

A Level Computer Science at St Wilfrids RC College

“At its heart lies the notion of computational thinking: a mode of thought that goes well beyond software and hardware, and that provides a framework within which to reason about systems and problems.”

(CAS-Computer Science a Curriculum for Schools).



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Welcome to the ICT/Computer Science Department

HoD: Mr Dann

Teachers of Computer Science

Mr Dann Head of Dept

Mr Gordon



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Why Computer Science?

- it is an intensely creative subject that combines invention and excitement, and can look at the natural world through a digital prism.
- OCR's A Level in Computer Science will value computational thinking, helping learners to develop the skills to solve problems, design systems and understand the power and limits of human and machine intelligence.
- Learners will develop an ability to analyse, critically evaluate and make decisions.
- The project approach is a vital component of 'post-school' life and is of particular relevance to Further Education, Higher Education and the workplace.
- Each learner is able to tailor their project to fit their individual needs, choices and aspirations.



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Course Aims

- An understanding of and ability to apply the fundamental principles and concepts of computer science including; abstraction, decomposition, logic, algorithms and data representation
- The ability to analyse problems in computational terms through practical experience of solving such problems including writing programs to do so
- The capacity for thinking creatively, innovatively, analytically, logically and critically
- The capacity to see relationships between different aspects of computer science
- Mathematical skills
- The ability to articulate the individual (moral), social (ethical), legal and cultural opportunities and risks of digital technology.

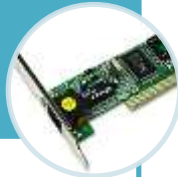


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A Level Computer Science - H446 – (OCR)

- Hardware
- Software development
- Data types
- Legal, moral, ethical issues

Computer
Systems (40%)



- Computational Thinking
- Problem solving
- Algorithms to solve problems

Algorithms
(40%)



- A 'real' project
- The Journey
- Your choice
- Stakeholder

Practical
Project (20%)



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Content Overview	Assessment Overview	
<ul style="list-style-type: none"> • The characteristics of contemporary processors, input, output and storage devices • Software and software development • Exchanging data • Data types, data structures and algorithms • Legal, moral, cultural and ethical issues • Elements of computational thinking • Problem solving and programming • Algorithms to solve problems and standard algorithms 	<p>Computer systems (01)</p> <p>140 marks</p> <p>2 hours and 30 minutes</p> <p>written paper</p>	<p>40%</p> <p>of total</p> <p>A level</p>
<p><i>The learner will choose a computing problem to work through according to the guidance in the specification.</i></p> <ul style="list-style-type: none"> • Analysis of the problem • Design of the solution • Developing the solution • Evaluation 	<p>Algorithms and programming (02*)</p> <p>140 marks</p> <p>2 hours and 30 minutes</p> <p>written paper</p>	<p>40%</p> <p>of total</p> <p>A level</p>
	<p>Programming project (03* or 04**)</p> <p>70 marks</p> <p>Non-exam assessment</p>	<p>20%</p> <p>of total</p> <p>A level</p>

Component 1 – Computer Systems

- **1.1 The characteristics of contemporary processors, input, output and storage devices**
- **1.2 Software and software development**
- **1.3 Exchanging data**
- **1.4 Data types, data structures and algorithms**
- **1.5 Legal, moral, cultural and ethical issues**



Component 2 – Algorithms and programming

- **2.1 Elements of computational thinking**
- **2.2 Problem solving and programming**
- **2.3 Algorithms**



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Algorithms – Warm up question.

A girl throws a coin 10 times. Write a program in pseudocode that will calculate how many times the coin will land on heads.



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Algorithms – Warm up question.

A girl throws a coin 10 times. Write a program in pseudocode that will calculate how many times the coin will land on heads.

```
VAR NumberofHeads = 0
```

```
VAR CoinToss = ""
```

```
FOR Count = 0 to 10
```

```
    CoinToss = input("Toss a coin. Enter a 'H' for heads and a 'T' for tails")
```

```
    If CoinToss == "H" Then
```

```
        NumberofHeads = NumberofHeads + 1
```

```
    Endif
```

```
Next Count
```

```
Print ("The number of time a head was tossed was: " + str(NumberofHeads))
```



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Course Information.

Year 1

- Computer Systems
- Computational Thinking and Algorithms
- Start Practical Project – May

Exams

- End of Unit Exams
- Mock Exams every 3 months



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Course Information.

Year 2

- Complete Practical Project to Xmas
- Complete remaining Computer Systems
- Complete Algorithms

Exams

- End of Unit Exams
- Full mock exams from November
 - 2x 2.5hrs Papers
- Final PP Submission in May
- Final Exams in May and June



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Course Information.

Key Skills

- Independent Learning – *this is different to GCSE!*
- Exam Technique
- Logical Thinking and Problem Solving
- Programming skills
- Complete Algorithms – PG



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Example Practical Project

Excellent feedback from OCR regarding last years entries

Many Grade A



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Careers

- Software Engineer, Network Architect, Data Scientist
- Systems Analyst, Business Analyst
- Computer Game Developer/Programmer, Software Developer



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Task – Can you think Logically?

MYSTERY THEATER

THE STORY:
Mrs. Lee's students reenacted a mystery in their classroom. Two boys (Doug and Levi) and two girls (Mary and Beth) played the roles of secret agent, detective, spy and police man. Figure out which role each student played and what one piece of spyware (camera, glasses, radio, and handcuffs) they each used.

	DOUG	MARY	LEVI	BETH
SECRET AGENT				
DETECTIVE				
SPY				
POLICE MAN				
SPY CAMERA				
SPY GLASSES				
SPY RADIO				
HANDCUFFS				

THE CLUES:

1. The handcuffs and spy camera were not used by the police man or the secret agent.
2. The girls played the roles of spy and secret agent.
3. Mary used the spy camera.
4. Neither Doug nor Beth used the spy radio.



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What Computer Science skills did we use?

	DOUG	MARY	JIM	BETH
SECRET AGENT				
DETECTIVE				
SPY				
SPY GLASSES				
SPY CAMERA				
SPY RADIO				
HANDCUFFS				

THE STORIES:
The story is a mystery involving a secret agent, a detective, and a spy. The story is set in a school and involves a spy camera, a spy radio, and a spy. The story is a mystery involving a secret agent, a detective, and a spy. The story is set in a school and involves a spy camera, a spy radio, and a spy.

THE OBJECTS:
1. The secret agent and detective were used for the job.
2. The spy camera was used to get information.
3. The spy radio was used to get information.
4. The spy was used to get information.

Decomposition – breaking the problem down in to smaller problems so it was easier to solve

Abstraction – focused on only the relevant detail

Boolean Logic – AND, IF and NOT statements

e.g. “The girls played the role of spy **and** secret agent”

e.g. “The handcuffs **and** spy camera were **not** used by the policeman **or** the secret agent”

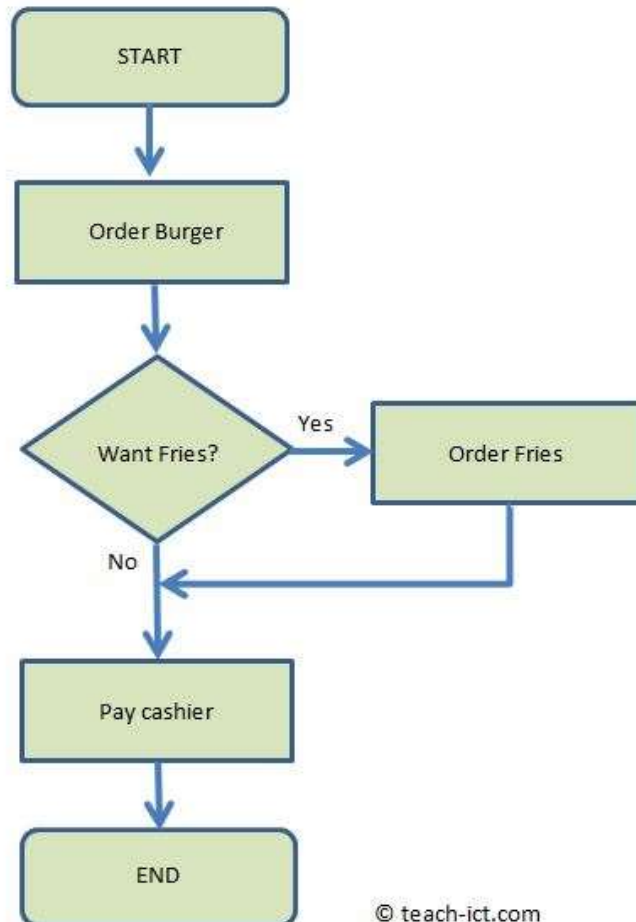


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Task – Flowcharting

Here is an example flowchart.

Task. Can you make a flowchart that describes the steps you would take if your mobile phone did not work when you awoke one morning.



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LMC exercises from AS programming techniques module