Sir John Cass & Red Coat
Sir John Cass's Foundation & Red Coat Sixth Form
www.sjcr6thform.net

Step Up to A Level Computer Science

at Sir John Cass & Red Coat

Pack 2

**For Year 11 pupils considering A Level Computer Science*

Transition Activities: Preparing for A –Level Computer Science

Using resources such as the teach ICT website (login given below), you should work through each of the activities to help develop your knowledge and skill in preparation for this subject.

Recommended Resource:

https://www.teach-ict.com/ (Username: e10rh Password: computer2)

https://www.codecademy.com (Learn to code in Python)

Transition Activity 4

Networks

1. Explain the similarities and differences between
    a. A LAN and a WAN
    b. Client-server and peer-to-peer networks

2. Explain the difference between the Internet and the World Wide Web

3. Describe the factors that affect network performance, and explain how network performance can be improved

4. Draw three different network topologies
    a. Label all the components required to create each network
    b. Explain the purpose of each component in the network, including
        i. Wireless Access Points
        ii. Routers
        iii. Switches
        iv. Network Interface Cards
        v. Transmission media, such as Ethernet Cables

5. Create an interactive presentation or resource, such as a website, that explains how your computer connects to a webpage, such as www.bbc.co.uk Include the following:

a. DNS
b. Hosting
c. TCP/IP, including the concept of layers
d. HTTP/HTTPS
e. Packet switching

6. There have been many recent high-profile cyber-attacks across the world, including the attack on the NHS in May 2017. Some commentators have said that "we now rely too much on technology". Write an essay explaining how far you agree with this statement and including descriptions of threats to IT systems and ways to reduce vulnerabilities.

Transition Activity 5

Systems Software & Ethical, Legal, Cultural and Environmental Concerns

1. Create a presentation comparing Windows, Linux, iOS, Android (which is based on Linux) and Unix. Discuss the features of each operating system, comparing the benefits and limitations of each. Note that you can try a basic Unix interface here: http://www.masswerk.at/jsuix/

2. Find a recent news story on one of the following topics:

- A legal issue in computing, such as a breach of the Data Protection Act
- An ethical issue in computing, such as the development of AI
- An environmental issue in computing, such as the disposal of waste equipment
- A technical development in computer science, such as the Internet of Things

Summarise the story, explaining any technical content for a student in year 10. Explain how the story affects you as a student of computer science.

Transition Activity 6

Computational Logic and Calculations

1. Complete the truth tables for the following expressions a. A AND (B OR C)

A	B	C	B OR C	A AND (B OR C)
0	0			
0	0			
0	1			
0	1			
1	0			
1	0			
1	1			
1	1			

b. (NOT A) OR (NOT B)

i. What single logic gate produces the same result as this expression?

A	B			

c. Draw a circuit to represent each expression

2. Calculate each of the following, showing any appropriate working you need

a. 13 MOD 2
b. 16 MOD 6
c. 15 MOD 3
d. 7 MOD 8
e. 13 DIV 2
f. 16 DIV 6
g. 15 DIV 3
h. 7 DIV 8
i. 2^0
j. 2^7
k. 2^8
l. 2^10

3. Covert the following into the units given

a. 4 bytes = bits
b. 1 TB = bytes
c. 80 kB = GB
d. 40 MB = nibbles

4. Complete the table, converting between binary, hexadecimal and denary as required

Binary	Hex	Denary
0010 1010		
	0B	
		255
0110 0111		
	F5	
		48
	CD	

5. Complete the following calculations
   a. 0110 0011 + 0011 0001
   b. 1010 0110 + 1100 1111
   c. 0110 0011 << 2 (bit shift left two places)

6. Check if these are valid ASCII characters. If they are, give their character equivalent. Note that the first bit is a check digit using even
   a. 1110 0010
   b. 1100 0111
   c. 0011 0110
   d. 1100 1010