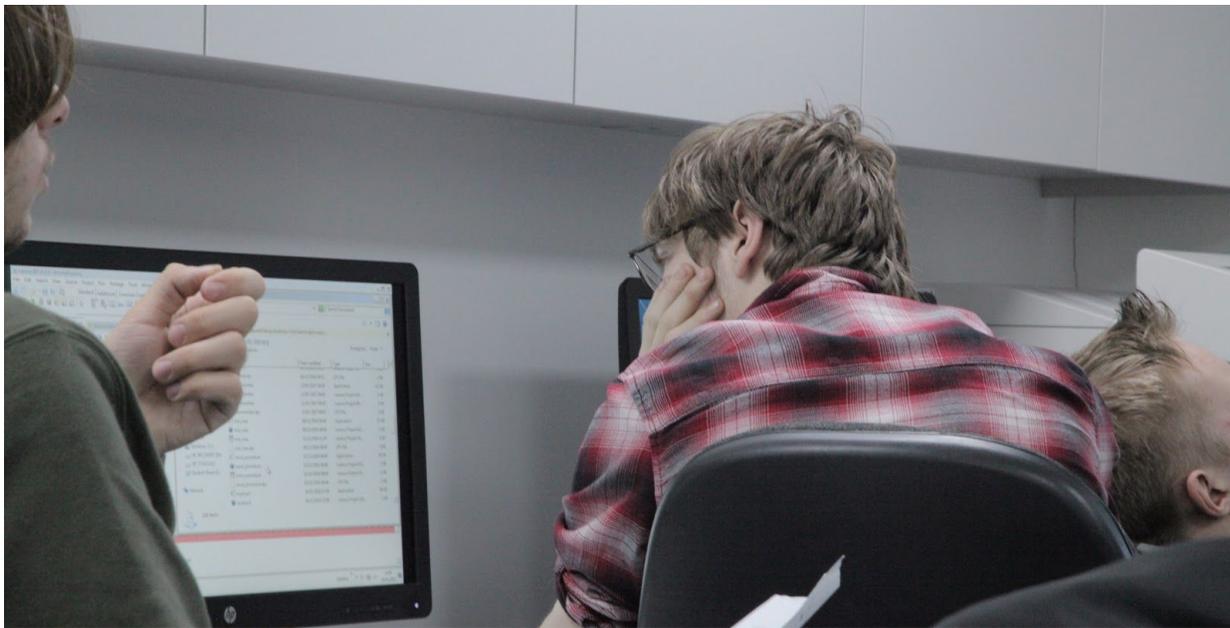




Portland  
Place  
School

# Sixth Form **A Level** **Computer Science** Transition Booklet

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Name:



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## Welcome to Computer Science at Portland Place

This Transition work is designed to help you to bridge the gap between your GCSE studies and AS/A Level.

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### Why do Transition work?

Preparation is crucial for studying A levels. A levels require you to be an independent learner. Although you have fewer subjects, A levels require different study skills and the volume of work is greater due to the increased demand of depth and detail. The exercises in this booklet will ensure that you are ready for the exciting challenges of becoming an A level student in September. It may be necessary to complete some of the tasks on separate sheets of paper. You have the choice of either typing or handwriting your responses. Each subject will be slightly different, but they will all require you to use the skills you will need for A level: independent enquiry; evidence of reading around the subject and enthusiasm and interest.

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### Is Transition work assessed?

Yes. In September, your subject teacher will ask you for your Transition work and it will be assessed. Teachers will be able to diagnose your strengths and weaknesses and begin to support and challenge you in a more targeted way.

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**You must bring all the work with you to your first Year 12  
Computer Science lesson in September.**

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Your A Level Computer Science will cover the following units

## **A-level**

### **Subject content**

- 10 Fundamentals of programming
- 11 Fundamentals of data structures
- 12 Fundamentals of algorithms
- 13 Theory of computation
- 14 Fundamentals of data representation
- 15 Fundamentals of computer systems
- 16 Fundamentals of computer organisation and architecture
- 17 Consequences of uses of computing
- 18 Fundamentals of communication and networking
- 19 Fundamentals of databases
- 20 Big Data
- 21 Fundamentals of functional programming
- 22 Systematic approach to problem solving
- 23 Non-exam assessment - the computing practical project

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## Assessments

### Paper 1

**What's assessed:** this paper tests a student's ability to program, as well as their theoretical knowledge of Computer Science from subject content 10-13 above and the skills required from section 22 above.

#### Assessed

- On-screen exam: 2 hours 30 minutes
- 40% of A-level

#### Questions

Students answer a series of short questions and write/adapt/extend programs in an Electronic Answer Document provided by us.

We will issue Preliminary Material, a Skeleton Program (available in each of the Programming Languages) and, where appropriate, test data, for use in the exam.

### Paper 2

**What's assessed:** this paper tests a student's ability to answer questions from subject content 14-21 above.

#### Assessed

- Written exam: 2 hours 30 minutes
- 40% of A-level

### Non-exam assessment

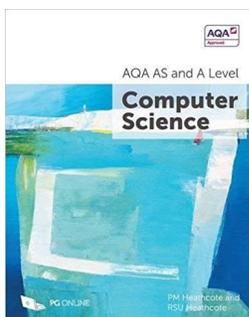
What's assessed: the non-exam assessment assesses student's ability to use the knowledge and skills gained through the course to solve or investigate a practical problem. Students will be expected to follow a systematic approach to problem solving, as shown in section 22 above.

#### Assessed

- 75 marks
- 20% of A-level

## Useful Links and Resources

Among the text books recommended by the Examination Board (AQA) is:



Authors: PM Heathcote and RSU Heathcote

Publisher: PG Online

ISBN-13: [978-1-910523-07-0](https://www.isbn-international.org/product/9781910523070)

Publication date: May 2016

You may wish to purchase this book in advance or else it would be issued to you in September.

Also the following link is helpful for revising of the subject:

[https://en.wikibooks.org/wiki/A-level\\_Computing/AQA](https://en.wikibooks.org/wiki/A-level_Computing/AQA)

Computer Science is full of logical puzzles. To help yourself preparing for the challenges in this subject why don't you try solving the logical puzzles in this link? Don't look at the answers before giving each puzzle a good try:

<http://www.treeknox.com/general/puzzles/logical/index.php>

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Alternatively, you may wish to play some logical puzzles. The funnest way to prepare for a course in computer science is to play logical games and to solve logical puzzles. This site offers a number of good games:

<http://www.mathplayground.com/logicgames.html>

You are also advised to sign up with this popular and prominent site and train your brain with their scientifically tested and proven games programme on a regular basis:

<https://www.lumosity.com/>

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# Year 11 to Year 12 Computer Science/A-Level Transition Unit

## Section: Examination Questions

### Task 1: Research essay

You are required to research and write an essay (of minimum 500 words) **on one of the following topics**. You may use the internet based resources and include pictures or diagrams in your essay but the wording must be yours:

1. Programming Languages: what are the five most popular programming languages? What are their strengths and weaknesses? Compare their application in business and finance industry, gaming technologies and science and engineering.
2. Gaming technologies: review the history and evolution of gaming technologies from the console to the cloud. Compare the languages and technologies (e.g. A.I.) that may be used in the games and comment on the pros and cons of each technology using examples.
3. Artificial Intelligence and Robotics: review the history of robotics and their evolution. Discuss the role and impact of A.I. and robotics in workplace and employment. Comment on advantages and disadvantage of robotics to humans. How do you see the future of A.I. in the light of Stephen Hawking's recent observation: "A.I could end mankind."

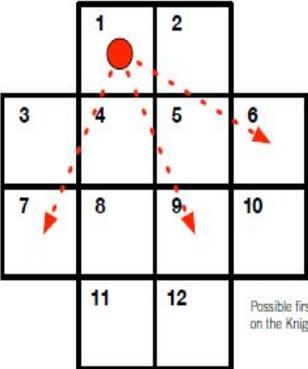
Task 2 : solving a famous puzzle.

Read about the puzzle in the image below. Solve it!

## ***The Knight's Tour puzzle***

In the Knight's Tour puzzle, a single chess knight is able to move on a small, cross-shaped board. A knight can move two spaces in one direction and then move one square at right angles, or vice versa as shown. It jumps to the new square without visiting any in between, and must always land on a square on the board.

You must find a sequence of moves that starts from square 1, visits every square exactly once by making a knight's moves, and finishes where it started.



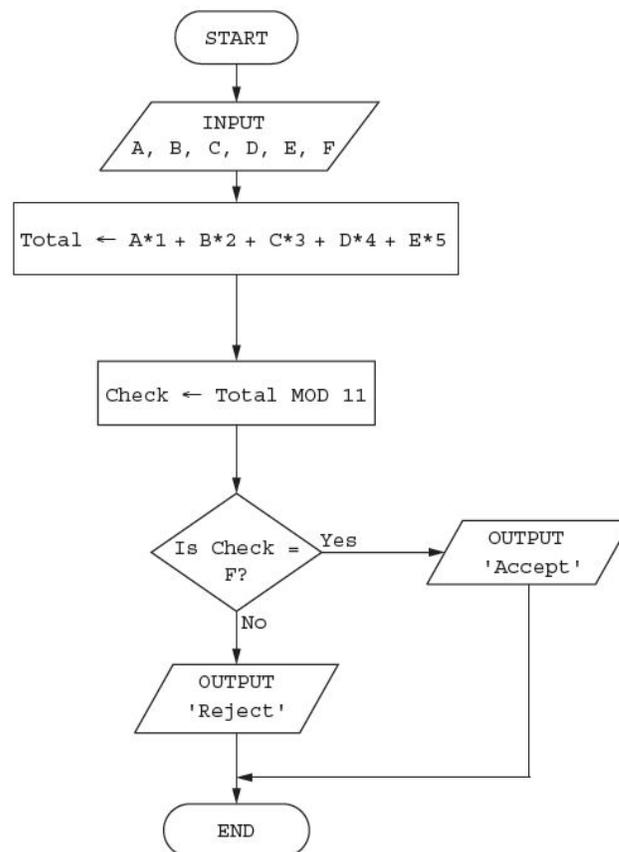
Possible first moves on the Knight's Tour

4 [www.cs4fn.org](http://www.cs4fn.org)

## Task 3 - Exam style question

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- 3 (a) The flowchart below inputs six single digit numbers. The predefined function MOD gives the value of the remainder, for example,  $Y \leftarrow 10 \text{ MOD } 3$  gives the value  $Y = 1$



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Complete a trace table for each of the two sets of input data.

Set 1 5, 2, 4, 3, 1, 5

Set 2 3, 2, 1, 0, 7, 3

Trace table set 1 5, 2, 4, 3, 1, 5

A	B	C	D	E	F	Total	Check	Output

Trace table set 2 3, 2, 1, 0, 7, 3

A	B	C	D	E	F	Total	Check	Output

[4]

(b) State the purpose of the flowchart in part (a).

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 ..... [1]

(c) Identify a problem with this flowchart and explain how to correct it.

Problem .....

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Solution .....

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..... [3]