CHIEF MARKER'S REPORT

SUBJECT:	INFORMATION TECHNOLOGY P2

1. ANALYSIS OF QUESTION BY QUESTION PERFORMANCE

SECTION A:

QUESTION 1

In general the multiple choice questions were fairly straight forward and hence well answered as a whole. The specific wording of question 1.10 (*A technique used by intruders to make their network or Internet transmission appear legitimate to a victim*) seemed to have confused a number of learners who immediately related this to phishing instead of spoofing.

QUESTION 2

2.1.1 Most learners got this question (involving an external hard drive that used to work on an older operating system) correct but did not specifically focus on the term 'drivers' and used vaguer descriptions such as 'incompatible'.

2.1.2 This question involving what it meant to partition a hard drive, and what the advantages thereof are, was very well answered.

2.1.3 This question and the following one involving the difference between Plug and Play and Hot swappable were also well answered.

2.1.5 The components that needed to be upgraded to increase performance were predictably well-answered.

2.1.6 Most candidates provided an adequate explanation of a heat sink and a fan. Candidates, however, should note that in general a 2-mark question is not going to be fully answered by one word such as 'cooling'.

2.1.7 This question involving the benefits of flat-screen monitors over LCD monitors was well answered.

2.2.1 Some candidates answered question (b) simply from the perspective of a network as opposed to a client-server network.

2.2.2 The question on the star topology was well-answered but a quite a few candidates did not seem to be aware of the cost overhead in terms of using fiber optic cable in a topology that required a lot of cabling.

In addition most candidates could give a function of a switch as a device that connects several devices in a network. Switches, however, also perform critical functions such as detecting and isolating errors and sending data to the required destination on the network.

The questions relating to WiFi were very well answered. It appears that candidates are far more familiar with these concepts as these technologies become more prevalent.

2.3.1   This question relating to DRAM (which as to be refreshed regularly) and DDR2 – RAM which allows data to be transferred twice as fast in a clock cycle was well answered.

2.3.2   Some of the concepts in this question were not well-answered or understood. Pipelining occurs when the CPU is able to read and execute new instructions from memory before the instruction that is busy being processed is completed.

Hyperthreading differs from multithreading (where a program is split into independent threads). Hyperthreading – allows the operating system to view a single processors having two processors i.e. the CPU can mimic the power of two processors.

Clock multiplication allows the CPU to run at a faster speed than the supporting motherboard i.e. for every tick of the system clock, the CPU's own clock ticks at least 10 times.

2.3.3   This question referred to an open-source multitasking operating system used in smart phones. This therefore excluded any proprietary operating systems such as Widows Mobile.

2.3.4   This question involving compression and file conversion utility functions was very well answered.

2.3.5   There appeared to be some confusion in terms of how a 32-bit operating system differs from a 64-bit operating system. The operating system itself does not have registers or buses – it is software that makes use of 32- or 64 bit architecture.

2.4   This question relating to video conferencing and Skype was well answered. Once again one suspects that this might be as a result of the technology becoming more pervasive.

SECTION C: APPLICATIONS AND IMPLICATIONS

QUESTION 3: e-COMMUNICATION

This question relating to podcasting, IM, e-mail and the 'mobi' domain was well answered as a whole. Note that podcasting is a method of distributing recorded audio in a format (usually an MP3 file). Sites in the 'mobi' domain have been specially designed for viewing on mobile devices such as cellphones.

QUESTION 4: SOCIAL AND ETHICAL ISSUES

This question was also well answered and was obviously well covered by the educators and learners.

SECTION D: PROGRAMMING AND SOFTWARE DEVELOPMENT

QUESTION 5: ALGORITHMS AND PLANNING

5.1   This question relating to primary keys, foreign keys and data types of fields in a database table was very well answered.

5.2.1   Quite a few candidates gave vague answers for the advantages of normalising tables. In addition, many also gave 'text book' answers which they may or may not have understood. The aims in this specific case are less duplication of data (e.g. repeating technician details), avoiding anomalies (e.g. if a technician's details are changing the change only happens in one place) and being easier to query the database.

5.2.2   Most candidates achieved full marks for this question as would have been expected.

5.2.3   Most candidates achieved full marks for this question as would have been expected.

5.3.1   The trace table was fairly easy compared to similar questions from previous years and many of candidates scored close to full marks.

5.3.2   The fact that many candidates answered question 5.3.1 correctly meant that that could quite easily 'predict' the logical error and rewrite the necessary code.

5.4   This question, involving the debugging of an algorithm which contained a logical error was also answered fairly well. It was, however, apparent that learners were not always clear on the difference between a logical error (which gives incorrect output) and a run-time error which interrupts the executing of a program.

5.5   This question produced a mixed bag of results which was surprising in that it can be reasonably expected that the candidates should have through their programming course, been exposed to a variety of input control and interfaces for the capture of data such as dates.

In addition, it was clear that many learners are not being taught the differences between the different types of test data. This is not only important for the nomenclature aspects, but is also critical to the programming component of the course.

Normal test data is test that conforms in terms of type, format and in the range of values permissible for a particular variable such as a month in a year. *Erroneous* data does not follow the correct format for the data or format of the data. *Extreme* data is data that follows the correct format for data but uses values beyond the expected or possible range – for example entering 13 for the month or -10 for an age.

Invalid data means the data is not in a required range – this can usually be validated using programming code e.g. selecting 30 for the 'days' for the month of February. *Incorrect* data is, by contrast, almost impossible to detect. If for example the date to be entered is 30 March but the user enters the date 20 March, the data is 'normal' but incorrect.

The latter half of the question dealing with the general guidelines for compiling good error messages was well-answered.

5.6 This question dealt with OOP and it is clear that there are still many candidates who have little or no idea of how OOP works and what the purpose of OOP is.

This section needs to be understood and cannot be taught in a parrot-like fashion. It is an abstract section of programming but is clear that those centres that have made the effort are reaping the rewards in terms of their learners' understanding of this section of programming.

5.6.1 The relatively simple but crucial concept of the difference between public and private declarations in terms of OOP, was not well understood or explained in general and this type of 'muddled' thinking seemed to characterise the general level of understanding of OOP in some centres.

Public means the entity can be accessed from outside the class it is declared in and private only from within the class.

5.6.2 It is crucial that learners use the correct terminology, not just for the sake of the 'naming' but in order to also foster a better understanding of concepts such as the difference between a default constructor and a parameterised constructor.

5.6.3 Most candidates managed to give an example of an accessor method or a mutator method from the given class diagram.

5.6.4 The answers given for the purpose of a *'toString'* method in a class were often not clear and many candidates only scored one of the two marks on offer. A *'toString'* method in a class is used create a string which formats and displays the values of the object's attributes for display/output purposes.

SECTION E: INTEGRATED SCENARIO

QUESTION 6

6.1 The question on Radio Frequency Identity (RFID) tags was fairly well answered. Note that radio frequency identification is over a relatively short distance. A number of learners used wide area satellite-type applications such as car-trackers' in their answers. Applications of RFID tags include tracking times of runners crossing the finishing line in a marathon, tracking payment as vehicles pass through booths at toll gate systems and adding tags to pet animals to identify them if they get lost (not to 'track' them').

6.2 This question involving wireless connectivity and the selection criteria that could be used for choosing an ISP was well answered.

6.3 The concepts of utility programs and firewalls were not well described by learners. Utility programs are not necessarily part of the operating system.

This is a type of system software that allows a user to perform maintenance-type tasks usually related to managing a computer, its devices or its programs.

A firewall is a system (hardware or software or both) that helps protect your computer by preventing unauthorised to and from it via a network such as the Internet.

6.4 This question involving providing hints to prevent the loss of data as a result of unforeseen circumstances was fairly open-ended and well answered as a result.

6.5 This question was also reasonably well answered but a number of candidates seemed to confuse the general concept of an instruction cycle with that of an instruction set. The instruction set refers to the basic set of instructions that the processor can recognise and execute. In other words a high level instruction in a program is 'broken down' (by the compiler) into a set of simpler instructions which the processor can recognise and execute.

It is apparent also that the concept of defragmentation is not clearly understood with a number of learners still incorrectly stating that it could be used to regain more free disk space. Disk defragmentation describes the process of consolidating fragmented files on a disk.

Fragmentation occurs over time as one saves, changes, or deletes files. As the file and the disk itself become fragmented, the computer slows down as it has to look in many different places to locate and open a file.
Defragmenting rearranges the data on the disk and reorganises the fragmented files.

6.6 This question which involved security issues was generally well answered. Most candidates could provide hints to users about selecting passwords that will not be easy to decipher, but several did not know the specific term biometric devices, even thought they could give examples thereof. Candidates need to note that these devices are for immediate 'recognition' of a user based on a physical characteristic such as a fingerprint, voice print or facial recognition etc. This would exclude DNA testing from a point of view of access systems.

7. ANY ADVICE THAT YOU COULD GIVE TO EDUCATORS TO HELP LEARNERS TO REACH THE EXPECTED LEVELS

This is the third November paper written in the NCS. The content in this paper is partially scenario-based, but the level and depth of content required for this paper has started to crystallise and stabilise in terms of what is required of both learners and educators alike. To this point, it is essential that learners are adequately prepared in terms of the fundamental or core knowledge the course.

This can now be re-enforced by reflecting on the format and content of past papers. There will always be content pitched at a higher-order but this can only be accessed by learners who understand the basic, fundamental content of the course.

It is noted that most educators battle to complete or cover the theory sections of the course adequately due to the high overhead time required to teach the practical component of the course and in order to complete the PAT. It must, however, be born in mind that, just from a marks allocation perspective, the theory paper counts 60% of the final examination mark. It is essential therefore that key concepts be reinforced from day 1.

While the content of this paper is theoretical, it is based on practical problem-solving skills that are either related to the programming content or by technology that seeks to fulfil a particular role or solve a particular problem.

It is therefore important that learners do not see this work not an abstract pile of facts but rather as an inter-connected system of facts and systems. It is clear that those learners who have a good understanding of the concepts outperform those learners who apply rote learning techniques.

Educators are therefore encouraged to try and teach the theory from the perspective of problem-solving. Concepts such as for example pipelining, hyperthreading and superscalar architecture are best explained in the context of finding solutions for more throughput in a processor.

8. ANY OTHER COMMENTS

It is again apparent that candidates from centres that do well in the Practical paper also do well in the Theory Paper (Paper 2). Information Technology teachers do face challenges in terms of their heavy marking loads and the fact that are usually one-person departments within their schools. Other challenges include a lack of support structures in terms of the fact that the number of learners taking the subjects is very small compared to most subjects.

Educators are encouraged to form alliances and partnerships with other schools offering Information Technology as a subject (not only in the same province). This can only usually best be done via the Internet. There are a number of forums and loads of good support material available. It does take time to customise their material to suit one own needs but it is in reality the best way in terms of developing good quality resources.

Educators should encourage learners to work though past examination papers or question banks as part of the teaching-learning process. They also need to see the memoranda or sample solutions to see how the questions are assessed especially in terms of the depth required for answers.

CHIEF MARKER'S REPORT

SUBJECT:	INFORMATION TECHNOLOGY P1

1. ANALYSIS OF QUESTION BY QUESTION PERFORMANCE

QUESTION 1 (SQL)

1.1 Most learners, as would have been expected, scored close to full marks for this question. Some candidates listed every field instead of using the '*" operator (SELECT *).

1.2 A number of candidates appeared not to have used the DISTINCT clause/operator to remove duplicates from a set of records with duplicates (SELECT Distinct Animal). In addition a number of learners curiously left off the parameter of WHERE Young = true.

1.3 Most learners scored close to full marks but several could not use the YEAR function: (year(Now()) – year (Date Appointed) AS [Total Years].

1.4 This was probably the most disappointing sub-question in terms of the learners' answers. Many learners clearly had not been exposed or know how to use to aggregate functions such as *Sum*, *Min*, *Max* or *Avg* and the fact that a GROUP clause needs to be added.

1.5 Learners should be encouraged not to covert the string input (even if it is a number) as the string input usually just needs to be added (concatenated) with the SQL string. In addition learners can output the SQL string prior to execution to check that strings are all correctly quoted.

1.6 The UPDATE SQL function was generally well answered but a number of learners did not add 'double quotes" e.g. "White Rhino".

1.7 This question was also well answered but a number of learners left off the condition *AND Animal = "Elephant"*. One suspects that this occurs due the length of the string being created. Learners should be encouraged to highlight/tick off each individual part of the question on the question paper itself.

QUESTION 2: OOP

2.1.1 Most learners who attempted this question obtained the full marks for defining the four private fields.

2.1.2 A number of candidates did not seem to understand the difference between a default constructor (simply creating the object) and a parameterised constructor (one that both creates the object and initialises the object's attributes).

2.1.3 The methods to calculate the points and the methods to total the number of animals (2.1.4) and the name (2.15) were predictably well answered.

2.1.4　It was disappointing to see how many learners could not produce concise code to determine the most spotted animal. In general the easiest way to determine the largest of three categories is to use a nested-if statement as demonstrated by the following pseudo-code.

If (A>B) and (A>C) then max = 'A'
Else
If (B>A) and (B>C) then max = 'B'
Else
  max = 'C'

2.2　Most learners (as would be expected) could write the code to test for the existence of the text file and then either exit the procedure or open the text file for processing. It seemed, however, that some learners could not come to grips with working with a single object as opposed to an array of objects which had been asked in previous papers.

The concern with this is that this implies that learners do not really understand how to use an object, as opposed to defining a class. These learners therefore could also often not/did not answer questions 2.2.2 and 2.2.3.

QUESTION 3

3.1　Most learners managed to declare the array and 'uncomment' the assignment statements.

3.2　It appeared that a number of learners were not used to processing numeric data. Many learners could extract the necessary data from the string entries but could not adequately perform the necessary calculations.

3.3　A number of learners scored full marks for this question. It was a question that could have easily been asked in part at grade 10 and 11 levels. Code to produce random numbers in a particular range should be second nature to learners by the time they reach grade 12. This was not always the case.

7.　ANY ADVICE THAT YOU COULD GIVE TO EDUCATORS TO HELP LEARNERS TO REACH THE EXPECTED LEVELS

This is the third November paper written in the NCS. The skills required in this paper have stabilised, especially for question 1 and 2. Is therefore imperative that learners should see the SQL question (question 1) and large parts of question 2 as marks that that should be able to acquire and work through fairly easily and quickly. It was obvious that many more candidates had the chance to complete the paper in that that paper was out of a 'genuine' 120 marks (with no ½ mark allocations as was the case in previous years). The examining panel is to be commended for this move.

By the same token, the shortened format of the paper clearly indicated which centres are adequately preparing their candidates and those who are not. There will be a spread of abilities within any centre but in too many centres it was obvious that learners had not been exposed to or grasped some of the fundamental content for this paper. To this point, it is essential that learners are adequately prepared in terms of the fundamental or core knowledge and skills needed to successfully sit for a practical examination of this nature.

This can now be re-enforced by reflecting on the format and content of past papers. There will always be content pitched at a higher-order but this can only be accessed by learners by understanding the basic, fundamental content of the course.

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Educators should encourage learners to work though past examination papers or question banks as part of the teaching-learning process. They also need to see the memoranda or sample solutions to see how the questions are assessed especially in terms of the depth required for answers.

The standard expected in the practical paper is now well-established. Learners must be exposed to similar types of questions so that are better prepared for this type of examination.