

Markscheme

May 2026

Digital society

Standard level

Paper 1

© International Baccalaureate Organization 2026

All rights reserved. No part of this product may be reproduced in any form or by any electronic or mechanical means, including information storage and retrieval systems, without the prior written permission from the IB. Additionally, the license tied with this product prohibits use of any selected files or extracts from this product. Use by third parties, including but not limited to publishers, private teachers, tutoring or study services, preparatory schools, vendors operating curriculum mapping services or teacher resource digital platforms and app developers, whether fee-covered or not, is prohibited and is a criminal offense.

More information on how to request written permission in the form of a license can be obtained from <https://ibo.org/become-an-ib-school/ib-publishing/licensing/applying-for-a-license/>.

© Organisation du Baccalauréat International 2026

Tous droits réservés. Aucune partie de ce produit ne peut être reproduite sous quelque forme ni par quelque moyen que ce soit, électronique ou mécanique, y compris des systèmes de stockage et de récupération d'informations, sans l'autorisation écrite préalable de l'IB. De plus, la licence associée à ce produit interdit toute utilisation de tout fichier ou extrait sélectionné dans ce produit. L'utilisation par des tiers, y compris, sans toutefois s'y limiter, des éditeurs, des professeurs particuliers, des services de tutorat ou d'aide aux études, des établissements de préparation à l'enseignement supérieur, des fournisseurs de services de planification des programmes d'études, des gestionnaires de plateformes pédagogiques en ligne, et des développeurs d'applications, moyennant paiement ou non, est interdite et constitue une infraction pénale.

Pour plus d'informations sur la procédure à suivre pour obtenir une autorisation écrite sous la forme d'une licence, rendez-vous à l'adresse <https://ibo.org/become-an-ib-school/ib-publishing/licensing/applying-for-a-license/>.

© Organización del Bachillerato Internacional, 2026

Todos los derechos reservados. No se podrá reproducir ninguna parte de este producto de ninguna forma ni por ningún medio electrónico o mecánico, incluidos los sistemas de almacenamiento y recuperación de información, sin la previa autorización por escrito del IB. Además, la licencia vinculada a este producto prohíbe el uso de todo archivo o fragmento seleccionado de este producto. El uso por parte de terceros —lo que incluye, a título enunciativo, editoriales, profesores particulares, servicios de apoyo académico o ayuda para el estudio, colegios preparatorios, desarrolladores de aplicaciones y entidades que presten servicios de planificación curricular u ofrezcan recursos para docentes mediante plataformas digitales—, ya sea incluido en tasas o no, está prohibido y constituye un delito.

En este enlace encontrará más información sobre cómo solicitar una autorización por escrito en forma de licencia: <https://ibo.org/become-an-ib-school/ib-publishing/licensing/applying-for-a-license/>.

1. Augmented reality (AR) glasses

- (a) (i) Identify **one** input device that would be used by the augmented reality (AR) glasses. [1]

Answers may include:

- Camera
- Microphone

*Award [1] for identifying **one** input device that would be part of the augmented reality glasses.*

- (ii) Identify **one** output device that would be used by the augmented reality (AR) glasses. [1]

Answers may include:

- Screen / monitor / display / projector / lens of the glasses
- Speaker(s)
- LED lights (for status warning – e.g. batteries running down)

*Award [1] identifying for **one** output device that would be part of the augmented reality glasses.*

- (iii) Identify the steps taken to convert speech to text. [4]

Answers may include:

- Speech/analog data is captured by the microphone on the glasses
- Speech is converted to electrical signals
- Signals are converted to digital data
- Speech / data is sent to the smartphone / app
- Speech is broken up into phenomes / individual sounds
- Speech (phenomes / sounds) is compared with the data held in a database
- If the speech pattern can be mapped to data
 - The text is sent to the glasses
 - The text is displayed on the screen
- If the speech pattern cannot be mapped to data in the database
 - The text that corresponds most closely to the speech pattern is sent to the glasses
 - Or A message is sent to the glasses to say the speech pattern cannot be recognised
- The text (or message) is displayed on the screen / lens of the glasses.

Award [1] for one step identified to convert the speech to text up to [4].

- (b) (i) Distinguish between augmented reality (AR) and virtual reality (VR). [2]

Answers may include:

- Augmented reality (AR) involves adding computer media on top of real-world scenes. AR keeps the user in the real world but overlays digital components
- Virtual reality (VR) hardware and software are designed to replace the real world with a computer-generated scenario. Virtual reality is a fully immersive experience. The user is in a different world.

Award [1] for each difference identified between augmented reality (AR) and virtual reality (VR) up to [2].

- (ii) Explain **one** way in which these augmented reality (AR) glasses are an example of an Internet of things (IoT) device. [2]

Answers may include:

Definition: The Internet of Things is a network of 'things' other than traditional computer devices (such as glasses) that are connected to the internet in order to communicate and share data that has been collected by sensors

- They have an embedded processor which can process data
- ... and then communicate this to the users' smartphone.
- Connect to the internet
- ... to use the AI tools that translate speech to text or one language to another.
- They have a sensor (microphone) which is used to collect data
- ... and then communicate this to the user's smartphone through Bluetooth / WiFi / networks
- They share data with other devices through Bluetooth / WiFi / networks
- ... in order to display the processed data (the text) on the glasses.
- They are a device other than a "computing device" (such as a laptop or a tablet)
- ... that connects the internet in order to share data collected by their sensors

Award [1] for identifying a way how these smart glasses are an example of an Internet of Things device and [1] for a development of that way up to [2].

- (iii) Suggest **one** reason why the augmented reality (AR) glasses need to be connected to a smartphone.

[2]

Answers may include:

- Smart phone has more memory than the glasses
- Which might be required if there is a lot of text to transcribe or translate.
- Smart phone has more storage space than the glasses
- Which might be needed to store the data from past conversations, user preferences etc.
- Smart phone has more storage space than the glasses
- Will be used to store the applications needed for the glasses.
- Smart phone has more processing power than the glasses
- Processor on the glasses will be small/ is 'low-powered' and used mostly for connecting the glasses to the phone. Phone processor will be needed to perform the transcriptions.
- Smart phone allows for connection to the Internet
- Which is needed to store data in the cloud / or perform the transcriptions
- Smart phone may provide an interface / app to update settings / preferences for the glasses
- Which might require storage space / processing power / internet connection (that the glasses cannot provide)
- Battery life of the smart phone will be longer than the battery life of the glasses
- Makes sense to do the processing on the phone therefore.

*Award **[1]** for identifying each reason why the augmented reality glasses need to be connected to a smartphone and **[1]** for a development of that reason up to **[2]**.*

- (c) Discuss the opportunities **and** dilemmas of the use of augmented reality (AR) glasses.

[8]

Answers may include:

Opportunities

- Can display subtitles/captions in front of their eyes (no need to look away at a phone or other device) (systems, social)
- Assist all wearers in noisy environments
- Hearing impaired Can understand people who do not know sign language. (expression, social)
- Hearing impaired will not need to be able to see people's faces to lip read (can take part in conversations without having to anticipate who will speak next) (values & ethics)
- Can understand people who are speaking in different languages (expression, social)
- Will be able to see everything else around them, but with an enhancement (e.g. augmented reality) (systems, social)
- Hearing impaired can take part in events (such as theatre, music, cinema) which they otherwise could not. (expression, social)
- Can have closed captions / subtitles on the glasses when watching tv, without disturbing others by displaying these on the screen. (expression, social) /
- Could have subtitles / translations of any program (even if this is not already provided) (Change, Systems, Values & ethics)
- Can store text / transcripts of a conversation for later reference

Dilemmas

- Possible health risks from carrying a device so close to your head (radiation from wifi, processor etc). (health)
- Battery life will be limited on a device so small (means that after a short time you will not be able to take part in the conversation anymore). (systems)
- Might have problems reading the display in different lighting conditions (systems)
- Users may be distracted by the display (lose focus on their surroundings / increase the risk of accidents)
- Having the screen / display / lens of the glasses close to the eyes could potentially damage the users' eyesight.
- Privacy concerns of having the contents of all your conversations transferred to the web. (data, networks and the internet) (Values and ethics)
- Could malfunction and cause misunderstandings / AI might not do well under certain circumstances. (data, networks and the internet, expression)
- Could be hacked (data, networks and the internet) (Values and ethics)
- Could be susceptible to viruses (networks and the internet)
- Manufacturers control the software (in the cloud) and could therefore sell advertising which would be sent to the device. (networks and the internet, economic, power)
- Might be able to pick up conversations which you would otherwise not be a part of (e.g. listen in on other people's conversations). (data, values and ethics)
- Potential cost of the glasses (cost)
- Reliability of the internet connection and Bluetooth to the smartphone (Change, Power, Systems, Values and ethics)
- Might be able to record people without their consent or knowledge (data, values and ethics)

Keywords: change, expression, power, systems, values, ethics, data, cloud, internet, media, culture, social.

Please use markband on page 18.

2. Online voting in national elections

- (a) (i) Identify **two** hardware components needed to connect to the internet. [2]

Answers may include:

- Modem
- Router
- Network interface (card)
- Wifi Access Point (AP) / switch / hotspot (to connect to a LAN which is connected to the internet)

Award [1] for identifying each hardware component needed to connect to the Internet up to [2].

- (ii) Identify **two** characteristics of encryption. [2]

Answers may include:

- Text is converted to cipher text
- Cipher text must be decrypted before it can be used by the recipient
- Text is unreadable to anyone who does not possess the decryption key
- Uses a key to encrypt and decrypt the text

Award [1] for identifying each characteristic of encryption up to [2].

- (iii) Describe the difference between identification and authentication. [2]

Answers may include:

- Identification is determining the identity of a person
- Authentication is making sure a person is who they say they are
- An example of identification is providing a username
- An example of authentication is providing a password

Award [1] for each difference described up to [2].

- (b) (i) Explain **two** advantages for election authorities of using the cloud to store voters' data.

[4]

Answers may include:

- Increased accessibility to data.
- Election personnel can access the data from any location / Data does not need to be collected from various places.

- Less hardware is required.
- Data is stored on servers maintained by the cloud storage service provider so there may not be a need for the election authorities to have physical servers (and associated infrastructure) / results in a cost saving

- Improved performance
- The performance is easier to optimise as the storage is distributed across cloud storage locations rather than being dependent on a single network server.

- Improved security
- Security measures (such as encryption and / or malware protection) are handled centrally (by the cloud service provider).

- Improved reliability
- Data in the cloud are stored across multiple devices / locations, so the failure of a device will not risk the loss of that data. Cloud storage has data redundancy. Data in the cloud is backed-up.

- Improved scalability
- The storage capacity of cloud storage can be increased indefinitely, so the election authorities can store any amount of voters' data without having to upgrade hardware.

*Award **[1]** for identifying an advantage of using the cloud to store voters' data and **[1]** for a development of that advantage up to **[2]**.*

*Mark as **[2]** + **[2]***

- (ii) Explain **one** disadvantage of using the cloud to store voters' data. **[2]**

Answers may include:

- Requires internet access for every voter
- If the internet is not available or is unreliable, a person's vote might not be stored / registered.
- Requires internet access for the election authorities to access the stored data.
- If the internet is not available, the election authorities may lose access to voters' data
- Security is at risk during transfer of votes and when votes are stored.
- Because data may be intercepted during transit or accessed from the cloud storage.
- Centrally stored data could be more vulnerable to security risks such as hacking, DDOS or malware attacks.
- Because if data is accessible in multiple ways there is an increased likelihood of it becoming vulnerable.
- if the cloud services are owned by private companies (e.g. Amazon, Google, Microsoft) there could be questions about whether the data was being stored correctly / accurately /securely
- Data storage would be out of the control of the government or election authority.
- The costs associated with subscribing to / maintaining / increasing the cloud storage service might be significant.
- Which may be greater over the long term than those of maintaining the data locally.
- The location of the storage devices / data centres might raise issues surrounding data sovereignty,
- Because different regulations may exist that may have lower security requirements.

*Award **[1]** for identifying a disadvantage of using the cloud to store voters' data and **[1]** for a development of that disadvantage up to **[2]**.*

- (c) Discuss the opportunities **and** dilemmas of using online voting for political elections.

[8]

Answers may include:

Opportunities

- Saves time - Voters do not need to leave home to vote (systems)
- May encourage younger people to vote more – easy, fast (expression)
- Encourages people who vote less to vote more due to time saving (expression)
- Allows people who are not able to leave their homes to vote (space)
- Avoids queues at polling stations (space)
- No transport needed to get to polling stations (space)
- People don't need to miss a day of work to cast their votes (economic (4.2B Employment))
- More accurate when counting the votes
- May present fewer opportunities for vote manipulation (e.g. ballot-stuffing) than some other voting methods.
- Long term cost saving – need to weigh up outlay for hardware, software, storage, security, against cost of employing people at polling stations and assisting with counting votes.(change, space, systems, values & ethics)
- Less paper is used (environmental),
- Avoids the logistics of transport (environment, cost, systems).

Dilemmas

- If the voting is online from home, it may be difficult to authenticate the individuals and prevent people from voting twice or impersonating other people (identity, systems)
- Those without access to devices or the internet may be disadvantaged (digital divide) / Older people may not be able to use the online voting platform as easily as a paper-based system. (power, values, ethics)
- If voting is online, how will authorities ensure that people are not being persuaded or coerced into voting a certain way? (expression / political activism (2.2b))
- Security of votes is an issue. (identity, power, systems, values & ethics)
- The web site / voting form might become unreliable or crash. (systems)
- Internet connection may fail or become unstable, affecting people's ability to cast their vote.
- Algorithms used for counting the votes may not be transparent (black-box) or might not be accurate or may be susceptible to hacking, causing an incorrect tally of votes which is difficult to detect (systems)
- Security of voting data during transmission or storage might be an issue (identity, power, systems, values & ethics)
- Voters may not understand /trust how their data is collected or used (values & ethics).

Keywords: change, expression, identity, power, space systems, values and ethics, digital divide, data, networks, political processes.

Please use markband on page 18.

3. Artificial intelligence (AI) in news generation

- (a) (i) Identify **two** types of artificial intelligence (AI). **[2]**

Answers may include:

- weak,
- strong
- general,
- narrow,
- domain-specified

Note to examiners: Do not accept “super AI” as this is a theoretical type.

Award [1] for identifying each type of artificial intelligence (AI) up to [2].

- (ii) Identify **two** components of an algorithm. **[2]**

Answers may include:

- Inputs / outputs
- Instructions / defined steps
- Variables
- Conditionals/ if then statements
- Loops

Award [1] for identifying each component of an algorithm up to [2].

- (iii) Identify **two** reasons why news stories are given hashtags when posted on an online news platform. **[2]**

Answers may include:

- Indicates the main ideas in your post
- Quicker for people to search for topics
- Used in Search Engine Optimisation (SEO) to make sure that your post is easier to find
- Increases visibility / allows the algorithms to “boost” the post
- Posts can be more easily categorised by searching algorithms
- Encourages engagement / interaction / sharing of posts.

Award [1] for identifying each reason why the news stories use hashtags when posting to the platform up to [2].

- (b) (i) The text for the news articles can be generated using supervised learning or unsupervised learning.

Distinguish between supervised learning and unsupervised learning.

[2]

Answers may include:

- Supervised learning is the use of labelled training sets/ to train algorithms to predict outcomes. This ensures the quality of the content generated. May involve human input / intervention.
- Unsupervised learning is when the AI system trains itself to generate content/uses algorithms to discover patterns in data. Can be independent of human input / intervention.

Award [1] for identifying each difference between supervised learning and unsupervised learning up to [2].

- (ii) Explain **two** disadvantages of using artificial intelligence (AI)-generated actors (avatars) to present a news story.

[4]

Answers may include:

- Negative effects of anthropomorphism (similar to uncanny valley) / people may feel uncomfortable watching an avatar which is designed to look human.
- ... and this will put them off watching these types of news reports
- Avatars may lack or mis-communicate empathy / emotion in their delivery of news items
- ... leading people to feel uncomfortable.
- AI actors who can read the news as effectively as a human (while costing less)
- ... will possibly mean news presenters will lose their jobs (if the reading of the news is taken over by avatars).
- Lack of trust
- ... may result in people finding alternative sources of news / media.

Award [1] for identifying a disadvantage of using AI generated actors (avatars) for presenting the news and [1] for a development of that disadvantage up to [2].

Mark as [2] + [2].

- (c) Discuss the opportunities **and** dilemmas of using artificial intelligence (AI) to generate news articles.

[8]

Answers may include:

Opportunities

- Can generate content more quickly than human journalists (systems).
- Can search a large database of news stories to find the most accurate facts more quickly than humans (systems).
- Can analyse statistics and generate numerical data more quickly and accurately than humans (systems).
- Create jobs as people will need to check the facts in the news reports (change, values).
- Can save money as news agencies will no longer need to employ people to generate and research the news (change, power, values).
- AI could be used for the more predictable content (like classified adverts or obituaries) leaving the people free to write more creative articles (systems).
- Provides the opportunity for more objective reporting as it is free from human bias (change, power, systems, values, ethics).

Dilemmas

- Bias within the algorithms may lead to inaccurate news being generated and reported (expression, systems, values, ethics).
- Bias within the data may lead to inaccurate news being reported (systems, values, ethics).
- If the news sources are not correctly tagged, AI might not be able to find the necessary content to report (systems).
- AI 'hallucinations' may lead to inaccurate facts being incorporated in the news (systems, values, ethics).
- Leads to job losses for journalists and researchers (change, systems, identity, values, ethics).
- Use of AI raises environmental concerns such as energy / water use (systems, values, ethics).

Keywords: change, expression, power, systems, values and ethics, data, algorithms, bias, transparency, accountability, synthetic data, deepfakes, AI, machine learning, journalism.

Please use markband on page 18.

4. House-building robots in South Africa

- (a) (i) Identify **two** characteristics of a robot. [2]

Answers may include:

- Sensory inputs for spatial, environmental and operational awareness
- The ability to logically reason with inputs, often using machine vision and/or machine learning.
- The ability to interact and move in physical environments, sometimes remotely.
- The demonstration of some degree of autonomy.

Award [1] for identifying each characteristic of a robot up to [2].

- (ii) Identify **two** types of robot **other than** industrial robots. [2]

Answers may include:

- Service
- Military
- Medical
- Domestic
- Social
- Educational
- Commercial

Award [1] for identifying each other type of robot up to [2].

- (iii) Identify **two** uses of robotic arms **other than** constructing houses. [2]

Answers may include:

- Vehicle construction
- Robotic surgery
- Picking / packing orders in a warehouse
- Space exploration
- Handling chemicals in a laboratory
- Defusing bombs
- Handling / lifting heavy items
- Handling hazardous / toxic materials
- Spray painting / finishing
- Welding.

Note to examiners: The question asks about robotic arms. Do not accept tasks (such as delivering items) that are not specifically focused on robotic arms.

Award [1] for identifying each other industrial use of robotic arms up to [2].

- (b) (i) Explain **two** advantages of using open source software for the robots. **[4]**

Answers may include:

- OSS is usually free to use
- ... can be used to develop low-cost housing without adding to the building costs.
- Source code is available to users
- ... so that it can be modified / perfected for this new use.
- Has a large number of developers
- ... who quickly identify and fix issues with the software.
- Quicker response time
- ... due to fewer logistics to negotiate.

*Award **[1]** for identifying an advantage of using open source software used to develop the software for the robots and **[1]** for a development of that advantage up to **[2]**.*

*Mark as **[2]** + **[2]***

- (iii) Explain **one** disadvantage of using open source software for the robots. **[2]**

Answers may include:

- Lack of structured support
- ... often maintained and developed by a group of volunteers and does not include support.
- Hidden costs
- ... software is free but support or certain features (like extra storage on cloud servers) might cost money. May be a problem depending on funding for this project.
- Lack of compatibility
- ... sometimes lacks compatibility with proprietary systems.
- Learning curve
- ... is sometimes more difficult to learn to use open source software as the developers tend to focus on function rather than user-friendliness / ... will not be similar to proprietary software which the users might be more familiar with / May be an issue due to lack of training in developing areas.
- Security risks
- ... as open source code is publicly available, which may allow malicious code to be added to the software.
- Incomplete documentation
- ... as the developer community is more focused on writing code than documentation.

*Award **[1]** for identifying a disadvantage of using open source software used to develop the software for the robots and **[1]** for a development of that disadvantage up to **[2]**.*

- (c) Discuss the opportunities **and** dilemmas of using 3D-printing robots to construct buildings in countries such as South Africa.

[8]

Answers may include:

Opportunities

- Faster than traditional methods (systems).
- Speed - Would be useful for emergency housing e.g. when there have been natural or man-made disasters (systems).
- Requires fewer people to build the house (change, systems).
- Can be done by people without construction skills (change, systems).
- Requires less physical labour (could be done by women or older people) as the machine doesn't require any particular strength to operate (change, systems).
- Less chance of injuries since humans don't need to enter the building site (change, systems).
- Fewer materials are required which makes it more cost effective (change, systems, cost).
- Could potentially build in less accessible/remote places (change, systems, spaces, feasibility).
- Could be adapted to use local materials (such as clay) which would reduce the movement of materials and the environmental impact of the building (change, spaces, systems).
- Does not need bricks to be made or transported which is environmentally more friendly (change, systems, space, values, ethics).

Dilemmas

- Currently still uses cement which contains materials which need to be mined, so it isn't more environmentally efficient than regular building (change, values, ethics).
- Expense - would require purchasing or hiring the robot which might still be expensive (change, systems, values, ethics, cost).
- Would need an operator for the robot / someone needs to learn how to use it (change, systems).
- Would still need windows and doors to be installed by specialist builders.
- Job losses - would require fewer workers (economic) (change, systems, values, ethics)
- Responsibility for malfunction – who will be responsible if the building collapses? (systems, ethics)
- Fewer humans around if something goes wrong during building (change, systems, values, ethics).
- People on the building site will have less expertise to detect poor build quality (change, systems, values, ethics).

Keywords: change, spaces, systems, values, ethics, robots, economic, environmental, sustainability, social.

Please use markband on page 18.

The following markbands should be used with responses to part (c)

SL and HL Paper 1, part (c)	
Marks	Level descriptor
0	The work does not reach a standard described by the descriptors below.
1–2	• The response shows limited understanding of the demands of the question. • There is limited relevant knowledge. The response is descriptive and consists mostly of unsupported generalizations. • The response has limited organization or is only a list of items.
3–4	• The response shows some understanding of the demands of the question. • Some relevant knowledge is demonstrated, but this is not always accurate and may not be used appropriately or effectively • The response moves beyond description to include some analysis, but this is not always sustained or effective. • The response is partially organized.
5–6	• The response shows adequate understanding of the demands of the question. • Response demonstrates adequate and effective analysis supported with relevant and accurate knowledge. • The response is adequately organized.
7–8	• The response is focused and demonstrates an in-depth understanding of the demands of the question. • Response demonstrates sustained evaluation and synthesis that is effectively and consistently supported with relevant and accurate knowledge. • The response is well-structured and effectively organised.