Essential
SQA Exam Practice

HIGHER COMPUTING SCIENCE

Practice Questions & Exam Papers

QUESTIONS & PAPERS

- Practise **25+ multi-part questions** covering every topic

- Complete **2 practice papers** that mirror the real SQA exams

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Key area	Practice Questions		Paper 1		Paper 2	
	Section 1	Section 2	Section 1	Section 2	Section 1	Section 2
Software design and development						
Development methodologies	2	1b, 2a	11	18a	2	
Analysis		1a, 1b, 3a, 3b	5			
Design		1c, 3c	21d			13e
Implementation (data types and structures)		1c, 1f	14a	15c, 15d	7	
Implementation (computational constructs)	1	1c, 1d, 1e, 1g, 2e	4, 13	14b, 15a, 15b, 21a, 21b	8	11e, 13a, 13d, 13f, 15a
Implementation (algorithm specification)	3	1f		18c, 19a, 21d		11a, 11d
Testing		2c, 3d, 3e		15e, 18b		11b, 11c, 13b, 13c, 15b
Evaluation		2b, 2d, 2f				
Computer systems						
Data representation	1		1, 2, 3	20d, 21c	1, 3	14b, 14c
Computer structure	2	1b, 1c, 1d	9		4	16b
Environmental impact	3	1a		17d		
Security risks and precautions	4, 5, 6	1e, 1f	10	19b, 19c		
Database design and development						
Analysis	4	1a				
Design	1, 3	1b, 1c, 2a, 2b, 2e	6, 7	16a, 16b, 22a		12a, 12b, 16a
Implementation	2	1d, 2b, 2c, 2f, 2g		16c, 22b, 22c, 22d		16c, 16d
Testing				16d	5	
Evaluation		2d			5	
Web design and development						
Analysis						17a
Design	3	1a	12a	17c, 20a		17b
Implementation (CSS)	5	1b, 1c, 1d, 1e, 1f, 1g, 2a, 2c		20b, 20c	6	17c
Implementation (HTML)	1	1b, 1g	12b	17a, 17b	9	17d
Implementation (JavaScript)	2	2b, 2d			10	12c
Testing	4	2e	8	15f		14a
Evaluation		1h				17e
Total Marks	/34	/110	/25	/85	/25	/85

Section 1 questions

Section 1 in the question paper will consist of several short problem-solving questions worth 1–4 marks. They may be split into two or three parts. Each question will relate to one of the four areas of study, i.e. Software design and development, Computer systems, Database design and development or Web design and development. Often there is information given in the question about a scenario or situation. You should refer to that situation in your answer.

Questions are likely to be of 'C' or 'B' level of difficulty. Be sure to use the computing terminology that you learned in your Higher course in your answers.

Top Tip!

Look for the command words: if a question says 'explain' or 'describe' then you must be sure to include technical detail justifying your answer. If a question says 'state', a shorter answer is often sufficient, but there is no harm in including extra detail if you know it.

| | MARKS | STUDENT MARGIN |

Software design and development

Questions set within a scenario, assessing content from the Software design and development area of study. Each worth between 1 and 4 marks.

1 Joyce's program has an integer variable called `result` that holds the number of seconds she took to finish a triathlon. She knows there are 60 seconds in a minute. She would like two variables, one holding the number of minutes and the other the remaining number of seconds to be used to output data. For example, if the result was 607 the output of her program would read 'You took 10 minutes 7 seconds'.

Implementation (computational constructs)

Program code:

```
DECLARE result, s, m AS INTEGER
INITIALLY 0
RECEIVE result FROM KEYBOARD
m=INT(result/60)
s=_____
SEND "You took " & m & " minutes "
& s & "seconds" TO DISPLAY
```

Top Tip!

There are four types of pre-defined functions that you need to be able to code:

- substring
- conversion between a character and its ASCII value
- changing a real number to an integer
- modulus.

a) Using a programming language of your choice to implement modulus, complete the missing line above to calculate the contents of the variables.

1

b) Explain why the pre-defined function INT() has been used in the above code.

1

2 Explain why it is less likely that, after the initial release of a program, a new feature will be added via an update if a program has been developed using an agile methodology rather than an iterative one.

2 *Development methodologies*

Hint!

When comparing two methodologies, be sure to mention both in your answer.

Section 2 questions

>> HOW TO ANSWER

Section 2 in the question paper will consist of several longer problem-solving questions split into many parts. Each question will relate to one of three of the areas of study, i.e. Software design and development, Database design and development or Web design and development. There may be parts of a question that relate to the Computer systems area of study, but not usually a whole question. The scenario or situation given at the beginning of the question continues to apply for all parts of that question. Each part may add new information to build on that given previously. You should refer to the situation in your answer.

Top Tip!

As for Section 1 questions, look for the command words: if a question says 'explain' or 'describe' then you must be sure to include technical detail justifying your answer. If a question says 'state' a shorter answer is often enough, but again there is no harm in including extra detail if you know it.

30% of the questions in a paper will be of 'A' level of difficulty and these are likely to be in this section. Be sure to use the computing terminology that you learned in your Higher course in your answers.

	MARKS	STUDENT MARGIN

Software design and development

Longer questions with many parts, each part of a question is set within the same scenario. These assess content from the Software design and development area of study.

1   Simeon is following an iterative development process in creating a program to analyse levels of carbon dioxide in the Earth's atmosphere. The unit of measurement for this is called ppm (parts per million). It will process the measurements for the past 40 years, one measurement per year.

   a)   Identify the boundaries of this proposed software. — **2** — Analysis

   ### Hint!
   Include any boundaries that you can see in the situation given, to be sure of gaining all available marks.

   b)   Explain why an accurate statement of the purpose, scope, boundaries and functional requirements is vital at the analysis stage of an iterative development process. — **2** — Analysis

   ### Hint!
   The iterative development process has six stages. The key here is to think about how the results of the analysis stage are used at each of the following stages.

   c)   The 40 years and the measurements are stored in a CSV file. Part of the file looks like this:
   … 1996,362.58,1997,363.48,1998, 366.27 …
   Show using a structure diagram how this data could be read from the file into two parallel one-dimensional arrays. — **5** — Design Implementation (data types and structures) / Implementation (computational constructs)

   ### Top Tip!
   You will often see problem-solving questions that combine different concepts from within the area of study. Here you are being assessed on structure diagrams, data flow, file handling and parallel one-dimensional arrays.

MARKS

1 Two's complement can be used to represent both positive and negative numbers. State the highest positive number and the lowest negative number that can be represented using 12-bit two's complement representation.

2

_____

_____

2 Gerry is following an iterative design methodology. Gerry's program has just reached the testing stage of the software development process. Explain why the term 'iterative' is used to describe this kind of design methodology.

2

_____

_____

3 Convert 110.00011 to floating point representation. There are 16 bits for the mantissa and 8 bits for the exponent.

3

sign	mantissa	exponent

4 One method for improving system performance is the use of cache memory. Explain how the use of cache would speed up the execution of the following code which calculates the volume of a room:

2

```
SET roof_height TO peak_height – wall_height
SET lower_volume TO wall_height * length * width
SET upper_volume TO (roof_height * length * width) / 3
SET room_volume TO lower_volume + upper_volume
```

_____

_____

_____

_____

5 Gina runs a database for a charity, and wishes to use a SQL statement to delete an entire table called 'Volunteer' from her database as it is no longer needed. Graham suggests the following statement:

3

```
DELETE * FROM Volunteer;
```

Evaluate the fitness for purpose of the above SQL statement. Justify your answer.

_____

_____

_____

_____

MARKS

Section 2

Total Marks: 85

Attempt **ALL** questions.

11 Fleur is a company that makes and sells packs of tea bags of various flavours of tea. They have a desktop application that allows them to keep track of their sales.

For each type of tea, the number of packs sold that week is stored in an array called `sold[]`, and the name of the type of tea is stored in an array called `name[]`:

name	jasmine	cinnamon	camomile	dusk	pink	autumn	green	detox
sold	18	16	15	16	65	65	30	3

a) The sales statistics feature allows the user to enter a type of tea, and displays a message, e.g.

```
The number of sales of dusk was 16
```

Write, using pseudocode or a language with which you are familiar, an algorithm that can:

- find the number of sales for the type of tea entered by the user
- display a similar message to that shown above, or an error message if that type is not in the list.

The type of tea entered by the user will be held in a variable called `target_name`.

6

Question			Answer	Marks available	Commentary, hints and tips
	d)	(i)	Count occurrences	1	
| | | (ii) | ```
SET total TO 0
FOR index FROM 0 TO 6 DO
   IF sold(index)>= 30 THEN
      SET total TO total + 1
   END IF
END FOR
SEND total & " types sold 30 or
more"  TO DISPLAY
``` 1 mark for initialising total to zero and adding one to the total within the IF. 1 mark for correct FOR and NEXT. 1 mark for correct IF and END IF. 1 mark for showing result on screen. | 4 | This algorithm will use a fixed loop to traverse the array and keep a running total of entries that meet the condition. |
	e)		Any two of: ▶ name of function ▶ name of argument(s) ▶ data type of argument(s) ▶ return data type.	2	An argument is a piece of data passed into a function that is required for the code within the function to perform the task it was designed to perform. A function always returns one value to the calling program/ subprogram.
12	a)		Category to Product is one-to-many. Manufacturer to Product is one-to-many. Exporter to Manufacturer is one-to-many. (1 mark each)	3	For two tables to have a relationship, one of the tables must contain a field which is a foreign key; that is the primary key from the other table. Whichever table contains the foreign key is on the 'many' side of a relationship with the table for which that field is the primary key.
	b)		2 marks for five correct fields or 1 mark for four correct fields. 1 mark for three correct tables. 1 mark for correct search criteria.	4	Take care to use the field names as given in the description of the database, not those that appear on the screenshot of the web page, as those labels are often different. For the search criteria, `Product.ProductID` is the only entry shown on the query result that is guaranteed to be unique – the shop may sell 'soor plooms' from a number of different manufacturers, so the product name is not an appropriate answer here.

Field(s) and calculation(s)	Product.Name Product.Product ID Product.Description Manufacturer.Name Category.Current Discount
Table(s) and query	Product, Manufacturer, Category
Search criteria	`Product.Product ID=0042`
Grouping	
Sort order	