DIGITAL TECHNOLOGIES HUB

Australian Curriculum V9.0

Data representation

How data is represented and structured symbolically for storage and communication by people and digital systems

ACARA, 2022

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.

For suggested resources

https://bit.ly/DataRepYears7and8

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

T	= 84	0	1	0	1	0	1	0	0
E	= 69	0	1	0	0	0	1	0	1
X	= 88	0	1	0	1	1	0	0	0
T	= 84	0	1	0	1	0	1	0	0

Code and decode words using numerical codes.

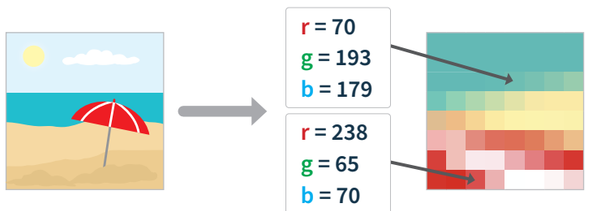
The number 27

128	64	32	16	8	4	2	1
0	0	0	1	1	0	1	1

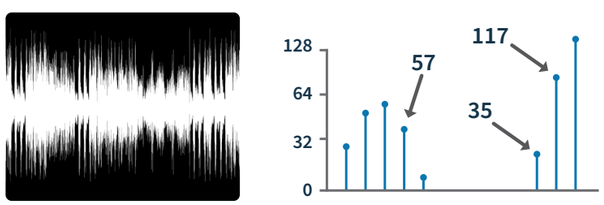
'Bit' is short for binary digit. There are 8 bits in 1 byte.

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.



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

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.

For suggested resources

https://bit.ly/DataRepYears9and10

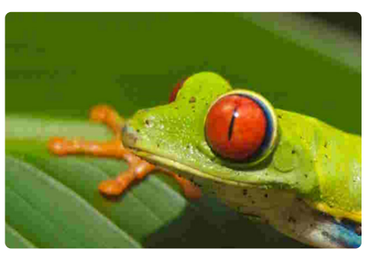
content	structure	styling
"Boticelli's Authentic Italian since 1924 menu"	<heading> <p> <a href…>	font-family: … font-size: … colour: …

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	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