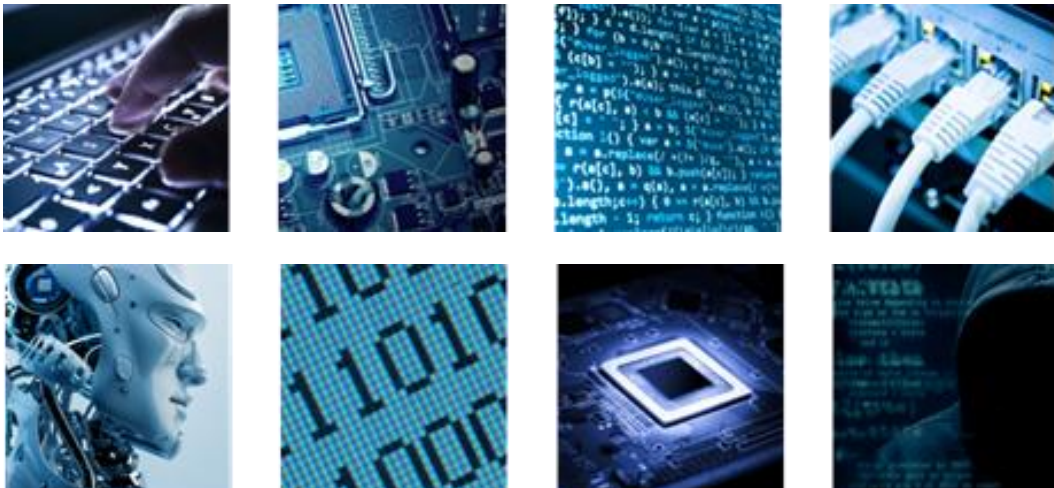


A-Level Computer Science

Preparation Pack Summer 2019



First Name:

Last Name:

Welcome

For many of you choosing the A-Level Computer Science course, this is the critical next step in towards preparing you for your next step. The purpose of the A-Level course is to help you develop a deeper understanding of how computers operate and how information is transferred, processed and stored between computational systems. It also includes the development of programming techniques as well as wider implications of the use of technology in society. We will revisit most of the content of the GCSE course and deepen our understanding of these key skills and of the taught content to help deepen your knowledge of Computer Science in preparation for further education, training or an IT-related career.

Under the reformed A-Level qualifications, students are also expected to have a secure understanding of mathematics, as mathematics is known to form the fundamentals of Computer Science. Without mathematics computers could not function. Even the basics, such as the storage of data, rely on the use of binary numbers. Creating images relies on vectors and writing algorithms involved mathematical functions.

The Non-Exam Assessment (NEA) component of the course provides an exciting opportunity for you to develop your practical programming skills in the context of solving a realistic problem or carrying out an investigation that interests you. This project will require you to work independently on developing a programmed solution over an extended period of time in a language of your choice. For many, the process involved in creating this will mirror the process a real software developer will go through, and furthermore will support you with extending and deepening your understanding of Computer Science.

In preparation for the beginning of the course, you will need a laptop (with internet access) running either Windows or Mac OS. We will be using Office 365 software provided for free to you by Ark Schools, to support your learning both in and outside lessons. It will be at your discretion as to whether you will bring this to lessons (or self-study sessions) for typing up your class notes and directed programming tasks, or whether you will use the limited facilities provided. As your NEA project may require specific software or hardware, you should ensure your laptop is suitable for more than just basic applications. Please speak to me or your tutor for further advice about this.

It is essential that you start the course as you mean to go on – meaning that from the very first lesson, you should establish (or continue to establish) good 'habits' in terms of notetaking, activity completion, presentation, organisation, revision and use feedback to constantly improve. This will allow you to make the transition between Key Stage 4 and 5 study and ultimately will support your ongoing success. Overall, you will be expected to demonstrate a high-level of responsibility and independence, both in your work and in your approach to lessons and the sixth-form experience.

In the remainder of this booklet, a programming task has been set for you to complete in preparation for the beginning of the course. This must be completed to allow your teachers to better understand your programming abilities. If you have any questions about this, please let me know.

Wishing you **success** with the course and in the future!



Mr Amin
Head of Computer Science
Ark John Keats Academy

Programming Project: Brief

Ark Schools have commissioned the development of a new Management Information System (MIS) called Arctic – which stands for Ark Teacher Information Centre.

The purpose of this system is to allow teachers to search through pupil data, so that, for example, registers of tutor and subject groups can be output.



Using Python, create a working prototype that will use pupil data (see Appendix I) stored in a text-file and through a menu system will allow the user to filter the data by name, tutor group or subject.

How does the program work?

There is no need for a login or authentication. When the program is run, it should read each line of the pupil data text-file and store this using a data structure appropriately.

The user runs the program and a menu is displayed with the following options (see *diagram, right*).

```
Arctic - Ark Teacher Information Centre
=====
```

1. Search by name
2. Search by tutor group
3. Search by subject
4. Quit Program

If the user selects **option 1**, then they will be asked to enter the first name **or** the last name of the pupil they wish to find. The program will then search through the data structure to recall the names and tutor group of the pupils. The program will only select pupils whose first or last name has been entered in exactly as stored – therefore queries in a different case or incomplete or inaccurately spelt will not return near matches.

For example, if the user enters the name 'James' the program will return:

```
Search by name
=====
```

```
Search: James
```

```
James CUBERLEY (12SIR)
James MCCREE (12ALT)
```

```
##END OF RESULTS##
```

An error message should be displayed if the name entered cannot be not found. For example, if the user enters in the name 'Jaden' the program will return:

```
Search by name
=====
```

```
Search: Jaden
```

```
## NO RESULTS FOUND ##
```

After the search results are displayed the user should be automatically directed back to the main menu.

If the user selects **option 2**, then they will be asked to enter in the year group code (in the format of a two-digit number followed by a three-letter code, in uppercase). The program will then search through the data structure to recall the names of pupils.

For example, if the user enters the tutor group '12POL' the program will return:

```
Search by tutor group
=====
```

```
Search: 12POL
```

```
Marrick SPINELLI
Tanisha OTTEWELL
Kinnie LEABURN
Vivianne BACON
Samson BUTTS
Jarred SKIRVING
Renate LETHBRIG
Jeanna DOCKRELL
Isaiah KIMMONS
Eve MELONBY
```

```
##END OF RESULTS##
```

An error message should be displayed if the tutor group entered is not found.

If the user selects **option 3**, then they will be asked to enter subject and the option block they are searching for. The program will then search through the data structure to recall the names and tutor group of the pupils.

For example, if the user enters the subject 'ART' and option block '1' the program will return:

```
Search by subject
=====
```

```
Subject: Art
Option Block: 1
```

```
Kinnie LEABURN (12POL)
Feodor GIOCANNONI (12SIR)
Faina WILDBORE (12SIR)
Annelise CARSWELL (12CAP)
Adan BANTHAM (12SIR)
Renate LETHBRIG (12POL)
Carleton TARVER (12CAP)
James MCCREE (12ALT)
Stefano MATFIELD (12SIR)
```

```
##END OF RESULTS##
```

If the user selects **option 4**, then they will be asked to confirm whether they wish to quit the program. If they input 'Y' the program will close, if they enter 'N' or any other possibility the program will return to the main menu.

```
Are you sure you would like to quit? Y/N Y
```

Why are we doing this?

We will use this project as a pre-assessment of your programming and problem solving abilities. This will allow the Computer Science team to target specific areas of weakness.

If you have not taken GCSE Computer Science, we recommend that you read and complete chapters 1-9 of 'Learning to Program in Python' by PM Heathcote (2017) or completing the 'Learn Python 3' course (<https://www.codecademy.com/learn/learn-python-3>).

What should I include in my program?

This program should demonstrate your programming abilities and should also therefore include the appropriate use of:

- Comments
- Variables (and Constants where necessary)
- Indentation
- Reading from a text-file
- Use of data structures
- Selection and Iteration
- Subroutines
- Local and global variables
- Consideration of the end-user experience

How can I extend my project?

You could:

- Use a sorting function to sort the data stored in the data structure
- Modify your subject search to show pupils from all option blocks taking one particular subject
- Use tab spacing to improve the appearance and readability of the information on-screen
- Include an option to search by URN
- Include an option to add a pupil to the text-file.

How should I submit my work?

Your work will need to be handed-in on your first A-Level Computer Science lesson.

You will be expected to provide copy of your python file submitted electronically using OneDrive or emailed to your teacher (details to be provided), and you will need to provide a printed version of your program code. Your printed code must include your name in the header and page numbers in the footer.

If you have not taken GCSE Computer Science, you will need to provide comprehensive evidence of your completion of self-directed study.

Appendix I: Pupil Data

You can download a comma-separated text file containing pupil data from: <http://tiny.cc/kdd25y>

URN	First Name	Last Name	Form	Option 1	Option 2	Option 3
762-69-7639	Aime	Gentzsch	12ALT	ENG LIT	MUSIC	PSYCHOL
359-53-2130	Marrick	Spinelli	12POL	MATHS	COMPSCI	PHYSICS
460-96-3787	Isaac	Keese	12SIR	ENG LIT	DRAMA	SOCIOL
715-07-6062	Tristan	Vecard	12ALT	MATHS	HISTORY	ECONOM
609-84-7112	Julieta	Zieme	12CAP	CHEM	PHYSICS	BIOLOGY
600-77-2786	Tanisha	Ottewell	12POL	ENG LIT	DRAMA	POLITICS
480-98-3891	Merry	Crinkley	12SIR	ENG LIT	GEOGR	HISTORY
841-09-3057	Iggy	Lilywhite	12CAP	MATHS	COMPSCI	ECONOM
162-75-7442	Kinnie	Leaburn	12POL	ART	DRAMA	SOCIOL
323-70-6993	Vivianne	Bacon	12POL	ENG LIT	MUSIC	SOCIOL
519-55-0944	Ursulina	Halleybone	12CAP	CHEM	BIOLOGY	MATHS
732-91-4737	Feodor	Giocannoni	12SIR	ART	ENG LIT	POLITICS
127-37-9818	Faina	Wildbore	12SIR	ART	SOCIOL	POLITICS
696-84-1243	Jaquenette	Allin	12ALT	ENG LIT	DRAMA	PSYCHOL
273-40-7784	James	Cuberley	12SIR	MATHS	COMPSCI	CHEM
536-56-2947	Brendan	Callington	12ALT	CHEM	PHYSICS	MATHS
875-18-4169	Mitchel	Froschauer	12SIR	ENG LIT	MUSIC	POLITICS
303-84-2283	Annelise	Carswell	12CAP	ART	DRAMA	MUSIC
448-69-4794	Samson	Butts	12POL	ENG LIT	POLITICS	PSYCHOL
816-01-4934	Darren	Rushford	12SIR	MATHS	COMPSCI	POLITICS
297-72-0692	Lona	Borrell	12ALT	CHEM	ECONOM	PSYCHOL
460-99-3753	Jarred	Skirving	12POL	ENG LIT	POLITICS	SOCIOL
663-34-4146	Demetrius	Sikora	12CAP	MATHS	COMPSCI	PHYSICS
426-58-7634	Adan	Bantham	12SIR	ART	PSYCHOL	ECONOM
632-21-1825	Harlin	Stanning	12ALT	ENG LIT	HISTORY	MUSIC
406-38-3989	Renate	Lethbrig	12POL	ART	SOCIOL	ECONOM
507-16-6413	Carleton	Tarver	12CAP	ART	GEOGR	HISTORY
136-66-1686	Jeanna	Dockrell	12POL	ENG LIT	GEOGR	POLITICS
333-10-7319	Isaiah	Kimmons	12POL	MATHS	COMPSCI	ECONOM
119-36-2630	James	McCree	12ALT	ART	POLITICS	COMPSCI
818-65-1423	Alane	Castelli	12CAP	ENG LIT	MUSIC	COMPSCI
128-10-0149	Archy	McVrone	12CAP	MATHS	HISTORY	MUSIC
547-01-7789	Garrard	Teresa	12ALT	CHEM	PHYSICS	MATHS
309-93-0750	Benedetta	Form	12SIR	MATHS	MUSIC	CHEM
570-06-8335	Hayward	Maleney	12CAP	ENG LIT	DRAMA	ART
259-67-8474	Nicolas	Edney	12ALT	MATHS	COMPSCI	HISTORY
402-99-5467	Benny	Robinson	12ALT	ENG LIT	HISTORY	MUSIC
421-52-2503	Stefano	Matfield	12SIR	ART	ECONOM	PSYCHOL
867-58-6326	Hatty	Rowdell	12CAP	MATHS	HISTORY	COMPSCI
655-08-9242	Eve	Melonby	12POL	ENG LIT	GEOGR	COMPSCI

Note: A Unique Reference Number (URN) for each pupil but this does not need to be included in your program.