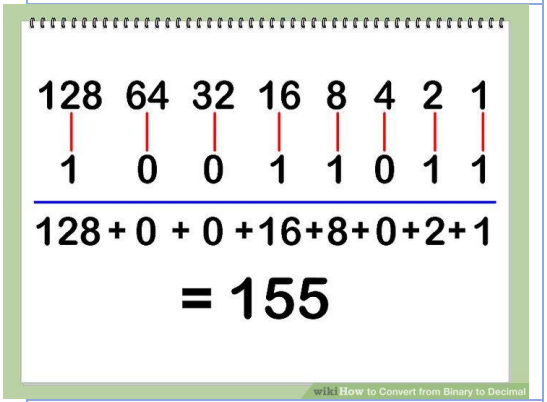
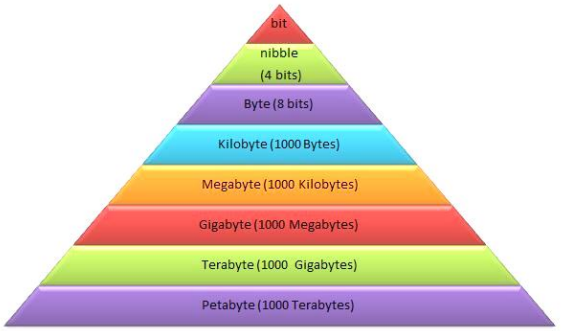
Year 9 Computing KO

Topic 1: Going AV – Binary Data

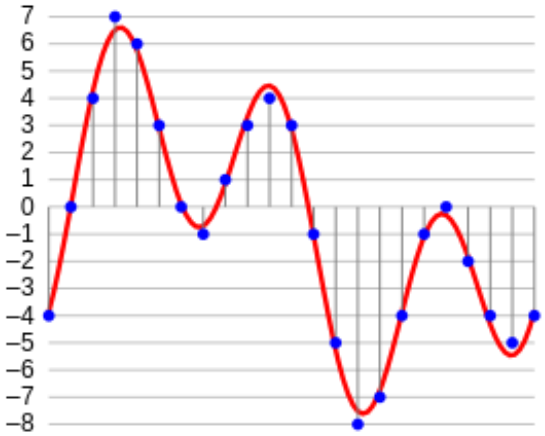
0 and 1	Only these two numbers are used in the Binary system
Transistor	A small electronic switch, there are billions inside a computer
On and Off	Transistors can be off or on, that's how they store 0 and 1
Base 2	Binary numbers use base 2, every column is worth 2 times the last one
Base 10	Denary numbers use base 10, because every column is 10 times the last one
Binary	The base 2 number system, only 0s and 1s are used



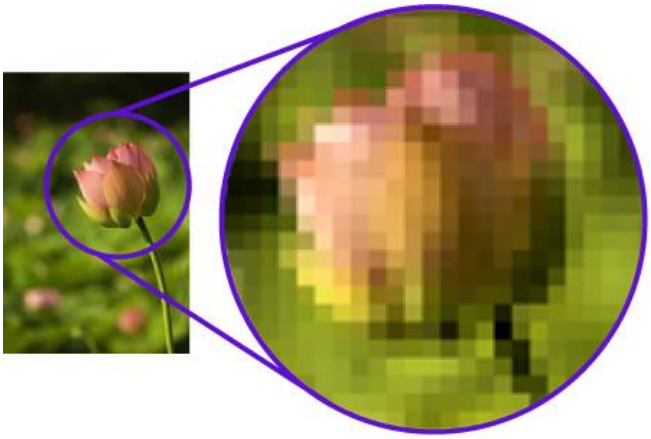
Denary	Also called decimal. It's the ordinary base 10 number system
bit	Short for "binary digit" it is a single binary number, 0 or 1
nibble	4 bits or half a byte e.g. 1011, 0110.
byte	8 bits make this binary quantity, it's enough to store one character e.g. the letter "A"
kilobyte	About 1000 bytes, it's written kB
Megabyte	About a million bytes, it's written MB
Gigabyte	About a billion bytes, it's written GB
Terabyte	About 1,000,000,000 bytes, it's written TB and most desktop hard drives are this big today.
9GB	The capacity of a standard DVD
512GB	Big USB memory sticks hold about this much data, it's also half a terabyte.
10MB	A typical smartphone image is about this size, it is about 10,000 KB
4KB	A Word document can be stored in this size file. It's around 4,000 bytes.



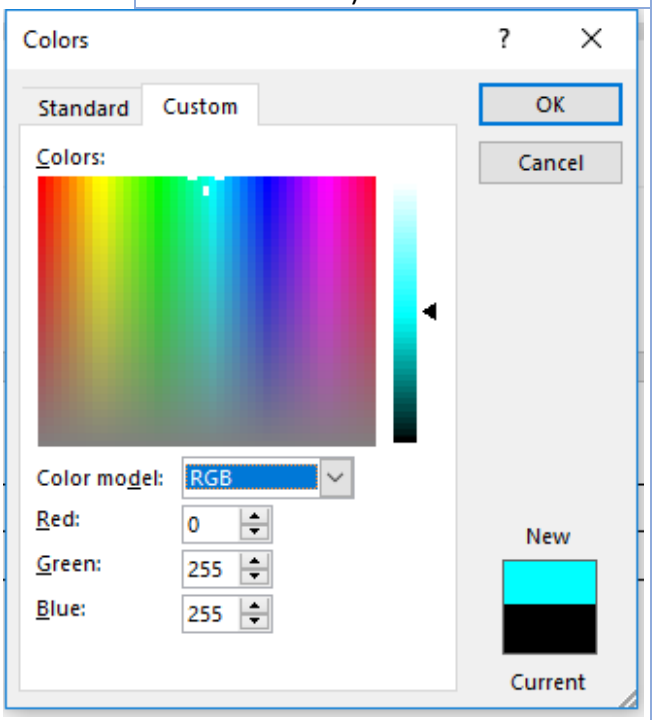
Analogue	Stored as a continuous wave. Old vinyl records and tapes used this format
Digital	Stored as numbers, the opposite of analogue.



MP3	A digital audio format that uses sampling to make a copy of an analogue sound wave
Sample Rate	Samples taken per second, in Kilohertz (kHz). Higher sample rate means better quality but a larger file
Bit depth	Bits per sample, it is how accurately the sample is measured, more bits means better quality but larger file
Bit rate	Number of bits per second in a sound wave, it's sample rate * bit depth. High bit rate = larger file but better quality.
JPEG	A Bitmap image format common on smartphones and digital cameras
Bitmap	An image composed of pixels. Each pixel is a single colour, and the picture is made up of lots of them.



Resolution	The number of dots per inch (dpi) in a digital image, the sharpness of the picture, higher resolution = larger file
Colour Depth	The number of bits per pixel, also called bit depth. More bits per pixel means more colours
True Colour	A bitmap colour palette with 24 bits per pixel, 8 bits per colour (Red, Green and Blue) for natural colours



Character	ASCII
A	65
B	66
C	67
D	68
E	69
F	70
G	71
H	72
I	73
J	74
K	75
L	76
M	77

Character	ASCII
N	78
O	79
P	80
Q	81
R	82
S	83
T	84
U	85
V	86
W	87
X	88
Y	89
Z	90

ASCII	A code for representing letters as numbers
A	65 is the ASCII code for this letter
128	The number of possible characters that can be stored in the standard 7-bit ASCII code
Extended ASCII	An 8-bit code for storing text in a computer, it has 1 more bit than standard ASCII so it can store twice as many characters (256)
66	The ASCII code for a capital B

Converting the text "hope" into binary

Characters:	h	o	p	e
ASCII Values:	104	111	112	101
Binary Values:	01101000	01101111	01110000	01100101
Bits:	8	8	8	8

ComputerHope.com

Stretch Questions:

1. *How is a Word document stored in the computer?*
2. *When you take an image with your phone, what type of file does it create?*
3. *How many colours can you make with the TrueColour system?*
4. *How big is a typical MP3 music file?*
5. *What happens if you take more samples per second when creating a digital music file?*
6. *Why do computers use binary?*

Year 9 Topic 2

PYTHON

What is a Python?

Python is a **text based programming language** that can be used to create small programs, web applications, games and even search engines like Google and YouTube!

Python is easy to learn and is a great beginner language.

Print statements

In order to display text in the **shell** you need to use a **Print** statement.

```
print ("Hello World")
print ("I am a programmer")
```

This is the output:

```
Hello World
I am a programmer
```

Input statements

Using **var = input ()** we can ask a user to input some information.

We can then **print** this back to the console window.

```
userName = input("what is your name?")
print ("Welcome ", userName)
```

userName is a **variable.** This means we can change the information stored. We can also name it whatever we want.

Syntax

Syntax is what we call the format that the code needs to be in, in order to be processed correctly.
If it is not in the correct format then the code will not work.

```
Traceback (most recent call last):
  File "C:/Python33/a.py", line 2, in <module>
    prin (greeting)
NameError: name 'prin' is not defined
>>>
```

Python tells us where the error is and what type it is.
Here it says the line the error is on
Here it says what type of error.

Key Words

Python	Programming	Print	Input	Output	
Syntax	IF/ ELIF	String	Integer	Float	Variable

IF statements

IF statements can be used to select different options in a program depending on a condition. Also known as **selection.**

```
question = input("Are you revising?")
if question == "yes":
    print ("Well done!")
elif question == "no":
    print("Oh dear!")
else:
    print("I don't understand")
```

Variables

A variable is something that can be **used to store information**. The information that is stored can be changed.

Data types

Different types of data are stored in variables as different **data types**. There are **three** main data types:
String, Integer & **Float**

String

A type of variable for storing **text** "strings" **e.g.** "Hello World"

```
string = str("This is a string")
```

Integer

A type of variable for storing **whole numbers**
e.g. 10, 182, -44

```
integer = int("This is an integer")
```

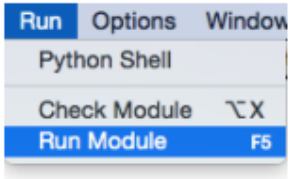
Float

A type of variable for storing **decimal numbers**. Also known as a **real** number
e.g. 2.5, 5.05, 3.14

```
decimal = float("This is a decimal")
```

Executing a program

In order to run or **test** a program written in Python the user needs to go to **Run** and then **Run Module.**



Alternatively, you could press the **F5** button on the keyboard.

Python key terms

Sequence	Two or more lines of code that are executed in order, top to bottom.
	`print("Welcome!")`
	`name=input("name?")`
	`print("hello",name)`

Selection	When the code makes a choice, with an "if" statement
	`if age > 18:`
	`  print("come in!")`
	`else:`
	`  print("go away!")`

Iteration	Code that repeats, also called a loop. We use "for" and "while" to iterate.
	`# 5 times table program`
	`for num in range(10):`
	`  print("5 times",num,"=",5*num)`

Function	A piece of code you write once using **def**, then can call over and over.
	`def add(num1,num2):`
	`  answer = num1 + num2`
	`  return answer`

if	Keyword that makes a selection, e.g. **if age > 18:**
elif	The Python statement that follows "if" to create another condition e.g. **elif age > 16:**
else	A Python keyword used with "if" to say what to do otherwise, i.e. when the "if" condition is not true.
for	Python code that loops a set number of times, e.g. **for num in range(10):**
while	This Python keyword starts a loop or iteration, which runs while a condition is true, e.g. **while credit < 100:**
variable	A named storage location that stores data in a program

Casting Function	function that converts from one type to another. int(), str() and float() are all examples.
int()	A casting function that converts a string to an integer, e.g. 14 or 999.
float()	A casting function that converts strings to "floating point" or decimal numbers.
str()	A casting function that converts numbers to strings e.g. "14".
data type	The type of data stored in a variable. **Integer**, **float**, **string**, **boolean** and **list** are all Python data types.
Pseudo-code	A precise way of planning a program in words. It's "mock code", easier than Python but still precise.
comment	A note in a program beginning with # which does not run but explains what the code does.
logic error	When the program runs but does something unexpected because your code is wrong e.g. subtracting 1 from the score instead of adding 1.
syntax error	The code does not follow the rules of the language, e.g. missing punctuation in **print(hello"**
list	A Python data structure that stores a set of values e.g. **players = ["Kane", "Maguire", "Dier", "Pickford"]**
index	The number that represents the position of an item in a list., e.g. the number 1 in **"players[1]"**.
random	A **library module** that contains **functions** including the random integer generator **randint().**
append()	A function that adds a value to the end of a list: **players.append("Tripper")**