National Mathematics Day Activity

Title of chapter/article	Binary code
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Each cipher and code activity has a suggested level: lower primary, upper primary or junior secondary. However, many of the activities can be enjoyed by students (and teachers!) of all ages.

For more information about this resource, please contact:
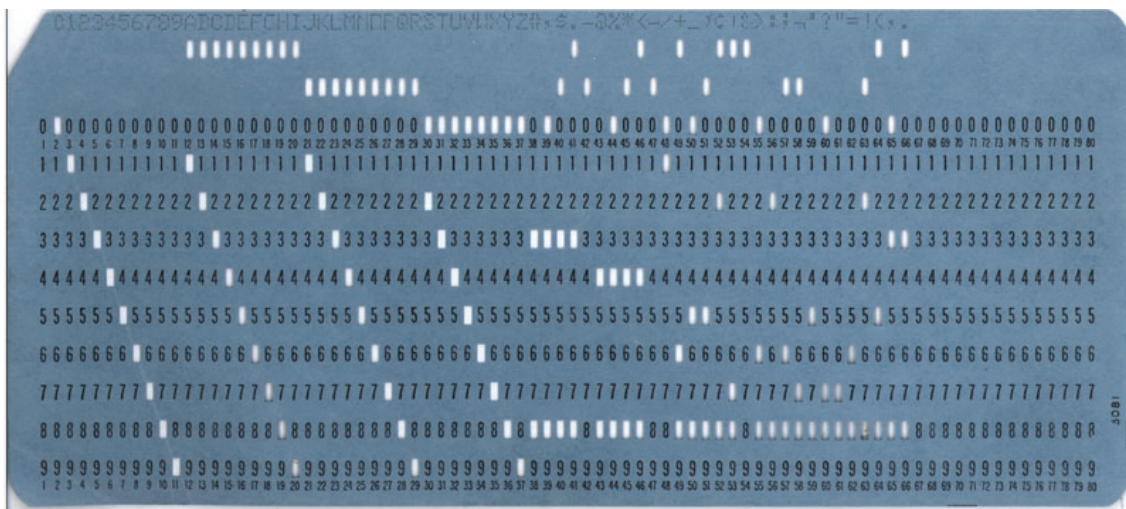
Binary code

The prefix bi- means 'two', therefore a binary code has two outcomes: 0 and 1. It can also be thought of as 'on and off' (like Morse code and smoke signals) or 'flat and raised' (like Braille) or 'solid and hollow' (like a computer punch card shown below).

Emile Baudot developed a 5-digit binary code in 1874, later named the Baudot-Murray Code or International Telegraphy Alphabet No. 2. This alphabet was used by telegraphers to transmit messages.

Binary numbers are still used today to represent information in the digital world. The Baudot-Murray code was considered to be the first truly digital form of communication.

International Telegraphy Alphabet No.2

Binary code	Letter shift	Figure shift
11101	Q	1
11001	W	2
10000	E	3
01010	R	4
00001	T	5
10101	Y	6
11100	U	7
01100	I	8
00011	O	9
01101	P	0
11000	A	-
10100	S	BELL
10010	D	$
10110	F	!
01011	G	&
00101	H	#
11010	J	'
11110	K	(
01001	L	)
10001	Z	"
10111	X	/
01110	C	:
01111	V	;
10011	B	?
00110	N	,
00111	M	.
11011	Shift to figures	
11111	Shift to letters	

Each binary code has two possible 'answers': a letter or a figure. The 11011 code shifts the 'answer' from letters to figures, and the 11111 code shifts it from figures to letters.

- There are 32 different 5-digit binary combinations. Can you list them all? Can you explain why there are 32?

- The cover of Coldplay's album X&Y is another visual representation of binary (search online). The colours (as pairs) represent a vertical 5-digit binary code.
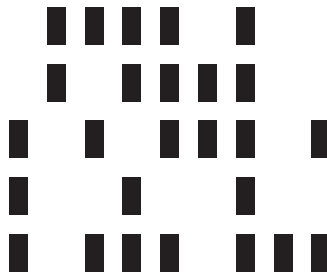
10111, 11011, 00011, 10101

It has been translated (by some) as:

X, shift, 9, Y

The album cover is supposed to be X & Y, not X 9 Y!

What is the correct vertical binary code? (Hint: you will need five vertical lines.)

- What does this message say?

- How would this word look if it were written in Baudot-Murray code?

computer

- Can you write your own message using Baudot-Murray code?

- Which 5-digit binary numbers are missing from the International Telegraphy Alphabet No. 2 table? Find out what symbols/letters/words/numbers they are assigned to.

- How many possible combinations are there for an 8-digit binary code? Can you generalise the formula for n-digits?