



# Resources to support the National 5 Computing Science course

The following table shows which past examination paper questions would be suitable for the revised National 5 course.

Software design and development		
Course specification		Past Paper Questions
Development methodologies	Describe and implement the phases of an iterative development process: analysis, design, implementation, testing, documentation, and evaluation, within general programming problem-solving.	2018 SP Q2(1)
Analysis	Identify the purpose and functional requirements of a problem that relates to the design and implementation at this level, in terms of: <ul style="list-style-type: none"> <li>◆ inputs</li> <li>◆ processes</li> <li>◆ outputs</li> </ul>	2018 SP Q16(a)(3) All Nat 5 previous courseworks
Design	Identify the data types and structures required for a problem that relates to the implementation at this level, as listed below.	2013 SP Q17(b)(3)
	Describe, identify, and be able to read and understand: <ul style="list-style-type: none"> <li>◆ structure diagrams</li> <li>◆ flowcharts</li> <li>◆ pseudocode</li> </ul>	2018 SP Q19(a)(1) 2018 SP Q19(b)(3) 2018 SP Q21(c)(ii)(2) 2017 Q13(1) 2016 Q21(a)(2) 2014 Q18(d)(1) 2014 Q20(f)(1) 2013 SP Q17(a)(2)

	Exemplify and implement <b>one</b> of the above design techniques to design efficient solutions to a problem.	2018 SP Q16(b)(4) 2016 Q12(2) 2016 Q18(d)(ii)(2) All Nat 5 previous courseworks
	Describe, exemplify, and implement user-interface design, in terms of input and output, using a wireframe.	All Nat 5 previous courseworks
Implementation (data types and structures)	Describe, exemplify, and implement appropriately the following data types and structures: <ul style="list-style-type: none"> <li>◆ character</li> <li>◆ string</li> <li>◆ numeric (integer and real)</li> <li>◆ Boolean</li> <li>◆ 1D arrays</li> </ul>	2018 SP Q14(b)(1) 2018 SP Q21(a)(2) 2017 Q3(1) 2017 Q15(a)(1) 2016 Q16(b)(1) 2016 Q19(a)(2) 2015 Q2(1) 2015 Q10(1) 2015 Q19(a)(3) 2015 Q19(c)(i)(2) 2013 SP Q7(2)
Implementation (computational constructs)	Describe, exemplify, and implement the appropriate constructs in a high-level (textual) language: <ul style="list-style-type: none"> <li>◆ expressions to assign values</li> <li>◆ expressions to return values using arithmetic operations (addition, subtraction, multiplication, division, and exponentiation)</li> <li>◆ expressions to concatenate strings</li> <li>◆ selection constructs using simple conditional statements with &lt;, &gt;, ≤, ≥, =, ≠ operators</li> <li>◆ selection constructs using complex conditional statements</li> <li>◆ logical operators (AND, OR, NOT)</li> <li>◆ iteration and repetition using fixed and conditional loops</li> <li>◆ predefined functions (with parameters): <ul style="list-style-type: none"> <li>— random</li> <li>— round</li> <li>— length</li> </ul> </li> </ul> <p>Read and explain code that makes use of the above constructs.</p>	2018 SP Q4(3) 2018 SP Q14(a)(3) 2018 SP Q14(c)(5) 2018 SP Q19(c)(2) 2017 Q7(2) 2017 Q15(c)(i)(1) 2017 Q19(b)(5) 2016 Q9(2) 2016 Q12(2) 2016 Q16(d)(2) 2016 Q16(e)(2) 2016 Q18(d)(ii)(2) 2016 Q19(b)(i)(3) 2016 Q19(b)(iii)(2) 2016 Q19(c)(1) 2016 Q20(b)(3) 2015 Q3(2) 2015 Q7(2) 2015 Q19(b)(i)(2) 2015 Q19(c)(ii)(2) 2015 Q21(b)(4) 2015 Q21(c)(2) 2015 Q21(d)(1) 2014 Q12(2) 2014 Q16(b)(5) 2014 Q18(a)(3) 2014 Q18(c)(2) 2014 Q19(b)(i)(2) 2014 Q20(a)(3) 2014 Q20(c)(1) 2013 SP Q17(d)(3) 2013 SP Q19(b)(2) 2013 SP Q21(a)(3) 2013 SP Q21(b)(2) 2013 SP Q22(a)(6) 2013 SP Q23(a)(3) 2013 SP Q23(b)(3)

		All Nat 5 previous courseworks
Implementation (algorithm specification)	Describe, exemplify, and implement standard algorithms: <ul style="list-style-type: none"> <li>◆ input validation</li> <li>◆ running total within loop</li> <li>◆ traversing a 1D array</li> </ul>	2018 SP Q19(e)(4) 2017 Q17(a)(4) 2017 Q19(a)(3) 2016 Q16(a)(4) 2015 Q21(a)(3) 2014 Q16(c)(i)(1)
Testing	Describe, identify, exemplify, and implement normal, extreme, and exceptional test data for a specific problem, using a test table.	2018 SP Q21(b)(2) 2017 Q12(2) 2017 Q17(b)(2) 2016 Q16(c)(1) 2016 Q21(c)(i)(3) 2015 Q5(2) 2014 Q13(1) 2014 Q16(c)(ii)(3) 2013 SP Q17(c)(2) 2013 SP Q19(c)(4) All Nat 5 previous courseworks
	Describe and identify syntax, execution, and logic errors.	2018 SP Q21(c)(i)(1) 2017 Q17(c)(2) 2017 Q17(d)(i)(2) 2016 Q21(c)(ii)(1) 2014 Q14(2) 2014 Q18(b)(1) 2014 Q19(a)(iii)(1)
Evaluation	Describe, identify, and exemplify the evaluation of a solution in terms of: <ul style="list-style-type: none"> <li>◆ fitness for purpose</li> <li>◆ efficient use of coding constructs</li> <li>◆ robustness</li> <li>◆ readability: <ul style="list-style-type: none"> <li>— internal commentary</li> <li>— meaningful identifiers</li> <li>— indentation</li> <li>— white space</li> </ul> </li> </ul>	2017 Q19(c)(2) 2016 Q2(1) 2016 Q21(d)(1) 2015 Q9(2) 2014 Q20(b)(1) 2013 SP Q14(2)

Computer systems		
Course specification		Past Paper Questions
Data representation	Describe and exemplify the use of binary to represent positive integers.	
	Describe floating point representation of positive real numbers using the terms mantissa and exponent.	2018 SP Q12(2) 2017 Q2(2) 2015 Q17(a)(2) 2013 SP Q16(c)(2)
	Convert from binary to denary and vice-versa.	2018 SP Q1(1) 2017 Q15(d)(1) 2016 Q1(1) 2015 Q1(1) 2014 Q5(1) 2013 SP Q1(1)
	Describe extended ASCII code (8-bit) used to represent characters.	2018 SP Q6(2) 2017 Q15(c)(ii)(1)
	Describe the vector graphics method of graphic representation for common objects:  <ul style="list-style-type: none"> <li>◆ rectangle</li> <li>◆ ellipse</li> <li>◆ line</li> <li>◆ polygon</li> </ul> with attributes:  <ul style="list-style-type: none"> <li>◆ co-ordinates</li> <li>◆ fill colour</li> <li>◆ line colour</li> </ul>	2018 SP Q8(3) 2017 Q4(2) 2014 Q20(d)(2)
	Describe the bit-mapped method of graphics representation.	2018 SP Q18(e)(i)(2)
Computer structure	Describe the purpose of the basic computer architecture components and how they are linked together:  <ul style="list-style-type: none"> <li>◆ processor (registers, ALU, control unit)</li> <li>◆ memory locations with unique addresses</li> </ul>	2018 SP Q21(d)(2) 2017 Q15(b)(3) 2016 Q5(1) 2016 Q19(b)(ii)(2) 2015 Q17(d)(3) 2014 Q4(1) 2013 SP Q3(1)

	<ul style="list-style-type: none"> <li>◆ buses (data and address)</li> </ul>	
	<p>Explain the need for interpreters and compilers to translate high-level program code to binary (machine code instructions).</p>	<p>2018 SP Q19(d)(2)  2017 Q15(e)(3)  2016 Q11(2)  2015 Q17(b)(2)  2015 Q17(c)(1)  2015 Q17(a)(2)  2014 Q18(e)(2)  2013 SP Q23(c)(ii)(2)</p>
Environmental impact	<p>Describe the energy use of computer systems, the implications on the environment and how these could be reduced through:</p> <ul style="list-style-type: none"> <li>◆ settings on monitors</li> <li>◆ power-down settings</li> <li>◆ leaving computers on stand-by</li> </ul>	<p>2018 SP Q11(2)</p>
Security precautions	<p>Describe the role of firewalls.</p>	<p>2018 SP Q5(a)(1)  2016 Q20(a)(1)</p>
	<p>Describe the use made of encryption in electronic communications.</p>	<p>2018 SP Q5(b)(1)  2016 Q20(b)(2)</p>

Database design and development		
Course specification		Past Paper Questions
Analysis	Identify the end user and functional requirements of a database problem that relates to the implementation at this level.	All Nat 5 previous courseworks
Design	Describe and identify the implications for individuals and businesses of the General Data Protection Regulation (GDPR) — Regulation (EU) 2016/679 that data must be: <ul style="list-style-type: none"> <li>◆ processed lawfully, fairly and in transparent manner in relation to individuals</li> <li>◆ used for declared purpose only</li> <li>◆ limited to data need for the declared purpose</li> <li>◆ accurate</li> <li>◆ not kept for longer than necessary held securely</li> </ul>	2018 SP Q3(2) 2017 Q14(b)(2) 2016 Q18(e)(2)
	Describe and exemplify entity-relationship diagrams with two entities indicating: <ul style="list-style-type: none"> <li>◆ entity name</li> <li>◆ attributes</li> <li>◆ relationship (one to many)</li> </ul>	2018 SP Q17(a)(4) 2018 SP Q20(a)(iii)(1)
	Describe and exemplify a data dictionary: <ul style="list-style-type: none"> <li>◆ entity name</li> <li>◆ attribute name</li> <li>◆ primary and foreign key</li> <li>◆ attribute type: <ul style="list-style-type: none"> <li>— text</li> <li>— number</li> <li>— date</li> <li>— time</li> </ul> </li> </ul>	2018 SP Q9(2) 2018 SP Q20(a)(i)(ii)(4) 2017 Q8(1) 2017 Q14(a)(1) 2017 Q14(d)(3) 2016 Q4(1) 2016 Q15(a)(1) 2016 Q15(d)(1) 2016 Q15(e)(i)(1) 2015 Q20(a)(2) 2015 Q20(c)(3) 2015 Q20(d)(2) 2014 Q21(a)(3) 2014 Q21(c)(1) 2013 SP Q2(1) 2013 SP Q20(b)(3) 2013 SP Q20(c)(2) 2013 SP Q20(d)(2)

	<ul style="list-style-type: none"> <li>— Boolean</li> <li>◆ attribute size</li> <li>◆ validation: <ul style="list-style-type: none"> <li>— presence check</li> <li>— restricted choice</li> <li>— field length</li> <li>— range</li> </ul> </li> </ul>	All Nat 5 previous courseworks, except Games Review
	<p>Exemplify a design of a solution to the query:</p> <ul style="list-style-type: none"> <li>◆ multiple tables</li> <li>◆ fields</li> <li>◆ search criteria</li> <li>◆ sort order</li> </ul>	2018 SP Q20(c)(4) All Nat 5 previous courseworks, except Games Review
Implementation	Implement relational databases with two linked tables, to match the design with referential integrity.	All Nat 5 previous courseworks, except Games Review
	Describe, exemplify and implement SQL operations for pre-populated relational databases, with a maximum of two linked tables: <ul style="list-style-type: none"> <li>◆ select: <ul style="list-style-type: none"> <li>— from</li> <li>— where: <ul style="list-style-type: none"> <li>○ AND, OR, &lt;, &gt;, =</li> <li>○ order by with a maximum of two fields</li> </ul> </li> </ul> </li> <li>◆ insert</li> <li>◆ update</li> <li>◆ delete</li> <li>◆ equi-join between tables</li> </ul> <p>Read and explain code that makes use of the above SQL.</p>	2018 SP Q17(b)(2) 2018 SP Q17(c)(ii)(1) 2018 SP Q20(b)(3)
Testing	Describe and exemplify testing: <ul style="list-style-type: none"> <li>◆ SQL operations work correctly at this level</li> </ul>	2018 SP Q17(c)(i)(2)

Evaluation	Evaluate solution in terms of: <ul style="list-style-type: none"> <li>◆ fitness for purpose</li> <li>◆ accuracy of output</li> </ul>	All Nat 5 previous courseworks, except Games Review
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Web design and development		
Course specification		Past Paper Questions
Analysis	Identify the end user and functional requirements of a website problem that relates to the design and implementation at this level.	Games Review coursework
Design	Describe and exemplify the website structure with a home page, a maximum of four linked multimedia pages, and any necessary external links.	2018 SP Q15(a)(3) 2017 Q20(d)(2) 2014 Q19(a)(i)(2) 2013 SP Q18(c)(2) Games Review coursework
	Describe, exemplify and implement, taking into account end-user requirements, effective user-interface design (visual layout and readability) using wire-framing: <ul style="list-style-type: none"> <li>◆ navigational links</li> <li>◆ consistency across multiple pages</li> <li>◆ relative vertical positioning of the media displayed</li> <li>◆ file formats of the media (text, graphics, video, and audio)</li> </ul>	2016 Q17(d)(i)(1) 2014 Q15(c)(2) Games Review coursework
	Describe and identify the implications for individuals and businesses of the Copyright, Designs and Patents Act 1988 relating to: <ul style="list-style-type: none"> <li>◆ web content (text, graphics, video, and audio)</li> </ul>	2018 SP Q18(g)(1) 2017 Q18(b)(1) 2016 Q18(d)(i)(1) 2014 Q19(b)(iii)(1)
	Compare a range of standard file formats:	2018 SP Q10(2) 2018 SP Q18(e)(ii)(2) 2017 Q5(1)



	<ul style="list-style-type: none"> <li>◆ audio standard file formats WAV and MP3 in terms of compression, quality, and file size</li> <li>◆ bit-mapped graphic standard file formats JPEG, GIF, and PNG in terms of compression, animation, transparency, and colour depth</li> </ul>	
	Describe the factors affecting file size and quality, relating to resolution, colour depth, and sampling rate.	2013 SP Q16(d)(ii)(1)
	Describe the need for compression.	2017 Q16(d)(iii)(1) 2015 Q8(1)
	Describe, exemplify and implement prototyping (low-fidelity) from wireframe design at this level.	2018 SP Q7(1)
Implementation (CSS)	<p>Describe, exemplify and implement internal and external Cascading Style Sheets (CSS):</p> <ul style="list-style-type: none"> <li>◆ selectors, classes and IDs</li> <li>◆ properties <ul style="list-style-type: none"> <li>— text: <ul style="list-style-type: none"> <li>○ font (family, size)</li> <li>○ color</li> <li>○ alignment</li> </ul> </li> <li>— background colour</li> </ul> </li> </ul> <p>Read and explain code that makes use of the above CSS.</p>	2018 SP Q15(b)(4) 2018 SP Q18(d)(i)(1) 2018 SP Q18(f)(2)

<p>Implementation (HTML)</p>	<p>Describe, exemplify and implement HTML code:</p> <ul style="list-style-type: none"> <li>◆ HTML</li> <li>◆ head</li> <li>◆ title</li> <li>◆ body</li> <li>◆ heading</li> <li>◆ paragraph</li> <li>◆ DIV</li> <li>◆ link</li> <li>◆ anchor</li> <li>◆ IMG</li> <li>◆ audio</li> <li>◆ video</li> <li>◆ lists — ol, ul and li</li> </ul> <p>Read and explain code that makes use of the above HTML.</p>	<p>2018 SP Q18(b)(3) 2017 Q16(c)(1) Games Review coursework</p>
	<p>Describe and implement hyperlinks (internal and external), relative and absolute addressing.</p>	<p>2018 SP Q13(2) 2017 Q1(2) 2017 Q16(d)(i)(1) 2016 Q17(c)(1) 2016 Q17(e)(1) 2014 Q1(1) 2014 Q15(b)(ii)(1) 2013 SP Q18(b)(2) Games Review coursework</p>
<p>Implementation (Javascript)</p>	<p>Describe and identify Javascript coding related to mouse events:</p> <ul style="list-style-type: none"> <li>◆ Onmouseover</li> <li>◆ Onmouseout</li> </ul>	<p>2018 SP Q18(c)(i)(1) 2018 SP Q17(c)(ii)(1) 2017 Q16(b)(1) 2015 Q18(f)(1) 2014 Q15(b)(iii)(1) 2013 SP Q5(2)</p>
<p>Testing</p>	<p>Describe and exemplify testing:</p> <ul style="list-style-type: none"> <li>◆ matches user-interface design</li> <li>◆ links and navigation work correctly</li> <li>◆ media (such as text, graphics, and video) display correctly</li> <li>◆ consistency</li> </ul>	<p>2018 SP Q15(c)(2) 2018 SP Q18(a)(2) 2018 SP Q18(d)(ii)(3) 2017 Q16(e)(1) 2017 Q20(a)(2) 2015 Q6(1) 2015 Q15(1) 2014 Q9(1) 2013 SP Q18(a)(1) Games Review coursework</p>

Evaluation	Evaluate solution in terms of:  ◆ fitness for purpose	Games Review coursework
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