

SECRET CODES



Year: **Year 5 / 6**

Task: Counting the treasure

Computing Focus: Algorithms, Creating a sequence of command, Testing, Debugging

Aims: To create, test and debug simple programs.

KS 2 National Curriculum coverage: Create and debug simple programs (Algorithms).
That programs execute by following precise and unambiguous instructions.
Use logical reasoning to predict the behaviour of simple programs (algorithms).

Unplugged activity:



The crew need a secret way to count the treasure and send messages between the ship and the island. The problem is they only have 5 lamps and need to think of a way to use these to signal the letters of the alphabet.

This activity introduces the idea of binary numbers for storing and sending information.

Resources: Binary number cards and worksheets.

Plugged activity: High seas activity.



Resources: Google CS-first

COUNTING THE TREASURE

Pupils will be used to counting in base 10 where we have units, tens, hundreds and so on, with each place value going up by a factor of ten. In this way we represent Three hundred and fifty seven by:

Thousands	Hundreds	tens	Units
0	3	5	7

This is a great way for humans to do maths and calculations but not a very efficient way for computers to represent and store numbers as each place value needs ten different characters - 0, 1, 2, 3, 4 and so on.

Computers work with binary numbers and this fits very well with switches, which themselves are binary (either on or off , 1 or 0).

The place value in binary numbers double each time, rather than going up by 10 times in base 10. So the number 22 in binary is 00010110 and is made up of $2 + 4 + 16 = 22$

See the table below which shows each binary digit. In computing we call **binary digits** BITS and 8 bits make a Byte. Pupils may have heard of bits and bytes when talking about computers.

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

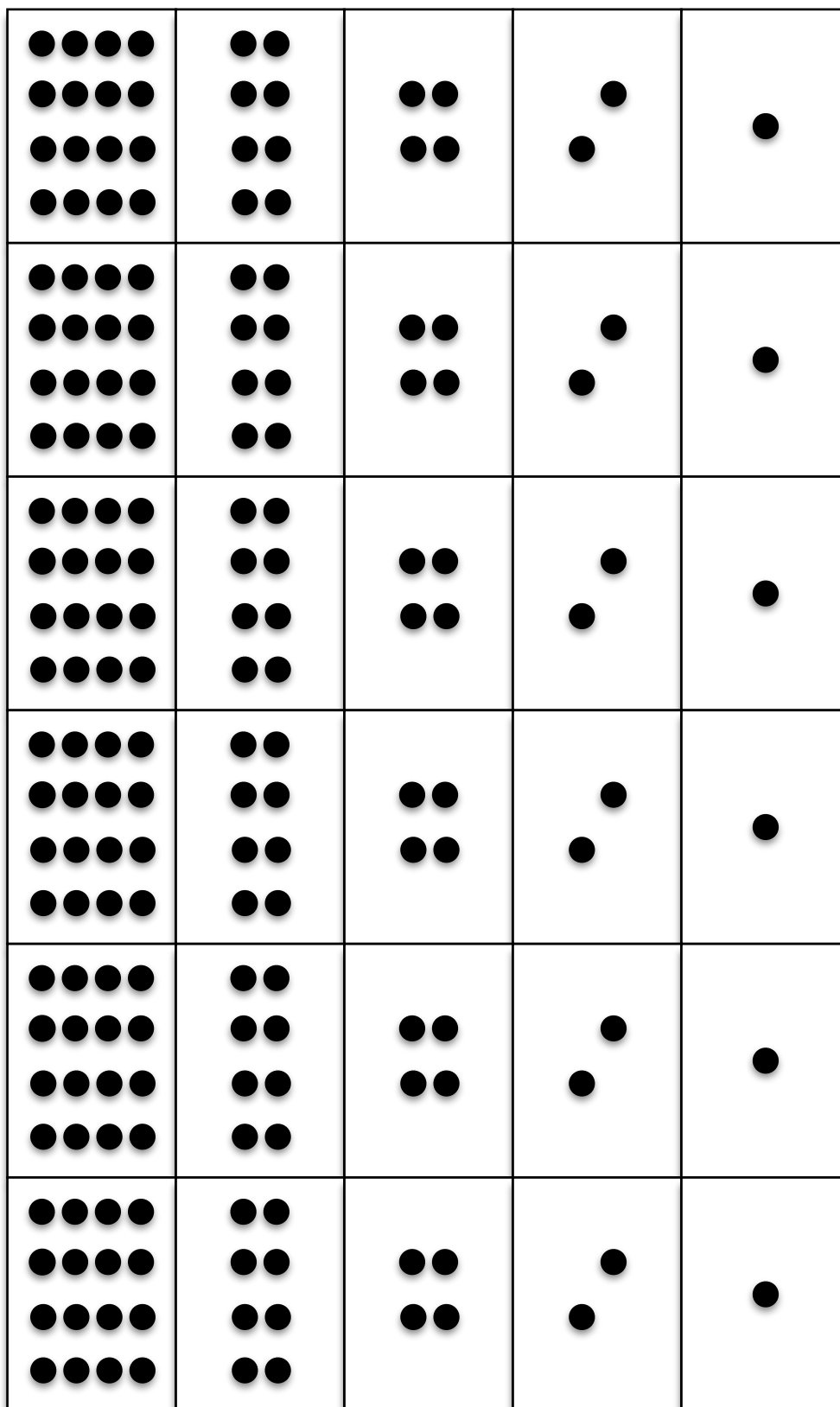
There is a useful video, from computer science unplugged, explaining binary numbers here, <https://www.youtube.com/watch?v=b6vHZ95XDwU>

For our activity with pupils we are just going to use the first five bits, 16, 8, 4, 2, 1. Pupils will need to cut out a set of Binary digit cards and place them on the table in ascending order from right to left. If a card faces up (you can see the dots) it is on (1), if a card is face down (blank), it is off (0).

We are going to use these cards to work out how to count in binary and then create our own secret messaging code using binary numbers.

BINARY DIGIT CARDS

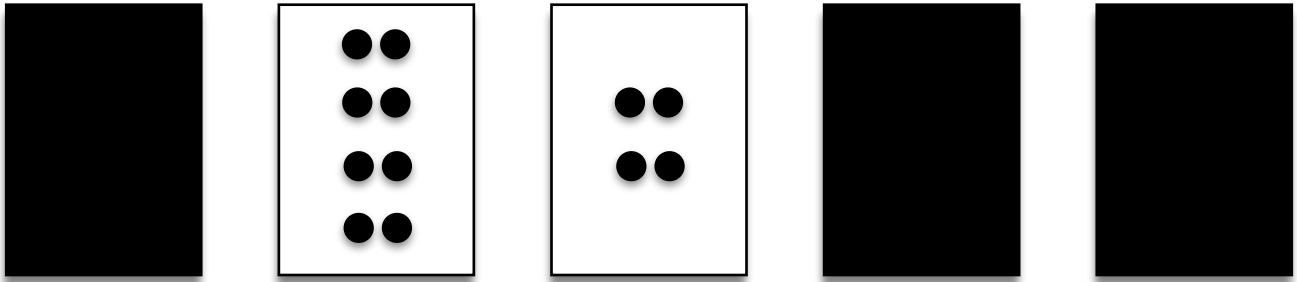
Make sure you cut out 5 separate cards.



COUNTING THE TREASURE

Lay the cards out on the table with the dots upwards for on (1) and face down for off (0).

So 0 1 1 0 0 in binary would look like:



which equals 12 (8+4).

See if you can work out what the following binary numbers represent.

0	1	1	0	0	equals	12
0	0	0	1	1	equals	
0	1	0	1	1	equals	
1	1	1	0	0	equals	
1	1	1	1	1	equals	

Can you work out the binary code for the following numbers

					equals	3
					equals	0
					equals	30
					equals	11
					equals	40

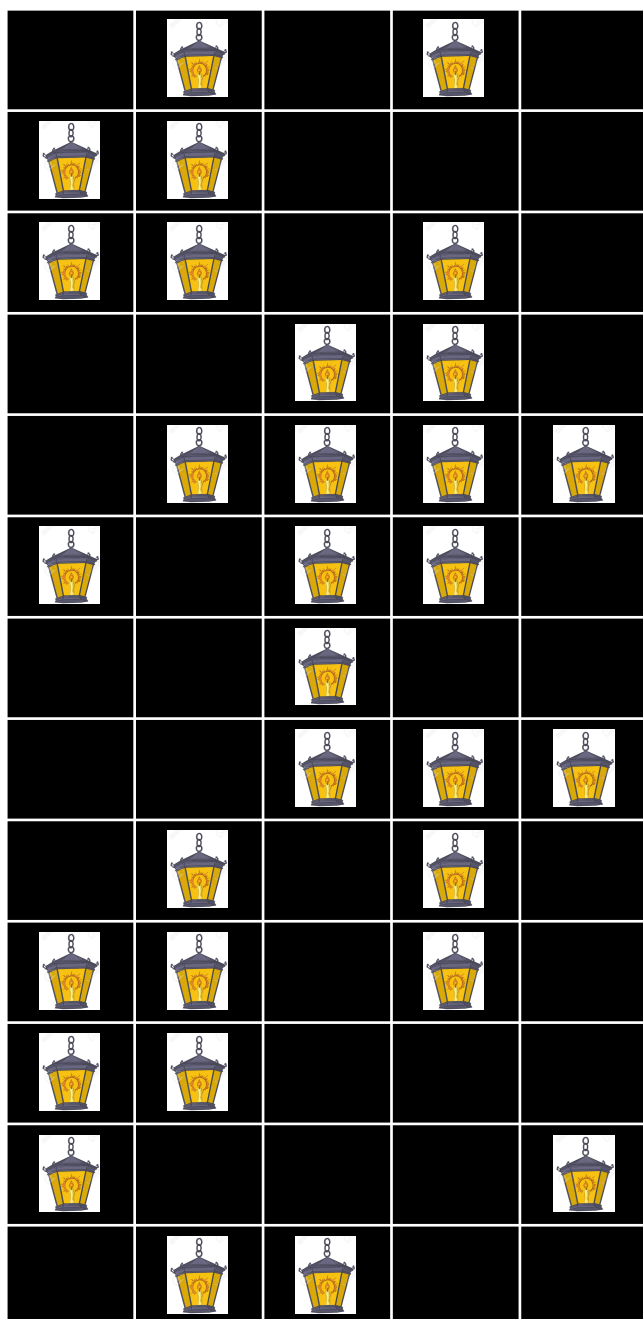
How would you write down in Binary the following number of treasure chests?



SENDING SECRET MESSAGES

It is night time and too dark to sail out to the pirate ship. The pirates need a way to send secret messages to the Captain on the ship. They only have 5 lamps, which can be either on or off.

1	2	3	4	5	6	7	8	9	10	11	12	13
a	k	q	b	v	d	y	l	o	s	f	t	h
14	15	16	17	18	19	20	21	22	23	24	25	26
g	r	p	x	c	z	i	j	u	m	e	w	n



One of the crew invents a secret code using binary numbers.

Can you decode the secret message?



CREATING YOUR OWN SECRET CODE AND MESSAGE

Code grid

1	2	3	4	5	6	7	8	9	10	11	12	13
14	15	16	17	18	19	20	21	22	23	24	25	26

Message - how could you code words longer than 5 letters?

CS FIRST HIGH SEAS ADVENTURE

High seas adventure is available at:

<https://www.cs-first.com> Click on I am a **Teacher**

and then click **explore materials**.

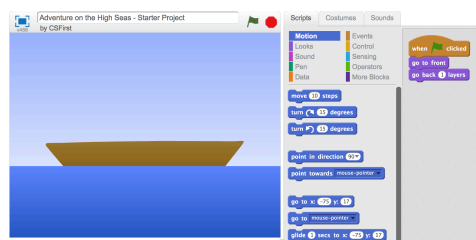
Under sample activities choose High Seas Activity and click **try now**.



The CS First projects have two main kinds of resources:

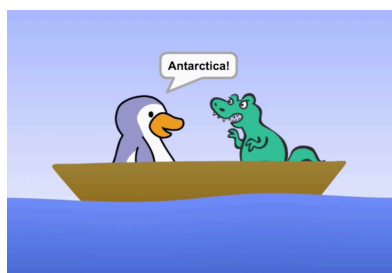
Video files which provide step by step instructions throughout the task and Scratch project files with all the key resources to complete the project.

Click on the video and follow the instructions in the video which explain how you move from video instruction to practical Scratch activities.



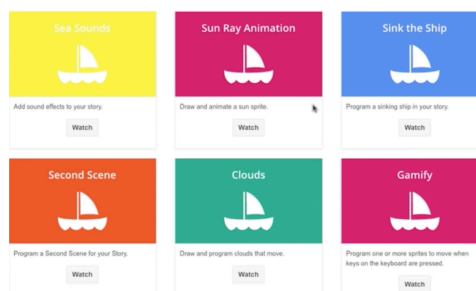
It is recommended that with year 5 / 6 pupils that you demonstrate the initial video and activity to the pupils and that they are then allowed to work through the remaining activities at their own pace.

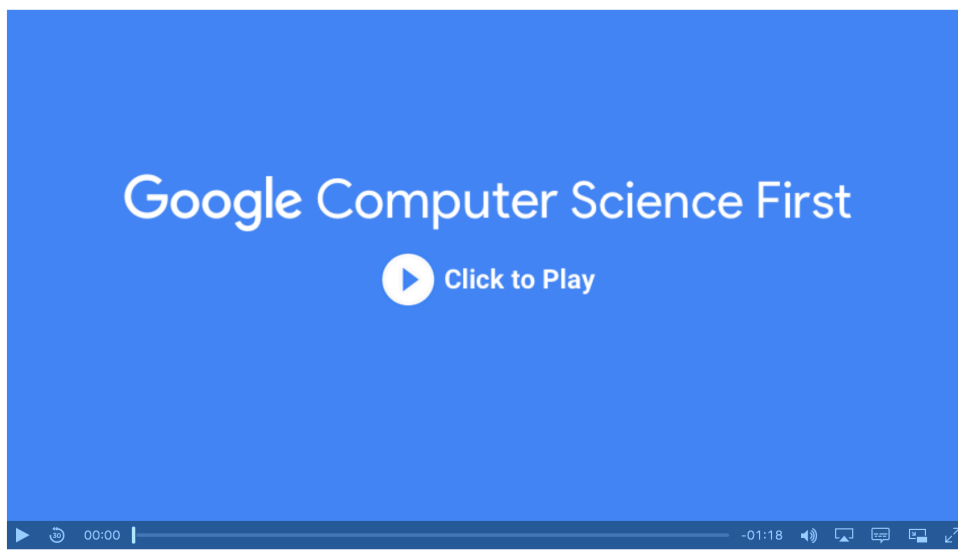
The best way to manage the activities and to easily enable pupils to save their work is to sign into CS First as a teacher, using your School360 Google account and then create a course for your pupils. This creates a club code which pupils can use to log into both CS First and also Scratch. In this way they can save their Scratch projects.



Once the pupils have completed the activity, they can use the Scratch skills they have developed to create their own animated story with a Pirate theme.

The resource also includes extension activities where pupils can add clouds, another scene or sink the ship!





Overview

Watch this video to learn how to create Scratch account.

Instructions

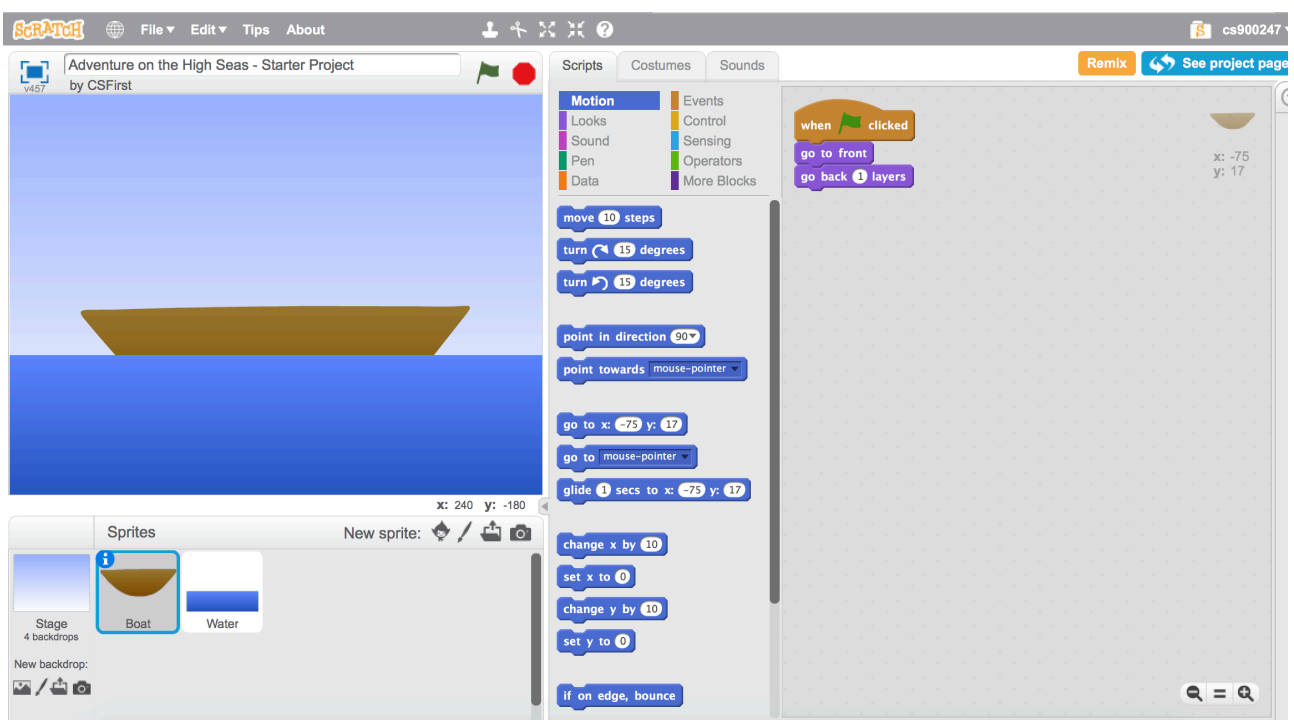
1. Click the starter project link next to this video.
2. Then, if you'd like to save your project, click remix, and create a Scratch account.

Links

- [Adventure on the High Seas Starter Project](#)

CS - First provides full instructional videos with links down the side to associated Scratch tasks.

As a reminder and check list for pupils the tasks set out in the video are listed in the instructions so pupils are clear what their next task is.



Links are provided to launch the associated Scratch activities and any resources, sprites, sound files etc are provided.