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EXAMINATION	NATIONAL SENIOR CERTIFICATE
GRADE	12
DATE	NOVEMBER 2024
SUBJECT	INFORMATION TECHNOLOGY
PAPER	2
MARK TOTAL	150
DURATION (HOURS)	3
NUMBER OF PAGES	16 + 2 tear-off sheets

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INSTRUCTIONS AND INFORMATION

1. This paper consists of 16 pages with the following sections:

SECTION A:	Short questions	(20 marks)
SECTION B:	System Technologies	(30 marks)
SECTION C:	Communications and Network Technologies	(30 marks)
SECTION D:	Data and Information Management	(20 marks)
SECTION E:	Solution Development	(25 marks)
SECTION F:	Integrated Scenario	(25 marks)

2. Answer **ALL** the questions.

3a. Use the tear-off sheet at the back of the paper to answer Section A (Questions 1.1 and Question 1.2) and Question 5.1.1. from Section E.

3b. Answer **ALL** the other **SECTIONS** in the answer book.

4. Number the answers correctly according to the numbering system used in this question paper.

5. Start **EACH** main question on a **NEW PAGE**.

6. Leave a line open between **EACH** of your answers.

7. One mark is located per fact; therefore, a question that is 2 marks requires 2 facts.

8. Write neatly and legibly.

9. Read **ALL** the questions carefully before answering it.

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SECTION A

QUESTION 1: SHORT QUESTIONS

Give the best term for each of the descriptions given below:

NOTE: Use the space provided for your answer on the tear off sheet at the end of the examination paper.

1.1.1 The law protecting the intellectual property of a developer. (1)

1.1.2 An image used as a code, which acts as a link to a form, document or website. (1)

1.1.3 Connection and communication of different types of devices over the internet. (1)

1.1.4 Watching or listening to the content of files on the internet without saving it. (1)

1.1.5 A hardware component that provides a desktop computer with electricity and also controls the electrical current (amps) distributed to the different hardware components within the computer. (1)

1.1.6 Software where the code is available to be used and/or changed if the user has the knowledge to do so. (1)

1.1.7 A type of network involving various devices and usually controlled by the individual's mobile device. (1)

1.1.8 When devices are connected to the computer, they are identified by the operating system (OS) and immediately available for use as the OS has the drivers installed. (1)

1.1.9 The number of BITS in a BYTE. (1)

1.1.10 The coding error when we refer to a working/running program providing incorrect output. This is usually due to incorrect order of statements or incorrect formula used (typing errors in formulae). (1)

(10)

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1.2 Choose a term/concept from COLUMN B that matches a description in COLUMN A. Write only the letter (A – Q) next to the question numbers (1.2.1–1.2.10) in the space on the **tear-off sheet**, e.g. 1.2.11 R.

COLUMN A		COLUMN B
1.2.1	Software interface between different programs.	A. Virtualisation B. Nanorobotics
1.2.2	A compiled program in machine code.	C. Rootkit
1.2.3	A computer system created using software on one physical computer to emulate the functionality of another separate physical computer.	D. Audit trail E. Source code
1.2.4	A technology field that creates machines or robots with components that are at or near the scale of a nanometre.	F. Virtual machine G. Record Lock H. Mesh topology
1.2.5	Protection of a record in a database while it is being altered until the process is completed.	I. GUI (graphical user interface) J. Procedure
1.2.6	A method that must return ONLY one result.	K. Virtual office L. Object code
1.2.7	Compression type where no detail is lost.	M. Function
1.2.8	An example of the layout of a network.	N. Lossy compression
1.2.9	A Type of malicious software designed to gain unauthorized access to a computer system and maintain privileged control over it while remaining hidden from detection.	O. API (application programming interface) P. High-level language
1.2.10	An office area mostly used for a physical address and not as a daily working area.	Q. Lossless compression

(10)

TOTAL SECTION A: [20]

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SECTION B

QUESTION 2: SYSTEM TECHNOLOGIES

You have heard that several factors can influence the performance of computers. You downloaded the freeware application called CPU-Z. (Figure 1) This application shows information about the hardware configuration of your computer, such as processing speed, CPU information and Cache.
Figure 2 is a screenshot of a compulsory action/step before the completion of the installation can take place.
Figure 3 is a screenshot taken of the running application.

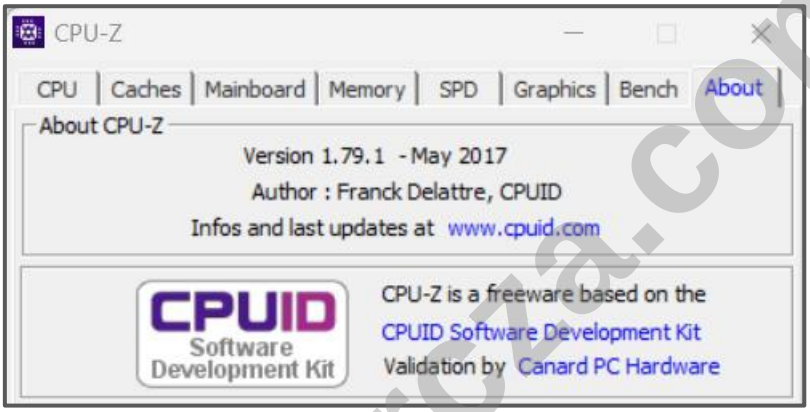

Figure 1

Figure 2

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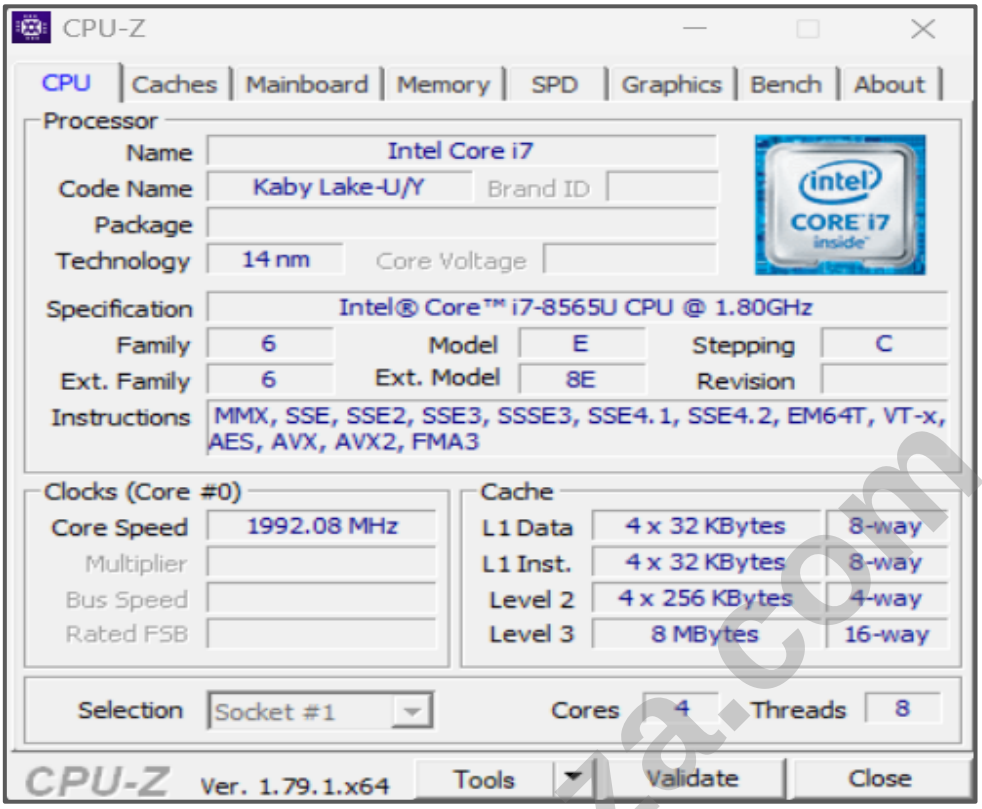

Figure 3

2.1 The application in Figure 1 is referred to as freeware, as opposed to proprietary software.

2.1.1 Explain what is meant by freeware. (1)

2.1.2 Why is it compulsory to adhere to the license agreement (Figure 3) even if the application is freeware? (1)

2.2 The EULA provides for proprietary software to either be installed as a single-user, multi-user or as a site license.

Distinguish between a multi-user license and a site license. (2)

2.3 The Core i7 in Figure 3 is a multi-core processor.

2.3.1 Define the meaning of cores when referring to a CPU. (1)

2.3.2 How many cores are on this Intel i7 processor, according to Figure 3? (1)

2.4 Figure 3 also indicates different levels of cache on the CPU.

2.4.1 State the function of cache on the CPU. (2)

2.4.2 Give an example of another use for cache memory. Explain how it is used in your example. (2)

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2.5 The concept of 'ergonomically designed' often features in advertisements.

2.5.1 Elaborate on the meaning of a device that is 'ergonomically designed'. (2)

2.5.2 Name the condition some people suffer from, which led to the study of ergonomically designed peripherals, such as a mouse. (1)

2.6 The widespread ownership of computers and computing devices is a recent phenomenon compared to the history of technology.

Provide THREE reasons, aside from internet access, why computer ownership has become so prevalent in the current century. (3)

2.7 Functional computers require both application and system software.

Distinguish clearly between the two groups of software and explain any dependencies between the two types of software. (4)

2.8 Define the term modular design of computers. Refer to how it is made possible and why modular design is beneficial. (3)

2.9 It would be preferred to equip computers with Solid State Drives (SSD) rather than conventional hard drives.

2.9.1 Why have conventional hard drives not yet completely been replaced with solid-state drives (SSDs)? (1)

2.9.2 Explain TWO benefits associated with an SSD. (2)

2.10 Cloud synchronisation of files is NOT a true backup!

2.10.1 State TWO considerations when making backups. (2)

2.10.2 Define the term: cloud synchronisation. (2)

TOTAL SECTION B: [30]

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SECTION C

QUESTION 3: COMMUNICATIONS AND NETWORK TECHNOLOGY

You are a financial consultant for a company group and work mostly from home. You have access to confidential information about the company and their employees. Occasionally you need to commute between their different branches in different provinces. Fortunately, internet connectivity benefits your working environment.

3.1 When visiting a branch, you need to log onto their network.

Which security actions/strategies can the company apply to verify that you are authentic to log onto the network?

List TWO actions/strategies. (2)

3.2 Due to the volume of emails you receive daily, you're susceptible to various security risks. List, then define/explain in a table THREE of the most common email security risks. For each risk, suggest ONE protective measure you can take to mitigate the risk.

Redraw and complete the following table:

Risk	Explain/define	Protective measure
1:		
2:		
3:		

(6)

3.3 You are to present a workshop to all managers at all branches.

3.3.1 Suggest the most time and cost-efficient way to conduct this workshop. (1)

3.3.2 Which protocol made the answer in 3.3.1 possible? (1)

3.4 Differentiate between a LAN and a WAN. Just referring to the size of the area is NOT enough. (1)

3.5 Define the following terms in relation to networking:

3.5.1 Router (2)

3.5.2 Cloud Server (2)

3.5.3 Bandwidth (2)

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3.6 Many organisations, including companies and schools, often implement Local Area Networks (LANs) that span a large area and are divided into smaller subnetworks. These subnetworks connect to a central device. In a star topology, all devices connect to this central device.

3.6.1 State the name of the central device. (1)

3.6.2 Name another network topology (besides star). (1)

3.6.3 Give TWO reasons why fibre optical cable will be used as communication medium of the backbone. (2)

3.7 Collaboration and centralised file management help to eliminate unnecessary duplication and reduce associated errors.

State TWO reasons how utilising the Cloud can assist in this regard. (2)

3.8 Many companies are implementing software as a service (SaaS) to distribute/introduce their software.

Discuss why this distribution model will benefit their clients. (2)

3.9 Artificial Intelligence (AI) is widely used in the technology industry. ChatGPT is one example of this.

3.9.1 Describe data warehousing and the relationship between data warehousing, data mining, and ChatGPT. (4)

3.9.2 Explain how modern robotics is an example of AI. (1)

TOTAL SECTION C: [30]

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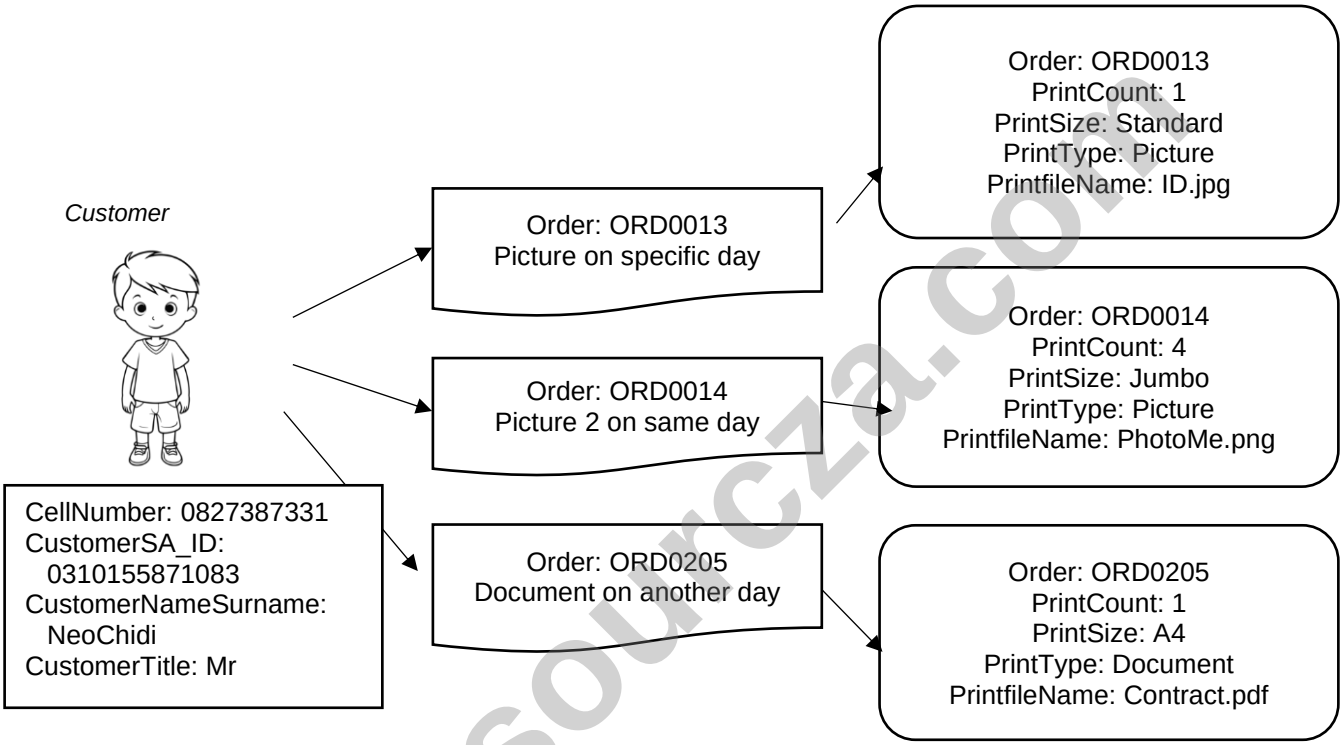
SECTION D

QUESTION 4: DATA AND INFORMATION MANAGEMENT

A stationery company decided to open a prepaid self-service printing kiosk for customers who need to print documents or photos. They need to record the paper usage of the kiosk to better budget for paper.



Data is saved into 2 linked tables. An example of the tables in the designed database are shown in the screenshots below:

CustomerTbl

Field Name	Data Type	
CellNumber	Short Text	Cell Phone number - 10 digits
CustomerNameSurname	Short Text	Name and surname saved with space
CustomerSA_ID	Short Text	SA ID number - 13 Digits
CustomerTitle	Short Text	5 Characters for Title

OrdersTbl

Field Name	Data Type	
OrderNumber	Short Text	Order number saved as ORD and 4 digits
CustomerCellNum	Short Text	10 digit Cell Phone Number
OrderDate	Date/Time	Short date on which print was made (system date)
PrintCount	Number	Integer to indicate the number of prints(copies)
PrintSize	Short Text	Selection of A4, A5, Standard or Jumbo
PrintType	Short Text	Picture or document
PrintFileName	Short Text	Document name to be printed

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4.1 Comment on the data type used for the cell phone (CellNumber) and SA ID fields (CustomerSA_ID). Clearly indicate why it is either correct or incorrect. (2)

4.2 Is the way in which the name and surname field is saved, correct? Motivate your answer. (2)

4.3 Draw the relationship between the 2 tables. Also, indicate the fields being used in the relationship. (2)

4.4 Both the cell phone number and the SA ID could be used as primary key for the customer. How do we refer to the CustomerSAID field in association with the table, if the cell phone number is the primary key? (1)

4.5 Suggest two different reports that the company can generate from the data in the tables. (2)

4.6 Write an SQL statement to count the number of prints made from the different print sizes (PrintSize field). Use a descriptive heading for the answer field. (4)

4.7 Which Delphi component would best be suited to indicate the number of copies to be printed? (1)

4.8 How would you design the interface (GUI) for the program to allow the print sizes A4 and A5 to be available only for the "Document" print type, and the print sizes Standard and Jumbo to be available for the "Picture" print type?

You may write or draw your suggestion. Only refer to the **PrintSize** and **PrintType** fields. (2)

4.9 Give an example of where/when you would create a one-to-one relationship between two tables. (1)

4.10 Many businesses use distributed databases for data storage.

4.10.1 Explain what a distributed database is. (1)

4.10.2 Give TWO benefits of using the distributed databases. (2)

TOTAL SECTION D: [20]

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SECTION E

QUESTION 5: SOLUTION DEVELOPMENT

5.1 You have designed the following encryption algorithm to reverse a data line and add a * between all characters. Example *file* becomes *e*l*i*f**

```
{1}    sData ← 'file'
{2}    sNew ←''
{3}    for i ← 1 to length(sData)
{4}            sNew ← sNew + sNew[i]+'*'
{5}    end// for
{6}    Display sNew
```

5.1.1 Use a trace table with the following headings to test the logic of the algorithm above.
(Complete the trace table provided on the tear-off sheet at the end of this paper.)

line	sData	sNew	i	If i<=4	output
1	file				
2		''			

(4)

5.1.2 Comment on the correctness of the algorithm.
Suggest an improvement or correction if you feel it is required. (1)

5.2 Each user needs a strong password. One of the requirements for a strong password is that it may not contain your name within it.

Example: if your name is Ben the following
are wrong: *56#**BEN**!!* *Or KUJ**bEn**98&*
are correct: *76B*en76@%* *or oiuoNEB(*2.*

Give the Delphi statement to be used to test if a name is contained in the password. (Use **sName** and **sPassword** as variables) (3)

5.3 Another requirement for a strong password is that it must contain at least 1 (one) uppercase letter and at least 2 (two) digits.

Write an algorithm to test this requirement. Show the result as a message. (7)

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5.4 An object class is required to create an order object.
The details required for an order are shown in the table below and correspond with the details in **OrdersTbl** as in Question 4.

Attributes:	**Example:**
Order number	ORD0013
Cell number of customer	0848666060
Date of order	10 May 2024 (taken from the system date) Not a parameter to be passed
Number of copies printed	1
Print size	Standard or Jumbo or A5 or A4
Type of document	Document or picture
File name of source	Dog.png or contract.pdf

Draw a unified modelling language (UML) class diagram to represent the object class called **TOrder.**

The UML class diagram must contain the following:

- All the attributes of the **TOrder** object indicating data types and private/public scope.
- A constructor method indicating values received for all attributes required as parameters. (6)

5.5 What is the purpose of a mutator method? Also indicate whether it is a function or procedure. (2)

5.6 The Object-oriented programming (OOP) paradigm is widely used in programming.

Explain TWO benefits of OOP. (2)

TOTAL SECTION E: [25]

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SECTION F

QUESTION 6: INTEGRATED SCENARIO

Theft of stock in any shop is a concern to be prevented. Barcodes have been used by Point of Sales (POS) systems for many years. A new tendency is to use radio frequency identification (RFID) tags.

[Source: https://www.qodenext.com/]

6.1 RFID is also scanned like barcodes but is more expensive.
Explain why the use of RFID tags is more expensive. (1)

6.2 Provide TWO reasons for the shop manager to convince him/her to invest in the RFID tags to replace barcodes. (2)

6.3 Explain to the manager what 'location-based computing' is and how it can be utilised to the advantage of the shop's turnover. Include TWO benefits to support your answer. (4)

6.4 The shop has a website, and the manager is interested in increasing its online presence by making it appear more prominently in search engine results.

Name the term for techniques of improving a website's ranking in search results. (1)

6.5 '*The world has become smaller*' is a statement that can be associated with the effects of globalisation.

6.5.1 What do you understand as 'globalisation'? (2)

6.5.2 Give THREE examples of how globalisation is experienced. (3)

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6.6 Study the following illustration and incomplete table and answer the questions that follow:

[Source: https://www.tutorialspoint.com/wimax/wireless_introduction.htm/]
Figure 4

6.6.1 Supply the missing part (word, term or partial phrase) of each statement as indicated by the letters (a) to (d).

Feature	Wired Communication	Wireless Communication
Connection Medium	6.6.1 (a)_	Radio waves or infrared signals
Mobility	Limited mobility for devices, due to fixed positions.	High mobility for devices, can connect from anywhere within the 6.6.1 (b) _
Security	Generally more secure due to physical connection. Easier implementation of security measures.	Less secure due to open air transmission of signals, requires additional security measures like 6.6.1 (c) _
Susceptibility to Interference	6.6.1 (d)_	More susceptible to interference.

(4)

6.6.2 Give the common name for the 'Wireless Device' as indicated in Figure 4. (1)

6.6.3 Internet speed refers to how long it takes for data to transfer back and forth between your device and the web server via the router.

State the unit which is used to measure internet speed. (1)

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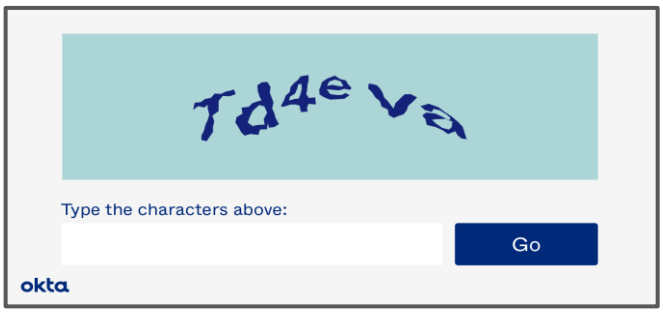
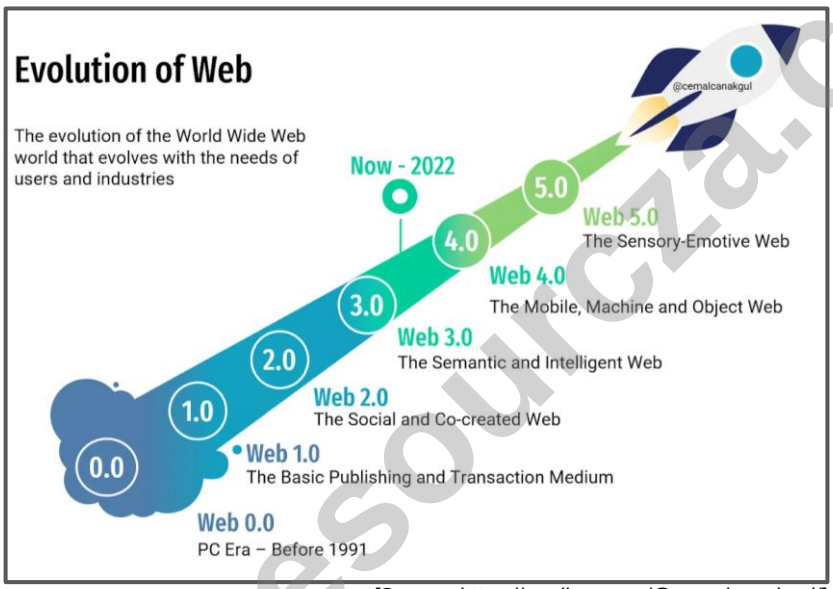
6.7 When creating online accounts, one is frequently asked to complete the CAPTCHA process indicated in the screenshot below.



What is it used for and how does it work? (2)

6.8 Figure 5 shows the evolution of the web:



[Source: https://medium.com/@cemalcanakgul/]

Figure 5

6.8.1 What was the restriction in Web 1 that led to the development of Web 2? (1)

6.8.2 Describe the main feature found in Web 3. (1)

6.9 Explain what a software patch is by referring to an example. (2)

TOTAL SECTION F: [25]

GRAND TOTAL: [150]

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Examination Number: _____

QUESTION 1

1.1.1			1.2.1	
1.1.2			1.2.2	
1.1.3			1.2.3	
1.1.4			1.2.4	
1.1.5			1.2.5	
1.1.6			1.2.6	
1.1.7			1.2.7	
1.1.8			1.2.8	
1.1.9			1.2.9	
1.1.10			1.2.10	

(20)

Staple to your answerbook.

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Line number	sData	sNew	i	If i<=4	output
1	file				
2		"			
3					

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