

CARIBBEAN EXAMINATIONS COUNCIL

**REPORT ON CANDIDATES'S WORK IN THE
CARIBBEAN SECONDARY EDUCATION CERTIFICATE® EXAMINATION**

MAY/JUNE 2012

**INFORMATION TECHNOLOGY
GENERAL PROFICIENCY EXAMINATION**

GENERAL COMMENTS

Three papers were written in this year's examination. Paper 01, Multiple Choice; Paper 02, Structured Questions and Paper 032, the Alternative to School Based Assessment for private candidates.

DETAILED COMMENTS

Paper 01 – Multiple Choice

This paper consisted of 60 multiple-choice questions testing all areas of the syllabus. Some candidates encountered difficulty in the following areas:

- Role of a systems programmer
- Verification and validation checks
- Cable/wired and wireless data transmission media
- Spreadsheet: Use of pre-defined functions
- Spreadsheet: Type of data that can be entered in a cell
- Database: Linking tables
- Database: Use of primary key, secondary key, composite key, foreign key, candidate key and alternate key
- PowerPoint: animation effects to slides
- Web page design: Use of hyperlinks
- Problem solving and Program design:
 - Use of trace tables to determine the output of program segment
 - Tasks performed in each step in problem solving
 - Use of logical operators in truth table
- Program Implementation:
 - Valid data types in Pascal
 - Identifying error types in a program segment
 - Indicating the functions of a compiler
 - Declaring arrays in Pascal
 - Classifying program languages into computer generations

Paper 02 – Structured Questions

This paper consisted of three sections with a total of 12 compulsory structured questions. Section I consisted of six short-answer questions worth 60 marks and tested the Theory profile. Section II consisted of two structured questions worth 15 marks and tested the Productivity Tools profile. Section III consisted of four structured questions worth 45 marks and tested the Problem solving and Programming profile.

Section I – Theory

Question 1

Part (a) required candidates to arrange given units of storage in order of capacity from smallest to largest. This part of the question was well done by the majority of candidates. Some candidates provided the reverse order of largest to smallest while some candidates used the first character of the unit of storage rather than the whole name. For example, some candidates used G instead of Gigabyte. Candidates are advised to write out the names in full.

In Part (b), candidates were required to state the meaning of the term *bit* and to indicate how it was derived. This part of the question posed difficulty for the majority of candidates. While some candidates were able to state the meaning of the term *bit* they were unable to explain how the term was derived.

Part (c) tested candidates' ability to show a difference between a *word* and a *byte*. This part of the question was well done by the majority of candidates who provided answers such as *a byte is made up of 8 bits while a word is one or more bytes*.

For Part (d), candidates' ability to explain the term *bi-stable device* was tested. This part of the question was satisfactorily done by the majority of candidates. Some candidates provided examples of a bi-stable device such as a switch being *on* or *off*. An example of a correct response is: A bi-stable device is one that can exist in either *one of two* states.

Question 2

Part (a) tested candidates' ability to match output devices with their most appropriate tasks. This part of the question was well done by the majority of candidates. In some cases, candidates made up their own tasks rather than use the given tasks. Candidates are advised to stick to the tasks as set out on the question paper.

Part (b) tested candidates' ability to identify situations where one type of printer would be more suitable than another and to state reasons for their choice. This part of the question proved to be a challenge to the majority of candidates who were unable to identify the situations and to provide the appropriate reasons.

Question 3

Part (a) tested candidates' knowledge of the functions of an operating system. This part of the question was satisfactorily done by the majority of candidates. Some candidates confused the features of an operating system with the functions of an operating system.

Part (b) tested candidates' ability to classify three given software into four categories of software. This part of the question was well done by the majority of candidates. Some candidates confused general purpose software with integrated software. In addition, some candidates could not recognize that Pascal compiler and Windows XP are examples of systems software.

In Part (c), candidates were required to explain why it is necessary to customize certain types of software and to provide one example of a type of customized software. This part of the question was well done by the majority of candidates. However, many candidates were unable to provide one example of customized software such as an accounting software package.

Question 4

Part (a) tested candidates' ability to identify cable/wired media from given drawings. This part of the question was satisfactorily done by the majority of candidates. Candidates knew the names of the cable/wired media but some were unable to associate them with the correct cabling drawing. Drawing C (fibre-optic cable) was not recognized by many candidates.

Part (b) required candidates to identify two types of wireless media (for example, satellite, microwave, infra-red). Most candidates provided examples of devices that use media such as cellular phone, notebook computer, rather than the types of wireless media.

Part (c) tested candidates' knowledge of the use of the various types of networks. Most candidates were familiar with the application of LAN and WAN but not MAN.

Part (d) tested candidates' knowledge of the meaning of the term *modem* and asked them to indicate how the term was derived. This part of the question was poorly done by the majority of candidates. Many candidates provided the functions of the modem but were unable to explain how the term modem was derived. An example of a correct response is as follows:

Modem is an acronym for modulator-demodulator.

Modem is formulated by taking the first two letters from the word 'modulator' and the first three letters from the word 'demodulator'.

Question 5

Part (a) tested candidates' ability to match professional computer job titles with the most appropriate task performed by each professional. This part of the question was poorly done by the majority of candidates. Candidates were not familiar with the tasks performed by the network administrator, systems programmer and database administrator. In many establishments, the computer technician performs the roles of some of the given computer professionals. This may have confused the candidates.

Part (b) tested candidates' ability to associate professions with related technologies. This part of the question was poorly done as the majority of candidates could not correctly associate the given professions with the given technologies. An example of a correct response is as follows:

PROFESSION	TECHNOLOGY
Music	MIDI
Law enforcement	Biometrics
Engineering	Sensors
Training	Multimedia

Question 6

This question tested candidates' knowledge of methods of verification and validation of data.

Part (a) required candidates to identify one error that can occur in the data collection phase. This part was poorly done; most candidates seemed unfamiliar with the activities in the data collection phase.

In Part (b), candidates were required to identify one error that can occur in the data capture phase. This part was poorly done; most candidates seemed unfamiliar with the activities in the data capture phase.

Part (c) tested candidates' knowledge of the concept of data validation. This part was poorly done. Part (d) tested candidates' knowledge of data validation checks. This part was satisfactorily done by the majority of candidates. Some candidates provided the names of the validation checks but did not describe what the checks do.

Section II – Productivity Tools

Evidence from the marking exercise indicated that many candidates need more hands-on training in the use of spreadsheet and database management software.

Question 7

This question tested candidates' knowledge of basic features of a spreadsheet program. It was satisfactorily done by the majority of candidates.

In Part (a), some candidates provided the names of all the candidates in the correct sort order rather than indicating 'Persaud' as the name of the candidate who will be at the top of the sorted list as required.

For Part (b), the majority of candidates provided the SUM function correctly. Some candidates provided the arithmetic formula (+B4+C4+D4) instead of the sum function.

In Part (c), many candidates indicated the IF function but were unable to indicate the correct test condition and results. The correct response was: =IF(F6>=0.6, "Eligible", "Not Eligible")

For Part (d), the majority of candidates provided the correct ranges. In some cases however, candidates provided the range A1..F6 rather than the separate ranges for the 'Name' column (A1..A6) and the '% of Total IA' column (F1..F6).

Question 8

This question tested candidates' knowledge of basic features of a database management program. It was satisfactorily done by the majority of candidates.

In Part (a), the majority of candidates provided the correct data type used in the SKILL table, numeric data type for the UNCERTIFIED field and alphanumeric (text) for the SKILL and AREA_ID fields.

For Part (b), the majority of candidates did not write the correct query. An example of a correct response is: **SKILL = "Mason" AND UNCERTIFIED > 50**

In Part (c), the majority of candidates were able to join the two tables and indicate 25 as the number of uncertified persons in New Amsterdam.

For Part (d), many candidates correctly identified the UNCERTIFIED field as the field on which the SKILL table was sorted.

Many candidates were unable to identify the SKILL field or the AREA_ID field as the fields that can be used to group the records in the report in Part (e).

Section III – Problem Solving and Programming

Question 9

This question tested candidates' ability to classify given pseudocode statements as input, processing or output statements and to complete a given truth table.

Part (a) was well done by the majority of candidates. Some candidates did not recognize that 'S4: Prompt the user' was an output statement.

Part (b) was well answered. Some candidates were not clear on the use of the AND operator. In addition, some candidates used 'Good at' and 'Not good at' in the truth table instead of 1 and 0 respectively.

Question 10

In Part (a), the majority of candidates seemed unfamiliar with the use of the CONST statement to set a fixed value. An example of a correct response is: CONST Tax = 0.10;

Part (b) was well done by the majority of candidates. Candidates used meaningful variable names such as cost and price.

Part (c) was poorly done by the majority of candidates; they could not provide a correct arithmetic statement to calculate the final price. Many candidates used the '=' sign instead of the assignment ':=' symbol and also the multiplication sign (x) instead of the * symbol.

Question 11

This question tested candidates' ability to use control structures, identify errors and concepts associated with programming.

Part (a) was poorly done by the majority of candidates who appeared unfamiliar with the use of loops, in particular, the Repeat..Until loop. Many candidates did not initialize the counter (count := 1) and did not increment the counter (count :=count + 1). An example of a correct response is as follows:

```
(i)      Count := 1;
        WHILE count <= 10 DO
        Begin
            read (mark);
            count := count + 1;
        End;
```

```
(ii)      Count := 1;
          REPEAT
              read (mark);
              count := count + 1;
          UNTIL count = 10;
```

Part (b) was well done by the majority of candidates. Some of them however seemed unfamiliar with run-time errors while some confused syntax with logic errors.

Part (c) was poorly done by the majority of candidates. Most candidates identified one or two statements describing external documentation instead of the three correct statements (D1, D3, D4).

Question 12

This question tested candidates' ability to analyse a set of programs involving arrays.

Part (a) asked candidates to identify the name of the program. The majority of candidates responded correctly. In some cases however, candidates stated the name of the program as 'PROGRAM IRG' instead of 'IRG'.

Part (b) required candidates to identify the name of the array. This part was satisfactorily done by the majority of candidates. In some cases however, candidates gave the whole array statement ALPH: ARRAY[1..3] OF CHAR instead of the name of the array, ALPH.

Part (c) was well done by the majority of candidates. They were able to correctly identify the size of the array. Some candidates however listed the size of the array as 1..3 instead of 3.

Part (d) was poorly done by the majority of candidates, they could not trace through the program and identify the output as follows:

```
G          (line 1)
G          (line 2)
G          (line 3)
```

Paper 03 – School-Based Assessment (SBA)

The SBA consisted of a practical project testing the productivity tools (word processing, spreadsheets and database management), problem solving and programming profiles.

Further Comments

- Generally the presentations of the SBAs have improved.
- In most cases, the description of the project was not submitted.
- Each project component should be strictly separated and labelled.

Sample Uniqueness

In many cases there was a lack of uniqueness among SBAs from the same centre. In fact, evidence showed that in many samples, one student's work was used for the other students' samples, or an outline provided for the students to insert a few changes prior to submission. This practice should be discouraged.

Moderation Sheets

- The samples sent by the school should match that generated by CXC's ORS system.
- Computer-generated printouts must match the marks and students on the moderation sheet and samples submitted.

Spreadsheets

Formula Sheets

Widespread lack of formulae sheets worked to the disadvantage of a number of students, leading to a reduction in marks awarded. Teachers must insist that students print and submit formulae sheets. Formulae sheets must be legible. Students should ensure that formulae sheet printouts are at default font size, or 100% zoom.

Students need to be able to demonstrate the correct use of absolute cell referencing (\$F\$2).

Formatting Features

In the event of an insertion or deletion of records, records should be highlighted for easy identification. A separator or label indicating the 'before or after' insertions or deletions should be included.

Sorting

Sorted records should be clearly identified by highlighting or labelling the sorted range.

Charting Operations

In some instances, graphs were not printed, or for the graphs which were printed, the axes were not labelled and had no titles. Teachers should ensure that axes are labelled and an appropriate title assigned to the chart.

Students should pay closer attention to the colour scheme of charts, which would make charts more legible, especially if printed in black and white.

Two different types of charts should be submitted, for example, a pie chart and a bar chart or a column chart. The pie chart should include an appropriate title, legend and data labels. The bar chart should compare different series of data.

Extracting Data

Many students failed to successfully perform advanced filtering. Students should clearly indicate when a specific task is being executed. For example, if advanced filtering is the task, then a caption should be added to the results to indicate the criteria, if it is not previously indicated. Similarly, if sorting is the task, then a caption (label) indicating the particular field would be useful.

Teachers must ensure that the advanced filter be part of the SBA. In addition, the advanced filter should be used to extract summary data. Evidence of the criteria should be shown as well as the results. The criteria range and the results should appear on the same page.

Length of SBA

In the area of spreadsheet formatting, much improvement is needed in order to limit printouts. Too many unnecessary printouts were submitted. Teachers and students need to concentrate more on the quality of work done, specific to the tasks, rather than copious quantities of unnecessary printouts.

The number of printouts should be limited (at most 15 pages) to avoid unnecessary and repetitive printouts. Documents should be appropriately and intelligently formatted so as to ensure good printouts. Students should make good use of page breaks for column adjustments to ensure that data and charts are not spread across several pages in a way which makes them difficult to understand or interpret.

Presentation

The SBA report is an official document and therefore should be presented in a coherent manner.

Printouts should be properly collated and secured so as to ensure good presentation.

Syllabus Guidelines for Marking SBA

Teachers are strongly urged to strictly adhere to CXC's mark scheme as provided in the syllabus.

The assignment details should also be submitted.

Database Management

Overall the mark schemes were good. The majority of SBA submissions used the schemes from the current CXC syllabus. As a result there was less variation in the moderated marks. Usage of the new syllabus guidelines (effective from 2010) is very important.

- The recommended number of records, as stipulated in the syllabus, should be kept.
- Teachers should ensure that structures (design views of tables and queries) are submitted. Printouts of original tables, queries and report results are to be submitted. Screen shots should be used to supply supplementary evidence (primary key, criteria, calculated fields and sorting). Duplications of printouts should be avoided, however, evidence of modifications (sorting, additions and deletions of records) should be provided in 'before' and 'after' printouts.
- Tables/queries should fit on one page.
- Students should ensure that formatting is done properly in Spreadsheet if data is to be exported to Database.

- There was an improvement in the presentation of samples. However, one neatly bound sample per student should be submitted with clearly defined sections (tables, queries, report) and graded individual mark schemes should always accompany each sample submitted.

Tables

Most samples showed evidence of two or more database tables. Although some primary key evidence was seen, there is a need for screen shots of table structures (design views) to provide clear evidence of the existence of primary keys and modification of field sizes. In some cases the database documenter was used. However, when used the documenter should only present relevant data, that is, field names, field type, primary keys, field sizes, and relationships should be displayed. There is no need to show field properties.

Though some samples included evidence of joined table by hard copy proof of relationship diagrams, there is still much room for improvement.

Modifying Database Tables/Files

Most samples provided no evidence of additions/deletions/modifications of fields or records. Evidence of these tasks being done can be provided by 'before' and 'after' hard copies of tables/records/fields. The structure that initiated the modification can also be done and clearly stated.

Queries

Generally, simple queries were well done. However, evidence (design views via screen shots or SQL statements) should be provided to show how queries were done. More emphasis needs to be placed on performing complex queries and calculated fields.

Sorting

Although this activity was performed well by many students, more emphasis should be placed on sorting tables. Students need to provide clearly labelled 'before and after' copies of the table(s) which have been sorted (indicating the type of sort and which field or fields have been sorted).

Reports

Some samples did not show reports. Also some reports were only provided in the word processing section. More emphasis should be placed on grouping in reports showing more than one record per group. Summary/statistical features should be included. Evidence of sorting must be shown in reports. Reports should show appropriate titles.

Programming

Generally, the quality of work produced in this section has improved. However, the significant degree to which templates were used or duplicates submitted remains a source of great concern.

Teachers are reminded that while sufficient guidance should be provided to allow students to complete the project (as specified in the syllabus), students should be encouraged to demonstrate their learning and creativity in deriving a solution to the problem specified. That is, teachers should resist giving students the solution. To this end, the project specified should be of a sufficiently substantive nature to allow for a variety of solution-focused approaches.

In a number of cases, students' responses showed an extremely high degree of similarity. Emphasis should be placed on making students aware of the difference between an algorithm/pseudocode and a source code. Further, teachers need to ensure that students understand the nature of a *problem statement*. It should not simply be the restatement of the project description. Note also that program solutions should be confined to the program language specified in the syllabus — Pascal.

A substantive project should incorporate the following:

- A minimum of three variable types
- At least one array data structure
- A minimum of two selection structures

Problem Statement

Most students did not write a problem statement. In cases where the problem statement was submitted, it was taken directly from the SBA assignment. That is, students have been rewriting the programming question as a problem statement. Teachers must encourage students to write their problem statement by determining that the problem is from the assignment; they should not copy the SBA assignment. Note that problem statements should be well defined and precede the algorithm.

Algorithm

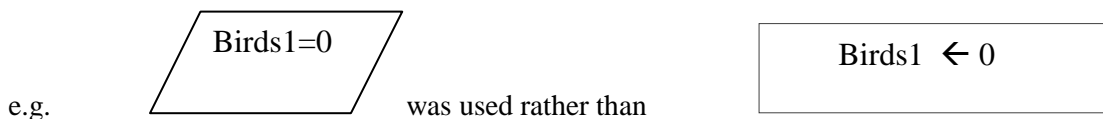
This area showed improvement in comparison to previous years. While flow charts and pseudocode were submitted by students to describe algorithms, the use of pseudocode seems to be the more preferred method. Flow charts and pseudocode are used as tools to describe algorithms. Hence, students should not submit both. Only *one* is required.

Flow Chart

In creating the flow chart, students must use the correct symbols, especially input/output and processing. The directional lines should clearly indicate the flow of data (direction) and should not intersect. If the flow chart extends beyond one page, then the use of connectors is advised. In a number of cases where flow charts were used, looping and selection structures were blurred.

Students should note the following advice regarding flow charts:

- Show direction of flow lines
- Make use of correct symbols
- A decision symbol should indicate whether it represents a loop or conditional statement
- Decision symbols need to be labelled so as to indicate the next step
- Input/output symbols should be indicated clearly whether data is being accepted or displayed
- Initialize variables when doing flow chart
- Correct symbol and syntax should be used for initializing



Pseudocode

There were too many instances where students removed the semicolons from the source code and called it pseudocode. Teachers must encourage students to write the pseudocode before the source code, using standard approaches. Some students did not put *start* at the beginning of the pseudocode; variable initialization was not always evident at the beginning of the program, but in some cases appeared within loops. Some students did not prompt the user for inputs. A significant number of students did not use any arrays or loops, but the overall quality and responses was an improvement over 2011. The majority of the students showed high proficiency in recognizing the need for and use of a selection construct (in most cases, the IF construct).

Teachers should encourage students to design and describe the algorithm before writing the source code, thereby ensuring that they have a workable solution that is *not* a duplication of the source code.

The following are the key concerns regarding pseudocode:

- The use of complete Pascal code for the whole algorithm is not advisable.
- Pascal code and the pseudocode describing the algorithm should be distinct, that is, students should avoid submitting the Pascal program code as their algorithm. Algorithms should be done before the Pascal program and should serve as the basis for the development of the actual program code.
- Variable names should be a continuous string; not separated with a space, for example, the instruction ***Read First Name*** should be ***Read FirstName***.
- Incorrect representation of control structures, for example:
 - IF without END IF,
 - FOR without END FOR
 - WHILE without END WHILE.
- Failure to initialize variables and arrays within the pseudocode.
- Inconsistent variable names as it relates to their use in trace tables.

Trace Table

This section was poorly done by the majority of students. In some instances, teachers requested that students write a separate algorithm for the trace table.

Specific areas of concern are as follows:

- Variables incorrectly represented in trace tables: trace tables should show the exact variables from the algorithm or flow chart to execute the dry run.
- Changes in values should be correctly and adequately demonstrated after the use of test data.
- It is not necessary to include formulae sheet from Excel in trace tables.

The following is a typical example of what was presented as a trace table:

Step	Write	Read	Calculate
Step 1	Start		
Step 2	Name		
Step 3		Gender	
Step 4		Parent name	
Step 5		Telephone number	
Step 6	Term1, term 2, term 3		
Step 7	Exam 1, exam 2, exam3		
Step 8	Total (term 1 + term 2 + term 3)		
Step 9	Average (total)/ 6		
Step 10			Studentaverage is > = 90% set Grade = A ⁺ Average = 80 – 94% then Grade = A Average =60 – 79% then Grade = B Average = 50 – 59% then Grade = C Average = 40 – 49% then Grade = D Average = < 40 % then Grade = F

It is to be noted that this bears no semblance to the program under consideration. Variable names could not be mapped to segments of the code or a logical sequence to the changes determined.

Programming

Compilation

Students should be encouraged to print screen shots of the working program. The screen shots must match the programming code.

Variables

Students demonstrated good use of different data types in declaring variables. Some students initialized their variables very well. However, a significant number of them did not use the array data structure. Some used the record data structure effectively, but this is outside the scope of the syllabus. Teachers need to encourage students to use arrays rather than records. The main data types used were string, real, integer, char or Boolean.

Selection

All students used selection constructs (IF and/or CASE). However, students need to be able to adequately show their ability to use the variations, for example, IF ... THEN, and IF ... THEN ... ELSE. Consider the following code segment:

```
Start
.
.
  Display "Please enter your gender"
  Get (gender)
  While gender <> 'nil' do
    Begin
      If gender = 'M' then
        male <- male + 1
      else
        female <- female + 1
      endif
      if age >= 18 then
        adults <= adults + 1
      endif
    endwhile
  .
  .
  STOP
```

This segment uses two IF statements, one with IF... THEN... ELSE... ENDIF and the other IF...THEN...ENDIF.

Looping

Most students used one looping structure, or one type of looping structure. Students must be encouraged to use more than one type of looping structure, and use it accurately. At least one of the looping structures *must* be used to manipulate the array.

Documentation

Most students did not present proper program documentation. They did not include their name (author), the date created or problem statement. The documentation must not be part of the program, but it should be a comment at the top of the source code. Many students inserted comments throughout the program indicating what was occurring at each stage.

Indentation of the source code was poorly done. Students in most cases did not indent at all or indented by space or sections.

Most students designed their source code ensuring that it was user-friendly by having appropriate prompts and comments; in some cases colour was used in their outputs.

The following is a list of concerns associated with the program implementation section:

- Failure to present printout of compiled program and printout of program outputs

- Failure to use more than one type of looping structure, for example, FOR LOOP and a WHILE LOOP or FOR LOOP and REPEAT LOOP
- Failure to use more than one type of selection statement, for example, IF...THEN and IF...THEN...ELSE
- Failure to initialize variables
- Failure to use loop to manipulate an array
- Failure to indent program code to enhance readability
- Inadequate program documentation — documentation should include the author, date created and a description of the program as well as significant segments of the program
- Failure to include appropriate prompts

Note that candidates must use PASCAL language code for the program.