

Sixth Form Summer Transition Work

Welcome to Arnewood Sixth! You are about to embark on a busy and important two years of sixth form study.

Sixth form life is very different. You are going to feel much more independent, empowered and responsible for your own learning. The expectation is that this journey is down to you. You need to commit and relish in the challenge of sixth form life; ambition, belief and commitment are essential for your success.

Below is a transition activity designed for you to complete over the late spring into summer in preparation for your chosen course. By completing the task, you will be better prepared for the start of your course. Your A level teachers will check the work in September. Your commitment starts now!

Subject	Computer Science – Data Representation & Binary Arithmetic	
Key Question	How are negative and real numbers operations performed in binary?	
Resource List	AQA A level Computer Science Specification Craig & Dave (student website) Craig & Dave (Binary)	https://filestore.aqa.org.uk/resources/computing/specifications/AQA-7516-7517-SP-2015.PDF https://student.craigndave.org/aqa-alevel-videos https://student.craigndave.org/videos/slr11-binary

Your Task	<p>There are 4 parts to your Transition task:</p> <p>Task 1: Access and read the AQA A level specification using the link above.</p> <p>Task 2 (Unsigned Binary Arithmetic): You need to be able to perform binary arithmetic on unsigned binary numbers. Unsigned means that all numbers are positive (no sign).</p> <ul style="list-style-type: none"> - Range of values given a number of bits (minimum, maximum and total combinations) - Binary addition - Binary multiplication - Concept of overflow <p><i>(Use the links above to develop/further your knowledge)</i></p> <p>Complete the questions below to consolidate your knowledge.</p> <p>Task 3 (Signed Binary - Two's complement): You need to be able to understand how negative numbers are represented in binary using Two's complement. Be aware that the range of numbers that can be represented given a number of bits changes versus an unsigned representation. Aspects to take into consideration:</p> <ul style="list-style-type: none"> - Range of values given a number of bits (minimum, maximum and total combinations) - Binary addition (including subtraction) - Concept of overflow (now from both positive / negative sides or the range) <p>Task 4 (Fixed-point representation): You need to be able to understand one of the methods for representing real numbers using binary.</p> <ul style="list-style-type: none"> - Range and precision depending on the placement of the dot “.” - Transformation between denary and fixed-point binary numbers (and viceversa). <p>Complete the questions below to help structure your work.</p>
Additional resources	Please see the attached PDF for you to complete.

A Level Computer Science Summer Transition Work – Additional Resource

Please complete the following questions.

1. Complete the following table indicating the minimum, maximum and number of combinations possible for each of the number of bits given. One of them has been completed for you.

Binary Bits	Minimum	Maximum	Combinations
2 bits			
4 bits	0	15	16
8 bits			
16 bits			
24 bits			

2. Complete the binary addition.

	0	1	1	0	0	0	1	0
+	0	1	1	1	0	1	1	1

3. Complete the binary multiplication:

				0	0	1	0	0	1	1	0
			x	0	0	0	0	0	1	1	1

4. Convert the denary number -55 to Two's complement. Complete the following table with your solution.

5. Convert the following binary number from two's complement into denary:

Your solution _____

1	1	0	0	0	1	0	1
---	---	---	---	---	---	---	---

6. Complete the following table with the corresponding binary value representing the number 12.75 using fixed-point representation



7. Indicate what is the denary value represented by the following fixed-point binary value.

Your solution _____



--	--	--	--	--	--	--	--

8. Explain the difference between range and precision in the context of fixed-point representation (2 marks)

1	0	1	1	1	0	0	0
---	---	---	---	---	---	---	---

--	--	--	--	--	--	--	--

Gore Road, New Milton, Hampshire, BH25 6RS

Telephone: School 01425 625400 **Sixth Form Centre:** 01425 625408

Email: c.salt@arnewood.hants.sch.uk **Website:** www.arnewood.hants.sch.uk/sixth-form

Arnewood Sixth



9. Explain the problem with fixed-point representation when using the numbers 5.1 or 7.2.

Gore Road, New Milton, Hampshire, BH25 6RS

Telephone: School 01425 625400 **Sixth Form Centre:** 01425 625408

Email: c.salt@arnewood.hants.sch.uk **Website:** www.arnewood.hants.sch.uk/sixth-form