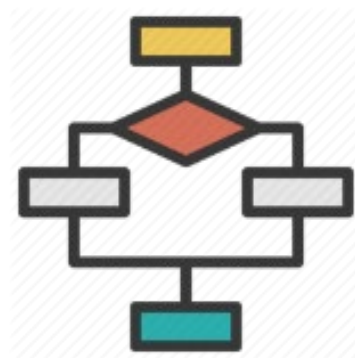
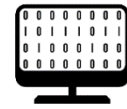




{ Spring }

Computer Science



ICT - Year 9

Topic: History of Computing,
Algorithms, Logic and Programming

Name: _____

KNOWLEDGE ORGANISER
BIG IDEA: Computer Science
TOPIC: Computing, Algorithms, Logic and programming

Key Word	Definition
Wired Communication	Wired communication refers to the transmission of data over a wire-based communication technology.
Wireless Communication	Wireless Communication is a method of transmitting information from one point to other, without using any connection like wires, cables or any physical medium.
Bandwidth	Bandwidth measures the amount of data that can transfer through a communication channel over a given period of time.
Emerging Technologies	Emerging technology is a term generally used to describe a new technology, but it may also refer to the continuing development of an existing technology.
Decomposition	Breaking down a complex problem or system into smaller, more manageable parts.
Abstraction	Focusing on the important information only, ignoring irrelevant detail.
Pattern Recognition	Looking for similarities among and within problems.
Algorithms	Developing a step-by-step solution to the problem, or the rules to follow to solve the problem.

Historic Communication Methods

Timeline of communication methods:

- 1817: Carrier pigeon
- 1837: Semaphore
- 1837: Telegram
- 1876: Telephone
- 1901: Wireless
- 1981: Email

IP Address

An IP address is made up of 4 groups of numbers between 0 and 255, each separated by a full stop. These are unique for every device on the internet. Typically, this would be the address of the router that connects to the internet.

Example:

192.168.5.43

Wired vs Wireless Communication

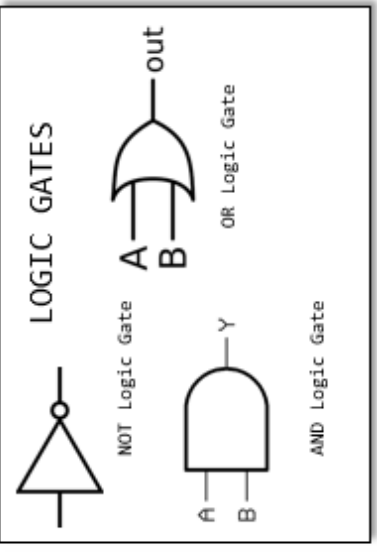
Wired	Wireless
Advantages Faster connection (due to no interference) Higher bandwidth	Disadvantages Cables can be a trip hazard and look unpleasant More expensive and time-consuming to add devices, as each device needs cables Devices are in fixed positions (no portability)
Disadvantages No tripping wireless trip hazard It is quick and cheap to connect new devices	Advantages Lower bandwidth Wireless connections can be weakened by walls and ceilings Less secure
Allows portability	

Data Packets

- Networks send and receive messages in small units of data known as 'packets'.
- A single message may be too large to fit in one packet. It is often split into many packets.
- Each packet contains a part of the message, an address of where it came from, and an address of where it is going. These addresses are known as 'IP addresses', and they are unique.

Truth Tables

Input A	Input B	Output Z
0	0	0
0	1	1
1	0	1
1	1	0



Computing Pioneers

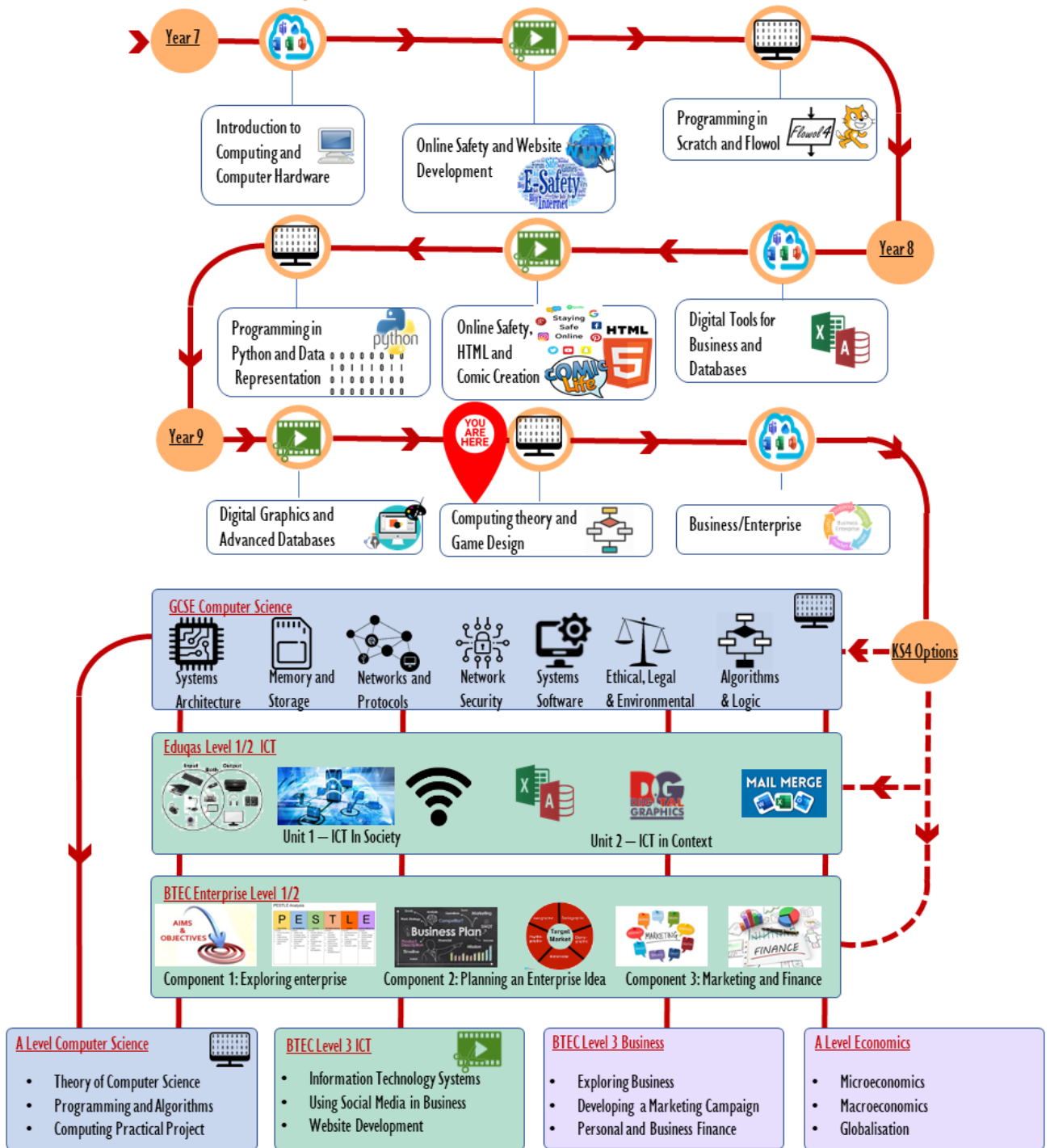
Timeline of computing pioneers:

- 1815-1864: George Boole
- 1815-1852: Ada Lovelace
- 1891-1954: Alan Turing
- 1890-1955: Steve Wozniak
- 1895-1971: Charles Babbage
- 1905-2011: Steve Jobs
- 1955-: Sir Tim Berners-Lee



ICT, Business and Computer Science

Curriculum Pathway










Lesson 1: History of the internet

Objective: Understand the development of computing communication technology and 'communication protocols'

DO NOW: Historic Communication Methods

You will find the names of five communication methods below. Can you match the name of the communication method with the correct image and the year in which it was first used? Draw lines to match up each method, image, and year.

Name	Image	Year
Telegram		1876
Email		1961
Homing/Carrier pigeon		1837
Telephone		1791
Semaphore		1167



Task 1: Data transmission across continents

Visit www.submarinecablemap.com

- 1) Name two countries that are connected by the 'Columbus-III'.
 - 1)
 - 2)
- 2) How long is the cable used in 'Columbus-III'?
- 3) What is the longest cable?
- 4) What do you think is the most important cable?

Task 2: Packets

Data is sent over the _____ and is broken down into small _____ to be sent. The packets travel the _____ way through _____.

Each packet will have an _____ address which is unique just like a postcode.

Word Bank:

Fastest Internet Protocol Transfer Packets Routers
IP
Information

Challenge:

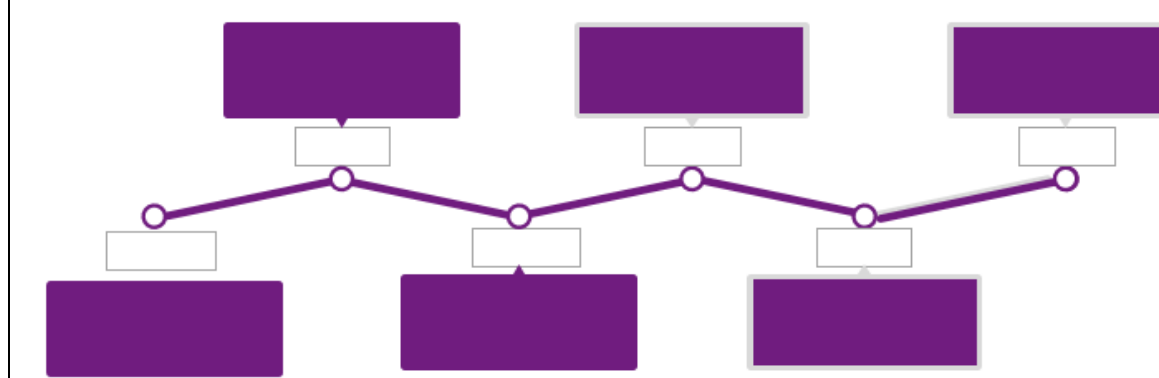
1. Write down an example of an IP address.

2. See if you can find out what your Google's IP address is.



Task 3: Internet Milestones

Open the K:\ICT\Year 9\2. Computer Science\ 1. History of the internet - Task 3 Milestones. Find 6 milestones in the development of communication technology, give the dates and key facts about the milestone



Extension: Open and complete the tasks on the word document K:\ICT\Year 9\2. Computer Science\ 1. History of the internet - 1. History of the internet - extension

Plenary: Recall Quiz

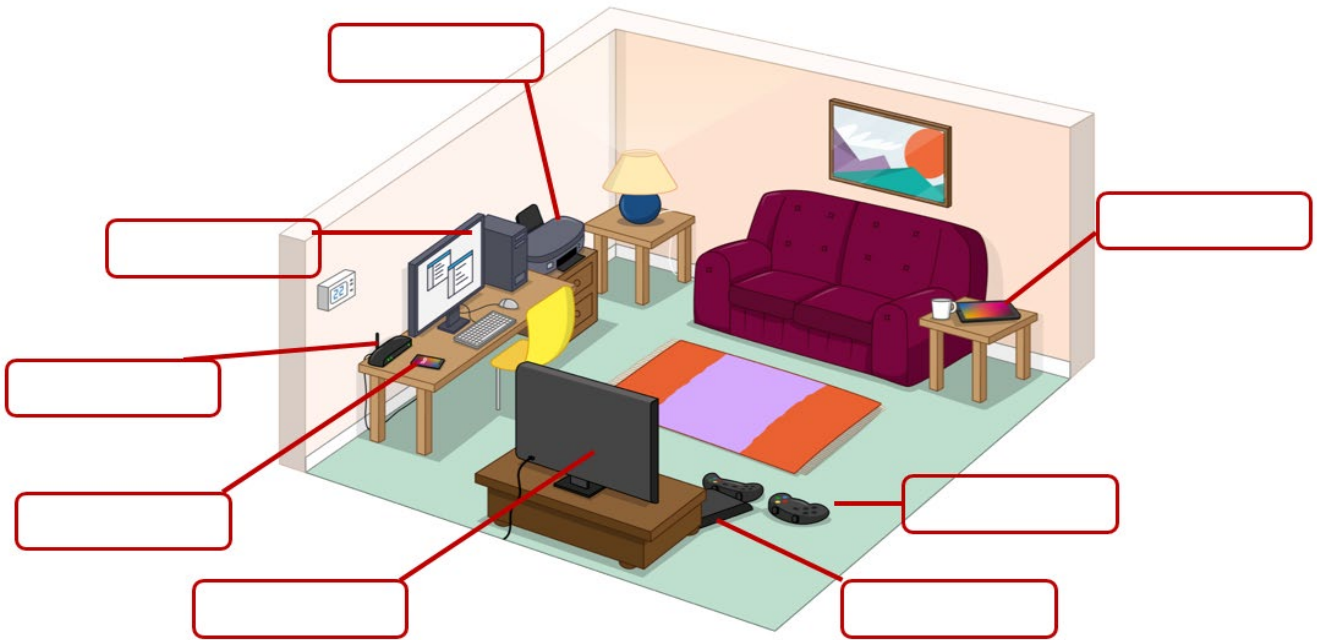
- | | |
|--|---|
| <p>1) What is the internet?</p> <ul style="list-style-type: none">a) A global network of networksb) A network within a single buildingc) A routerd) A telephone network <p>2) What is the main purpose of the Transmission Control Protocol (TCP)?</p> <ul style="list-style-type: none">a) To route datab) To connect a device to the internetc) To split a message into smaller pieces called 'packets'd) To upload files to a server <p>3) What does IP stand for?</p> <ul style="list-style-type: none">a) Intellect Protocolb) Internet Processingc) Internet Protocold) Intercept Packaging | <p>4) Which of the below data transfer methods is most common on the internet?</p> <ul style="list-style-type: none">a) Cablesb) Satellitesc) Bluetoothd) 3G <p>5) Which of the below is stored in the payload of a packet?</p> <ul style="list-style-type: none">a) Sender IP addressb) Receiver IP addressc) Total number of packetsd) Part of the message/data |
|--|---|



Lesson 2: Wired and wireless communication

Objective: Compare wired to wireless connections, the devices used and the term bandwidth

Do Now: Wired or wireless?



Look at the image of the living room and the devices within it. Identify if the devices are connected to the network through a **wired** or **wireless** connection

Task 1: Bandwidth matters

Some online activities use more data than others. Can you identify which activities use more bandwidth? Look at each activity and place an 'X' in the correct column to identify whether it is a light-, medium-, or high-bandwidth activity.

Activity	Light	Medium	High
Reading online news			
Checking the weather			



Online gaming			
Checking social media			
Emailing regularly			
A vlogger uploading videos to YouTube daily			

Task 2: Wired vs Wireless

K:\ICT\Year 9\2. Computer Science\ 2. Wired and Wireless - Task 2

There are twelve statements and two tables.

One table is for wired networks and the other table is for wireless networks. Each table contains two columns, one for advantages, and one for disadvantages.

Your challenge: Move the statements to the correct columns

Then:

Read the six scenarios on the second slide. Identify whether it would be best to use a wired or wireless network.

Task 3: Encrypting messages

Go to this website tinyurl.com/task3encryption

Complete the encryption task

Extension: For each connection method: 3g/ 4g, Ethernet and Wifi

You need a brief description of how it works and advantages and disadvantages of each



Lesson 3: Computing Pioneers

Objective: Investigate some of the famous computer scientists and their inventions

DO NOW:

Who are these famous computer scientists

Hint: Search the date range



1791-1871



1815-1852



1950-



1955-.....



1815-1864



1912-1954

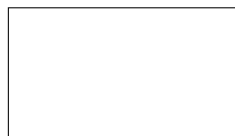


1955-2011

Task 1: Famous Computer Scientists

K:\ICT\Year 9\2. Computer Science\3. Computing Pioneers - Task 1 Famous Computer Scientists

Complete the timeline, giving a brief overview of what these famous computer scientists achieved.



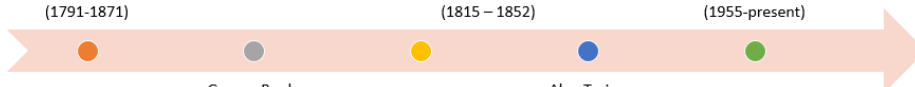
Charles Babbage
(1791-1871)



Ada Lovelace
(1815 - 1852)



Sir Tim Berners-Lee
(1955-present)



George Boole
(1815-1864)

Alan Turing
(1912-1954)





Task 2: Facebook factfile

Pick from the list of Computer Scientists below. Complete a Facebook factfile, looking at their achievements and what they did:

- Grace Hopper
- Tim Berners-Lee
- Alan Turing
- Ada Lovelace
- John Von-Neumann
- Barbara Liskov
- Vint Cerf
- Steve Jobs
- Bill Gates

The form is titled 'facebook' and includes the following sections:

- Picture of**: A large empty box for a profile picture.
- Name of Person**: Fields for 'Lives in', 'Date of Birth', 'Religion', 'Languages', and 'Date of Death'. Below these are four boxes: 'In each of these four spaces, draw or copy a picture', 'Of additional pics of the mathematician', 'Front covers of their books, things they achieved', and 'Or famous formulae they discovered'.
- Education and Work**: A section for 'College' with the prompt 'Where did they study?'.
- Main Achievements**: A large text area with the prompt 'Use this space to write about the things this computer scientist achieved and the contributions he/she made to the world'.
- Activities and Interests**: A text area with the prompt 'Use this space to write down things that this person enjoyed researching'.
- Friends (3)**: Three rows, each with a box for a friend's name and a box for a picture. The boxes contain prompts: 'In each of these three spaces, draw or copy a picture', 'Of mathematicians who worked at the same time', and 'Or with this mathematician'.

Plenary: Match the famous Computer Scientists to their achievements

Tim Berner's Lee
Alan Turing
Ada Lovelace
Vint Cerf
Bill Gates
Charles Babbage

One of the fathers of the internet
Creator of the world wide web
A mathematician who published one of the first algorithms
A WW2 code-breaker and computer designer
Creator of the difference engine
Founder of Microsoft



Lesson 4: Emerging Technology

Objective: Describe and analyse the features of emerging technologies

DO NOW: Predictions from the past

Read the technology predictions from the past. Choose the correct word below to complete each sentence.

computers motion picture radio
telephone television World Wide Web

1. "There is no reason people would want _____ in their homes."
2. "This _____ has too many shortcomings to be seriously considered as a means of communication. The device is inherently of no value to us."
3. "I believe that the _____ is destined to revolutionize our educational system and that in a few years it will supplant largely, if not entirely, the use of textbooks."
4. "In five years, you will not be able to buy a _____ that is not Internet-enabled."
5. "I predict the _____ will go spectacularly supernova and in 1996 catastrophically collapse"
6. "The _____ has no imaginable commercial value. Who would pay for a message sent to nobody in particular?"



Task: Future tech research task

Go to K:\ICT\Year 9\2. Computer Science and open **4. Emerging Technology**

– **Task.** Use the resources provided and conduct your own research into the technologies given.

- Describe the technology / what does it do etc...
- How far have we got towards making it available?
- What do we still need to develop for it to be real?
- Explain how it might work.

Further guidance.

Try and look at something that hasn't yet happened and find out how far we have got towards making it happen.

A great place to start is in films or books that use technology that hasn't yet been made.

Web search tips:

Use different combinations of words and terms don't just keep asking the same question.

Try different names for the same thing.

Don't just go for the first link scroll and try and find different pages.

Plenary: Emerging Tech Quiz

Type the link below and complete the quiz

<https://tinyurl.com/plenarytechquiz>







Lesson 5: Environmental Issues

Objective: Understand the environmental impact of technology

DO NOW:

Name each of the computer components below
What raw materials are they each made from?

							
							
Steel	Gold	Copper	Aluminium	Rubber	Plastic	Lithium	Fibreglass

Task: Persuasive poster

You need to create a poster to persuade people to create less environmental waste
You should explain:

- The resources used in manufacturing the technology
- Some key facts and figures surrounding the topic
- The ways in which we can be more environmental in our use of tech
- Some of the good things that tech has done for the environment

Plenary:

Give one benefit of technology for the environment: _____

Give one drawback of technology for the environment: _____



Lesson 6 & 7: Cultural and Ethical Issues Mini Project

Objective: Understand how technology impacts us in our daily lives

Task: Ethical and cultural concerns

There are two scenarios to pick from:

- Online shopping
- Self driving cars

You need to:

- Read the background information on the scenario
- Read the questions/ issues to consider
- Look at the resources provided/ do your own research
- Pick from each of the scenarios and create a newspaper article that discusses the advantages/ disadvantages and the overall impact of the technology.
- There is a Newspaper article template in **K:\ICT\Year 9\2. Computer Science** for you to use

When you have finished you need to print your newspaper article out and stick it to the next page.





When you have finished your article you should print it and stick it in your booklet in the box below.

<Stick your article in here>



Mini Project PRIDE

Effort

1

2

3

4

Strength



- You can identify the benefits of a technology
- You can identify the drawbacks of a technology
- You can explain the benefits/ drawbacks of a technology
- You can compare the impacts of a technology and draw a conclusion
- You can suggest potential solutions to the problems presented
- Your article has suitable formatting that is fit for purpose
- You used appropriate pictures for the topic

Target



- Explain another benefit of the technology
- Explain another drawback of the technology
- Write a brief conclusion, discussing whether the technology is good overall
- Give a potential solution to the issues the technology presents
- Suggest two improvements you could make to the formatting of the article
- Give two fonts that would be appropriate to use
- Find another picture you could use for the project and explain why it would be good

Presentation and SPaG



- Correct any missing capital letters
- Correct your spellings
- Add in missing full stops/ apostrophes
- Write in black pen
- Draw diagrams in pencil

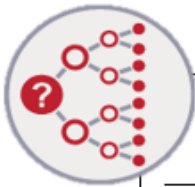
Student Improvement:



Lesson 8: Computational Thinking

Objective: Know and apply the four concepts of Computational Thinking

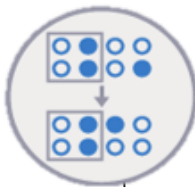
Task 1: Give a brief definition of these key problem solving terms.



Decomposition



Abstraction



Pattern Recognition



Algorithms

Task 2: You have four mini problems to solve that uses each of the four computational thinking techniques. Aim to spend no more than a few minutes on each one.

Abstraction: Cross out the unimportant information.

Problem 1:

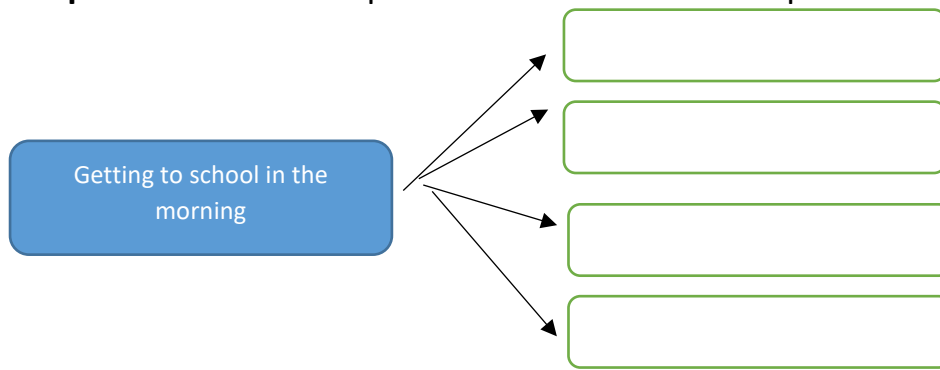
Micha's dad wants to try to save money on gas, so he has been tracking how much he uses. Over the past two years, Micha's dad used 200 litres of gas. This year, he used 100 litres of gas. How much gas did he use last year?

Problem 2:

Adrianna has 10 pieces of gum to share with her friends. There wasn't enough gum for all her friends, so she went to the store and got 70 pieces of strawberry gum and 10 pieces of bubble gum. How many pieces of gum does Adrianna have now?



Decomposition: Break the problem down into smaller problems



Algorithms:

Draw out the shape the code below will draw. The lengths don't need to be exact!

Start at the **dot**
Draw a 3 cm line
Turn left 90 degrees
Draw a 3 cm line
Turn left 90 degrees
Draw a 3 cm line
Turn left 90 degrees
Draw a 3 cm line
Turn left 90 degrees
Stop



Using this algorithm, write another one below that draws a hexagon.

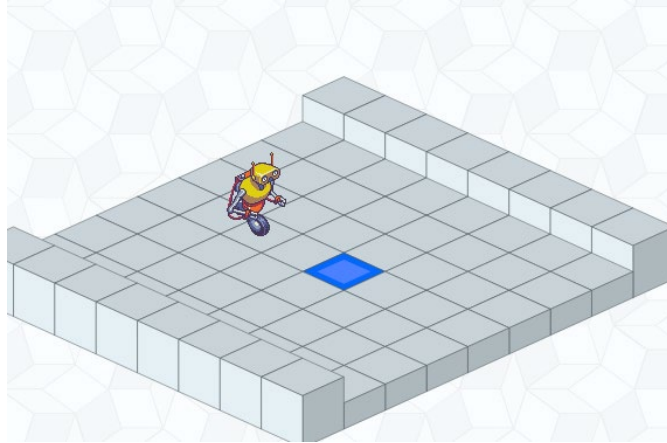


Pattern Recognition: Can you notice a pattern between the algorithm you have written for the hexagon and the algorithm for the square?



Task 3: Lightbot

Lightbot is a great tool to practice your computational thinking skills. Go to www.lightbot.lu. Complete as many of the levels as you can. Complete the Lightbot Computational Thinking powerpoint

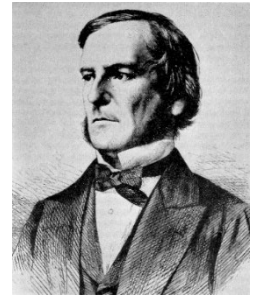




Lesson 9: Logic Gates

Objective: Know the three main logic gates and complete logic circuits

DO NOW: Who was George Boole and what did he do that was so important?



Task 1: Draw an image of each of the 3 main logic gates that we would find in a CPU

NOT Gate

AND Gate

OR Gate

Task 2: Complete the Truth Tables for each of the three main logic gates to show what the outputs are for the different combinations to inputs.

Not Gate

INPUTS	OUTPUTS



AND Gate

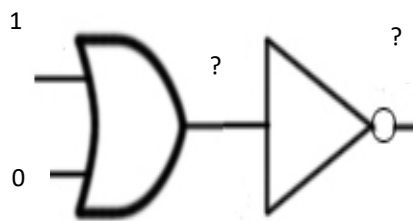
INPUT A	INPUT B	OUTPUTS

OR Gate

INPUT A	INPUT B	OUTPUTS

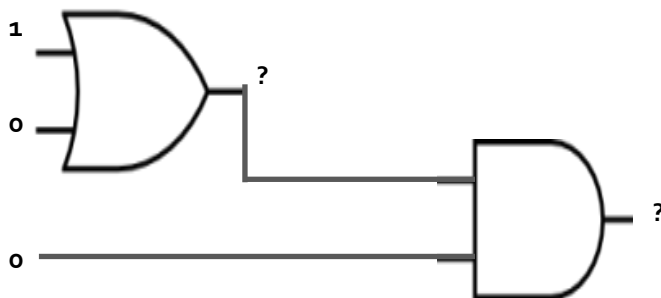
Task 3: For each of the Logic Circuits below, state what the output would be in each case

1.



What is the output for this Logic Circuit?

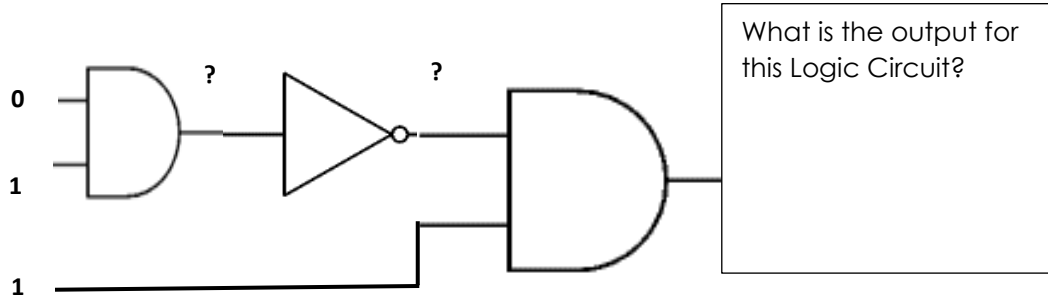
2.



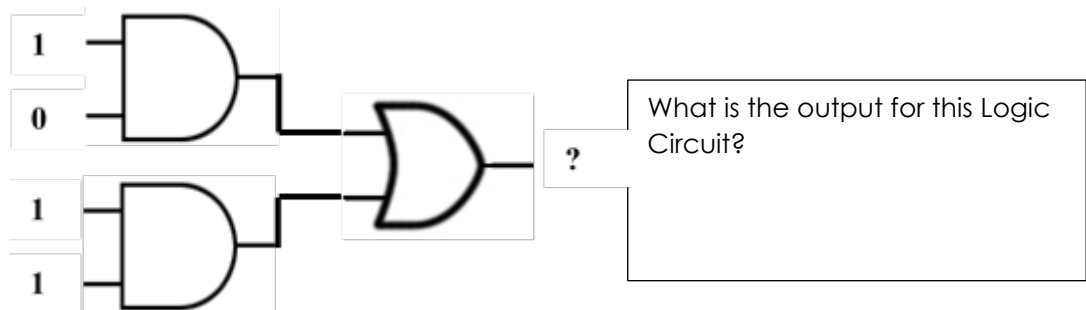
What is the output for this Logic Circuit?



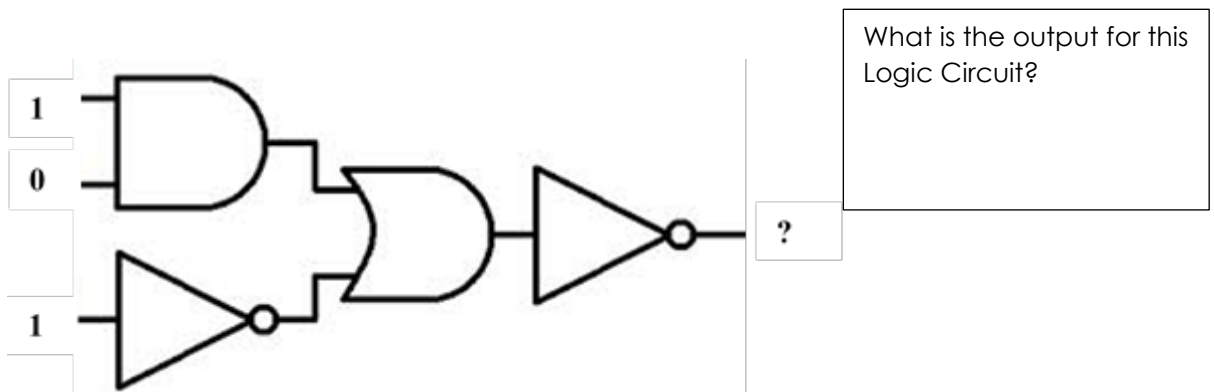
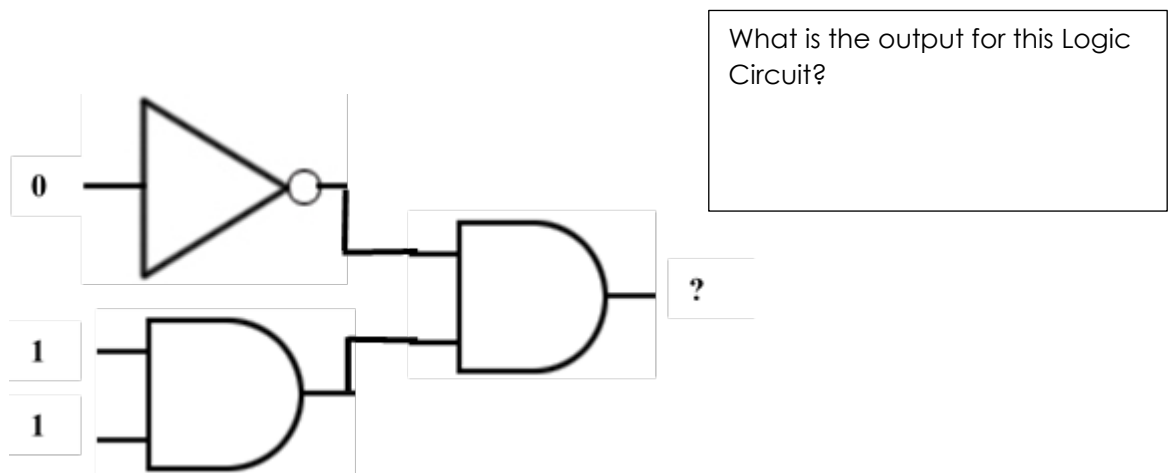
3.



4.



5.





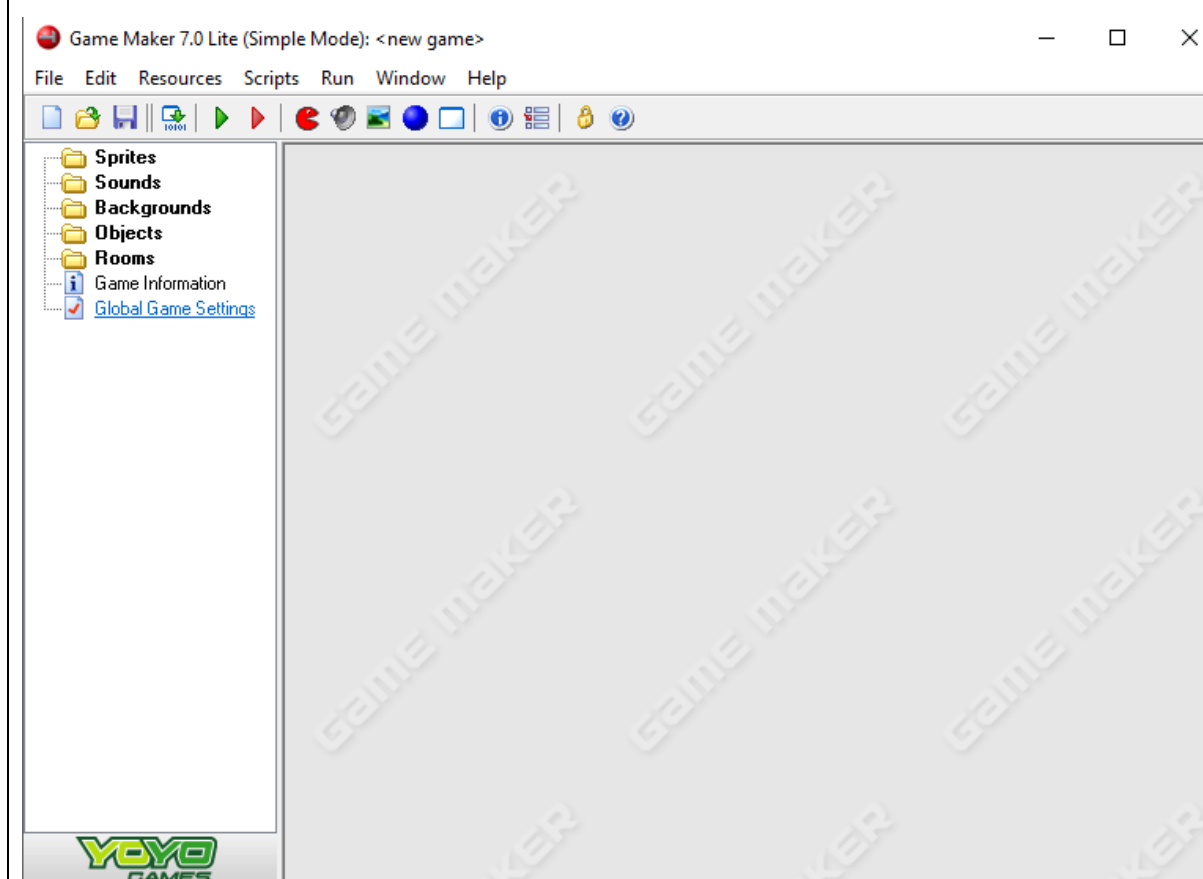
Lesson 10 - 12: Game Maker

Objective: Use the gamemaker software to make the EvilClutches game and adapt it to create your own games

Task : GameMaker

You can find all the tutorials for this project in
K:\ICT\Year 9\2. Computer Science\GameMaker

You will have a project diary to complete when you have made the games.
When you have finished print and stick this on the following page.





When you have finished, print and stick your project diary into the box below.

<Stick your project diary in here>



Empty rectangular box for student name or ID.

Assessment PRIDE

Effort

1

2

3

4

Strength



- You have created your own sprites for your game
- You have programmed a character (the boss) to move on their own
- You have programmed your own character to move when keys are pressed
- You have created a room/ environment for the game
- You have added a scoring system and menu to the game
- You have written an effective review of the game

Target



- Design your own sprite for the game
- Explain how to make a character move on their own in gamemaker
- Explain how to make a character move according to the keys pressed
- Explain how the scoring works in the game
- Write a short review of the game
- Give three improvements you could make to the project

Presentation and SPaG



- Correct any missing capital letters
- Correct your spellings
- Add in missing full stops/ apostrophes
- Write in black pen
- Draw diagrams in pencil

Student Improvement:



Unit Review - Self Reflection

Beginner	Progressing	Embedded
I am still learning this and don't feel confident about my knowledge of the topic	I am getting there but don't understand everything about the topic	I have a really good knowledge of this topic and can answer questions confidently

Assessment Criteria	Beginning	Progressing	Embedded
Understand how the internet works			
Be aware of cultural, ethical and environmental impacts of computing			
Know basic computational thinking skills and logic gates			
Use software to design and create games/apps			

Things that I have done well in this unit are:

--

Things I have learnt from Computer Science that I will take into my GCSEs are:

--