected and how it is collected. They will think about data being collected over time. Pupils will also think about questions that can and can't be answered using available data, and reflect on the importance of collecting the right data to answer questions. Later in the unit, pupils will put into practice the ideas that they have thought about in this lesson.	To explain that data gathered over time can be used to answer questions • I can choose a data set to answer a given question • I can suggest questions that can be answered using a given data set • I can identify data that can be gathered over time
2 Data collection	This lesson will build on the idea of collecting data over time, and introduce the idea of collecting data automatically using computers. Computers can capture data	To use a digital device to collect data automatically

	from the physical world using input devices called ‘sensors’. Sensors can be connected to data loggers, which can collect data while not attached to a computer. Data collected by a data logger can be downloaded for use later.	• I can explain that sensors are input devices • I can use data from a sensor to answer a given question • I can identify that data from sensors can be recorded
3 Logging	In this lesson, pupils will explore how data loggers work. Pupils will try recording data at set moments in time and draw parallels with the data points that a data logger captures at regular intervals. Pupils will use data loggers independently from a computer, then they will connect the loggers to a computer and download the data.	To explain that a data logger collects ‘data points’ from sensors over time • I can identify a suitable place to collect data • I can identify the intervals used to collect data • I can talk about the data that I have captured
4 Analysing data	In this lesson, pupils will open an existing data file and use software to find out key information. The data file is a five-hour log of hot water cooling to room temperature. **Note:** The logged activity can’t be done safely in school due to the high starting temperature. Later in the unit, pupils may choose to complete a warming experiment, starting with ice and allowing it to warm to room temperature.	To use data collected over a long duration to find information • I can import a data set • I can use a computer to view data in different ways • I can use a computer program to sort data
5 Data for answers	In this lesson, pupils will think about questions that can be answered using collected data. Pupils will choose a question to focus on and then plan the data logging process that they need to complete. After they have completed their plan, they will set up the data loggers to check that their plan will work. This setting up is designed to ensure that the data collection will work, and that pupils will have data to use in Lesson 6.	To identify the data needed to answer questions • I can propose a question that can be answered using logged data • I can plan how to collect data using a data logger

		• I can use a data logger to collect data
6 Answering my question	In this lesson, pupils will access and review the data that they have collected using a data logger. They will then use the data collected to answer the question that they selected in Lesson 5. Pupils will also reflect on the benefits of using a data logger.	To use collected data to answer questions • I can interpret data that has been collected using a data logger • I can draw conclusions from the data that I have collected • I can explain the benefits of using a data logger

Progression

This unit progresses pupils' knowledge and understanding of data and how it can be collected over time to answer questions. The unit also introduces the idea of automatic data collection.

Please see the learning graph for this unit for more information about progression.

Curriculum links

National curriculum links

Computing – Key stage 2

- ...work with various forms of input
- select, use and combine a variety of software (including internet services) on a range of digital devices to design and create a range of programs, systems and content that accomplish given goals, including collecting, analysing, evaluating and presenting data and information

Science – Lower key stage 2/Year 4

- making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers
- They should learn how to use new equipment, such as data loggers, appropriately. They should collect data from their own observations and measurements, using notes, simple tables and standard units, and help to make decisions about how to record and analyse this data.

Assessment

Formative assessment
Assessment opportunities are detailed in each lesson plan. The learning objectives and success criteria are introduced in the slide deck at the beginning of each lesson, and then reviewed at the end. Pupils are invited to assess how well they feel they have met the learning objective using thumbs up, thumbs sideways, or thumbs down.

Summative assessment
Please see the assessment rubric document for this unit.

Subject knowledge

This unit focuses on using technology to automatically gather environmental data over time. It refers to data points and logging intervals.

A data logger is a digital device that can collect data over time and store it. Data loggers designed for education will usually have built-in sensors for light, temperature, and sound, as well as the option to connect external sensors.

You should be aware that input devices allow data to be entered into a computer. Keyboards, mice, and microphones are all input devices.

A sensor is a type of input designed to allow computers to capture data from the physical environment. Sensors can be connected to a computer to capture data about temperature, light, sound, humidity, pressure, etc. A microphone can be used to record audio into a computer, or it can be used as a sound sensor.

You should also be aware that data loggers capture data at given time intervals. The interval is a regular time period between each data capture and can vary according to the experiment. For example, if data is being logged for a week, the interval might be every hour.

Enhance your subject knowledge to teach this unit through the following training opportunities:

Online training courses

- Raspberry Pi Foundation online training courses

Face-to-face courses

- National Centre for Computing Education face-to-face training courses