Key Stage 4

Colour Coded – Part I

Student worksheet

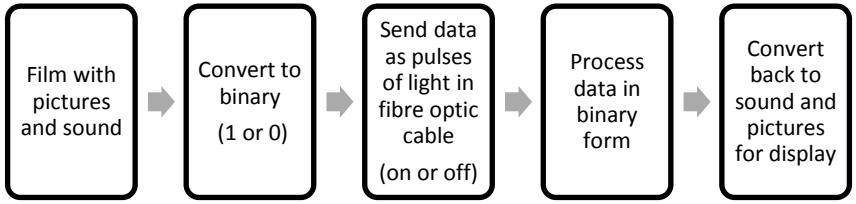
Sending data

Much of our life involves receiving and transmitting data (e.g., watching TV, posting on social media, sending emails). Although we might want to receive something complicated like sound and moving images, in order to process and send the information it is converted to an extremely basic code. That code consists of only two options, usually written as 1 and 0. This is often referred to as ***binary*** or ***digital***.

Once a complicated signal like a picture or sound recording has been converted to a binary code, the code can then be transmitted using pulses of light in ***fibre optic cables***. These are special cables containing long strands of glass fibres that are designed to allow light to travel down them.

https://www.oxfordsparks.ox.ac.uk/content/what-are-quantum-rainbows

The pulses of light are either ON or OFF (corresponding to 1 or 0 in binary code). At the other end the code is decoded again back into sound and pictures.



Creating your own binary code

Have a go at creating your own binary code for each letter of the alphabet. Create a code by shading (1) or not shading (0) the boxes. Be careful not to accidentally use the same code for two different letters. In this example £ has been coded to 11101.

A					
B					
C					
D					
E					
F					
G					
H					
I					

J					
K					
L					
M					
N					
O					
P					
Q					
R					

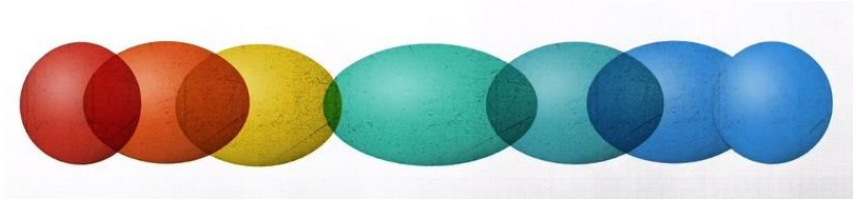
S					
T					
U					
V					
W					
X					
Y					
Z					
£	■	■	■		■

Using the code write a three letter word here and give it to someone else to decode:

Coded Word															
Decoded Word															

Key Stage 4

Colour Coded – Part II



Scientists at the University of Oxford are looking for a way to be able to give pulses of light more than two different properties. This would be like having lots of different colours to create the code rather than just black or white.

Try creating a colourful code using the colours Red(R), Orange(O), Yellow(Y), Green (G), Purple(P), Blue(B), Black (Bk) & White/Blank(W). Use the letters if you don't have enough coloured pens!

Create your code below:

A		
B		
C		
D		
E		
F		
G		
H		
I		

J		
K		
L		
M		
N		
O		
P		
Q		
R		

S		
T		
U		
V		
W		
X		
Y		
Z		
£	G	O

You should be able to create all the letters using two colours. Don't forget you can have both colours the same.

https://www.oxfordsparks.ox.ac.uk/content/what-are-quantum-rainbows

Using the code write a three letter word here and give it to someone else to decode:

Coded Word						
Decoded Word						

When you coded using only black and white, you needed five squares for every letter. Using eight different colours, you only need two. By creating light that can be more than just on or off it is possible to send far more information.