

# Computer Science at Xaverian College



# Past Students: 2018

## Samuel Johnson 'A\*'



Top 50 students in the UK at AQA Comp Sci!  
Now studying: **Computer Science**  
At: **Cambridge University**

# 2018 Amna Irfan 'A'



Now studying: **Physics**  
At: **Oxford University**

# 2018 Joe Fagan 'A'



Now studying: **Computer Science**  
At: **Nottingham University**

# Computer Science

## Entry Requirements:

- Maths GCSE Grade 6 and Science Grade 5
- At least grade 5 in GCSE Computer Science – if taken



## Other Requirements:

- You will need to have Problem Solving Ability
- It is important that you have an interest in how Computers work
- Combines well with *Sciences and Maths*

# A Level Computer Science

Split into three modules

## Paper 1

On-screen exam –  
Short theory  
questions & writing  
program code

2 ½ hours

40% of the Marks

## Paper 2

Written Exam –  
Short and  
extended answer  
questions

2 ½ hours

40% of the Marks

## NEA

Your Own Choice  
of coursework  
topic

20% of the Marks



# About the Practical Exercise

- For **Paper 1** the exam board give you a skeleton program at the start of the second year. You will be asked questions on it in the exam.
- The **Paper 2** exam will be assessed by the usual written answers to set questions.



# How the course is taught.

We spend two lessons a week covering the theory topics and two lessons learning how to program.

You will be given a **homework** assignment each week based on the theory topic covered.





# Programming Lessons in C#

In the programming lessons you will learn how to:

- Write a program
- Run a program
- Debug a program.



The programming language you will learn is called C#.

<https://visualstudio.microsoft.com/vs/>

**Helpful Tutorial:**

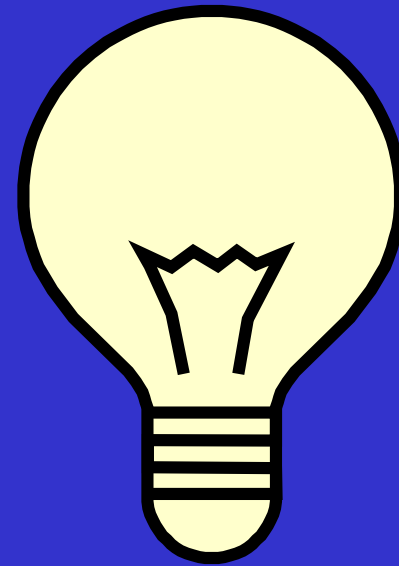
<https://www.w3schools.com/cs/default.asp>

# Problem Solving

One of the main aspects of Computer Science is problem solving. Solutions to problems are described and then automated by writing programs.

## Stages in problem solving:

- Understand the problem
- Devise a plan
- Carry out the plan
- Review the solution



# Example Problem:

Determine whether the numbers **231787** and **479561** are prime or not.

## 1. Understand the problem

What is a prime number?

A number that is only divisible by itself and 1.

Do we mean any number?

Only integers (whole numbers).

What do we mean by is divisible by?

Divides a whole number of times with no remainder.

How do we know that a number isn't prime?

If we find another number (integer) that divides into it exactly.



**Example**

7 is a prime  
32 is not (div  
by 2,4,8)

## 2. Devise a plan

It is easier to establish that a number isn't prime.

How can this be done?

Systematically divide integers into the number and if we find a number that divides exactly, the number isn't prime.

What number do we need to go up to?

The square root of the number being tested.

Do we need to try every number between 2 and the square root of the number being tested?

We only really need to divide by the prime numbers but it's time-consuming to find them. We can reduce the number of divisions by just trying 2 and then all the odd numbers.

The next stage is to write a detailed algorithm – this is a step-by-step description of how to solve the problem.

## The Algorithm

Input number

IsPrime  $\leftarrow$  true

**If** number divisible by 2  
**then** IsPrime  $\leftarrow$  false

**else**

divisor  $\leftarrow$  3

**While** IsPrime=false and divisor $\leq$ SquareRoot(Number)

**If** number divisible by divisor

**then** IsPrime  $\leftarrow$  false

**else** divisor  $\leftarrow$  divisor +2

**end while**

**If** IsPrime=true

**then** output 'Prime'

**else** output 'Not prime'

## The Program

Type in the code given on the sheet .

Run the program and find out if the two numbers are prime or not.

## Further Extension Ideas

The program does not work for all numbers.

If you enter 2 or 3 the programs says they are not prime.

Look carefully at the code and see if you can fix this bug.

Hint: the sign `!=` means not equal to.