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TOTAL
MARKS

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INTERNATIONAL SECONDARY CERTIFICATE EXAMINATION
NOVEMBER 2023

COMPUTER STUDIES: PAPER II

EXAMINATION NUMBER

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Time: 3 hours

150 marks

PLEASE READ THE FOLLOWING INSTRUCTIONS CAREFULLY

1. This question paper consists of 30 pages. Please check that your question paper is complete.
2. The paper is divided into Section A (25 marks), Section B (75 marks) and Section C (50 marks).
3. **Answer ALL the questions on the question paper and hand it in at the end of the examination. Remember to write your examination number in the space provided.**
4. Non-programmable calculators may be used.
5. It is in your own interest to write legibly and to present your work neatly.
6. Read the questions carefully. Take note of the action verbs in some of the questions, i.e., explain, name, select, discuss, identify, etc., and then answer accordingly.
7. Give your answers in general terms, e.g., use 'word processor' rather than 'Microsoft Word'. Use brand names only when asked.
8. In general, a mark is allocated per fact. Therefore, a two-mark question would require two facts, and so on. One-word answers will not necessarily give you the mark. Writing in full sentences is required.
9. DO NOT USE CORRECTING FLUID.
10. TWO blank pages (pages 29–30) are included at the end of the paper. If you run out of space for an answer, use these pages. Clearly indicate the number of your answer should you use this extra space.

FOR OFFICIAL USE ONLY:

MARKER TO ENTER MARKS BELOW									
Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	TOTAL
10	15	22	19	10	9	15	26	24	/150
MARKER/MODERATOR TO INITIAL BELOW									

SECTION A**QUESTION 1**

Select the **MOST** correct answer to each question. Write down **ONLY** the letter of your choice in the space provided.

- 1.1 Which **ONE** of the following statements is **TRUE** regarding the difference between freeware and shareware?

- A Freeware is platform-specific, and shareware is multiplatform.
- B Freeware makes all features available, and shareware only some.
- C Freeware can be freely modified, and shareware cannot be modified.
- D Freeware is free, and shareware is limited to a trial period.

1.1	
-----	--

(1)

- 1.2 Files with .docx, .rtf and .txt extensions are ...

- A video files.
- B document files.
- C image files.
- D audio files.

1.2	
-----	--

(1)

- 1.3 An architect designs houses using AutoCAD. Which category of user would an architect typically fall under?

- A Power user
- B Entry-level user
- C SOHO user
- D Mobile user

1.3	
-----	--

(1)

- 1.4 In a Microsoft Excel worksheet, a range is ...

- A a preprogrammed formula.
- B the intersection of a row and a column.
- C two or more adjacent cells.
- D an instruction to calculate a number.

1.4	
-----	--

(1)

1.5 Which **ONE** of the following statements is **TRUE** when comparing Solid-State Drives (SSD) and Hard Disk Drives (HDD)?

- A SSDs hold more data than HDDs.
- B SSDs boot faster than HDDs.
- C SSDs are cheaper than HDDs.
- D SSDs consume more power than HDDs.

1.5	
-----	--

(1)

1.6 The following statements about data representation are TRUE, **EXCEPT** ...

- A a bit is either a 1 or a 0.
- B 1 kilobyte is equal to 1024 bytes.
- C 8 bits is equal to 1 byte.
- D a character is equal to 8 bytes.

1.6	
-----	--

(1)

1.7 Fortnite, Dota, and League of Legends competitions are collectively known as ...

- A Ebooks.
- B Ematches.
- C Esports.
- D Ecommerce.

1.7	
-----	--

(1)

1.8 Which **ONE** of the following devices is best suited for location-based services?

- A Laptop
- B Smartphone
- C Desktop
- D Mainframe

1.8	
-----	--

(1)

1.9 Which **ONE** of the following statements is **FALSE**?

- A You paid a programmer to write code for you; the programmer owns the exclusive copyrights to the software.
- B A blog is copyrighted, and your ideas may not be used without getting permission from the author.
- C During the period of copyright, work may only be circulated by first obtaining permission from the creator or paying a licence fee.
- D The duration of copyright protection is the life of the creator plus at least 50 years after their death.

1.9	
-----	--

(1)

1.10 Which **ONE** of the following statements about grouping in a database is **FALSE**?

- A Keeps all like or similar records together.
- B Compares or distinguishes between categories of data.
- C Arranges data in alphabetical or chronological order.
- D Keeps data in a specific order.

1.10	
------	--

(1)
[10]

MARKER'S USE ONLY:	Total mark Q1	
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QUESTION 2

2.1 Give the **MOST** appropriate **TERM** for each of the following statements.

2.1.1 The latest version of the software that has substantial changes or major improvements to the software over a previous version.

2.1.1		(1)
-------	--	-----

2.1.2 A character used in a Microsoft Access database to substitute one or more characters in a string.

2.1.2		(1)
-------	--	-----

2.1.3 The chip on the motherboard that stores information that is needed when the computer boots up.

2.1.3		(1)
-------	--	-----

2.1.4 The ability of a single processor to process more than one instruction at the same time.

2.1.4		(1)
-------	--	-----

2.1.5 A series of commands and instructions created in Microsoft Word or Microsoft Excel that you group as a single command to accomplish a task automatically.

2.1.5		(1)
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- 2.2 Choose the term in Column B that **BEST** matches the definition in Column A. Write down **ONLY** the letter of your choice in the space provided, for example, 2.2.11 X.

	Column A	Column B	
2.2.1	A small file that contains data about a user and their preferences.	A.	Defragmentation
2.2.2	The software method where the size of the file is reduced to save disk space.	B.	Firewire
2.2.3	A software mode that temporarily disables new or enhanced features of the software so that the document can still be edited by users using the earlier version of the software.	C.	Indenting
2.2.4	Hardware and/or software that monitors the traffic between a computer and the Internet to safeguard against breaches in security.	D.	Styles
2.2.5	A feature of Microsoft Word that allows a user to easily apply consistent formatting to documents and quickly change existing formatting.	E.	Compatibility
2.2.6	A hardware design principle that divides a system into separate components.	F.	Forum
2.2.7	A website developed collaboratively by a community of users, allowing users to add and edit content.	G.	Spyware
2.2.8	A utility program that determines how a computer communicates with a peripheral device.	H.	Tabs
2.2.9	A user-friendly environment that implements icons, menus, and windows.	I.	Firewall
2.2.10	A word processing feature that refers to the distance between the text and sides of a whole page or whole document.	J.	Modular
		K.	Device Driver
		L.	Compression
		M.	Wiki
		N.	Cookie
		O.	GUI

WRITE YOUR ANSWERS HERE:

2.2.1		(1)	2.2.6		(1)
2.2.2		(1)	2.2.7		(1)
2.2.3		(1)	2.2.8		(1)
2.2.4		(1)	2.2.9		(1)
2.2.5		(1)	2.2.10		(1)
[15]					

MARKER'S USE ONLY:	Total mark Q2	
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25 marks

SECTION B**QUESTION 3 SYSTEM TECHNOLOGIES**

- 3.1 You are considering buying a laptop with the following specifications for administrative purposes:

ASUS X15 Core i5 1135G7 Processor 2.4 **(a)**

8 **(b)** DDR4

1 **(c)** SSD

15.6-**(d)** HD LED 60 Hz

Intel UHD Graphics

Wi-Fi 5 + Bluetooth

USB 3.0 x 1 port, USB 2.0 x 2 ports, USB Type-C port x 1

Windows 11 Home

- 3.1.1 For each letter **(a)** to **(d)** in the specifications above, write down the unit in which the component is measured.

(a) _____ (1)

(b) _____ (1)

(c) _____ (1)

(d) _____ (1)

- 3.1.2 Both primary and secondary memory specifications are included in the advert.

- (a) What is the function of **primary memory**?

_____ (2)

- (b) Discuss **TWO** differences between primary and secondary memory besides the function mentioned in Question 3.1.2 (a).

Primary memory	Secondary memory

(4)

- 3.2 Most new laptops come standard with USB ports. This laptop has the following USB ports:

USB 3.0 × 1 port, USB 2.0 × 2 ports, USB Type-C port × 1

- 3.2.1 What is the difference between **USB 3.0** and **USB Type-C**?

(2)

- 3.2.2 What other port, not mentioned in the specifications in the advert, do most modern computers have? Give a reason for your answer.

Port: _____

Reason: _____

(2)

- 3.3 Windows 11 is Microsoft's latest major release of their operating system and an example of proprietary software.

- 3.3.1 How does an **embedded** operating system differ from an operating system such as Windows 11?

(2)

3.3.2 How does **proprietary** software differ from **open-source** software?

Proprietary software: _____

Open-source software: _____

(2)

3.3.3 One of the functions of an operating system is file management.

- (a) Name
- TWO**
- significant activities of an operating system related to file management.

Activity 1: _____

Activity 2: _____

(2)

- (b) Discuss
- TWO**
- benefits of converting files to PDF format.

Benefit 1: _____

Benefit 2: _____

(2)

[22]

MARKER'S USE ONLY:	Total mark Q3	
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QUESTION 4 INTERNET AND NETWORK TECHNOLOGIES

Since 2020 and the lockdown, university lecturers have offered students the flexibility to attend lectures online or access video lectures through virtual platforms.

- 4.1 Students have a choice of using streaming video or video downloads. Discuss the difference between **streaming** and **downloading**.

Streaming: _____

Downloading: _____

(2)

- 4.2 Video conferencing is a live connection between two or more remote parties over the Internet, simulating a face-to-face meeting.

- 4.2.1 Name **TWO** uses of video conferencing for the lecturers.

Use of video conferencing 1: _____

Use of video conferencing 2: _____

(2)

- 4.2.2 Name **ONE** video-conferencing application.

(1)

- 4.2.3 Name **TWO** hardware devices you would need to participate in video conferencing.

Device 1: _____

Device 2: _____

(2)

- 4.3 The lecturers can securely log into the university's network while safely working from their homes.

4.3.1 What is the type of technology that makes this connection possible?

(1)

4.3.2 How does this technology enable the lecturers to work securely on the network over a public Internet connection?

(2)

- 4.4 The university implemented cloud computing to unite lecturers and students on a single platform.

4.4.1 How will the university use **cloud computing** to bring lecturers and students together on a single platform?

(3)

4.4.2 Differentiate between Microsoft 365 and Google Workspace cloud-based applications, which are offered free of charge by the university to the students.

Microsoft 365 : _____

Google Workspace: _____

(2)

- 4.5 Students can find search engines frustrating; they need to learn how to use them effectively. One student, looking for the effects of lockdown on education, used the following search string, which produced billions of hits.

What effect has lockdown had on education?

- 4.5.1 Explain the term **hits** to the user.

(1)

- 4.5.2 List **THREE** ways in which the accuracy of the search could have been improved.

Method 1:

Method 2:

Method 3:

(3)

[19]

MARKER'S USE ONLY:	Total mark Q4	
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QUESTION 5 INFORMATION MANAGEMENT

The constant rise in cyberattacks has emphasised the need for more advanced access control modes. Multi-Step Verification is considered the gold standard for account security and makes it easy to secure your digital communications.

[Source: <<https://www.makeuseof.com/what-is-multi-factor-authentication/>>]

5.1 Identify **ONE** form of **single-step authentication**.

(1)

5.2 Explain how **Multi-Step Verification** can contribute to your online security.

(2)

5.3 Name **TWO** pieces of hardware that could be used to verify your identity.

Hardware 1: _____

Hardware 2: _____

(2)

5.4 Your bank has always used Multi-Step Verification on their banking website. Complete the Input Processing Output (IPO) model below to show how you log in to your banking website to complete your banking.

INPUT	PROCESSING	OUTPUT

(3)

- 5.5 Justify the continued use of online banking over the user physically visiting the bank, considering the rise in cyberattacks.

(2)
[10]

MARKER'S USE ONLY:	Total mark Q5	
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QUESTION 6 SOCIAL IMPLICATIONS

Remote work presents complexities for companies in Africa. The challenges of working remotely are power problems, Internet connectivity, distractions due to limited space, financial difficulties, and socio-economic issues.

[Source: <<https://www.infoq.com/articles/working-remotely-Africa/>>]

6.1 Although remote work can present challenges, it has several benefits for employees and organisations.

6.1.1 Discuss **TWO** benefits of remote work for **employees**.

Benefit 1: _____

Benefit 2: _____

(2)

6.1.2 Discuss **TWO** benefits of remote work for **organisations**. (*Do not duplicate your answers from Question 6.1.1 above.*)

Benefit 1: _____

Benefit 2: _____

(2)

6.2 Remote communication can cause an increase in information overload.

6.2.1 What is **information overload**?

(1)

6.2.2 Discuss **TWO** consequences of information overload in remote communication.

Consequence 1: _____

Consequence 2: _____

(4)
[9]

MARKER'S USE ONLY:	Total mark Q6	
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QUESTION 7 SOLUTION DEVELOPMENT

Your local community centre provides support classes for young school-going children to help them with homework. You and your school friends have offered to help at the community centre. The community centre manager created a database to store the details of all the students who help at the local community centre.

StudNo	Helper	Class	Gender	Shifts	Hours Worked
1	Khule	12A	M	Morning	3
2	Mary	12C	F	Evening	5
3	Tiffany	11B	F	Afternoon	8
4	Kenyon	11C	M	Afternoon	2
5	Cameron	12C	M	Morning	10

Figure 1: Extract of Community Centre database

7.1 What would be the most suitable field for the primary key?

(1)

7.2 Which **TWO** database features could be used to ensure that only 'M' for male and 'F' for female are entered into the **Gender** field?

Feature 1: _____

Feature 2: _____

(2)

7.3 The manager requires a printed document that displays the names, surnames and hours worked for all the students who helped at the community centre.

7.3.1 Which database object would be **MOST** suitable to create this printed document?

(1)

7.3.2 Write down a formula/function to calculate the number of students helping at the community centre. The formula/function must be written down in the format that you would enter into the database object and will appear in the footer.

(2)

7.4 The manager transferred the data from the database to a spreadsheet.

7.4.1 What is the **BEST** feature for the manager to use to transfer the data from the database table to the spreadsheet without retyping the data?

(1)

7.4.2 The chart/graph below compares the times the students worked at the community centre.

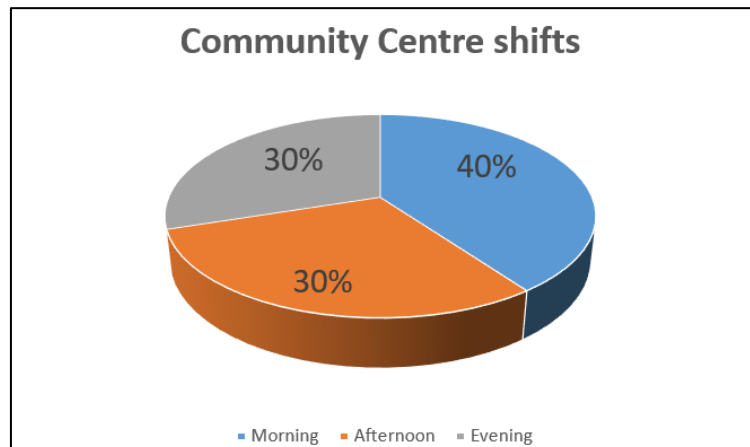


Figure 2: Graph showing students' shifts in the community centre

(a) Suggest a more appropriate type of chart/graph to display and compare the data.

(1)

(b) Discuss the importance of using a chart/graph instead of text when presenting results.

(2)

7.5 The manager has asked you to help him design and code a website in HTML for the community centre.

7.5.1 Name any **ONE** suitable application you could use to create a website.

_____ (1)

7.5.2 The manager typed the following incorrect HTML code to link an image to the web page:

**<a href='https://en.wikipedia.org/wiki/CC' <image src='cc.jpg'> **

Identify the **TWO** errors in the HTML code and correct them.

(a) Error 1: _____

Correction Error 1: _____

_____ (2)

(b) Error 2: _____

Correction Error 2: _____

_____ (2)
[15]

MARKER'S USE ONLY:	Total mark Q7	
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75 marks

SECTION C

Consider the following scenario when answering the rest of the examination paper unless otherwise stated or the questions are general.

SCENARIO**The Metaverse is Coming. Will SA's Networks Be Ready in Time?**

By Luis Monzon, March 15, 2022

Heralded as the next frontier of the Internet, the metaverse is the vision of a persistent 3D virtual world where we can explore and interact with others as avatars, whether for work or entertainment, using virtual reality (VR) and augmented reality (AR) headsets.

While this may seem like a futuristic concept to some, many big tech companies are taking it seriously – exemplified by Facebook's recent decision to rebrand itself as Meta. Mark Zuckerberg, CEO of the newly named Meta, estimates it could take five to ten years before the metaverse becomes mainstream, but some aspects already exist.

[Source: <<https://www.itnewsafrika.com/2022/03/the-metaverse-is-coming-will-sas-networks-be-ready-in-time/>>]

QUESTION 8 INTEGRATED SCENARIO

8.1 Distinguish between **Virtual Reality (VR)** and **Augmented Reality (AR)**.

VR: _____

AR: _____

(2)

8.2 The World Wide Web (WWW) has evolved from Web 1.0 since its inception in 1983 to Web 2.0, Web 3.0 and then Web 4.0 with the metaverse as one of the ground-breaking technologies. The Internet of Things (IoT), a technology part of Web 3.0, will become even more powerful with the advent of Web 4.0.

8.2.1 Describe the **Internet of Things (IoT)**.

(2)

8.2.2 Give **TWO** examples where IoT could be used to improve the lives of the population of the African continent.

Example 1: _____

Example 2: _____

(2)

8.3 According to Prenesh Padayachee, SEACOM Group Chief Digital Officer, the metaverse's foundation will be connectivity. South Africa's nationwide network infrastructure must be stronger to support the metaverse's bold ambitions. South Africa will require more robust networks and more powerful computing capabilities.

8.3.1 5G and fibre might solve some of the network challenges.

(a) Discuss **TWO** benefits of 5G.

Benefit 1: _____

Benefit 2: _____

(2)

(b) Name **TWO** advantages of using fibre optic cables to create a strong fibre backbone for the 5G network.

Advantage 1: _____

Advantage 2: _____

(2)

- 8.3.2 Name the **THREE** main hardware components **AND** provide a reason the component will be required to ensure your computer is powerful enough to manage a virtual reality environment.

Component 1: _____

Reason: _____

Component 2: _____

Reason: _____

Component 3: _____

Reason: _____

(6)

- 8.4 IPv6 implementation is crucial to support the metaverse.

- 8.4.1 What is an **IP address**? *(No mark will be given for just expanding the acronym.)*

(2)

- 8.4.2 What is the difference between **IPv4** and **IPv6**?

IPv4: _____

IPv6: _____

(2)

8.4.3 Explain why the implementation of **IPv6** is crucial to support the metaverse.

(2)

8.5 In the metaverse, personal data will be gathered in the background without a user being involved in collecting the data.

8.5.1 List **TWO** methods of processing this data to produce information.

Method 1:

Method 2:

(2)

8.5.2 How does information differ from knowledge?

Information:

Knowledge:

(2)
[26]

MARKER'S USE ONLY:	Total mark Q8	
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QUESTION 9 INTEGRATED SCENARIO (continued)

- 9.1 In December 2021, Statista sent out an online survey to over 1,000 global Internet users to determine the leading benefits of the metaverse worldwide. The results of the online survey are shown in **Figure 3** below.

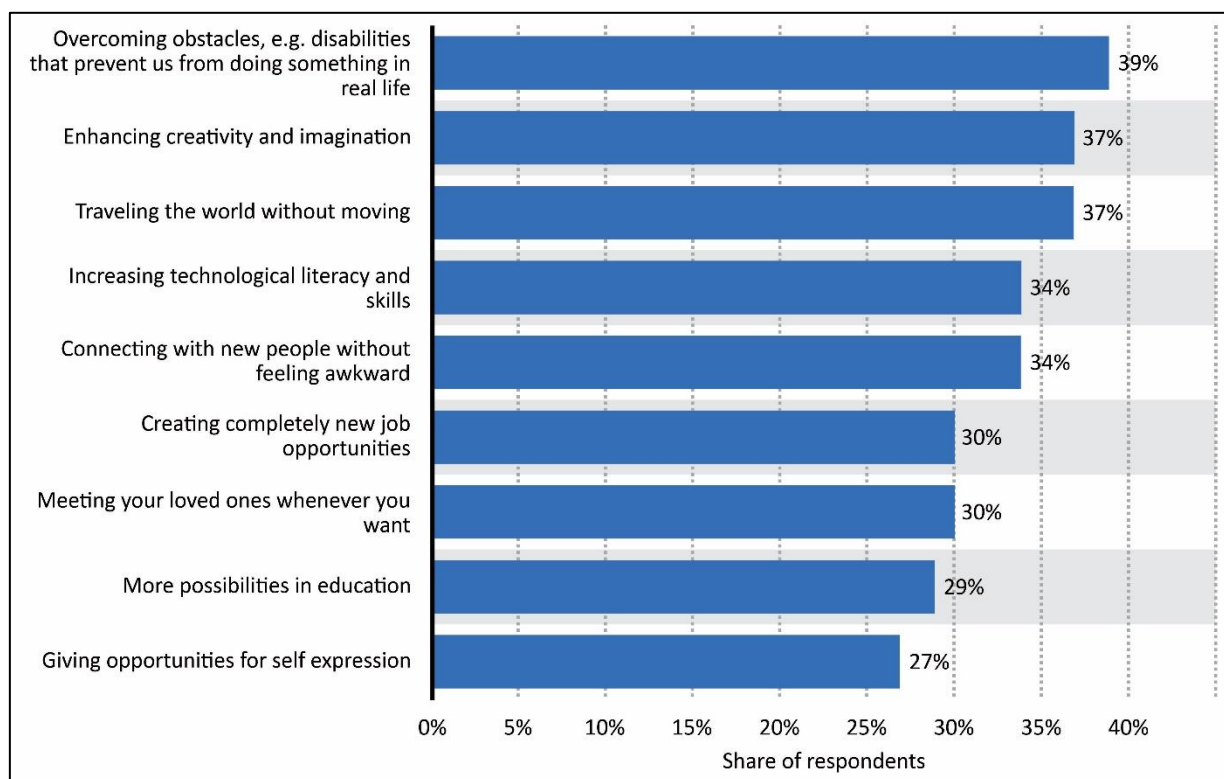


Figure 3: Leading benefits of the metaverse worldwide in 2021 ©Statista 2022

- 9.1.1 Discuss **TWO** benefits of using an online survey to collect statistics.

Benefit 1: _____

Benefit 2: _____

(2)

- 9.1.2 A Quick Response (QR) Code was used so that users could gain access to the survey.

(a) What is a **QR Code**?

(1)

- (b) What hardware and software will the users require to use the QR Code?

Hardware: _____

Software: _____

(2)

- 9.1.3 What did the users find as the second highest-ranked benefit of the metaverse?

(1)

- 9.1.4 Discuss **TWO** methods to enhance the graph/chart in **Figure 3**.

Method 1: _____

Method 2: _____

(2)

9.2

Decentraland is one of the metaverse platforms that allow a user to enter and experience the metaverse.

[Source: <<https://www.cashify.in/how-to-enter-and-access-metaverse>>]

- 9.2.1 One of the first steps when creating a virtual world is to make your digital avatar. What is an **avatar**?

(1)

- 9.2.2 The spreadsheet in **Figure 4** below shows a list of recommended metaverse platforms with the currency they use and the price in US Dollars. Study the spreadsheet and answer the questions that follow.

	A	B	C	D
	Platform	Currency	USD (as at Aug 5, 2023)	SA Rand
1				
2	Decentraland	\$MANA	0.39	
3	The Sandbox	\$SAND	0.39	
4	Somnium Space	\$CUBE	1.06	
5				18.47

Figure 4: Metaverse platforms showing value in USD and SA Rand

- (a) The current USD-Rand exchange rate is \$1 : R18.47, shown in cell **D5**. Write down the formula in cell **D2** that will convert the USD amount to SA Rand. The user should be able to copy the formula to cells **D3:D4** without making any changes to the formula.

(3)

- (b) What is the purpose of the drop-down arrows at the bottom right of the heading cells?

(1)

- (c) What type of currency are \$MANA, \$SAND and \$CUBE in **column B**?

(1)

- 9.3 A Digital Virtual Assistant is a program that understands voice commands and can perform electronic tasks for the user. It is a new entity that lives within the metaverse.

- 9.3.1 Name **ONE** service a Digital Virtual Assistant can provide their owners.

(1)

9.3.2 Name **TWO** examples of Digital Virtual Assistants.

Example 1: _____

Example 2: _____

(2)

9.4

Riccardo Znardelli, a PhD student in Statistics and Data Science, authored an article, *'Building the metaverse is more about metadata (and less about 3D).'*

[Source: <<https://zanardelli.medium.com/building-the-metaverse-is-more-about-metadata-and-less-about-3d-bbbac5ed946b>>]

Metadata means data that describes other data.

9.4.1 What is the importance of **metadata**?

(1)

9.4.2 Name **TWO** examples of metadata.

Example 1: _____

Example 2: _____

(2)

9.4.3 What do you think Riccardo Znardelli means by the statement *'Building the metaverse is more about metadata (and less about 3D)'*?

(2)

- 9.5 3D printing is another vital component of the metaverse. Provide **TWO** real-life examples of how 3D printers are already part of the metaverse.

Example 1: _____

Example 2: _____

(2)
[24]

MARKER'S USE ONLY:	Total mark Q9	
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50 marks

Total: 150 marks

MARKER'S
USE ONLY

CLEARLY INDICATE AT THE QUESTION THAT YOU USED THE ADDITIONAL SPACE TO ENSURE THAT ALL ANSWERS ARE MARKED.

[illegible]

MARKER'S
USE ONLY

[illegible]