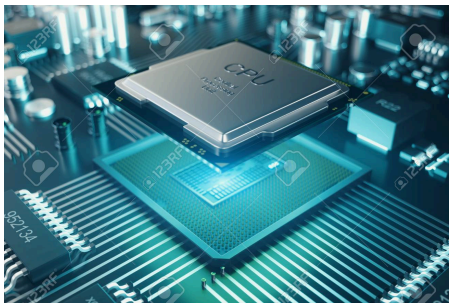
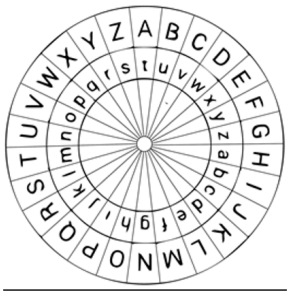
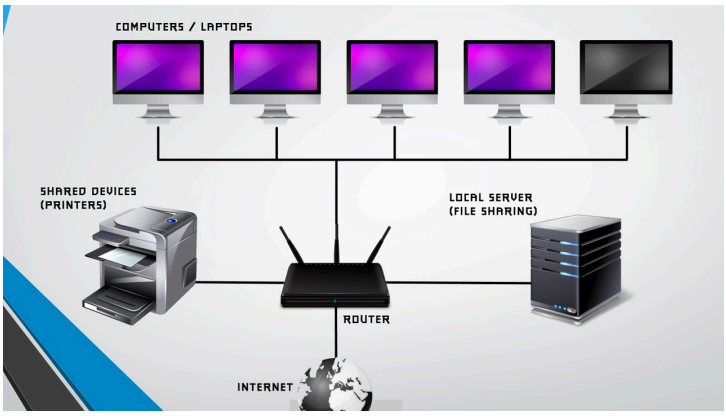
OCR A LEVEL COMPUTER SCIENCE





A Caesar Wheel



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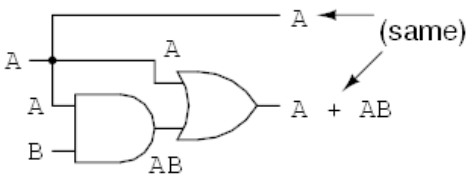

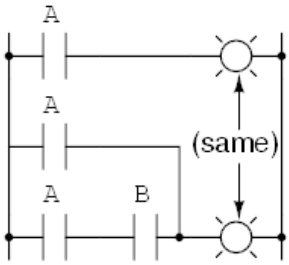

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OCR A Level Computer Science

Course overview

You have made an excellent choice in deciding to study Computer Science at A Level.

Computer Science is a practical subject where students can apply the academic principles learned in the classroom to real-world systems. The aims of this qualification are to enable learners to develop the following:

- An understanding and ability to apply the fundamental principles and concepts of computer science, including: computational thinking (abstraction, decomposition, pattern recognition) logic and Boolean logic, algorithms, data representation and object oriented programming (OOP).
- The ability to analyse problems in computational terms through practical experience of solving such problems, including writing programs (using python or java programming languages).
- The capacity to think creatively, analytically, logically and critically.

Mathematical skills to understand data types and primitive data types. The ability to solve binary arithmetic and floating point arithmetic and solve logic problems using Boolean algebra.

This pack contains a programme of activities and resources to prepare you to start an A Level in Computer Science in September. It is aimed to be used throughout the remainder of the summer term and over the summer holidays to ensure you are ready to start your course in September.

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Task 1: Job opportunities: "Why study computer science!"

Watch the following Ted Talk

- https://youtu.be/t3Y4p-6YWnQ

Watch the video:

- https://www.youtube.com/watch?v=6cKaok1F1P0

Answer the following:

1. **Why have you chosen the study Computer Science at A Level?**
2. **What do you aim to achieve from the course?**
3. **What skills are you aiming to develop?**
4. **What other A Levels have you chosen and why?**
5. **What programming languages have you used?**

Task 2: Learn how to make notes using the Cornell Notes system.

Watch the video below:
https://www.youtube.com/watch?v=ErSjc1PEGKE&feature=youtu.be

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Task 3 – Computational thinking

Watch this video:

- https://youtu.be/euFj8D1A1Kw

Read the following:

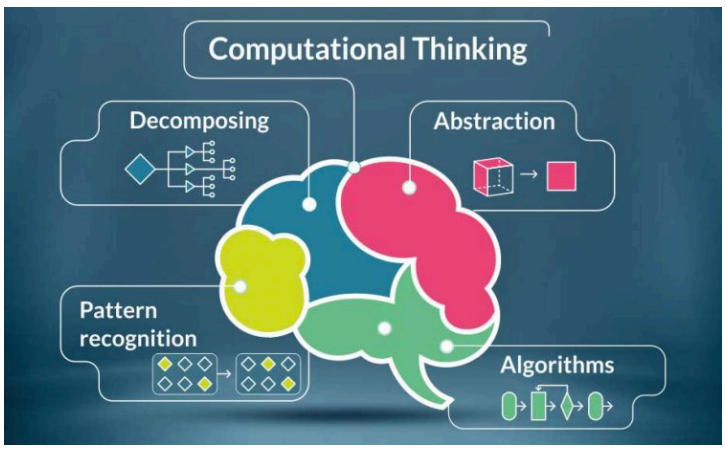
- **https://www.cambridgemaths.org/Images/espresso_19_computational_thinking_in_the_classroom.pdf**

Answer the following using complete sentences and with examples:

1. **What is an algorithm?**
2. **What is computational thinking?**
3. **Why is computational thinking required in the study of computer science?**
4. **What is abstraction and provide an example.**
5. **What is decomposition and provide an example.**

So what actually is 'computational thinking'? You should have a basic understanding from your GCSE years. It is the thought processes involved in problem solving, so that the solutions are represented in a form that can be effectively carried out by an information-processing agent, such as a computer.

Creativity is important when applying computational thinking principles to a problem. Programming is a fundamentally creative skill - whether it is used to create a search algorithm, build an app or design a website.



Task 4: BBC click review of 2019

This includes space travel, electric cars, 5G and the increased use by police of facial recognition.

Watch the video:
https://www.bbc.co.uk/iplayer/episode/m000d45t/click-best-of-2019

Task 5: Artificial Intelligence (AI) and Coronavirus

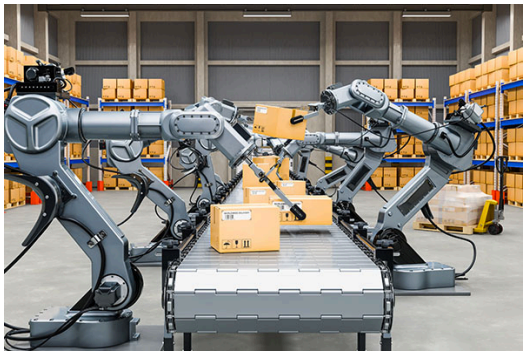
The following video looks at how AI tools could help track the virus spread and find new treatments.

Watch the video:
https://www.bbc.co.uk/iplayer/episode/m000g8w5/click-can-ai-help-fight-coronavirus

- You will learn about AI at A Level and will be required to answer an essay question in the exam that may relate to AI.
- Do some further research on AI and see below example exam question and have a go at answering.

Answer the following question:

1. "Developments in Artificial Intelligence mean that in twenty years time most people will be unemployed." Discuss whether or not you agree with this statement.



Task 6: Ethical hacking

You will discuss and learn about systems security, firewalls and encryption during your A level.

One of the coolest and highly paid jobs in Computing is be an Ethical hacker. Watch the video showing **World's Most Famous Hacker Kevin Mitnick** talk about hacking.

Watch the video:

- https://www.youtube.com/watch?v=iFGve5MUUnE

Read the following:

- https://us.norton.com/internetsecurity-emerging-threats-what-is-the-difference-between-black-white-and-grey-hat-hackers.html

Research task:

Research and explain the difference between Black, White and Grey Hat Hackers? Create a one page information sheet summarising your research.

OCR A Level Computer Science

Procedural programming vs OOP (Object Oriented Programming)

Task 7: Types of programming languages

Procedural Programming can be defined as a programming model which is derived from structured programming, based upon the concept of calling procedure. Procedures, also known as routines, subroutines or functions, simply consist of a series of computational steps to be carried out. During a program's execution, any given procedure might be called at any point, including by other procedures or itself.

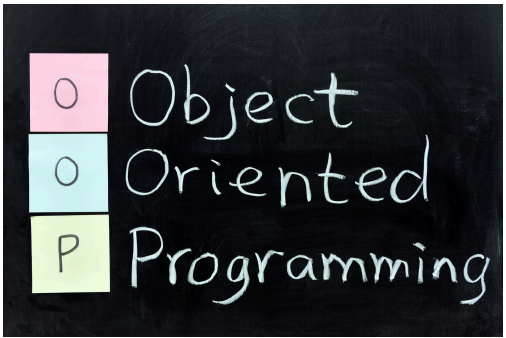
Object Oriented Programming can be defined as a programming model which is based upon the concept of objects. Objects contain data in the form of attributes and code in the form of methods. In object oriented programming, computer programs are designed using the concept of objects that interact with real world. Object oriented programming languages are various but the most popular ones are class-based, meaning that objects are instances of classes, which also determine their types.

Watch this video about OOP:

- https://youtu.be/pTB0EiLXUC8

Answer the following:

1. **In your own words explain the difference between Procedural programming and Object Oriented Programming (OOP)**
2. **Give one example of a Procedural programming language**
3. **Give two examples of a Object Oriented Programming (OOP)**
4. **Explain the following terms used in OOP**
    a. **Encapsulation**
    b. **Abstraction**
    c. **Inheritance**
    d. **Polymorphism**



Task 8: Developing your programming skills

Course : OOP (Object oriented programming)

Complete the following OOP course, which will take you about 10 hours. OOP is fundamental to A level and will help with your programming project. OOP is how the world is viewed as a col- lection of objects. An object might be a person, car or animal. You can then make 'blueprints' with that object and re-use its attributes and behaviours.

Go to the following OOP course to complete:
(you will get a certificate at the end to share with your teacher)

- https://www.futurelearn.com/courses/object-oriented-principles

or

If the first course is not available then try this one:

- https://www.futurelearn.com/courses/programming-103-data

Useful Resources & Further Reading

To help your way……..

It is also recommended that you take an active interest in science and technology news and current developments of new technology.

Useful Websites:

- OCR A level Computer Science Specification – https://www.ocr.org.uk/Images/170844-specification-accredited-a-level-gce-computer-science-h446.pdf
- Learn HTML, CSS and JavaScript - https://www.w3schools.com/
- A level CS Video - https://student.craigndave.org/a-level-videos
- Future Science & Technology news - https://www.wired.co.uk/