Toynbee Curriculum
KS3 Knowledge Maps

COMPUTER SCIENCE

Toynbee School

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7.1 Collaborating online respectfully

This unit has been designed to ensure that you are given sufficient time to familiarise yourself with the school network. Whilst completing this unit, you will also learn how to use presentation software effectively. In terms of online safety, this unit focuses on respecting others online, spotting strangers, and the effects of cyberbullying.

Shortcuts

Faster ways of achieving a common task. You can use to make yourself much more efficient. There are many more than listed here. To use them, press and hold control on your keyboard and them the relevant letter.

Weak Passwords	Normal Passwords	Strong Passwords
accident	AcciDent	Acc1den7
susan	Susan53	.Susan53!
jellyfish	Jelly22fish	Jelly22fi$h
smellycat	Sm3llcat	$m3llyc@t

Office 365 & One Drive

You can log into Office 365 and One Drive using your username and password. Some good advice would be to save your log in details when prompted to save time in the future.

Key Words:

Password	The way you access and secure you computer
Social Media	Websites and Apps which allow you to share information
Digital Footprint	The information that exists about you on the internet
Cyber Bullying	Bullying someone using an electronic device
CEOP	An organisation to keep children safe online
E-Safety	The methods we can use to keep safe online
Apps	Programs that you can use on digital devices
The Internet	A global computer network we use to share information
Search Engine	The way we find information on the internet
Profile	A collection of information about you, stored on a websit
Fake News	News which appears to be real, but is in fact made up

Application Software:

Icon	Description	Uses
	Microsoft **Word**: **Word Processing Software**	Letters, reports, text based documents...
	Microsoft **PowerPoint**: **Presentation Software**	Presentations, inter-active adverts
	Microsoft **Excel**: **Spreadsheet Software**	Spreadsheets, Graphs and Charts, Analysis
	Microsoft **Outlook**: **Email Software**	Email, Arranging meetings, calendars
	Microsoft **Publisher**: **Desktop Publishing Software**	Posters, fliers, graphical products
	Microsoft **OneNote**: **Note Taking Software**	Making notes, working together

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7.2 Networks

This unit begins by defining a network and addressing the benefits of networking, before covering how data is transmitted across networks using protocols. The types of hardware required are explained, as is wired and wireless data transmission. Learners will develop an understanding of the terms 'internet' and 'World Wide Web', and of the key services and protocols used.

LAN Hardware

Server

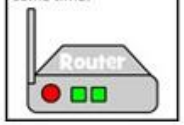
Stores all user data and information within a network in a central location. This allows users to log into any work station access their files.

Switch

Using Ethernet cables to connect to both the server and individual work stations, a switch directs information between the server and individual workstations.

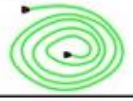
Router

Allows wireless connection of mobile devices to a network if within suitable range. Allows several devices to be connected at the same time.



Ethernet Cable

Networking hardware used to connect one network device to another. They can be used to share devices such as printers and scanners amongst many users.



What is a network?

A network is two or more computers (or other electronic devices) that are **connected together**, usually by cables or Wi-Fi.

Some computer networks will have a server. A server is a powerful computer that often acts as a central hub for services in a network, eg emails, internet access and file storage. Each computer connected to a server is called a client.

Networks

LAN – Local Area Network, connects devices together over a small geographical location e.g. a building. They connect computers using a combination of Ethernet cables and switches and require a Network Interface Card.

WAN – Wide Area Network A computer network where devices are connected over a large geographical area (e.g. the internet). They require access to the internet via a router / modem.

WPAN – Wireless Personal Area Network used to connect devices to your personal computer system without the use of wires. Most commonly uses Bluetooth. E.g. connecting a peripheral device to your laptop, connecting a mobile phone to a car, wireless headphones to your phone etc.

Internet

- Is a global network of interconnected networks. World Wide Web is all the webpages that are accessible via the Internet.

Domain name server

- Converts a website address into an IP address e.g. www.google.co.uk into IP address 172.217.14.195 that a client machine can make a request to the server hosting the webpage

Data travels

- Data travels as small packets of information between computers.
- It is broken down and then rebuilt back up into readable information like a sentence been broken up then put back together again.

Advantages of networks

- sharing devices such as printers saves money
- site software licenses are likely to be cheaper than stand-alone
- Files can be easily shared between users
- network users can communicate by email and instant messages
- Security is good, users cannot see other users' files like a stand-alone
- Data it is easy to backup and stored on a file server

Disadvantages of networks

- Purchasing network cabling and service is expensive
- You need a network manager to run a large network that is complicated
- If the fileserver breaks down your files are not accessible
- Viruses can spread more quickly through computer network
- Danger of hacking particularly wide area networks, you need security procedures tax, abuse, e.g. A firewall

Internet	A collection of inter connected networks and devices that communicate and send data between each other
DNS	Domain Name Server. Remembering **www.google.co.uk** is easier than remembering **173.194.34.95. Converts from number to address**
IP Address	Like every front door in the world, every computer in the world has a separate, unique address
URL	Uniform Resource Locator. A URL is a web address. All web addresses are unique
HTTP	**HyperText Transfer Protocol.** A protocol is a set of rules HTTP defines the rules used by web browsers and servers to exchange information
Data Packets	Data transmitted over the Internet is broken down into smaller chunks or packets to be sent
Bandwidth	The amount of data that can be carried at a time
WAN	Wide Area Network: Cover a large geographical area (eg Bank, Hospitals)
LAN	Cover a small geographical area (a home network or a school)
NIC	Network Interface Card. Can be wired or wireless, Needed to connect to Internet
Buffering	The delay whilst the internet downloads data needed (usually during streaming)

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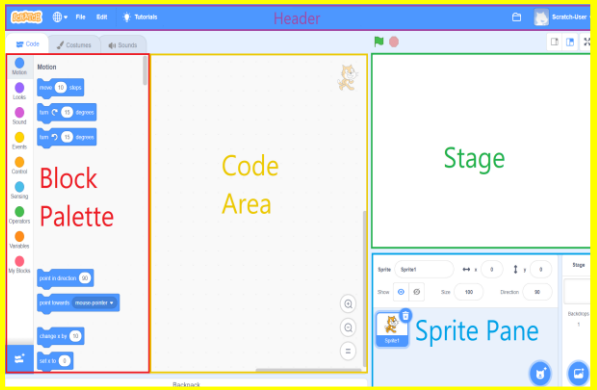
7.3 Programming 1

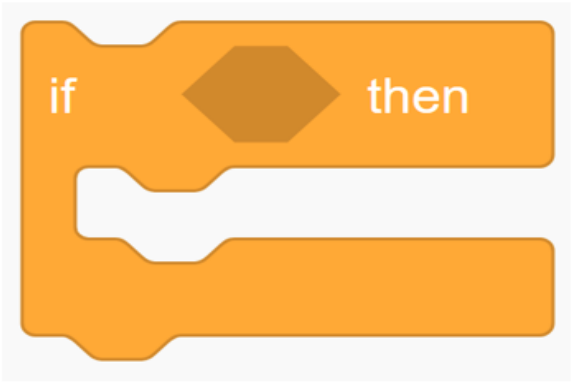
The aim of this unit and the following unit ('programming 2') is to build your confidence and knowledge of the key programming constructs. The main programming concepts covered in this unit are sequencing, variables, selection, and count-controlled iteration.



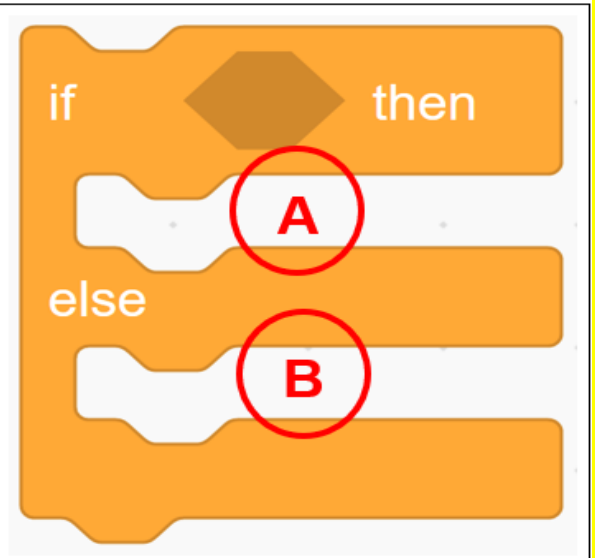
Code Category	Example Block	Description
Motion	move 10 steps	Code blocks that affect the position of a sprite on the stage
Looks	switch costume to costume2	Code blocks that change the appearance of a sprite or stage
Sound	play sound Meow until done	Code blocks that make a sound
Events	when clicked	Code blocks that affect when a script begins to run
Control	repeat 10	Code blocks that control selection and iteration in a script
Sensing	touching color ?	Code blocks that run when a specific action occurs
Operators	pick random 1 to 10	Code blocks to run mathematical operations
Variables	set my variable to 0	Code blocks that store a value to be used in a script

Conditions

- Basic conditions of operators > < =
- Logic operators (and, or, not)



Runs the code in the block if the condition is true



Runs the code in gap A if the condition is true. Runs the code in gap B if the condition is not true (false)

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).
Variable	A value that can change depending on conditions or information passed to the program.
Boolean expression	An algebraic expression which has a Boolean value
Comparison operator	Used to compare two expressions
Computer bug	Code that causes your computer to behave in an unexpected way
Resilience	The capacity to recover quickly from difficulties
Subroutine	A block of code within a program that is given a unique, identifiable name. Supports code reuse and good programming technique.
Decomposition	Breaking down a problem into smaller, more manageable parts in order to make the problem easier to solve
List	A data structure that allows multiple pieces of data under a single name
Data structure	A way or organising and managing data in a programming language that ideally enables efficient access and modification of the data

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7.4 Spreadsheets

Spreadsheets are used to store **information** and **data**. Once we have our information in a spreadsheet we can run powerful calculations, make graphs and charts and analyse patterns.

CALCULATIONS USING BASIC FORMULAE

	A	B	C	D
1				
2		6	3	
3				
4	Add	+	=B2+C2	9
5	Subtract	-	=B2-C2	3
6	Divide	/	=B2/C2	2
7	Multiply	*	=B2*C2	18

ABSOLUTE & RELATIVE CELL REFERENCING

Using the $ symbol to fix part of a formula onto a single cell.

Absolute reference

B3 =A1+5

	A	B
1	10	15
2	9	15
3	8	15
4	7	15

Relative reference

B3 =A1+5

	A	B
1	10	15
2	9	14
3	8	13
4	7	12

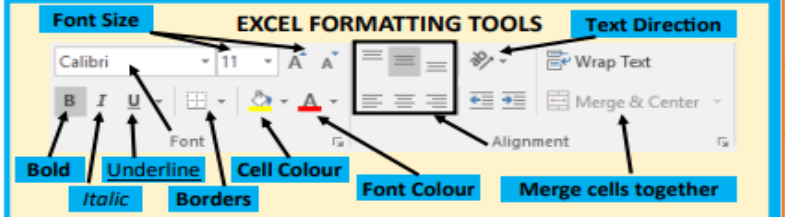
EXAMPLE FUNCTIONS IN EXCEL

	A	B	C	D	E	F	G
1							
2		10		Function	Description	Example Use	Answer
3		20		SUM()	Adds all the numbers in a range of cells.	=SUM(B2:B9)	210
4		30		AVERAGE()	Works out the average of the numbers in a range of cells.	=AVERAGE(B2:B9)	26.25
5		40		MAX()	Shows the largest number in a range of cells.	=MIN(B2:B9)	10
6		50		MIN()	Shows the smallest number in a range of cells.	=MAX(B2:B9)	50
7		10		COUNT()	Counts the number of cells in a range that contain numbers.	=COUNT(B2:B9)	8
8		20		COUNTIF()	Counts the number of cells in a range that meet a given condition.	=COUNTIF(B2:B9,10)	2
9		30		IF()	Checks if a condition is met and returns one value if TRUE and another value if FALSE.	=IF(B9>50,"Yes","No")	No

EXCEL DATA TYPES

- General — No specific format
- Number
- Currency
- Accounting
- Short Date
- Long Date
- Time
- Percentage
- Fraction
- Scientific
- Text

EXCEL FORMATTING TOOLS



LOGICAL OPERATORS

Operator	Meaning	Example	Result
=	Equal to	=G5=10	FALSE
<>	Not equal to	=G5<>"red"	TRUE
>	Greater than	=G5>100	FALSE
<	Less than	=G5<100	TRUE
>=	Greater than or equal to	=G5>=75	TRUE
<=	Less than or equal to	=G5<0	FALSE

Value: 85 — Cell G5

Other uses for spreadsheets –

- Modelling and Planning
- Wages/Invoices
- Creating charts and graph
- Home/Business Finance and Budgeting
- Predictions / Simulations / Calculations

Key Vocabulary

Active Cell	The **cell** you have selected and are currently on.
Cell	A rectangular box in a **worksheet** that can contain data.
Cell Range	A collection of selected **cells**. For example (B2:D2).
Cell Reference	A name given to each **cell** made up of the **column** letter and **row** number of that cell.
Chart	A graph - used to show data in a visual way.
Column	A vertical collection of **cells**. Each column has a letter to represent it.
Data Type	The type of value being stored in a **cell**. Text, 16, Yes/No, £34.59
Formatting Tools	A set of tools that allow the style of a **cell** to be changed.
Formula	A set of instructions to be carried out. =B3+D3
Function	A named formula built into a **spreadsheet** to perform a task. =SUM(B3:F3)
Modelling	Using a computer to predict and investigate a real life situation.
Row	A horizontal collection of **cells**. Each row has a number to represent it.
Spreadsheet	A computer program (software) that shows information in a grid of data where calculations can be performed. =A1+A2
Workbook	A **spreadsheet** file made up of **worksheets**. Sheet1 Sheet2 Sheet3
Worksheet	A single page within a **workbook**. Sheet1

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7.5 Programming 2

This unit begins right where 'Programming I' left off. You will build on your understanding of the control structures' sequence, selection, and iteration (the big three), and develop their problem-solving skills.

Boolean logic:

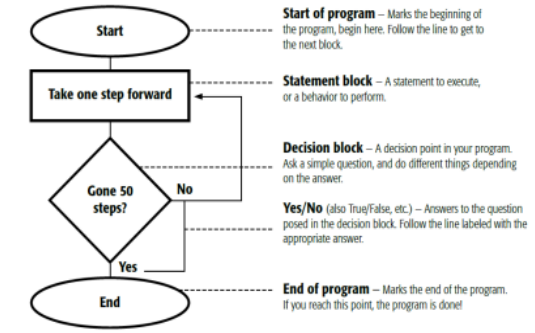
Boolean logic is a type of algebra used in computing. The answer can only be true or false.

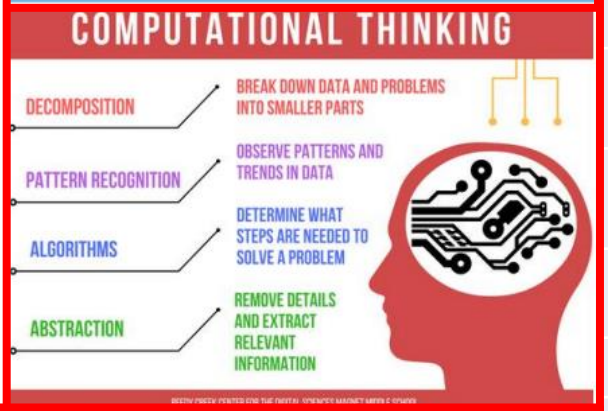
Understanding Boolean terms:

Expression:	Boolean term:
Equals	=
Greater than	>
Less than	<
Greater than or equal to	>=
Less than or equal to	<=
Does not equal	<>
And	AND
Or	OR
Not	NOT

Flowcharts

We use flowcharts to help us put instructions in order.





Count-controlled iteration - code inside the block repeats a set number of times

Condition-controlled iteration - code inside the block repeats until the condition is met (true)

Infinite iteration - repeats the code inside the block until the program is stopped by the user

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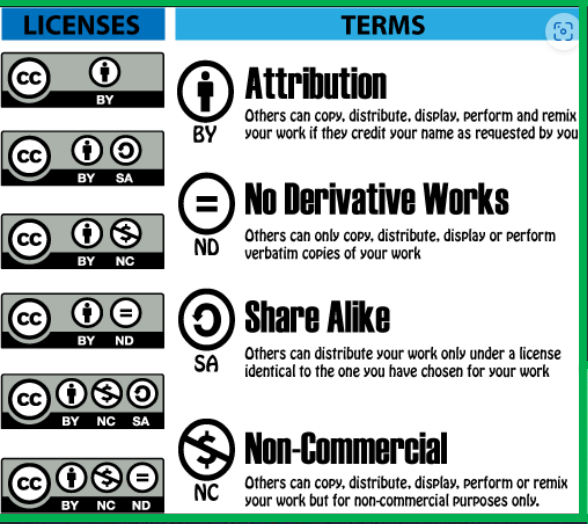
7.6 Support for a Cause

learners develop your understanding of information technology and digital literacy skills. You will use the skills learnt across the unit to create a blog post about a real-world cause that you would like to gain support for



Fact or Fake News

Sometimes people act too hastily – they respond in anger for example, or they share posts or tweets written by someone they don't know and cannot substantiate.

It's possible to accidentally post 'fake news' or rumours that might hurt someone or cause a problem somewhere.

"Fake News" is a type of journalism or propaganda that consists of deliberate misinformation or hoaxes spread via traditional print and broadcast news media or online through social media.

Reliability of content

- It is important to understand that not all content online is truthful.
- Anybody can set up a website and add content to it.
- It is important to look at different techniques to determine the credibility of the source as to how real or fake images and text are.

Format	To change how something looks on different documents
Referencing	Acknowledging where you have found your information
Source	Where you found your information
Plagiarism	To steal and pass off (the ideas or words of another) as your own without crediting the source
Trustworthy	A credible source which is free from bias and backed up with evidence. It is written by a trustworthy author or organisation
Citation	A reference of where you found your information.
Bias	cause to feel or show inclination or prejudice for or against someone or something

8.1 Computer Systems

This unit takes learners on a tour through the different layers of computing systems: from programs and the operating system, to the physical components that store and execute these programs, to the fundamental binary building blocks that these components consist of.

What is a computer?

A computer is any device take takes an input, processes it and then outputs infor-

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

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

- Word processors
- Spreadsheet software
- Presentation software
- Web browsers
- Games

Logic Gates

Logic gates are the building blocks of digital circuits. **Logic gates** have one or two inputs that can be turned on or off.

NOT – exactly opposite to the input

AND – both inputs must be on to work

OR – either input needs to be ON or both to work

XOR – either input needs to be on but not both to get it to work

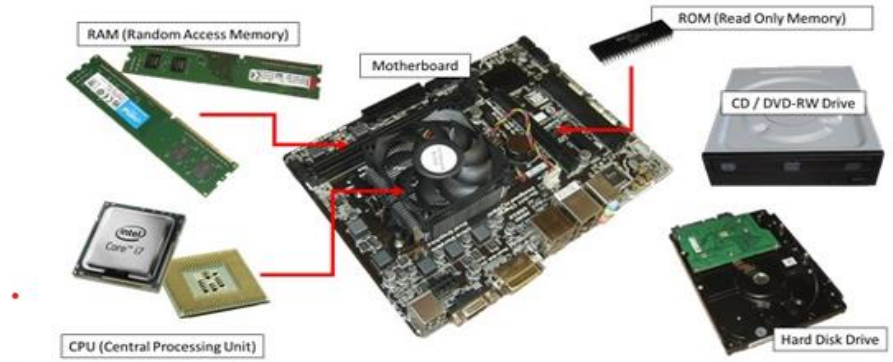
Storage

Non-volatile storage means data can be stored permanently, even when the computer is turned off.

Secondary storage

- Optical storage – e.g. Blue-Ray
- Solid state storage – e.g. Memory stick
- Magnetic storage – e.g. Hard disk drive

Internal Components



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
Processor	The part of the computer that interprets and carries out instructions
Main memory	The part of the computer that stores data that is currently being used by the processor
Secondary storage	The part of the computer that stores data long term that is not currently being used by the processor
I/O (Input / Output)	Refers to input, any method of getting information into the computer, and output, any method of getting data out of the computer.
Operating system	Specialised software that communicates with computer hardware to allow other programs to run
Logic gate	A physical device which performs a logical operation (AND, OR, NOT)

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8.2 Representations

This unit conveys essential knowledge relating to binary representations. The activities gradually introduce learners to binary digits and how they can be used to represent text and numbers. The concepts are linked to practical applications and problems that the learners are familiar with.

Binary	A number system that contains two symbols, 0 and 1. Also known as base 2
Denary	The number system most commonly used by people. It contains 10 unique digits 0 to 9. Also known as decimal or base 10
Hexadecimal	A number system that contains sixteen symbols, 0-9 and A-F. Also known as base 16
Place value / placeholder	The value of the place, or position, of a digit in a number
Character set	A mapping of keyboard characters to numbers used to represent those keyboard characters in a computer system
ASCII	American Standard Code for Information Interchange. A 7-bit character set for representing English keyboard characters.
Pixel	The smallest identifiable area of an image or computer screen
Bit	A single symbol in a binary number. Either 1 or 0
Bit pattern	Any sequence or more than one bit
Nibble	A bit pattern which is four bits long
Byte	A bit pattern with which is eight bits long
Kilobyte	1000 bytes
Megabyte	1000 kilobytes

Convert 8 bit Binary to Denary

Example: convert the Binary number **01000110** into Denary.

1. Create a binary table:

128	64	32	16	8	4	2	1	Answer

2. Add the binary number:

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

3. Add up all the numbers with a 1 underneath them to get the answer!

128	64	32	16	8	4	2	1	Answer
0	1	0	0	0	1	1	0	70

Convert Denary to 8 bit Binary

Example: convert the Denary number **45** into binary .

1. Create a binary table:

128	64	32	16	8	4	2	1	Answer
								45

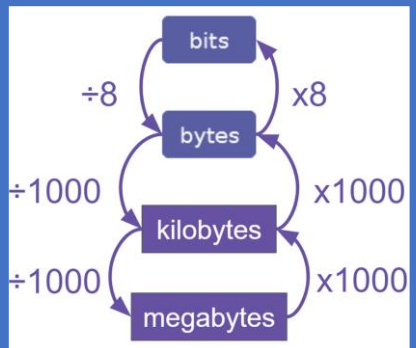
2. Place the number 1 under each number you need to make up 45

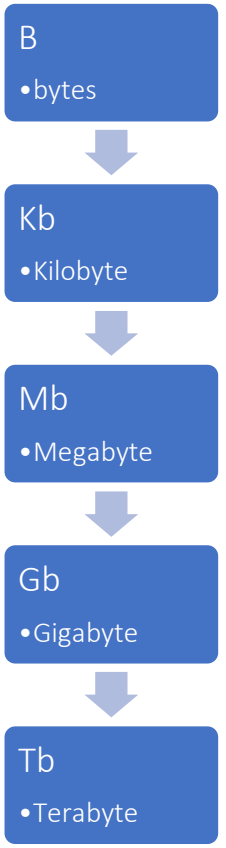
128	64	32	16	8	4	2	1	Answer
		1		1	1		1	45

3. Add a 0 for the unused numbers. The binary number is:

00101101

128	64	32	16	8	4	2	1	Answer
0	0	1	0	1	1	0	1	45





What is Binary?

Binary is a number system that only uses two digits: 1 and 0. All information that is processed by a computer is in the form of a sequence of 1s and 0s. Therefore, all data that we want a computer to process needs to be converted into binary.

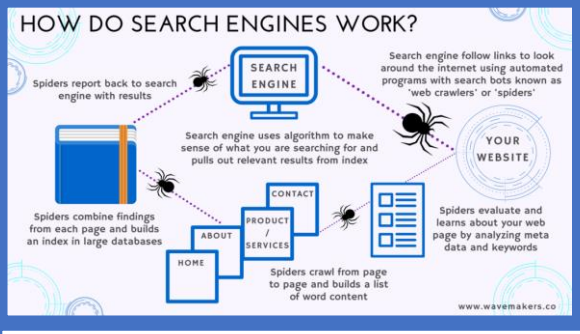
8.3 Developing for the Web

In this unit, learners will explore the technologies that make up the internet and World Wide Web. Starting with an exploration of the building blocks of the World Wide Web, HTML, and CSS,

HTML tags help the browser to know how to display a web page to the user.

HTML tags within the <body></body> tags define how the content of a page should be rendered by the browser.

HTML tags elsewhere, particularly those within the <head></head> tags are used for metadata, which is data about data. For example, in the head tags may contain the title of the web pages



Search engines are used by people when they want to find a resource on the world wide web.

CSS (Cascading Style Sheets)

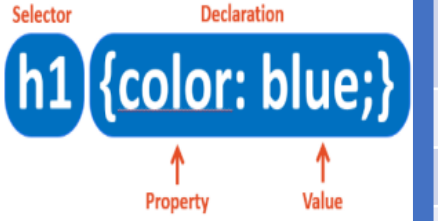
HTML defines the structure and content of your **web page**

CSS defines the style and layout of **web pages**

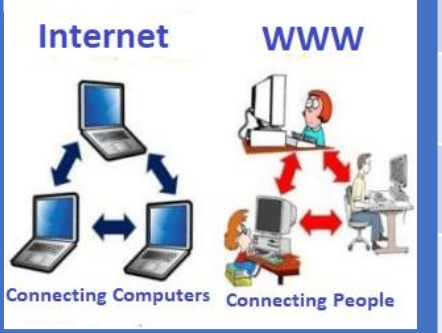
CSS can be used to change the style of a whole **website**, one **web page** or a single occurrence of an element, e.g.

```
<h1 style="text-align:center">
```

CSS Syntax



When adding **CSS** to a **web page** it is defined at the top of the page between the **<style>** tags.



HTML	Hypertext Markup Language (HTML) is used by website developers to define the structure of a website. A website user then uses a browser (which can understand the HTML and render it) to view the webpage
HTML Tag	Used to define a HTML element (part of a page) such as a paragraph or heading
Formatting	Changing the appearance of a webpage; usually to make it clearer and easier to understand the content
Attribute	Used inside of a HTML tag in order to provide additional information about the HTML element
CSS	Cascading style sheets (CSS) is the language that is used to format and style HTML web pages
Head	The head of a HTML page is a container for metadata (data about data)
Body	The body of a HTML web page is the part where the visible content goes
Hyperlink	A clickable element on a web page which takes the user to another web page
Crawler / Spider	A crawler (also known as a spider) is a program that a search engine uses to find content on the world wide web
Indexing	The process by which search engines organise large amounts of information to enable very fast access times
Search query	A search query is the collection of search terms that a user enters into a search engine to perform a search of the world wide web
Navigation	The part of a website, which is often a menu of some kind, which allows the user to move between pages on the website easily (i.e. without having to manually edit the URL in their browser)
Browser	A program (such as Google Chrome, Mozilla Firefox or Microsoft Edge) which can understand HTML, CSS and JavaScript code and display a website on a user's computer

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8.4 Intro to Python

This unit introduces learners to text-based programming with Python. The lessons form a journey that starts with simple programs involving input and output, and gradually moves on through arithmetic operations, randomness, selection, and iteration. Emphasis is placed on tackling common misconceptions and elucidating the mechanics of program execution.

Algorithm	A sequence of steps used by a human or computer to solve a problem or complete a task
Program	An algorithm expressed in a programming language
Input	Any method of getting data into the computer
Output	Any method of getting data out of the computer
Variable	A storage location with a name. The data in a variable can be changed after being initially set
Assignment	A statement in a programming language used to set or reset the data stored in a storage location identified by a variable name
Syntax error	An error that has occurred because the programmer has not followed the rules of the programming language they're using
Logical error	When a program does not behave in the way that it should, even though the programmer has followed the rules of the language
Arithmetic expression	A mathematical operation, for example, 10+5
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).

integer
A whole number

```
File  Edit  Format
print(3 + 2)
5
>>>
```

float
A decimal number

```
File  Edit  Format  Ru
print(3.95 * 2.34)
9.243
>>>
```

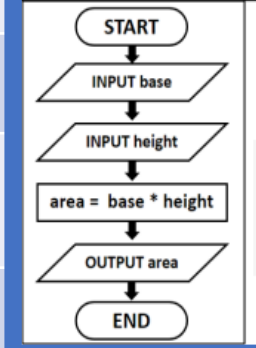
string
A character or text

```
File  Edit  Format  Run
print("hello world")
hello world
>>>
```

Boolean
A True or False value

```
File  Edit  Forma
print(True)
print(False)
True
False
>>>
```

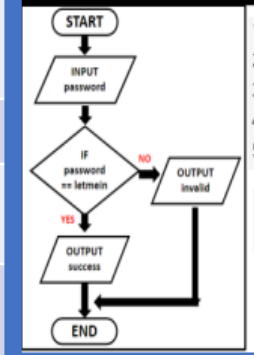
SEQUENCE




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

```
Enter the base: 10
Enter the height: 5
50
```

SELECTION

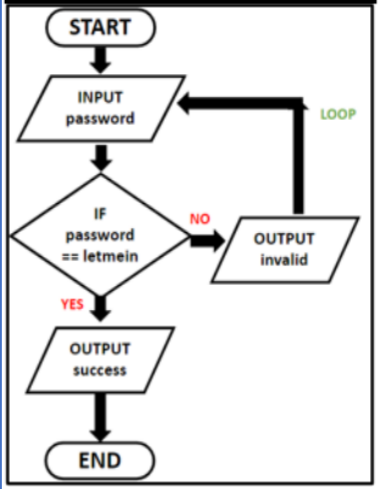



```
1 password = input("Enter the password: "
2 if password == "letmein":
3     print("Success")
4 else:
5     print("Invalid")
```

```
Enter the password: letmein
Success

Enter the password: abc123
Invalid
```

LOOP (Iteration)

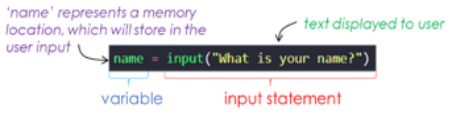



```
1 password = input("Enter the password: ")
2 while password != "letmein":
3     print("Invalid")
4     password = input("Enter the password: ")
5 print("Success")
```

```
Enter the password: abc123
Invalid
```

The Input Script

The input() script is set up like this:



Operator	Meaning	Example
+	Addition	4 + 7 ⟶ 11
-	Subtraction	12 - 5 ⟶ 7
*	Multiplication	6 * 6 ⟶ 36
/	Division	30 / 5 ⟶ 6
%	Modulus	10 % 4 ⟶ 2
//	Quotient	18 // 5 ⟶ 3
**	Exponent	3 ** 5 ⟶ 243

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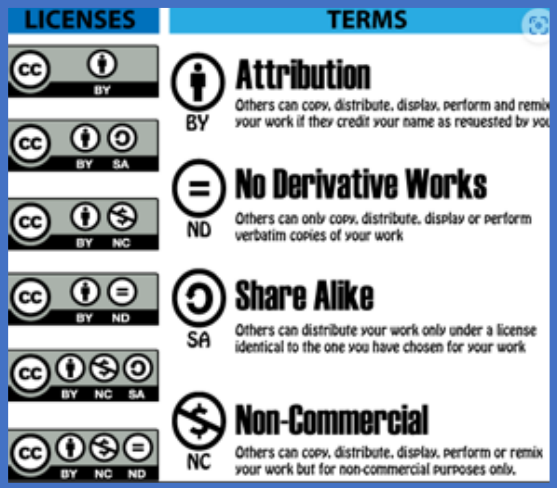
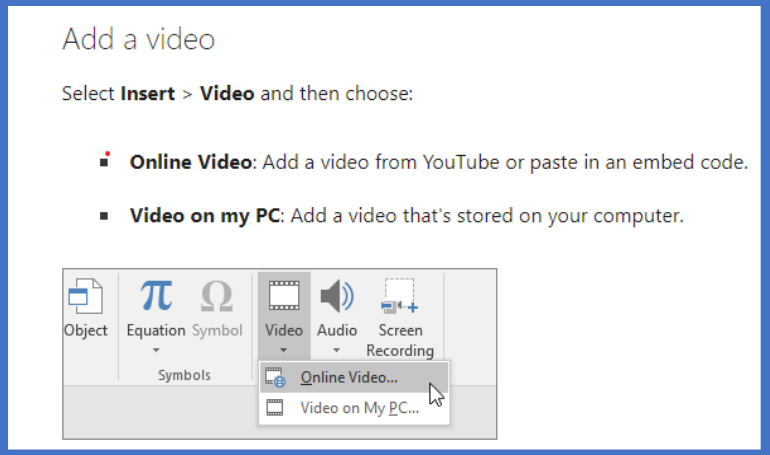
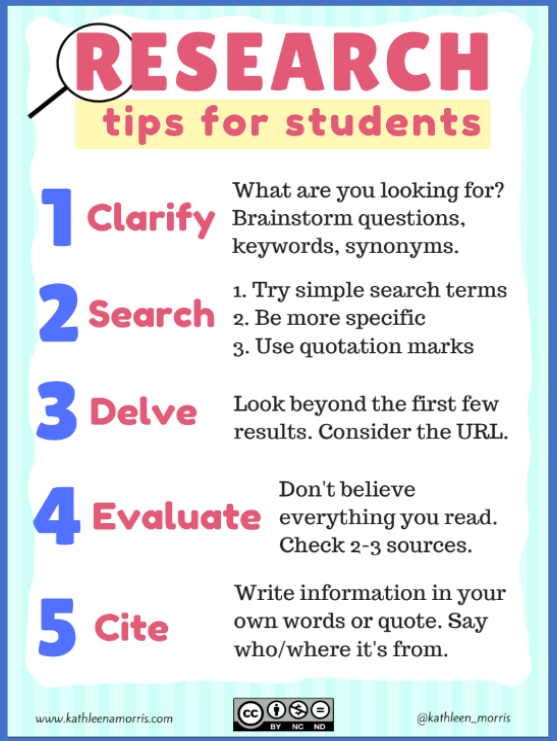
8.5 Heroes of Computing

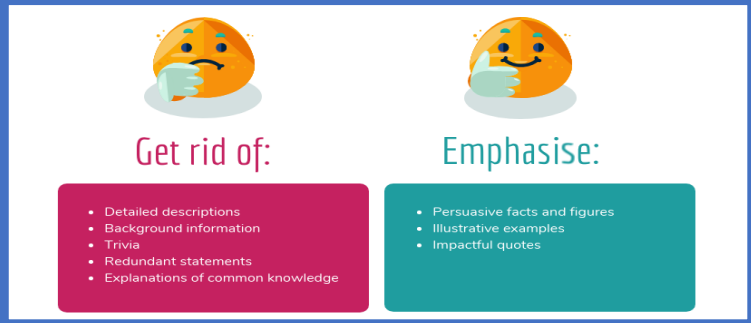
In this unit learners research key historical people who have made a significant contribution to computing and how we interact computing devices. Lessons are designed to challenge the gender/ethnic/LGBTQ divide in computing and celebrate the achievements of women, ethnic minority and LGBTQ individuals in computing. Learners will develop and present their findings on their given 'hero'.





Format	To change how something looks on different documents
Referencing	Acknowledging where you have found your information
Source	Where you found your information
Plagiarism	To steal and pass off (the ideas or words of another) as your own without crediting the source
Trustworthy	A credible source which is free from bias and backed up with evidence. It is written by a trustworthy author or organisation
Citation	A reference of where you found your information.





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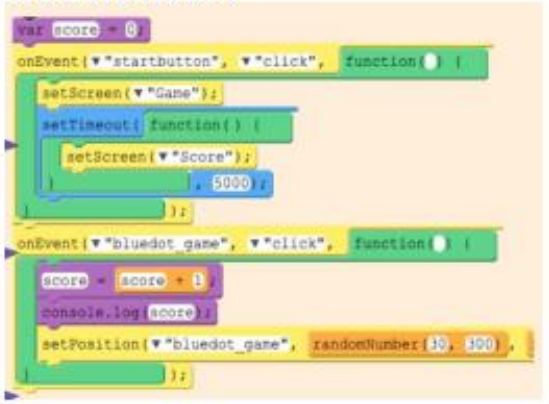
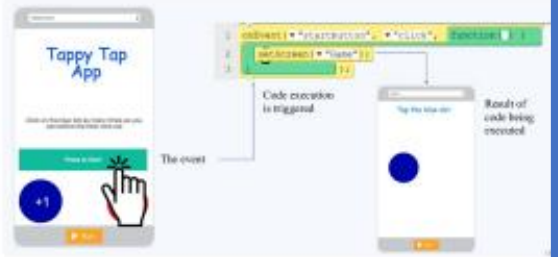
8.6 Mobile App

In a world where there's an app for every possible need, this unit aims to take the learners from designer to project manager to developer in order to create their own mobile app.

Decomposition	Is breaking a problem down into more manageable chunks.
Workspace	Build your programme by adding in blocks from the toolbox
Set Property block	Changes the elements on your screen
Event Driven Programming	When the flow of the program is controlled by events
Selection	Selects pathways through the code dependent on conditions
Variables	A value that can be changed (speed, lives, score)
Function	Inbuilt code that performs a specific task Sequence Parts of the code that run in order
getTEXT ("id")	is a built-in subroutine that collects the text entered into a textbox; "id" is to be replaced with the name given to the text box.
parameters	In computer programming, a parameter or a formal argument, is a special kind of variable, used in a subroutine to refer to one of the pieces of data provided as input to the subroutine
Button	linked to an event that will capture and process the data when it is clicked
Text boxes	allowing for the user to input a text string
Checkboxes	allowing for the user to indicate a yes or no response

Below you can see two **events**, one event where the start button is clicked and one event where the blue dot is clicked.



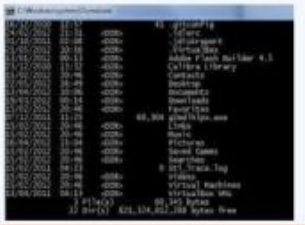


This is the **App Lab** web address:
https://code.org/educate/applab

You are using a programming language called **JavaScript** when coding in App Lab, but you use blocks, like you did with Scratch.

Graphical User Interface (often pronounced GOO-EY)

A way to communicate what you want to a software application by clicking/hovering/typing/activating graphical elements like buttons, labels, etc.



Opposite of a GUI - Command Line Interface

Event-driven programming

In event-driven programming, the flow of the program is controlled by events.

- Events can be user actions such as:
- Mouse clicks (or the touchscreen equivalent)
- Key presses OR Hovering over a picture
- Voice input ("OK Google...")

Events can also be also be triggered by:

- Sensors (e.g. if movement is sensed, turn the light on)
- Messages from other programs

Selection: in the snippet of code below, what text will show on the screen if the score variable has a value of 11?

Apps are big business!
The overall mobile app market is expected to generate **$935 billion** in 2023. Most of this revenue is generated from advertising and in app purchases on free apps

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9.1 Cyber Security

This unit takes you on a journey of discovery of techniques that cybercriminals use to steal data, disrupt systems, and infiltrate networks.

DATA PROTECTION ACT 2018

ALL ORGANISATIONS USING AND STORING DATA MUST **ABIDE** BY THE FOLLOWING **PRINCIPLES** →

- Used fairly, openly, and in accordance with the law
- Used for a specific and stated reason
- Used only in a way that is necessary and sufficient for the purpose for which it was collected
- Accurate and up-to-date
- Only kept for as long as it is needed
- Protected against loss, damage, and unauthorised access

AS A **DATA SUBJECT** YOU HAVE THE RIGHT TO FIND OUT WHAT INFORMATION THE GOVERNMENT AND OTHER ORGANISATIONS STORE ABOUT YOU. ←

- Find out how your data is being used (by an organisation)
- Access the data that an organisation has about you
- Update your data
- Have your data deleted
- Stop an organisation from processing your data
- Transfer your data to a different organisation

The Computer Misuse Act (1990)

The Computer Misuse Act (1990) and its amendments were created so that unauthorized access to computers and crimes committed using a computer could be prosecuted. The act is based on three principles and makes the following actions illegal:

PRINCIPLES	LEGAL ACTIONS
Unauthorised access to digital/computer material. This means a person asking a computer to perform any function with the intent of accessing anything on the computer for which they do not have permission, and for which they know they do not have permission.	Punishable by up to two years in prison and a £5,000 fine.
Unauthorised access to digital/computer material with intent to commit or facilitate the commission of further offences. This means a person gaining access to a computer without permission in order to commit another crime or to enable someone else to commit a crime.	Punishable by up to five years in prison and an unlimited fine determined by the damage caused and the severity of the crime.
Unauthorised acts with intent to impair, or with recklessness as to impairing, the operation of a computer. This means a person intentionally impairing the operation of any computer or program, or intentionally preventing access to any data or program on any computer. This includes creating or supplying materials that could be used to carry out this offence.	Punishable by a prison sentence of up to ten years and an unlimited fine, but if the act puts life at risk or endangers national security, the sentence may be extended to life imprisonment.

SOCIAL ENGINEERING

Social engineering is a set of methods used by cybercriminals to deceive individuals into handing over information that they can use for fraudulent purposes.

How might a hacker use the data you submitted?

- Name of first pet
- Favorite colour
- Mother's maiden name
- Favorite band or artist
- Date of birth
- Name / Email address

Shouldering (also known as **shoulder surfing**) is an attack designed to steal a victim's password or other sensitive data. It involves the attacker watching the victim while they provide sensitive information, for example, over their shoulder. This type of attack might be familiar; it is often used to find out someone's PIN at a cash machine.

PHISHING ATTACK

A **phishing attack** is an attack in which the victim receives an email disguised to look as if it has come from a reputable source, in order to trick them into giving up valuable data. The email usually provides a link to another website where the information can be inputted.

Phishing: Key indicators of a phishing email

- Unexpected email with a request for information
- Message content contains spelling errors
- Suspicious hyperlinks in email
  - Text that is hyperlinked to a web address that contains spelling errors and/or lots of random numbers and letters
  - Text that is hyperlinked to a domain name that you don't recognise and/or isn't connected to the email sender
- Generic emails that don't address you by name or contain any personal information that you would expect the sender to know

BLAGGING

Blagging (also known as **pretexting**) is an attack in which the perpetrator invents a scenario in order to convince the victim to give them data or money.

Hacking *in the context of cyber security* is: **Gaining unauthorised access to or control of a computer system**

Why might people want to hack?

- To steal data
- To disrupt services
- For financial gain
- For political reasons (espionage and activism)
- For fun (planting the flag)
- For ethical reasons

BLAGGING

Denial of service attack (DoS) This is a cyberattack in which the criminal makes a network resource unavailable to its intended users. This is done by **flooding** the targeted machine or website with lots of **requests** in an attempt to overload the system.

Distributed denial of service attack (DDoS)
This uses the same concept as a DoS attack, but this time it is **multiple computers** making the attacks at the same time.
It is a lot harder to:

- Stop the attack by simply blocking a single source
- Identify who is responsible, as lots of machines are making requests, many of them because they are infected by malware

Brute force attack This is a form of attack that makes multiple attempts to discover something (such as a password).

MALWARE

Typical actions of malware include deleting or modifying files.

Spyware—secretly monitors user actions, e.g. key presses, and sends information to the hacker. Some spyware can even use your webcam without your knowledge.

Viruses—spreads through normal programs and might slow down your device or change your applications and documents.

Worms— spread from device to device and copy themselves hundreds of times. A worm might copy itself onto your email account and then send a copy to all of your email contacts!

Trojan horse— pretends it will be a useful and safe program, when actually it will try to attack your device.

Adware—displays adverts while it is running; some can serve as spyware, gathering information

BOTS

Internet bots
Bots are automated programs that perform tasks repeatedly.
Bots are a crucial part of the internet's infrastructure and perform useful tasks such as:

- Finding new websites for search engines to index
- Providing customer service online (chatbots)
- Monitoring the prices of items to find the best deal (shopbots)

PROTECTION

Firewalls A firewall checks incoming and outgoing network traffic. It scans the data to make sure it doesn't contain anything malicious and that it follows the rules set by the network.

Anti-malware Anti-malware is software that scans any file that is able to execute code. The anti-malware will have a list of definitions of sequences of code that they are aware are malicious. If the code in your files matches the definitions, the files are quarantined.

Auto-updates Auto-updates refers to software that automatically checks for available updates for the software you have on your computer. Once it finds an update, the software can be set either to alert the user or to install it automatically. This software is often included with an operating system.

User permissions Users on a network can be put into groups, with each group having a unique set of privileges, such as: Which network drives they have access to, Their read/write permissions, Which printers they are able to use, What software they can use, Which websites they are allowed to access

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9.2 Animations

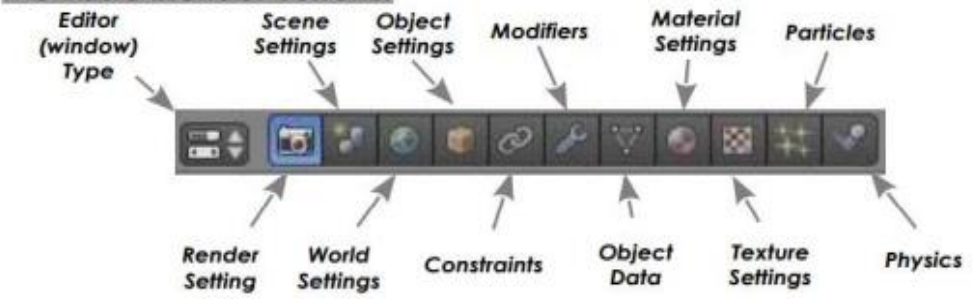
In this unit you will discover how professionals create 3D animations using the industry-standard software package, Blender. By completing this unit you will gain a greater understanding of how this important creative field is used to make the media products that we consume.

Animation	The process of giving the illusion of movement to drawings, models, or inanimate objects.
3D animation	Animating 3D models made in 3D software.
Frame	Still images that appear as a moving image when they are shown one after another at high speed. The frame rate determines the speed of an animation
Keyframe	Keyframe animation only requires you to pick the important locations, the keyframes and the computer works out the rest (called tweening) e.g. Pixar films.
Stop Motion	Stop motion means you have to manually animate every frame of the animation e.g. Shaun the Sheep.
Vector	An image stored as mathematical instructions for how to do draw it. This means its width and height can be increased without the loss of quality.
Composition	The composition of an animation refers to the animation of the properties of an object or multiple objects
Knife tool	The knife tool in Blender can be used to interactively subdivide geometry by drawing lines or closed loops to create holes.
Face	A surface made up of three or more sides, often referred to as a polygon.
Vertex	A point where one or more edges meet.
Edge	A line connecting two vertices.
Scale	Scaling means changing proportions of objects.
Rotate	Rotation is also known as a spin, twist, orbit, pivot, revolve, or roll and involves changing the orientation of elements (vertices, edges, faces, objects, etc.) around one or more axes or the Pivot Point.
Parenting	Used to attach objects to each other.

Stop Frame Animation

Stop frame animations – create the beginning and ending frames, as well as all the frame in-between. For a bouncing ball the key frames for the lowest and highest bounce points, as well as the frames in-between would have to be created.

The Basic Blender Buttons:



Bitmap vs Vector Images

Bitmap

Bitmap graphics are made from pixels.
Resizing will cause loss of quality.
NOT to be used in animations.

Vector

Vector graphics are made from shapes .
Resized without any loss of quality.
Colours of individual shapes can be changed.
Used to create clean, smooth animations.