



HASTINGS HIGH SCHOOL

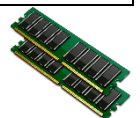
EXAMINATION GUIDE 2017-19

Subject	Computer Science
Course code	Computer Science (9-1) - J276
Website address	https://www.ocr.org.uk/qualifications/gcse/computer-science-j276-from-2016/
Provisional examination dates	<p>Paper 1: J276/01 Computer Systems</p> <p>50%: Monday 13th May 2019</p> <p>Paper 2: J276 / 02 Computational thinking, algorithms and programming</p> <p>50%: Thursday 16th May 2019</p>
GCSE grade type awarded	9-1
NEA Controlled Assessment	20 hour programming project to be completed in class during year 11 – Feeds into Paper 2 questions.
Revision books	<p><i>Pearson Revise OCR GCSE (9-1) Computer Science</i> Revision Guide</p> <p><i>Pearson Revise OCR GCSE (9-1) Computer Science</i> Revision Workbook</p>
Useful websites	<ul style="list-style-type: none">• https://student.craigndave.org/• https://quizlet.com/321187375/j276-computer-science-all-definitions-flash-cards/• https://courses.exa.foundation

1.1 Computer Systems – Computer Architecture



Topic	R	A	G	I know this because / Action
I can explain the purpose of the CPU				
Von Neumann architecture:				
<ul style="list-style-type: none"> I can explain the MAR (Memory Address Register) 				
<ul style="list-style-type: none"> I can explain the purpose and function of the MDR (Memory Data Register) 				
<ul style="list-style-type: none"> I can explain the purpose and function of the Program Counter 				
<ul style="list-style-type: none"> I can explain the purpose and function of the Accumulator 				
common CPU components and their function:				
<ul style="list-style-type: none"> I can explain the purpose and function of the ALU (Arithmetic Logic Unit) 				
<ul style="list-style-type: none"> I can explain the purpose and function of the CU (Control Unit) 				
<ul style="list-style-type: none"> I can explain the purpose and function of the Cache 				
<ul style="list-style-type: none"> I can explain how the CPU fetches and execute instructions stored in memory 				
Performance factors:				
<ul style="list-style-type: none"> I can explain how the clock speed of the CPU affects performance 				
<ul style="list-style-type: none"> I can explain how the cache size of the CPU affects performance 				
<ul style="list-style-type: none"> I can explain how the number of cores on the CPU affects performance 				
<ul style="list-style-type: none"> I can explain the purpose of embedded systems 				
<ul style="list-style-type: none"> I can describe examples of embedded systems 				



1.2 Computer Systems – Memory

Topic	R	A	G	I know this because / Action
I can explain the difference between RAM and ROM				

I can explain the purpose of ROM in a computer system				
I can explain the purpose of RAM in a computer system				
I can explain the need for virtual memory				
Topic	R	A	G	I know this because / Action
I can identify types of flash memory and explain how data is stored				



1.3 Computer Systems – Storage

Topic	R	A	G	I know this because / Action
I can explain the need for secondary storage				
I can calculate data capacity requirements				
I can identify optical storage and explain its advantages and disadvantages				
I can identify magnetic storage and explain its advantages and disadvantages				
I can identify solid state storage and explain its advantages and disadvantages				
I can compare the characteristics of storage media, including the capacity, speed, portability, durability, reliability, and cost.				



1.4 Computer Systems – Wired & Wireless Networks

Topic	R	A	G	I know this because / Action
I can describe the characteristics of a LAN (Local Area Network)				
I can describe the characteristics of a WAN (Wide Area Network)				
I can explain the factors that affect the performance of networks				

I can explain the different roles of computers in a client-server and a peer-to-peer network				
I can identify and explain the hardware needed to connect stand-alone computers in a Local Area Network: <ul style="list-style-type: none"> • wireless access points • routers/switches • NIC (Network Interface Controller/Card) • transmission media 				
I can explain the internet as a worldwide collection of computer networks				
I can explain how the DNS (Domain Name Server) works				
I can explain the purpose of hosting data and content and how this enables the use of the “cloud”				
I can explain the concept of virtual networks				



1.5 Computer Systems – Network Topologies, protocols & layers

Topic	R	A	G	I know this because / Action
I can explain the difference between star and mesh network topologies				
I can explain the impact of Wifi frequency and channels				
I can explain the purpose of WiFi encryption				
I can explain what the Ethernet protocol is and how it is used to connect networks				
I can explain how IP addressing works				
I can explain what a MAC address is				

I can explain the purpose of the TCP/IP (Transmission Control Protocol/Internet Protocol) and how they work				
I can explain the purpose of the HTTP (Hyper Text Transfer Protocol) HTTPS (Hyper Text Transfer Protocol Secure) and how they work				
I can explain the purpose of the FTP (File Transfer Protocol) and how it works				
I can explain the differences between the email protocols: POP (Post Office Protocol), IMAP (Internet Message Access Protocol) and SMTP (Simple Mail Transfer Protocol)				
I can explain the concept of layers				
I can explain how packet switching works				



1.6 Computer Systems – System Security

Topic	R	A	G	I know this because / Action
I can identify the different forms of attack				
I can describe the threat posed by malware on a network				
I can describe the threat posed by phishing on a network				
I can describe the threat posed by people as the 'weak point' in secure systems (social engineering)				

I can describe the threat posed by brute force attacks on a network				
I can describe the threat posed by denial of service (DoS) attacks on a network				
I can describe the threat posed by data interception and theft on networks				
I can describe the threat posed the concept of SQL injection on networks				
I can describe the threat posed by a poor network policy				
Topic	R	A	G	I know this because / Action
identifying and preventing vulnerabilities:				
I can explain why penetration testing is used to identify and prevent vulnerabilities				
I can explain the need for network forensics in order to identify and prevent vulnerabilities				
I can explain the need for network policies to prevent vulnerabilities				
I can explain the need for anti-malware software to prevent vulnerabilities				
I can explain the need for firewalls to prevent vulnerabilities				

I can explain the need for user access levels to prevent vulnerabilities				
I can explain the need for passwords to prevent vulnerabilities				
I can explain the need for encryption to prevent vulnerabilities				



1.7 Computer Systems – Systems Software

Topic	R	A	G	I know this because / Action
I can explain the purpose and functionality of systems software				
operating systems:				
I can explain the purpose and function of the operating systems user interface				
I can explain how the operating system performs memory management				
I can explain how the operating system performs multitasking				
I can explain how the operating system performs peripheral management				
I can explain how the operating system manages software drivers				
I can explain how the operating system performs user management				
I can explain how the operating system performs file management				

I can explain the purpose of utility system software for encryption			
I can explain the purpose of utility system software for defragmentation			
I can explain the different methods of backup (full and incremental)			



1.8 Computer Systems – Ethical, cultural & environmental concerns

Topic	R	A	G	I know this because / Action
I can investigate and discuss Computer Science technologies considering ethical issues				
I can investigate and discuss Computer Science technologies considering privacy issues				
I can explain how key stakeholders are affected by computer science technologies				
I can explain and argue the environmental impact of Computer Science				
I can explain and argue the cultural implications of Computer Science				
I can explain the difference between open source vs proprietary software				
I can explain the legal implications of the The Data Protection Act 1998 and understand how to comply with this law				
I can explain the legal implications of the Computer Misuse Act 1990 and understand how to comply with this law				
Topic	R	A	G	I know this because / Action
I can explain the implications of the legal implications of the Copyright Designs and Patents Act 1988 and understand how to comply with this law				

I can explain the legal implications of Creative Commons Licensing and understand how to comply with this law				
I can explain the implications of the Freedom of Information Act 2000 and understand how to comply with this law				



2.1 Computational Thinking – Algorithms

Topic	R	A	G	I know this because / Action
I can explain the meaning of “ computational thinking ”				
I can explain what abstraction is and give examples				
I can explain what decomposition is and give examples				
I can explain what algorithmic thinking is and give examples				
standard searching algorithms				
I can explain how a binary search works and compare it to other search algorithms				
Topic	R	A	G	I know this because / Action
I can explain how a linear search works and compare it to other search algorithms				
standard sorting algorithms				
I can explain how a bubble sort works and compare it to other sorting algorithms				
I can explain how a merge sort works and compare it to other sorting algorithms				
I can explain how a insertion sort works and compare it to other sorting algorithms				
I can effectively produce algorithms using pseudocode				
Topic	R	A	G	I know this because / Action

I can effectively produce algorithms using flow diagrams				
I can effectively interpret, correct or complete algorithms				



2.2 Computational Thinking – Programming Techniques

Topic	R	A	G	I know this because / Action
I can program making use of variables, constants, operators, inputs, outputs and assignments				
I can explain and use the programming construct sequence and use this to program instructions in a specific order				
I can explain and use the programming construct selection and use this to program IF statements				
I can explain and use the programming construct iteration (count and condition controlled loops) and use this to program WHILE and FOR loops				
I can identify and use of basic string manipulation				
I can identify and use basic file handling operations (open, read, write, close)				
I can identify and use records to store data				
I can identify and use SQL to search for data				
I can identify and use arrays (tuples, lists, dictionaries) when solving problems, including both one and two dimensional arrays				
I can identify and use sub programs (functions and procedures) to produce structured code				
I can identify and use the data types (integer, real, Boolean, character and string, casting)				
I can identify and use the common arithmetic operators (+, -, *, /, DIV, MOD)				
I can identify and use the common Boolean operators (True, False)				



2.3 Computational Thinking – Producing Robust Programs

Topic	R	A	G	I know this because / Action
defensive design considerations				
I can explain what input sanitisation/validation is and why it is used in software programs				
I can explain why it is important to plan for contingencies when developing a software program				
I can explain why it is important to anticipate misuse when developing a software program				
I can explain why it is important to consider authentication when developing a software program				
I can explain how program maintainability can be used by using effective comments in the program code				
I can explain how program maintainability can be used by using indentation in the program code				
I can explain the purpose of testing				
I can explain what iterative testing means and why it is important				
I can explain what final/terminal testing means and why it is important				
I can identify syntax and logic errors in program code				
I can select and using suitable test data (valid, invalid, borderline, extreme)				



2.4 Computational Thinking – Computational Logic

Topic	R	A	G	I know this because / Action
I can explain why data is represented in computer systems in binary form				

I can work out and create simple logic diagrams using the operations AND, OR and NOT				
I can understand and create truth tables to identify all possible outcomes from a logic diagram				
I can create logic diagrams combining Boolean operators using AND, OR and NOT to two levels				
I can apply logical operators in appropriate truth tables to solve problems				
I understand and can use addition (+) in my programs				
I understand and can use subtraction (-) in my programs				
I understand and can use division (/) in my programs				
I understand and can use multiplication (*) in my programs				
I understand and can use exponentiation ^ (**) in my programs				
I understand and can use MOD (%) in my programs				
I understand and can use DIV (//) in my programs				

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ooo
user@user /c
$ _

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2.5 Computational Thinking – Translators & Facilities of Languages

Topic	R	A	G	I know this because / Action
I can identify characteristics and explain the purpose of different levels of programming language, including low level languages				
I can explain the purpose of translators				

I can identify the characteristics of an assembler, a compiler and an interpreter				
common tools and facilities available in an integrated development environment (IDE):				
I can explain the use of the editor in an IDE				
I can explain the use of error diagnostics in an IDE				
I can explain the use of the run-time environment in an IDE				
I can explain the use of the translator in an IDE				

1 0 0 1 1
0 0 1 1 1
1 1 0 1 0

2.6 Computational Thinking – Data Representation

Topic	R	A	G	I know this because / Action
I can identify and explain what the computing units bit, nibble, byte, kilobyte, megabyte, gigabyte, terabyte, petabyte are				
I can explain why data needs to be converted into a binary format to be processed by a computer				
I can convert positive denary whole numbers (0–255) into 8 bit binary numbers and vice versa				

I can add two 8 bit binary integers and explain overflow errors which may occur				
I can perform left and right binary shifts				
I can convert positive denary whole numbers (0–255) into 2 digit hexadecimal numbers and vice versa				
I can explain the purpose of check digits and how they work				
I can explain the use of binary codes to represent characters				
I can explain the term ' character-set '				
I can explain the relationship between the number of bits per character in a character set and the number of characters which can be represented (for example ASCII, extended ASCII and Unicode).				

Topic	R	A	G	I know this because / Action
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Images				
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I can explain how an image is represented as a series of pixels represented in binary				
I can explain the purpose of metadata and the kind of information included in the file				
I can explain the effect of colour depth and resolution on the size of an image file.				

Sound				
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I can explain how sound can be sampled and stored in digital form				
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<p>I can explain how sampling intervals and other factors affect the size of a sound file and the quality of its playback:</p> <ul style="list-style-type: none"> • sample size • bit rate • sampling frequency 				
Compression				
<p>I can explain the need for compression</p>				
<p>I can explain the difference between lossy and lossless compression</p>				