



# basic education

Department:  
Basic Education  
**REPUBLIC OF SOUTH AFRICA**

**NATIONAL  
SENIOR CERTIFICATE**

**GRADE 12**

**INFORMATION TECHNOLOGY P2**

**NOVEMBER 2014**

**MARKS: 150**

**TIME: 3 hours**

**This question paper consists of 16 pages.**

**INSTRUCTIONS AND INFORMATION**

1. This question paper consists of SIX sections:

SECTION A:	Multiple-choice Questions	(10)
SECTION B:	System Technologies	(25)
SECTION C:	Communication and Network Technologies	(25)
SECTION D:	Data and Information Management	(25)
SECTION E:	Solution Development	(25)
SECTION F:	Integrated Scenario	(40)
2. Answer ALL the questions.
3. Read ALL the questions carefully.
4. The mark allocation generally gives an indication of the number of facts required in your answer.
5. Number the answers correctly according to the numbering system used in this question paper.
6. Write neatly and legibly.

**SECTION A: MULTIPLE-CHOICE QUESTIONS****QUESTION 1**

Various options are given as possible answers to the following questions. Choose the answer and write only the letter (A–D) next to the question number (1.1–1.10) in the ANSWER BOOK.

- 1.1 Which ONE of the following is NOT an example of an operating system?
- A Microsoft Windows 8
  - B Microsoft Office
  - C iOS
  - D Ubuntu (1)
- 1.2 Which ONE of the following devices is needed to allow communication between networks?
- A Router
  - B Switch
  - C Hub
  - D Hot Spot (1)
- 1.3 Convergence refers to ...
- A technology that is always on.
  - B technology that does not need to be tethered to wired connections.
  - C functionalities of many devices built into one.
  - D the ability of mobile devices to connect to one another. (1)
- 1.4 A Trojan horse is ...
- A a malicious program disguised as an innocent application.
  - B software that tries to monitor and track which applications you use on your computer.
  - C software that downloads and displays pop-up adverts when your computer is connected to the Internet.
  - D an example of application software. (1)
- 1.5 The ... translates an entire program into machine language before execution.
- A compiler
  - B interpreter
  - C translator
  - D operating system (1)
- 1.6 Which ONE of the following statements is NOT true?
- A An interactive web page might contain code that can be executed.
  - B Flash-applets might be part of a static web page.
  - C A static web page can be interactive.
  - D Facebook is a dynamic website. (1)

- 1.7 A plug-in is ...
- A system software which controls all activities that take place in a computer.
  - B software which adds functionality to a program.
  - C software which allows the operating system to communicate with and control a hardware device.
  - D an area of storage that the operating system reserves for its own use. (1)
- 1.8 An organisation's private network environment consisting of documents and resources relating to the organisation's business is known as their ...
- A Ethernet.
  - B extranet.
  - C intranet.
  - D Internet. (1)
- 1.9 The BIOS is responsible for ...
- (i) primary memory management.
  - (ii) controlling hardware.
  - (iii) all logical processing in a computer.
  - (iv) locating and loading the operating system.
- A (i) and (ii)
  - B (ii) and (iv)
  - C (iii) and (iv)
  - D (i) and (iii) (1)
- 1.10 The following algorithm tests whether a value is greater than 50 and less than or equal to 60. The algorithm is tested with a number of input values.
- Which set of input values for the variable **Size** will cause the final value of the variable **InRange** to be set to True?
- |  |
|--|
| <pre>Line 1      Loop 2      Size ← Read Number 3      InRange ← False 4      If Size &gt; 50 And Size &lt;= 60 Then 5      InRange ← True</pre> |
|--|
- A 49, 53, 50
  - B 51, 57, 61
  - C 50, 54, 60
  - D 51, 55, 59 (1)

**TOTAL SECTION A: 10**

**SECTION B: SYSTEM TECHNOLOGIES****QUESTION 2**

Your school is doing an audit of the technology in the school. Decisions about upgrading and replacing various technologies will be based on the outcome of this audit.

- 2.1 As part of the audit process the hardware in the computer laboratory was checked. It has been suggested that the RAM of the computers in the laboratory be upgraded.
- 2.1.1 What is the purpose of RAM? (2)
- 2.1.2 Give TWO reasons why it may not be possible to upgrade the RAM of old computers. (2)
- 2.2 Mobile devices are used at the school for research purposes. The firmware of mobile devices is stored in read-only memory (ROM).
- 2.2.1 Give ONE reason why ROM is used to store firmware. (1)
- 2.2.2 Give TWO reasons why it is beneficial to update firmware on a mobile device. (2)
- 2.2.3 The school has been warned against jail breaking of mobile devices.
- Explain what *jail breaking* means in this context. (2)
- 2.3 Your school would like to use educational applications that have been developed for mobile devices and desktop computers.
- 2.3.1 High-level languages are commonly used to develop software applications.
- What are the advantages when a programmer uses a high-level programming language instead of a low-level programming language? (2)
- 2.3.2 State ONE challenge faced by developers when they design software applications for mobile devices. (1)
- 2.3.3 Some software applications are classified as open-source software.
- Explain what is meant by *open-source software*. (2)

- 2.4 The Internet is used by learners to do research and this can be time-consuming.
- 2.4.1 Describe how web caching speeds up the web browsing process. (2)
- 2.4.2 Describe another type of caching that may enhance the performance of a computer system. (2)
- 2.5 Your school wants to use the cloud to store administrative data.
- 2.5.1 Explain what is meant by *storing data in the cloud*. (2)
- 2.5.2 Motivate why it could be problematic if the school only uses the cloud to store their administrative data.  
State TWO problems that may occur as part of your motivation. (2)
- 2.6 To encourage interactive learning, wearable technology such as interactive glasses is being investigated.
- 2.6.1 State ONE advantage of interactive glasses. (1)
- 2.6.2 Name ONE type of technology that is used in interactive glasses. (1)
- 2.6.3 Why do you think the use of interactive glasses has been banned in some workplaces? (1)

**TOTAL SECTION B: 25**

**SECTION C: COMMUNICATION AND NETWORK TECHNOLOGIES****QUESTION 3**

During the audit process it was established that your school uses a cabled and a wireless network to share hardware resources.

- 3.1 Some aspects need to be clarified for the auditors.
- 3.1.1 Give TWO reasons for having a network other than the sharing of hardware resources. (2)
  - 3.1.2 State TWO benefits of using a star topology for the cabled part of the network. (2)
  - 3.1.3 Give TWO reasons why fibre-optic cable is not the best option for a school network. (2)
  - 3.1.4 Briefly describe the role of an access point in a wireless network. (1)
- 3.2 VoIP is one of the protocols that is used by the school network.
- Motivate the need for VoIP in an interactive learning environment. (2)
- 3.3 Your school uses an ADSL Internet connection.
- 3.3.1 Give TWO reasons why ADSL can be considered to be the best Internet connection option for the school. (2)
  - 3.3.2 Name any other readily available Internet connection that may be used by the school. (1)
  - 3.3.3 A firewall prevents unauthorised online access from outside the school network.  
  
Suggest TWO other measures that could be implemented to prevent unauthorised online access. (2)
- 3.4 Many teachers choose to use their personal mobile devices to send and receive e-mail on the school's wireless network.
- 3.4.1 Push technology is used to send and receive e-mails on a mobile device. Explain what *push technology* is. (2)
  - 3.4.2 E-mail attachments are usually not automatically downloaded on mobile devices.  
  
Give TWO reasons why this is the case. (2)

- 3.5 Teachers are encouraged to create podcasts of their lessons to promote e-learning.  
What is a *podcast*? (2)
- 3.6 Some learners use GPS technology in their school projects.
- 3.6.1 What does a GPS device use to determine a specific location? (1)
- 3.6.2 Give TWO examples of how GPS technology can be used by learners as part of school projects. (2)
- 3.7 Learners create personal area networks in the classroom to do their research.  
State TWO useful applications of a personal area network while doing research. (2)
- TOTAL SECTION C: 25**

**SECTION D: DATA AND INFORMATION MANAGEMENT****QUESTION 4**

The audit process showed that a database needs to be designed and implemented to store data for the tuck-shop.

- 4.1 Quality data is required as input to the database.
- 4.1.1 Briefly describe the difference between *data* and *information*. (2)
- 4.1.2 Name and briefly describe THREE characteristics of quality data. (3)
- 4.2 Your school has advertised a position for a database administrator.
- 4.2.1 State TWO responsibilities of a database administrator. (2)
- 4.2.2 Applicants for the database administrator post need to have some knowledge of SQL injection attacks.
- Briefly explain how SQL injection can be used as a hacking tool. (2)

- 4.3 It has been suggested that the **Tuckshop** database should contain two tables – one table, called **SuppliersTb**, must contain data about the suppliers and another, called **OrdersTb**, must contain data about all the items ordered from the suppliers.

The suggested table structures are as follows:

SuppliersTb		
Key	Field name	Data type
	SupplierID	AutoNumber
	Name	Text
	ContactNumber	Text

OrdersTb		
Key	Field name	Data type
	ItemName	Text
	SupplierID	Number
	UnitPrice	Number
	DateOrdered	Date/Time
	QuantityOrdered	Number
	DeliveryDate	Date/Time
	DeliveryCost	Currency

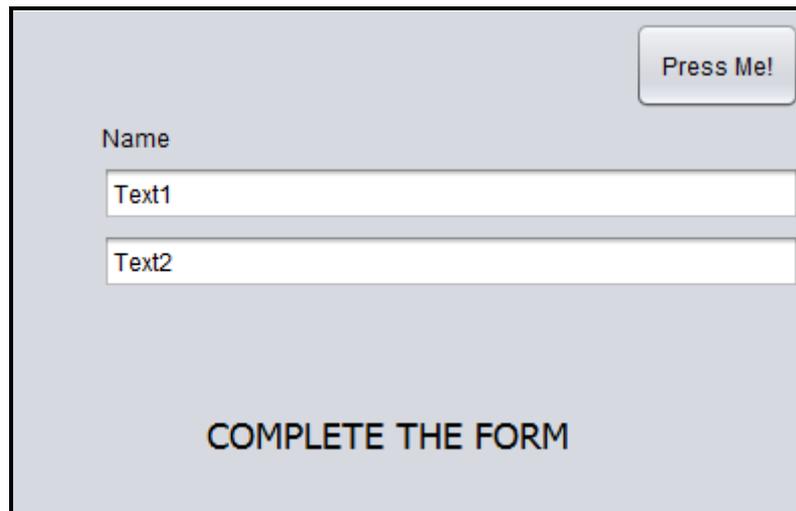
- 4.3.1 Briefly explain why the suggested **Tuckshop** database is a relational database. (1)
- 4.3.2 Use the suggested table structures and write SQL statements for each of the following queries:
- (a) Display the content of the **OrdersTb** (all the fields) in descending order of the quantity of items ordered. (3)
- (b) For each item, display the name of the item, the unit price, the quantity ordered and the total cost for the order in a new field named **TotalCost**. (3)
- NOTE:** Total cost is a calculated field and is calculated by multiplying the unit price by the quantity that was ordered. (3)
- (c) Increase the unit price for all records in the **OrdersTb** table by 5%. (3)
- (d) Remove all records from the **OrdersTb** where the order date is before 1/1/2013. (2)
- (e) Display the supplier name, contact number and item name for all deliveries that will arrive in 2015. (4)

**TOTAL SECTION D: 25**

**SECTION E: SOLUTION DEVELOPMENT****QUESTION 5**

The auditors suggested that new software should be developed to manage learner information.

- 5.1 The following GUI is currently used to allow a user to input learner information.



- 5.1.1 Comment critically on THREE design aspects of the given GUI that need to be improved on in the new system. (3)

- 5.1.2 Identify a component on the given GUI and an event of that component that can be utilised in an event-driven solution. (2)

- 5.2 Data validation is an important technique used to ensure that input data is valid.

A user is required to input a FOUR-character security code which contains ONE alphabetical character and THREE digits. The first character must be alphabetical, for example D845.

Write an algorithm using pseudocode to validate the code for the correct format once the code has been entered.

- NOTE:** Use at least ONE loop as part of your solution. (3)

5.3 Object-orientated programming (OOP) will be used in the design of the new software.

5.3.1 Explain the concept of *encapsulation* in object-orientated programming. (1)

5.3.2 A design is needed for a **Learner** class for the school's administrative program.

Draw a unified modelling language (UML) diagram for an object class called **Learner** and include the following:

- Name and Age attributes with appropriate data types
- Constructor without parameters
- Mutator method for the Name attribute

**NOTE:** Also indicate the accessibility of the attributes and methods. (5)

5.4 A security feature of the new software will use a check digit. The digit is generated by counting the number of factors of the user code.

A factor of a given number is a number which can be divided into the given number without a remainder.

The algorithm below, written in pseudocode, determines the number of factors that a given number has.

<b>Line</b>	
1	<b>Number</b> ← 4
2	<b>Count</b> ← 1
3	<b>NumFactors</b> ← 0
4	<b>While</b> Count ≤ Number
5	<b>If</b> Number modulus Count = 0 <b>Then</b>
6	<b>NumFactors</b> ← NumFactors + 1
7	<b>Count</b> ← Count + 1
8	<b>Display</b> NumFactors

**NOTE:** The result of the modulus operation is the remainder when a number is divided by another number.

Use the following headings to draw and complete a trace table in your ANSWER BOOK to show how the content of the variables change while tracing the steps of the given algorithm. Use as many lines as you require.

Number	Count	NumFactors	Count ≤ Number ?	Number modulus Count = 0 ?	Display

(6)

- 5.5 An algorithm needs to be designed for a program to manage a learner's marks. You have been provided with a line of pseudocode below which populates an array with marks.

Write an algorithm using pseudocode to sort the array of marks into descending order.

**arrMarks** ← (67,65,78,83,67,72,65) (5)

**TOTAL SECTION E: 25**

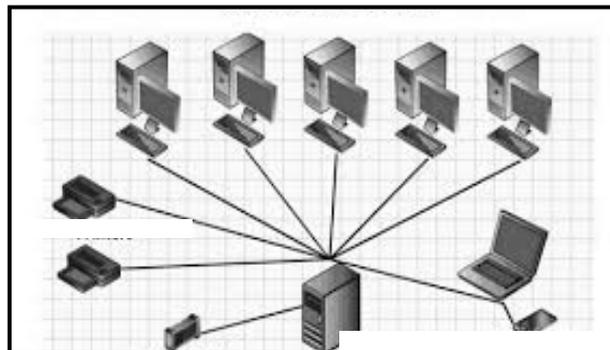
**SECTION F: INTEGRATED SCENARIO****QUESTION 6**

Read the scenario below and answer the questions that follow.

**SCENARIO**

After the implementation of the suggestions from the audit, your school is recognised as one of the leading schools in terms of the use of ICT. The school has an e-learning portal where teachers can upload learning materials and learners can access these materials on an interactive basis. An IT technician has been appointed to assist with the new technology.

- 6.1 The different departments in the school are all networked and use a central server as shown in the diagram below.



- 6.1.1 A client-server network is being currently used.  
Give TWO reasons why a client-server network would be a better option than a peer-to-peer network. (2)
- 6.1.2 State TWO hardware features of a server that are significantly different from those of a desktop computer. (2)
- 6.1.3 The school server uses virtualisation to run different servers on a single physical server.  
(a) Give ONE example of virtualisation software. (1)  
(b) Explain how different operating systems can be used in different virtual servers on the same physical server. (2)

- 6.2 The school runs a dynamic website which is often updated with news and photographs of school events.
- 6.2.1 The school's website offers an RSS feed.  
Give TWO reasons why an RSS feed is useful. (2)
- 6.2.2 The website uses lossy compression for the photographs that are uploaded.  
Explain the concept *lossy compression*. (1)
- 6.2.3 Many learners and parents view the school's website on their mobile devices.  
In what TWO ways could the mobile version of the website differ from the standard version? (2)
- 6.2.4 The principal has learnt that Web 3.0 is the latest evolution of websites.  
Why would a school prefer a Web 3.0 site to a Web 2.0 site? (2)
- 6.3 Parents are able to pay school fees online through the school website. The school website uses encryption to ensure that parent details are secure.
- 6.3.1 How can parents ascertain that the school website is secure from the information on their web browsers? (1)
- 6.3.2 Briefly describe what *encryption* is. (2)
- 6.3.3 Parents are encouraged to use 'strong' passwords.  
Give TWO guidelines parents can follow to create strong passwords. (2)
- 6.4 The school has joined a social media website.
- 6.4.1 Name TWO ways in which the school will benefit from having a presence on a social media website. (2)
- 6.4.2 Why would the school warn learners about posting personal information, such as phone numbers and addresses, on their profiles? (2)
- 6.4.3 State TWO ways in which the school can ensure its acceptable use policy (AUP) will be implemented when the social media website is used. (2)

- 6.5 The majority of teachers are now using e-learning to enhance their teaching and learning.
- 6.5.1 State TWO ways in which e-learning may be beneficial to the learner. (2)
- 6.5.2 Lesson videos are made available to download or stream.  
What is difference between *downloading* and *streaming*? (2)
- 6.5.3 Your school is planning live broadcasts for Mathematics revision lessons.  
Give TWO requirements of connectivity to successfully host a live broadcast. (2)
- 6.6 Learners and teachers are encouraged to use mobile devices such as smartphones and tablets for teaching and learning.
- 6.6.1 Name TWO ways in which mobile technology can improve teaching and learning. (2)
- 6.6.2 Mobile devices are powered by rechargeable batteries.  
State TWO techniques that are used to extend the battery life of these devices. (2)
- 6.7 The school's IT technician telecommutes on specific days. Telecommuting is using technology to work from home instead of actually being present in the workplace.
- 6.7.1 Name TWO tools/technologies that make telecommuting possible. (2)
- 6.7.2 Identify ONE possible challenge with telecommuting that is not technology-related. (1)
- 6.8 Your school is investigating the option of using Software as a Service (SaaS) to provide access to applications for the development of e-learning resources.  
Motivate, by giving TWO reasons, why it would be advantageous for your school to use SaaS. (2)

**TOTAL SECTION F: 40**  
**GRAND TOTAL: 150**