

This document is to serve as a guide to completing the “Cambridge AICE Computer Science” 2022 Summer Assignment. We will be learning the “AS” level of this course # 9618.

Course Description from Cambridge:

Cambridge International AS & A Level Computer Science encourages learners to meet the needs of higher education courses in computer science as well as twenty-first century digital employers. It encourages learners to think creatively, through applying practical programming solutions, demonstrating that they are effective uses of technology.

Learners develop computational thinking & programming skills to solve computer science problems. Cambridge International AS and A Level Computer Science will help learners develop a range of skills such as thinking creatively, analytically, logically and critically. They will also be able to appreciate the ethical issues that arise with current and emerging computing technologies.

Here is a link to the Cambridge’s website that details the course:

<https://www.cambridgeinternational.org/programmes-and-qualifications/cambridge-international-as-and-a-level-computer-science-9618/>

Copy of the Syllabus - <https://www.cambridgeinternational.org/Images/518133-2021-2023-syllabus-update.pdf>

Summer Assignment:

- 1.) View the first five (5) episodes of the YouTube tutorial listed below:

MrBrownCS – Computer Systems

https://www.youtube.com/watch?v=uMDQiZg8rWE&list=PL04uZ7242_M60Z2F8qV7sld99cuwV_Z3T

- 2.) Complete the attached two worksheets: (use may use the web to research)

Worksheet 1.1: for testing basic understanding

- Select the binary and hexadecimal representations of the denary number 62 from the following options:
 - 11111001
 - 00011111
 - 00111110
 - 1F
 - 3E
 - 3D
- The eight-bit code 10010001 could represent a number of values depending on the coding scheme being used. Select from the following the one value that it could **not** represent.
 - 145
 - 91
 - 17
 - 111

2^7			2^4			2^1	
					4s	2s	
1	0	1	0	0	1	1	0

- The last row in the above table shows a binary code. Fill in the top two rows of the table, assuming that the code represents a binary number.
 - If this binary code represents an unsigned integer, is the denary equivalent an even or an odd number? Explain your reason.
 - If this binary code represents an unsigned integer, give the denary equivalent.
 - If this binary code represents a two's complement representation of a signed integer, does it represent a negative or positive number? Explain your reason.
 - Give the denary equivalent of this two's complement representation.
- If the denary number 373 is to be converted to a binary representation, how many bits will be needed? Explain your reason.
 - A car has an odometer (measuring distance travelled in kilometres) At the start of a journey it shows 99940 and at the end of the journey shows 00230.
 - Use common sense reasoning to find the distance travelled.

- b** Try calculating this by subtracting 99940 from 00230 using a calculator or spreadsheet. What is the problem?
- c** Nine's complement is defined as the number obtained by subtracting each digit from nine. Ten's complement is obtained by adding one to the nine's complement. Show a calculation to get the correct answer by converting the 99940 to its nine's complement then to its ten's complement and then adding this to 00230.
- 6** A bitmap has an image stored that has resolution of 1024×768 and a colour depth of 8. Another file contains a five-minute soundtrack stored using a sampling rate of 100 samples per second and a sampling resolution of 16.
- Which file is the larger one?
- 7** Give **one** example where lossy compression will be useful and one example where lossless compression is essential.

Worksheet 2.1: for testing basic understanding

- 1 a Name the **two** types of cable that use copper to transmit an electrical signal.
 - b Which one of these types of cable is typically bundled?
 - c In the bundled cable, what is done to minimise interference?
 - d In the other type of cable, why is interference less of a problem?

- 2 Sort the different cable types by numbering them 1, 2 and 3.

- In part a, number them in order of increasing bandwidth.
- In part b, number them in order of increasing attenuation at high frequency.

Part a

Coaxial

Fibre optic

Twisted pair

Part b

Coaxial

Fibre optic

Twisted pair

- 3 a Explain **three** factors that need to be considered when using wireless transmission.
 - b For each factor, state which type of radiation it interferes with the most.
- 4 Choose whether each of the following statements about wireless transmission is true or false:
 - A The frequency for these forms of electromagnetic radiation increases from radio wave to microwave to infrared.
 - B Attenuation due to rain is worst for radio waves.
 - C Infrared is the wireless transmission that can best transmit through a wall.
 - D Infrared can be more effectively focussed into a directed beam.
- 5 Choose the correct word or phrase from the list, A–F, to complete the blank spaces in the following two sentences.

- The _____ is provided by _____ satellites where _____ are needed for global coverage. The _____ is supplemented by _____ satellites where _____ are needed for global coverage.

- A ten
- B fifty

- C** medium earth orbit (MEO)
 - D** global positioning system (GPS)
 - E** low earth orbit (LEO)
 - F** cellular phone network
- 6** The CSMA/CD (carrier sense multiple access with collision detection) technology is sometimes used with Ethernet in a LAN.
- a** When is it essential to use the CSMA/CD technology?
 - b** Outline the steps in the procedure when an end-system wishes to send a transmission.
 - c** Does an end-system have to take any action to ensure that a transmission is received using Ethernet?
- 7** Choose whether each of the following statements is true or false:
- a** POTS and PSTN mean the same thing.
 - b** A PSTN might function as an ISP.
 - c** A leased line service is a type of dial-up service provided by a PSTN.
 - d** The Internet is just a very large WAN.
 - e** The web and the Internet mean the same thing.
- 8** Consider the following two dotted decimal representations:
- 192.0.255.15
- 128.235.455.15
- Explain why only one is a possible IP address.
- 9** Consider the following IP addresses:
- 192.38.45.255
- 128.38.45.255
- 64.38.45.255
- Without converting to binary form, state which class each IP address represents.
- 10** Consider the following URL:
- <http://www.mirc.co.uk/help/jarkko2.txt>
- Explain the meaning of each part of this. In particular, identify the domain name and its associated hierarchy.