



Year 8

Computing Knowledge Organisers



Topic: Media – Vector Graphics

Rationale: To identify that a vector drawing comprises separate objects and be able to create vector graphics

Drawing Tools

Inkscape has tools for drawing a variety of different shapes:

- Rectangles
- Squares
- Circles
- Ellipses
- Arcs
- Polygons
- Stars

Combining Objects

Source: A B (A B is larger based)

Union: The set of elements that belong to either A or B, or possibly both

Difference: Subtraction A - B

Intersection: The set of elements that belong to both A and B

Paths

In Inkscape you can draw your own lines and shapes.

The lines can be:

- Straight
- Curved
- Freehand

Key Words

Digital Graphics	A graphic is an image or visual representation of an object. Therefore, computer graphics are simply images displayed on a computer screen.
Vector Image	Mathematically based images. Made up of lines, shapes etc (objects). Easily scalable (as they are not pixel based).
Bitmap Image	Pixel based images. This type of image is resolution based. Stretching them, stretches the pixels and loses quality.
Inkscape	Inkscape is professional quality vector graphics software

Common Uses

Common uses for vector graphics

Logos

Illustrations

Icons

Mark up

```
<svg viewBox="0 0 600 600"
xmlns="http://www.w3.org/2000/svg">
  <rect x="100" y="100" width="200"
height="200" />
  <rect x="400" y="100" width="100"
height="200" fill="red" />
  <circle cx="300" cy="450" r="100"
fill="blue" />
</svg>
```

The **markup** language shown above produces a vector image.

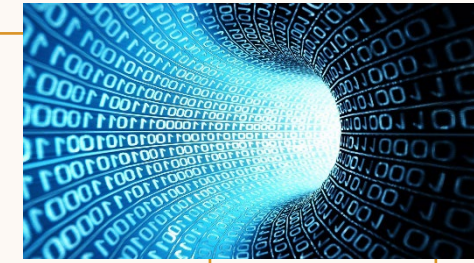
Difference between Bitmap and Vector Images

Vector graphics are images such as illustrations, icons, and logos. They do not use many colours because they have large areas of solid colour.

Bitmap images (raster graphics) are usually real photographs that contain a great deal of detail. They use lots of colours because each tiny pixel is a slightly different shade to allow the colours to blend together.



Topic: Representations from Clay to Silicon



Rationale: This unit conveys essential knowledge relating to binary representations, introducing binary digits and how they can be used to represent text and numbers.

Representation

Just as letters in the alphabet can be used to represent words, sequences of binary digits are also used to represent information in digital systems

10110111

Binary Digits

Binary digits are known as bits. They are a base-2 number system and are represented by 0 and 1. They are the smallest unit of measurement for data representation.

In denary (decimal), we use a base-10 number system, so we have ones, tens, hundreds, thousands, etc.

Binary to Denary

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

The binary number above would be worked out as a denary number by seeing which weightings have been "switched on" (have a 1). So we only add up the numbers that have a 1.

In this case: $64 + 4 + 2 = 70$
Therefore, 0100 0110 in binary is 70 in denary.

Key Words

Binary	A number system based only on the numerals 0 and 1
Denary	Humans tend to use the denary number system or decimal. This is the base 10 system that you are familiar with
Conversion	The way in which numbers can be converted from one numbers system to the other. For example from Binary to Denary or vice versa.
Units	All data is stored in computers using 1s and 0s (bits). We explain how much data we are storing by using terms like kilobytes.

Binary Sequences

All information is represented in sequences of binary digits. This includes:

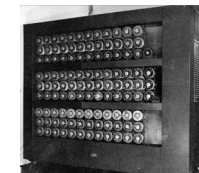
- Numbers
- Text
- Sound
- Images
- Video
- Animation

Units

Prefix	Symbol	Meaning
kilo	K	Thousands
mega	M	Millions
giga	G	Billions
tera	T	Trillions

Alan Turing

Alan Turing is widely considered to be the 'father of computing'. During World War II, his secret work at Bletchley Park was central to decrypting German communications.



Computing Knowledge Organiser- Year 8



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Topic: App Development



Rationale: Today, there's an app for every possible need. With this unit you can take learners through the entire process of creating their own mobile app. Building on the programming concepts learners used in previous units.

Decomposition

Identify when a problem needs to be broken down.

Decomposition is breaking a problem down into more manageable chunks. Programming an app for a mobile device can be a daunting task to undertake. Decomposing the problem helps us make the task less daunting and more achievable.



Logging into App Lab

- Log into App Lab using the login details given to you
- Browse to 'Start a new project'
- Select App Lab
- Rename your project 'Tappy Tap App'
- Add a button to the screen

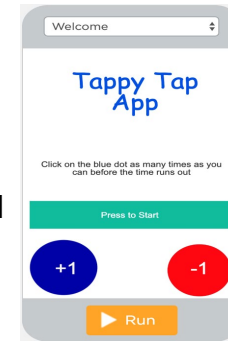


Success Criteria

The App will be measured against defined success criteria.

Welcome screen:

- Must show logo and instructions on how to play
- Must have a button that activates



Key Words

Mobile app- a computer program designed to run on a mobile device, such as a phone or tablet.

Event-driven programming- the flow of a program is controlled by events, such as, mouse clicks, key presses and hovering over pictures.

Variable- a value in a program that is stored and can change.

Parameters- values of a function, such as colour or size.

Checkbox- allows a user to indicate a yes or a no response.

Sequence- can contain a number of actions, that are executed in turn and no actions can be skipped.

Object properties- appearance changes, e.g. background colour, font size, font style, font colour, width, height, bold, italic, underlined.

Event-driven programming

```
1 onEvent(▼"startbutton", ▼"click", function() {
2   setScreen(▼"Game");
3 });
```

Code execution is triggered

The event

Result of code being executed

Pair programming

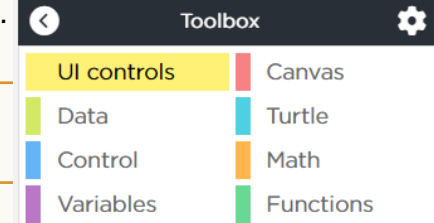
The driver: Your role is to control the keyboard and mouse and place the code blocks into the correct places.

The navigator: Your role is to help support the driver by watching for any mistakes, reading instructions to the driver, and seeking support if needed.



Score Screen Code

```
var score = 0;
onEvent(▼"startbutton", ▼"click", function() {
  setScreen(▼"Game");
  setTimeout(function() {
    setScreen(▼"Score");
    , 5000;
  });
});
onEvent(▼"bluedot_game", ▼"click", function() {
  score = score + 1;
  console.log score;
  setPosition(▼"bluedot_game", randomNumber(30, 300), );
});
```

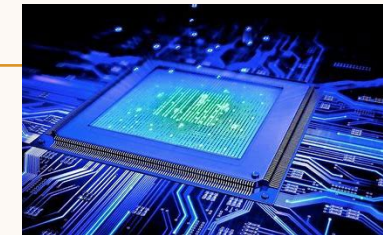


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Topic: Computer Systems



Rationale: This unit takes learners on a tour through the different layers of computing

Types of Computer

General Purpose and Special Purpose Computers

Babbage's difference engine was the first design for a general purpose computer, one that can automate any process specified by a program.



Babbage also designed the difference engine. The difference engine was not designed to be general purpose. It was specifically designed to do certain calculations and can therefore be considered a special purpose computer.



Hardware

Hardware can be **internal** (inside the PC/laptop/mobile phone case) or **external** (outside the case).



Software

Software can be placed into two categories: **system software** and **application software** based on the task(s) it performs.

Application software is designed to perform tasks that the user wants to complete.

System software is designed to control the hardware of the computer. It provides an interface between the hardware and the application software

Boolean Logic

Boolean logic is a **form of algebra where all values are either True or False**

The fundamental logical operations are:

Not
And
Or

Artificial Intelligence

AI today mostly focuses on individual aspects of intelligent behaviour.

Examples include:

- Game playing (Chess, Go)
- Deep Fakes
- Image recognition
- Facial recognition
- Natural language processing
- Targeted advertising
- Spam filtering

Free and Open Source

Free software is any software where the developer has granted the user the following four freedoms:

- to use for any purpose
- to study how the software works and change it however they want
- to redistribute and make copies
- to improve it and share their improvements with anyone

Open-source software (OSS) is a type of computer software in which **source code is released under a license**

Key Words

Computer	An electromechanical device which receives input, processes it and produces and output
Device	A piece of electrical or mechanical equipment made for a particular purpose
Program	A sequence of instructions written in a programming language that a computer can execute or interpret
Software	A set of programs used to operate computers and perform specific tasks
Hardware	The physical components of a computer
Data	Individual facts or statistics
Logical operator	The name of a logic circuit (AND, OR, NOT)

Computing Knowledge Organiser



Topic: Python Programming

Rationale: Python is a text based programming language that allows you to create programs and applications. You continue to learn about sequencing programmes, making choices with selection and running a programme repeatedly until a condition is met – iteration.

Key Words

Sequence - One of the three basic programming constructs. Instructions that are carried one after the other in order.

Selection - One of the three basic programming constructs. Instructions that can evaluate a Boolean expression and branch off to one or more alternative paths.

Iteration - One of the three basic programming constructs. A selection of code that can be repeated either a set number of times (count-controlled) or a variable number of times based on the evaluation of a Boolean expression (condition-controlled).

Variables are containers for storing data.

Syntax error - An error that has occurred because the programmer has not followed the rules of the programming language they're using

Logic Errors occur when the program runs without crashing, but produces an incorrect result. The error is caused by a mistake in the program's logic.

For loop - is used to repeatedly execute a set of statements until the end of sequence is reached.

If statements are used for decision making programs. An if statement will run the code only when the IF condition is true.

Algorithms

An algorithm consists of a set of instructions

```
1 base = int(input("Enter the base: "))
2 height = int(input("Enter the height: "))
3 area = base * height
4 print(area)
```

Inputs and Outputs

Input

Python name = input("please enter your name")

Output

Print(name)

Arithmetic

Arithmetic expressions

+, -, * (multiply), / (divide)

Relational operators

==, !=, <, <=, >, >=

Selection

An if statement can be used to implement selection in Python. It is optionally followed by an elif and/or and else statement.

```
1 password = input("Enter the password: ")
2 - if password == "letmein":
3     print("Success")
4 - else:
5     print("Invalid")
```

Condition-controlled Iteration

A **while** statement can be used to repeat a section of code until a condition becomes false.

```
1 password = input("Enter the password: ")
2 - while password != "letmein":
3     print("Invalid")
4     password = input("Enter the password: ")
5     print("Success")
```

Count-controlled Iteration

Count-controlled iteration can be used to repeat a section of code a predetermined number of times. The **for** loop is used to do this in Python.