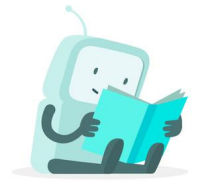






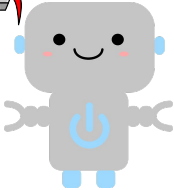
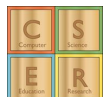




# CSER's 16 Days of Binary!



<p><b>Rules:</b> You must use your creativity, best problem- solving skills and have fun! <i>Ready, Set, GO!</i></p>		<p>1 Watch <a href="#">this video</a> on Binary, <a href="#">practise what you know</a>.</p> 	<p>2 Make the <a href="#">Binary Window</a> model. <a href="#">How it works</a>. Make these numbers 5, 10, 15, 21, 37, 48, 72, 134</p>	<p>3 GAME TIME! Practise your skills with the <a href="#">online calculator</a></p> 	<p>4 Write your own binary message. Need help with the codes? <a href="#">Click here</a></p> 	<p>5 <a href="#">How are letters represented in Binary?</a> What is the difference between upper and lower case? <a href="#">Codes here</a></p>
<p>6 Alphabet Write a message in Binary, also write down the solution. Email it to someone? Codes</p>	<p>7 Design a poster that teaches your classmates about binary. Share a photo to your teachers and a friend.</p> 	<p>8 How does a computer break down pictures. Colour the <a href="#">picture</a></p>	<p>9 Write a procedure for colouring the <a href="#">picture</a>. Identify patterns and find a <a href="#">shorthand</a> way to write it.</p>	<p>10 Use binary to draw pictures <a href="http://bit.ly/CSERbinary10">bit.ly/CSERbinary10</a></p> 	<p>11 <a href="#">Watch</a> Saving space when drawing <a href="#">pictures</a>. Write the patterns for this <a href="#">picture</a></p>	<p>12 Use <a href="#">this</a> to create <a href="#">pixel</a> art.</p> 
<p>13 Use <a href="#">this</a> to create your own pixel art. Do a search on "Pixel Art" to find a picture if you need ideas.</p>	<p>14 Can you mix colours using the binary system ? <a href="#">Online colour mixer</a></p>	<p>15 <a href="#">What are pixels</a> and how are they related to pictures? <a href="#">Pixel Viewer</a></p>	<p>16 Advanced - Explore this activity - <a href="#">pixel art</a> representing images with multiple colours.</p> 	<p>What was your <b>FAVOURITE</b> day?! Can you come up with your own challenge?</p>		



# Online Links

Day 1 - What is Binary <https://youtu.be/zdo9Os-zk6A>  
- Practise what you know - <bit.ly/CSERBinary1>

Day 2 - Print the Binary Window <bit.ly/CSERBinary2a>  
- Set up Binary Window tool  
<https://youtu.be/GMVArYjXHsQ>  
- How the Binary Window tool works  
<https://youtu.be/jOvOrLoHSnY>  
- Practise with the binary window  
<bit.ly/CSERBinary2>

Day 3 - Binary Online game <bit.ly/CSERBinaryGame>

Day 4 - Write a coded message <bit.ly/CSERBinary4>

Day 5 - What is the difference between upper and  
Lower case? <bit.ly/CSERBinary5>

Day 6 - Use codes from Day 5 <bit.ly/CSERBinary5>

Day 7 - Design a poster explaining binary

Day 8 - Colour this picture <bit.ly/CSERBinary8>

Day 9 - Write a procedure to colour this picture and  
find a shorthand way to record the steps  
<bit.ly/CSERBinary9>

Day 10 - Use Binary to make a picture  
<bit.ly/CSERbinary10>

Day 11 - Run Length Encoding  
<bit.ly/CSERBinary11>

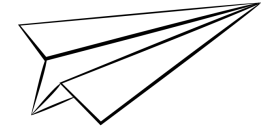
Day 12 - Pixel art template  
<bit.ly/CSERBinary12a>  
- Create the Parrot <bit.ly/CSERBinary12>  
- Create your own pixel art

Day 14 - Colour Mixer <bit.ly/CSERBinary14>

Day 15 - What are Pixels  
<https://youtu.be/15aqFQQVBWU>  
- Pixel Viewer <bit.ly/CSERBinary15>

Day 16 - Advanced Pixel Art <bit.ly/CSERBinary16>

# Printables for working on paper



Printable resources from the lessons in and for the links above

Large Binary Cards <https://csunplugged.org/en/resources/binary-cards/>

Small binary cards <https://csunplugged.org/en/resources/binary-cards-small/>

Binary to alphabet <https://csunplugged.org/en/resources/binary-to-alphabet/>

Binary Window [bit.ly/CSERBinary2a](http://bit.ly/CSERBinary2a)





# Day 2 - Practise with the Binary Window

1. Use the binary window cards to practise counting to 32.
  - a. Place all the cards in order with 1 on the right and 32 on the left.
  - b. Now turn all the cards face down this equals 0.
  - c. Practise counting from 1 to 32.
  - d. Continue counting until you get to 63.
  - e. Here is a video of what it should look like.
  - f. Online interactive game, to see the value of the cards, turn binary on and decimal on
    - i. can you predict the number you will get when you flip the cards?
    - ii. Make the following numbers -
      1. 5
      2. 10
      3. 15
      4. 21
      5. 37
      6. 48
      7. 72
      8. 134

1. If you have wifi and a device in your home you can try the online binary calculator
2. Open a browser
3. Get a new tab
4. Click or type the url <https://studio.code.org/projects/applab/iukLbcDnzqgoxuu810unLw>
5. Try to beat the Binary calculator



# Day 4 - Decoding Binary Messages

Letter	Binary
A	01001001
B	01001100
C	01000101
D	01000001
E	01001110
F	01000100
G	01001101
H	01000100
I	01001111
J	01000001
K	01001110
L	01000001
M	01001101

Letter	Binary
N	01001101
O	01001100
P	01000101
Q	01000001
R	01001110
S	01000100
T	01001111
U	01000001
V	01001110
W	01000001
X	01001110
Y	01000001
Z	01001101

01010011 01001101  
 01001001 01001100  
 01000101 01000001  
 01001110 01000100  
 01010111 01000001  
 01010110 01000101

Can you decode the message?

What information do you need?

Using computational thinking to solve the problem.  
 (Decomposition, pattern recognition, abstraction, algorithm design)

# Day 5.1 - Questions about the alphabet codes

Character	Binary Code	Character	Binary Code	Character	Binary Code	Character	Binary Code	Character	Binary Code
A	01000001	Q	01010001	g	01100111	w	01110111	-	00101101
B	01000010	R	01010010	h	01101000	x	01111000	.	00101110
C	01000011	S	01010011	i	01101001	y	01111001	/	00101111
D	01000100	T	01010100	j	01101010	z	01111010	0	00110000
E	01000101	U	01010101	k	01101011	!	00100001	1	00110001
F	01000110	V	01010110	l	01101100	"	00100010	2	00110010
G	01000111	W	01010111	m	01101101	#	00100011	3	00110011
H	01001000	X	01011000	n	01101110	\$	00100100	4	00110100
I	01001001	Y	01011001	o	01101111	%	00100101	5	00110101
J	01001010	Z	01011010	p	01110000	&	00100110	6	00110110
K	01001011	a	01100001	q	01110001	'	00100111	7	00110111
L	01001100	b	01100010	r	01110010	(	00101000	8	00111000
M	01001101	c	01100011	s	01110011	)	00101001	9	00111001
N	01001110	d	01100100	t	01110100	*	00101010	?	00111111
O	01001111	e	01100101	u	01110101	+	00101011	@	01000000
P	01010000	f	01100110	v	01110110	,	00101100	_	01011111

# Day 5.2 - Difference between Upper and Lower case?

1. What is the code for "A"? How is it similar or different to 1.
2. How is it similar or different to "a"?
3. Why is the code for an uppercase A different to a lower case a?
4. Can you explain the purpose of the different?
5. Write a message using binary letters.





# Day 8 - Binary


00001111111111

---

00001111111011

---

00001111111011

---

00001111111111

---

000011111111

---

000011111111

---

000001111111

---

1111111111111111

---

0111111111111111

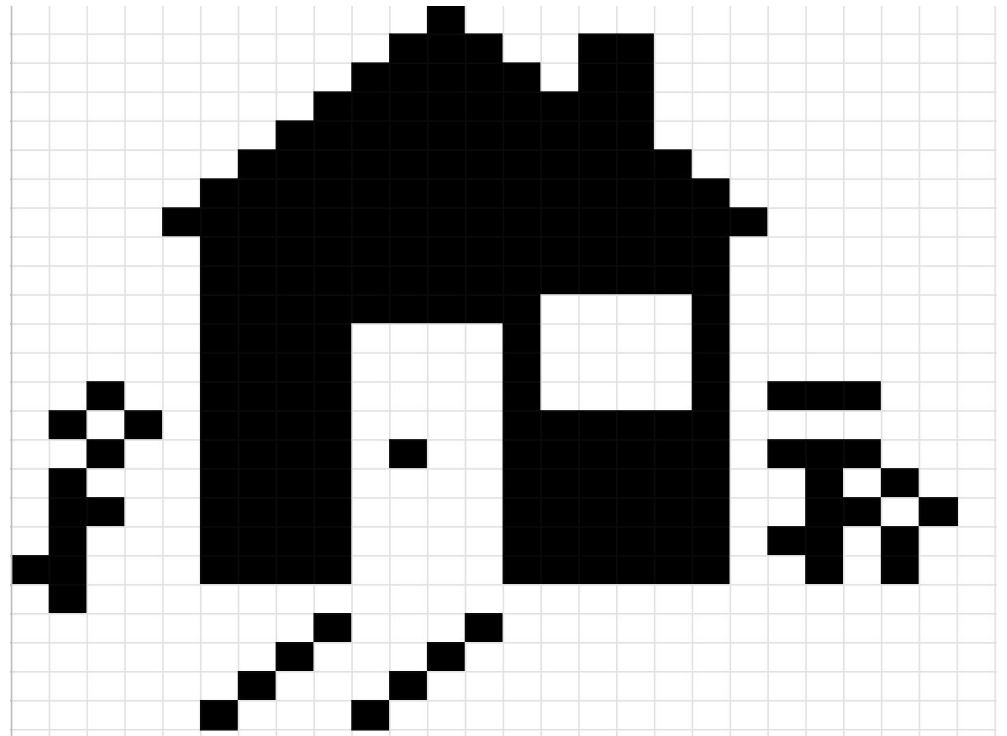
---



# Day 9.1 - Graph Paper Programming

## PROGRAMMING KEY

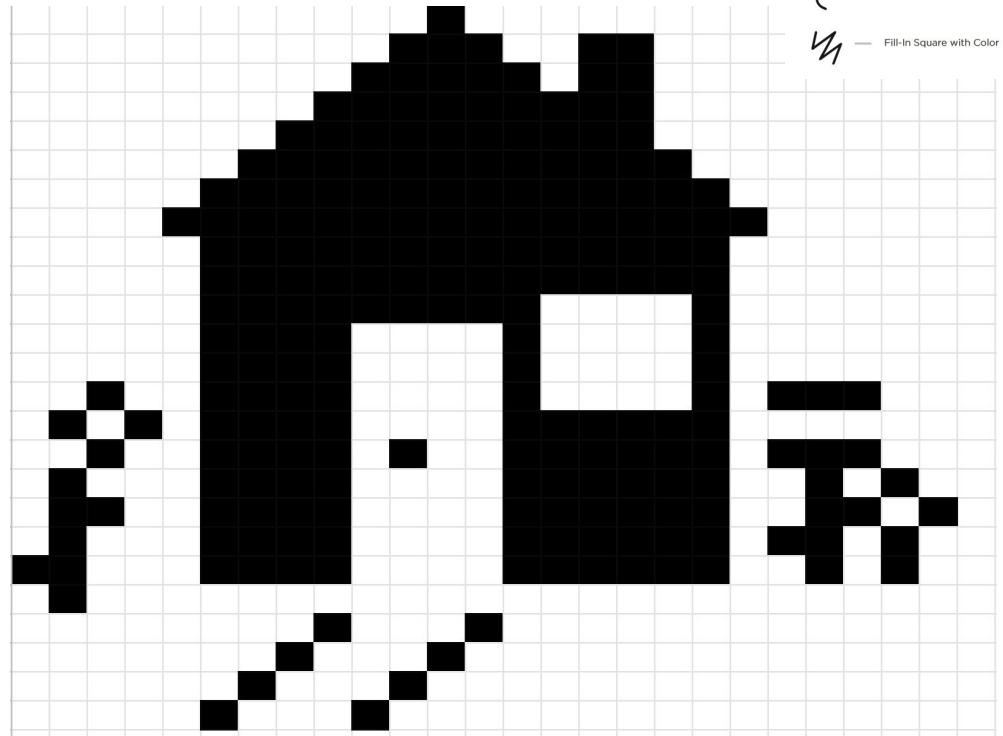
- — Move One Square Forward
- ← — Move One Square Backward
- ↑ — Move One Square Up
- ↓ — Move One Square Down
- ↻ — Change to Next Color
- ⚡ — Fill-In Square with Color



# Day 9.2 - Graph Paper Programming



- PROGRAMMING KEY**
- — Move One Square Forward
  - ← — Move One Square Backward
  - ↑ — Move One Square Up
  - ↓ — Move One Square Down
  - ↻ — Change to Next Color
  - Wavy line — Fill-In Square with Color



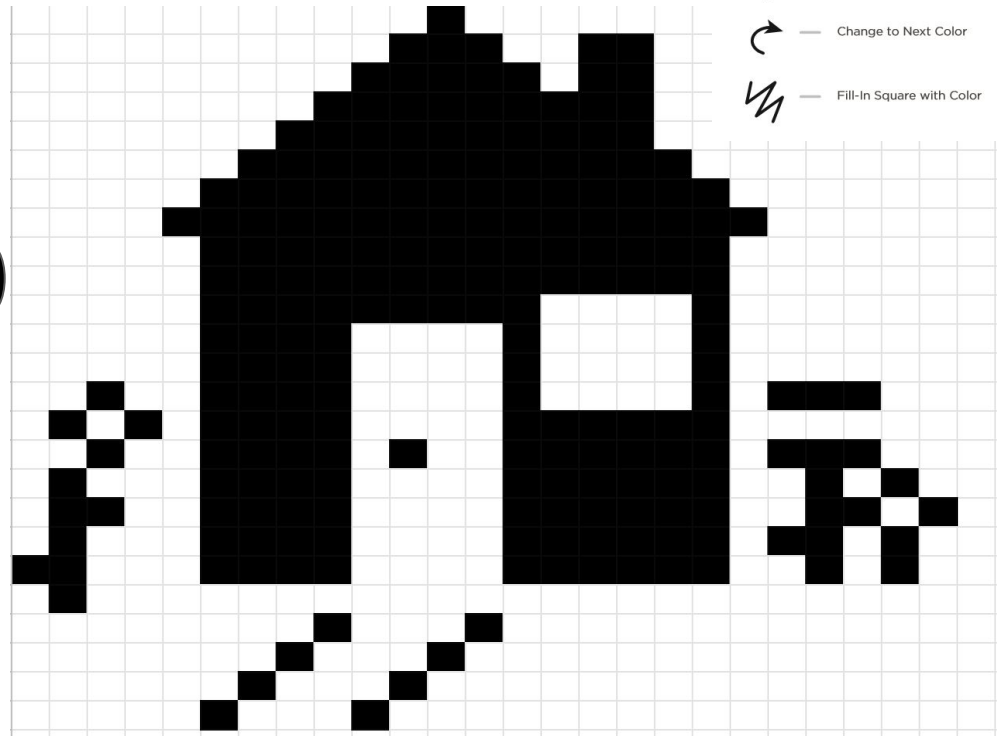
# Day 9.2 - Graph Paper Programming, Solution

## PROGRAMMING KEY

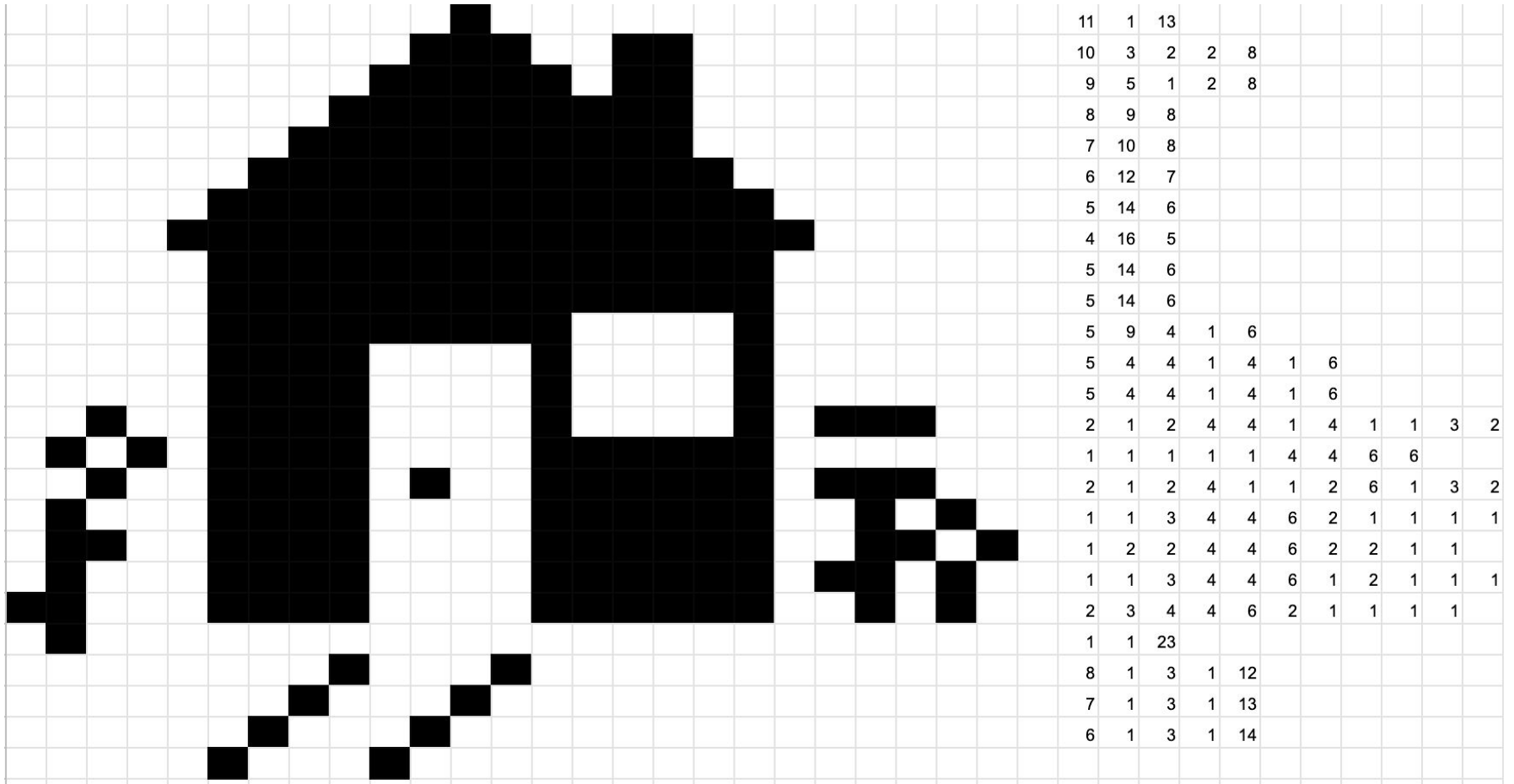
- — Move One Square Forward
- ← — Move One Square Backward
- ↑ — Move One Square Up
- ↓ — Move One Square Down
- ↻ — Change to Next Color
- ⚡ — Fill-In Square with Color



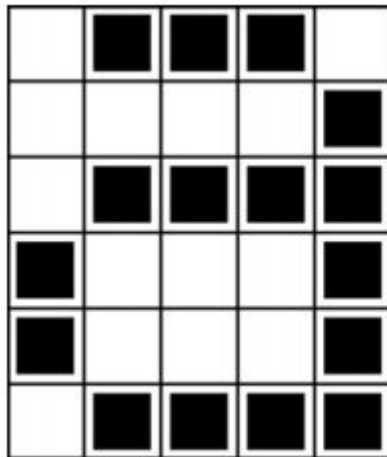
( → 11 ) ( ⚡ 1 ) ( → 13 )  
 ( → 10 ) ( ⚡ 3 ) ( → 2 ) ( ⚡ 2 ) ( → 8 )  
 ( → 9 ) ( ⚡ 5 ) ( → 1 ) ( → 2 ) ( → 8 )  
 ( → 8 ) ( ⚡ 8 ) ( → 1 )  
 ( → 7 ) ( ⚡ 9 ) ( → 1 )  
 ( → 6 ) ( ⚡ 11 ) ( → 1 )



# Day 9 Solution



# Day 11 - Run Length Encoding (RLE)



1, 3, 1

4, 1

1, 4

0, 1, 3, 1

0, 1, 3, 1

1, 4

- RLE is used to save space for storing digital images
- Computer screens are divided into a grid of small dots called pixels (picture elements)
- The letter a has been magnified to show the pixels
- First line consists of 1 white pixel, then 3 black and 1 white
- The first number always relates to the number of white pixels
- If the first pixel is black the line will begin with a zero.

# Day 11 - Your Turn Run Length Encoding

Solve this puzzle using the codes on the right.  
You need to colour blocks in black or white to reveal an image.


1, 3, 1

1,3,1

1,4,

1,3,1

1,3,1

# Day 11 - Solution

	■	■	■		1,3,1
■				■	1,3,1
■					1,4,
■				■	1,3,1
	■	■	■		1,3,1



