**Foundation**

I can explain how an object, picture or symbol stands for an idea or observation.

A picture, object or symbol can be used to communicate an idea or observation. For example, which emoji would you choose to tell us how you are feeling today? Which picture shows what tomorrow’s weather is expected to be?

Use symbols such as emojis to communicate how we feel. The U shape represents a happy person even though it is only an abstract representation of a smile, not even a whole person.

When drawing a picture to represent familiar objects, identify the features that can help us differentiate one from the other. For example, what features does a cat have that make it different to a dog?

Draw and display pictures to represent our daily activities. Compare representations and identify the commonly used features that make them easy to recognise.

**Achievement standard**

Students represent data using objects, pictures and symbols and identify examples of data that is owned by them.

**Content descriptions**

Represent data as objects, pictures and symbols | Digital Technologies AC9TDIFK02

**Related content**

Use shapes or images to represent an object when organising that data.

**Mathematics**

Collect, sort and compare data represented by objects and images in response to given investigative questions that relate to familiar situations. | Mathematics AC9MFST01

**Years 1–2**

I can use numbers and words to denote values, events or ideas.

Objects, ideas and events can be represented as pictures, symbols, numbers and words.

Data such as numbers can be represented as images, words, digits and tally marks.

Symbols such as arrows can be used to represent directions. These might be used to give a series of directions to follow.

Glyphs are graphical symbols or representations used to convey information or data. A simple key helps students interpret the data used to convey information.

An image of a house could be used as a glyph to visually represent data about a family. In this example, the number of windows represents the number of people in the family, red roof means no pets, blue roof means one pet.

First Nations Australians calendars represent seasonal and environmental indicators that signify connected events. For example, the blooming of specific flowers can signify the availability of food resources.

**Achievement standard**

Students represent and process data in different ways.

**Content descriptions**

Represent data as pictures, symbols, numbers and words | Digital Technologies AC9TDI2K02

**Related content**

Data representations can be organised into charts and displays to convey information.

**Mathematics**

Acquire and record data for categorical variables in various ways including using digital tools, objects, images, drawings, lists, tally marks and symbols | Mathematics AC9MIST01
Years 3–4

I recognise different kinds of data and can select appropriate symbols for it and explain my choices.

Students will be familiar with the idea that there are different types of data such as numbers, words, symbols and pictures.

We now explore how the same data can be represented differently depending on the purpose.

Familiar objects and places can be represented using words, photographs and pictures. Some representations provide clearer communication than others.

Actions and commands can also be represented in different ways.

Rock paintings made by First Nations Australians use images to represent knowledge such as resources for food and medicinal uses.

Achievement standard
Students process and represent data for different purposes.

Content descriptions
Recognise different types of data and explore how the same data can be represented differently depending on the purpose | Digital Technologies AC9TDI4K03

Related content
Use shapes or images to represent an object when organising that data.

Mathematics
Acquire data for categorical and discrete numerical variables to address a question of interest or purpose by observing, collecting and accessing data sets; record the data using appropriate methods including frequency tables and spreadsheets | Mathematics AC9M3ST01

Years 5–6

I can explain how data like text and images can be represented by numbers.

All data can be represented as whole numbers in digital systems.

Whole numbers can be used to represent the alphabet. Make a coded message using numbers to represent position in the alphabet: a = 1, b = 2, c = 3 and so on.

Students are introduced to data in binary (ones and zeros, or on or off states). For example, create an image on a grid using one of two states in each square: coloured or blank. Encode and decode data.

Achievement standard
Students process data and show how digital systems represent data.

Content descriptions
Explain how digital systems represent all data using numbers | Digital Technologies AC9TDI6K03

Explore how data can be represented by off and on states (zeros and ones in binary) | Digital Technologies AC9TDI6K04

Related content
Explore the construction and role of switches.

Science
Investigate the transfer and transformation of energy in electrical circuits, including the role of circuit components, insulators and conductors | Science AC9S6U03
**Data representation**

**Years 7–8**

I can show how whole numbers are expressed in binary (zeros and ones), so that different data can be stored and used in digital systems.

Digital systems represent text, image and audio data using integers. Text, images and other data can all be represented in binary.

Letters can be assigned numerical codes such as the ASCII or Unicode systems.

Code and decode words using numerical codes.

<table>
<thead>
<tr>
<th>The number 27</th>
</tr>
</thead>
<tbody>
<tr>
<td>128 64 32 16 8 4 2 1</td>
</tr>
</tbody>
</table>

Binary cards can be used to explore how whole numbers can be represented in binary. This is useful to do before exploring bitmap images.

Bitmap images can be broken into a grid of tiny pixels. Each pixel has a number for its red, green and blue component. Students explore how bits are used to represent colour.

Sound can be represented graphically as a waveform. Each point can be represented by a number. Any sound can be broken down into a series of numbers.

**Years 9–10**

I can demonstrate how plain text content is stored independently of its structure and styling. I can explore ways of compressing data.

Online document formats like HTML and CSS contain plain text content with additional tags and scripts to determine its placement and how it looks.

Data compression reduces the amount of binary digits needed to store sounds, images and other data. In some types of files we sacrifice a little bit of the quality if it allows us to make the file size a lot smaller. These compression methods are called lossy.

- **MP3:** The majority of a sound waveform can be simplified or removed while barely affecting what humans hear.
- **JPEG:** Areas of similar colour in an image can be simplified and combined with limited impact on what humans see.
- **PNG:** Sometimes, there’s enough of the same colour to simplify the data without losing anything! These compression methods are called lossless.

**Achievement standard**

Represent data with integers and binary ... explain how data is transmitted and secured in networks.

**Content descriptions**

Investigate how digital systems represent text, image and audio data using integers | Digital Technologies AC9TDI8K03

Explain how and why digital systems represent integers in binary | Digital Technologies AC9TDI8K04

**Achievement standard**

Students represent documents as content, structure and presentation ... explain how digital systems manage, control and secure access to data.

**Content descriptions**

Represent documents online as content (text), structure (markup) and presentation (styling) and explain why such representations are important | Digital Technologies AC9TDI10K02

Investigate simple data compression techniques | Digital Technologies AC9TDI10K03

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